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May 1986

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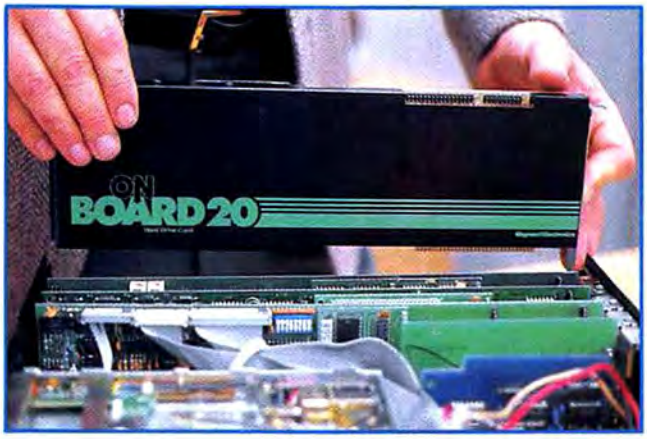

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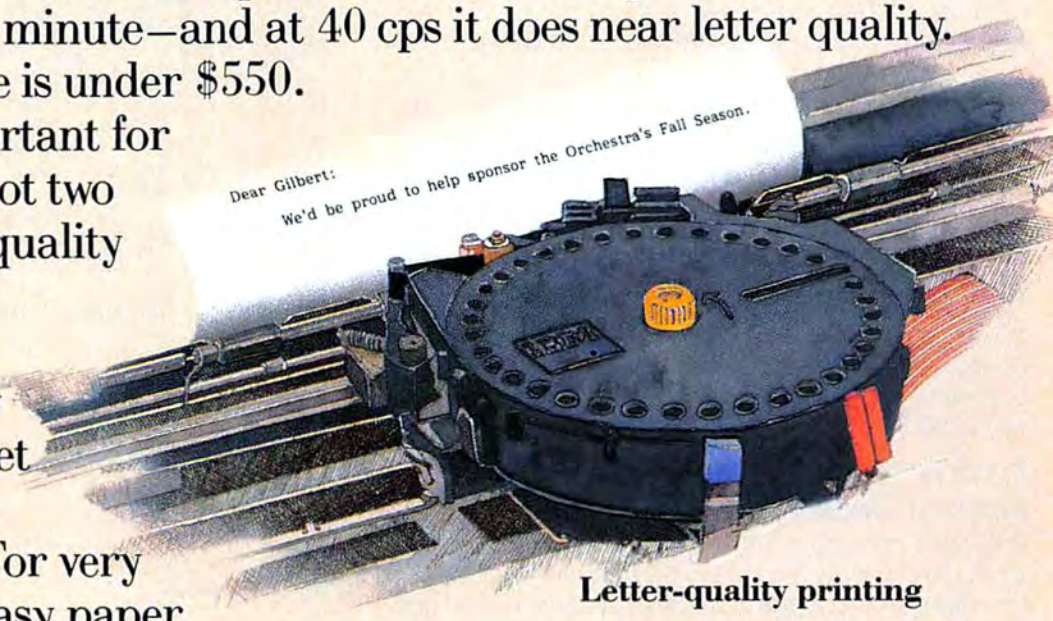

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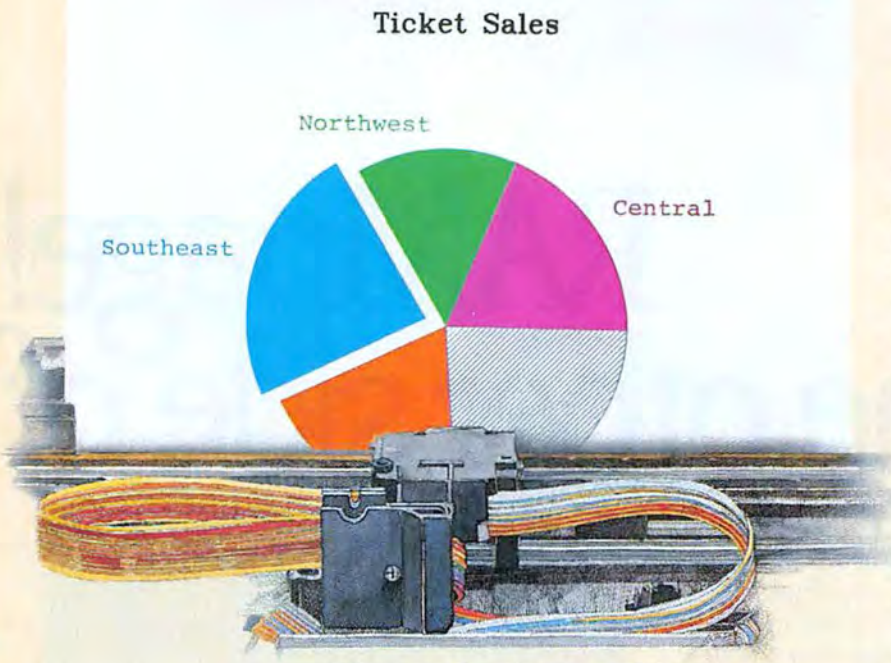

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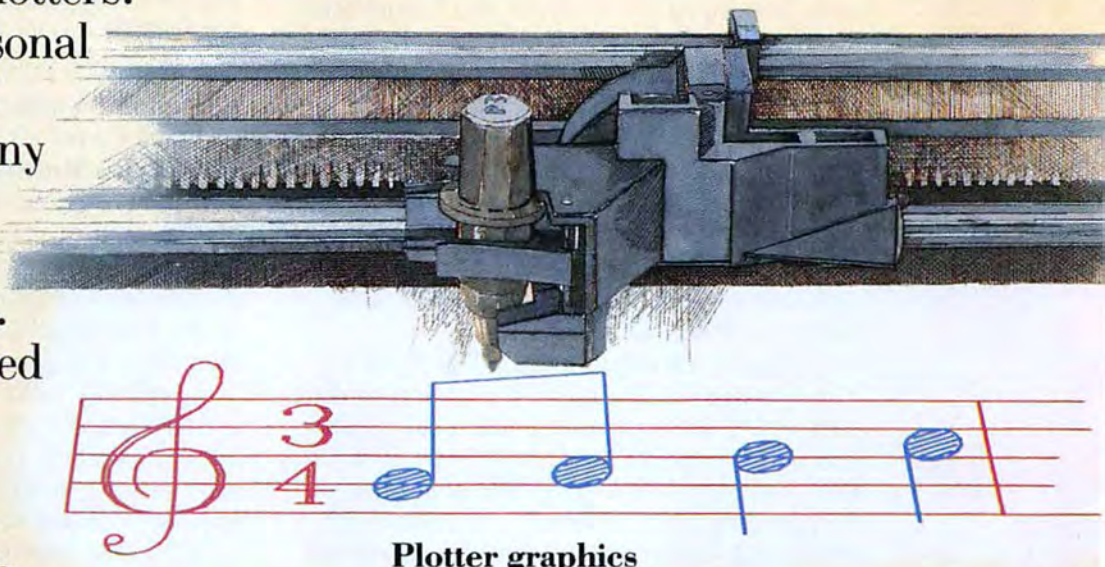

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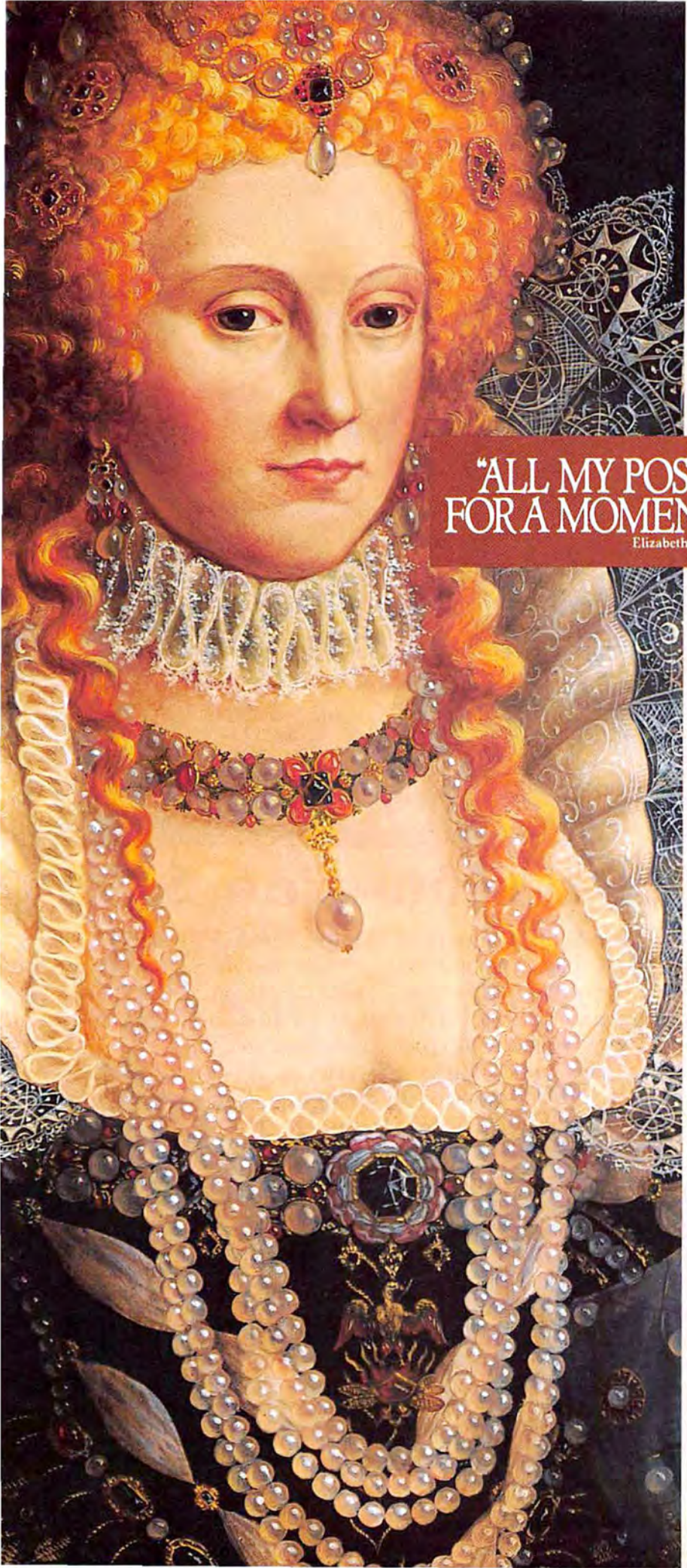

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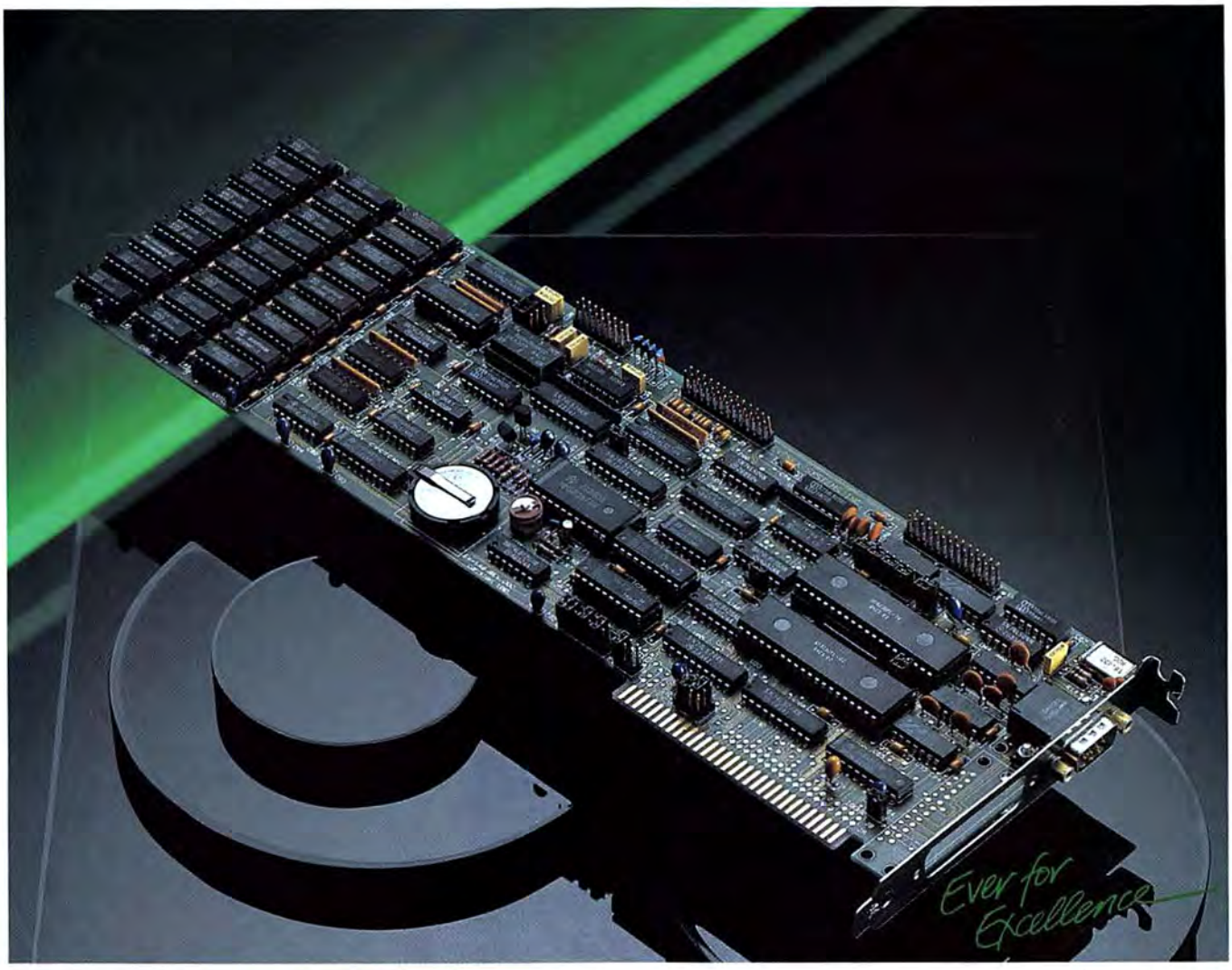

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David Bunnell

Personal Computer Games Come of Age

When are games more than mere child's play? PC World Publisher David Bunnell sheds some light on our technological future and contemplates the nature of fun.

Conventional wisdom in the personal computer industry says that the potential of home computers will not be realized until some truly practical and desirable application comes along. Electronic shopping and control of household appliances are often cited as the breakthroughs that will someday send hordes of new customers to the computer stores.

But I believe that it will be entertainment, not utility, that makes the home computer a standard household item.

I'm not referring to multitasking, RAM-resident utilities, networking, AI, data bases, or even cursor keys that glow in the dark.

No, I'm thinking about something that happens to have many more implications for humanity's mental health: computer games.

In the final analysis, computer games will prove to be the deciding factor that puts computers in every home. Fun—not functionality—will be the key.

Ultimately, computer games will change not only the way we view the world—they will also change the way we think about thinking.

How is that possible?

First of all, I'm not referring to the goofy track 'em, eat 'em, shoot 'em up games played by the game pioneers of olden days.

We've come a long way since then.

Most early games, you may recall, grew out of video games—or, to be precise, out of the mainframe computer game called Adventure.

In Adventure you traveled along a branching path, looking left and right, and made decisions about which direction to take. You also had to pick up certain objects along the way, such as a lantern and a knife. Eventually, you crossed a stream and came to a cave.

Waiting inside the cave was a dragon you could slay only if you managed to light the lantern and grasp the knife.

Adventure was the great-granddaddy of today's interactive adventure games for personal computers. Computer games that originated from video games like

(continues)

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COMPARE:	**Princeton HX-12**	**IBM 5153**
Dot Pitch	**.31 mm**	**.43 mm**
Nonglare Screen	**Yes**	**No**
Warranty	**1 Year**	**90 Days**

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[redacted]

Donkey Kong, Pong, and *Breakout* largely tested your reflexes and your hand-eye coordination.

One thing computer games didn't do was tax your brain. They were variations on a theme, and after you played them for a while, they became boring.

Because these games were so dull and repetitive, most computer magazines and computer enthusiasts wrote them off as juvenile pastimes. Games weren't seen as particularly meaningful.

Until now.

With personal computers that are more powerful and have more memory, computer games have changed dramatically. They are becoming mind exercises.

I heard about this notion from Trip Hawkins, president of Electronic Arts, a company that specializes in home computer games. Trip spoke at a computer conference recently about the brain's Use It or Lose It syndrome. He made the interesting observation that from the seventies on, physical exercise has been an important part of people's lives. More and more people today jog, swim, use Nautilus equipment, and engage in various other physical activities.

But so far we're exercising just the body and ignoring the mind.

Trip believes that soon we'll discover it's equally important to exercise our gray matter. With practice, we'll be sharper mentally, have a better memory, and in general prolong our intellectual alertness as well as delay the mental effects of aging.

(continues)

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David Bunnell

[redacted]

What health food is to the body, computer game software will be to the mind.

In fact, personal computer games could be the most engaging and beneficial form of mind exercise. Today, some people do the Sunday *New York Times* crossword puzzle, and some people play chess. These are mental exercises, of course. But the computer gives us the potential to enjoy a much greater variety of mental exercises with far more applications.

I've recently found two examples of games that flex the brain. There are many others, and there will be many more in the future, but both these games are excellent tools for developing awareness. They are also extremely educational.

One is Mindscape's *Balance of Power* for the Macintosh, and the other is Reality Development's *Business Simulator* for the IBM PC.

I think that the theme of *Business Simulator* reflects the fact that the IBM PC is a business-oriented machine for the corporate world, while the global quality of *Balance of Power* is more in line with the attitudes represented by Apple's Macintosh.

With *Business Simulator* you start your own company. You're in the robotics industry, you have $500,000 in seed money and access to robotics technology—and you're competing against Apple, Hewlett-Packard, Tandy, and Texas Instruments.

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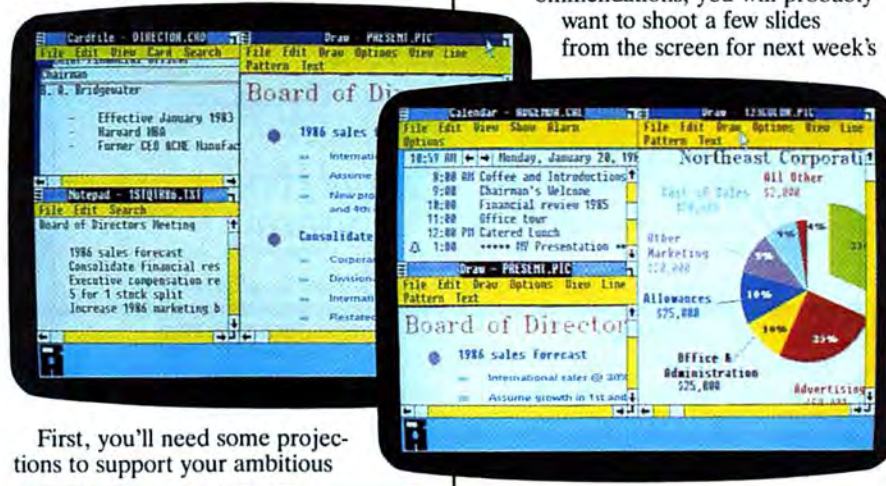

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what your prices should be, how many units you should build up in inventory, and how much you should spend on advertising. After you've made the choices, you run the program. It goes through an entire year's projections. Depending on your choices and the preprogrammed decisions of the other companies, the program determines your market share and how successful you'll be.

The game becomes more complex as you go from one level to another. For example, on a higher level you have to introduce new products into the market. There's a pet robot, then a security robot, a home robot, and other consumer products. You must decide how much money to spend on R&D. You're concerned about return on equity, about raising venture capital and building new factories. And you have to decide when to go public.

It's really like a Harvard MBA course on a disk.

Of course, the game is not real life, but you do learn many valuable concepts about doing business. As I became more involved in playing it, I began to dream at night about what kind of robots I was planning to build and what my fictional company was doing.

In fact, the game became so consuming that I spent more free time thinking about *Business Simulator* than I did about my real job at PC World Communications.

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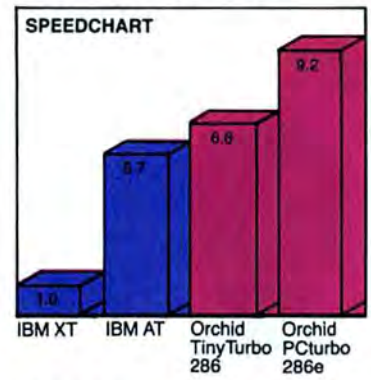

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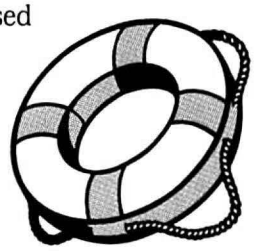

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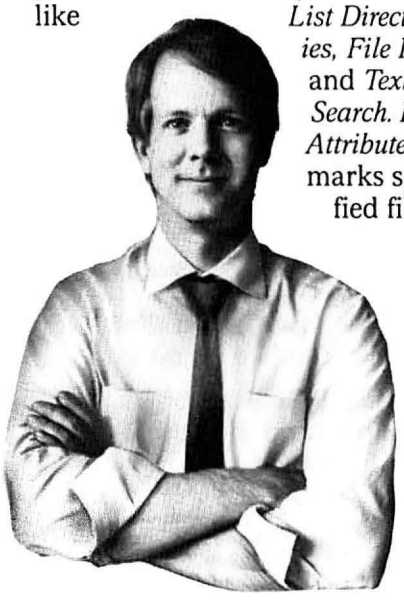

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David Bunnell

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moves can put the whole world in jeopardy, especially since you could easily cause a nuclear conflagration.

Just as with *Business Simulator,* you become completely involved, so when you accidentally blow up the world, you actually feel depressed.

As a consequence, you are determined to be more careful when you start up a new game. You come to appreciate the implications of each action, and you learn some of the complexities of international diplomacy. The game has four levels—Beginner, Intermediate, Expert, and finally, Nightmare.

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A decision that is a good strategy in one case might prove to be disastrous in another. The goal of the game is to gain more prestige than your rival without blowing up the world.

These two games are examples of how the computer game has come of age. I think that all computer users will pay more attention to games from now on.

And I predict that games will usher in a new era of fitness aimed at developing and strengthening the mind—firming up gray matter that has become flabby from lack of strategic exercise.

There could be all kinds of *Business Simulators.* In fact, just

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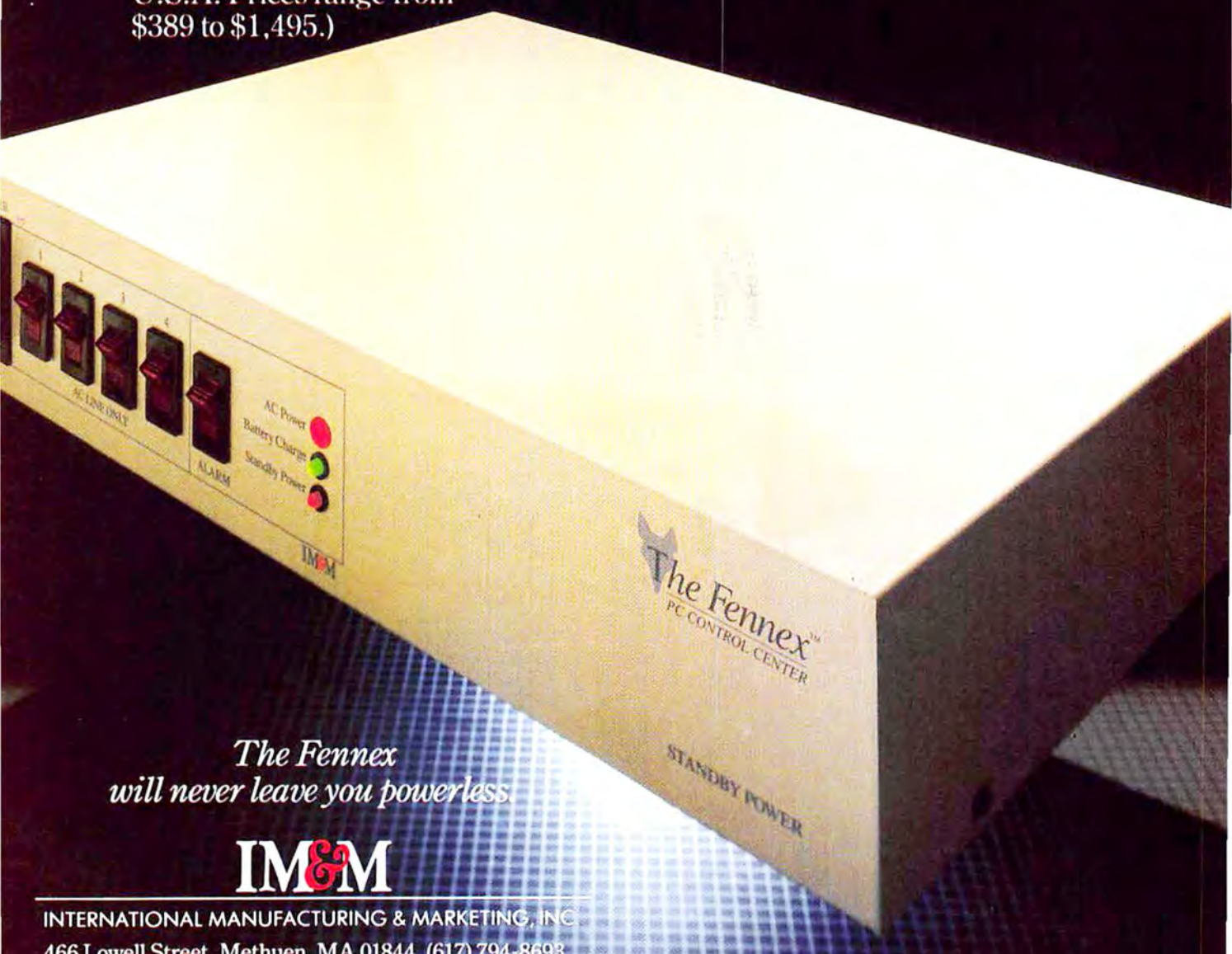

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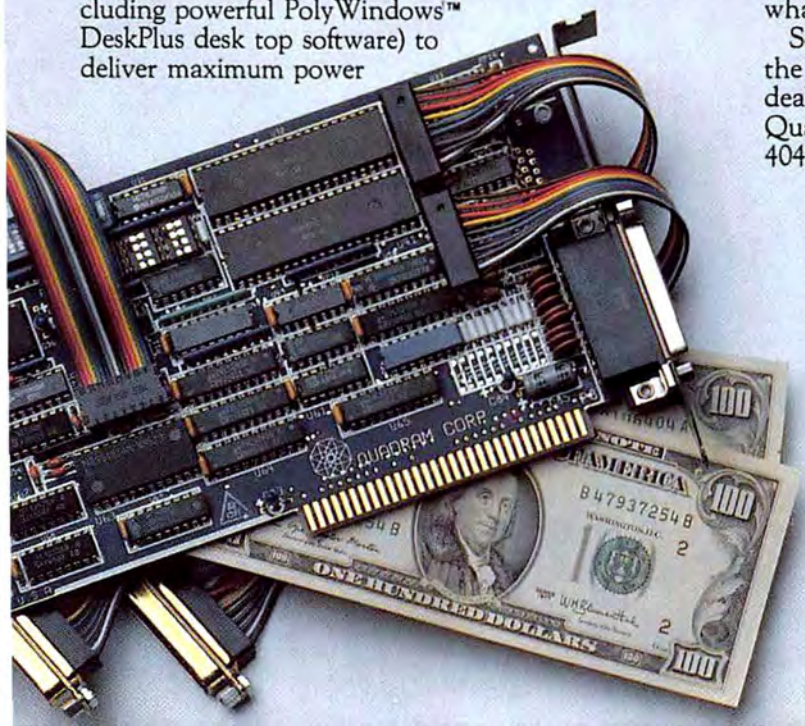

SPECIFICATIONS:
Silver Quadboard: Memory expansion in 64K or 256K increments, two serial ports, parallel port, game port, clock/calendar, QuadMaster III with RAM drive and spooler software, PolyWindows DeskPlus software.

SixPak Plus is a trademark of AST Research, Inc. Quadboard is a registered trademark of Quadram Corporation, IBM PC and PC XT are trademarks of International Business Machines, Inc. PolyWindows DeskPlus is a trademark of Polyvron, Corp.

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Dac-Easy Accounting "Best Software Value"

InfoWorld
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InfoWorld
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PRODUCT
OF THE
YEAR

Dac-Easy "Accounting Product of the Year"

PC World
December, 1985

70,000 and more every day. That's how many smart buyers have already streamlined their accounting with the fastest-selling, most highly praised accounting package ever introduced.

Dac-Easy offers seven full feature accounting modules in a perfectly integrated package, with instant access to:

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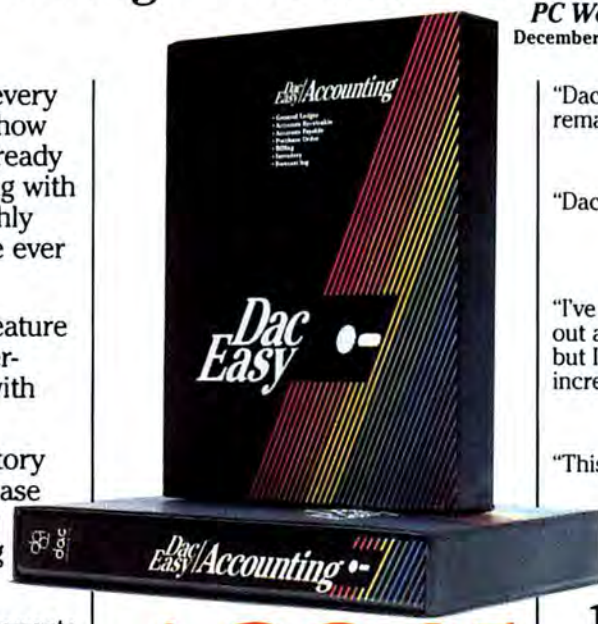
- Accounts Receivable
- Accounts Payable
- Forecasting
- Inventory
- Purchase Order
- Billing



You can generate over 300 reports from 80 different routines. And best of all, Dac-Easy Accounting can be used to manage either service-*or* product-based businesses.

Dac-Easy Accounting is non copy-protected, and comes in a handsome package with easy-to-follow documentation.

Read what the experts have to say. Compare Dac-Easy with packages sold module by module for *thousands* more. Then join more than 70,000 people who have said "Yes!" to Dac-Easy Accounting.

30-day money back guarantee

Dac Software offers an unconditional guarantee on Dac-Easy Accounting (less postage and handling). There is a $10 restocking fee if the disk envelope is opened.

Minimum Hardware Requirements:
IBM (PCjr, PC, XT or AT)[1] or other compatibles. (Also available for Apricot and Victor 9000.) 128K memory, one DSDD disk drive, 132 column printer in compressed mode, 80X24, CRT. MS-DOS[2], PC DOS[1] 2.0 or later.

[1]Trademarks of International Business Machines Corp.
[2]Trademark of Microsoft Corp.

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$49.95

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- Manages hire dates, raises, reviews, terminations, vacations and sick time.
- Generates complete range of management reports.
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Circle 33 on reader service card

as the early computer game Adventure came to us from the mainframe world, today's genre of so-called reality software is also taken from mainframe computing.

For some time now, programmers have been developing business simulations on mainframes for specific companies like IBM and AT&T. So, instead of playing with a robotics company, I could have a magazine publishing company. I could program my personal computer with all the characteristics of different computer magazines and create a real-life simulation of my own business. Eventually anyone could have a custom-designed simulation.

This is where computer games are heading. As PCs continue to gain memory and horsepower, you'll see more levels of simulation that truly relate to your life--personally and professionally.

In your personal life you could simulate your family, friendships, and individual goals. Your business supplies endless simulation possibilities for every kind of real or imagined enterprise.

It's been a long time coming, but computer games are no longer going to be considered an unimportant by-product of computer technology–just something for kids to do when they want to vegetate electronically.

The games are going to be much more serious than that. Two or three years from now, computer games will be *the* thing.

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And with this new generation of computer games, we will see the distinction between entertainment and education disappear completely.

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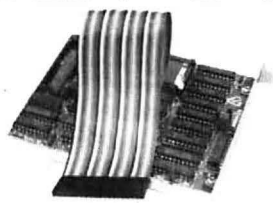

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Circle 402 on reader service card

Before you invest in a DEC*VT240 terminal, consider the software alternative.

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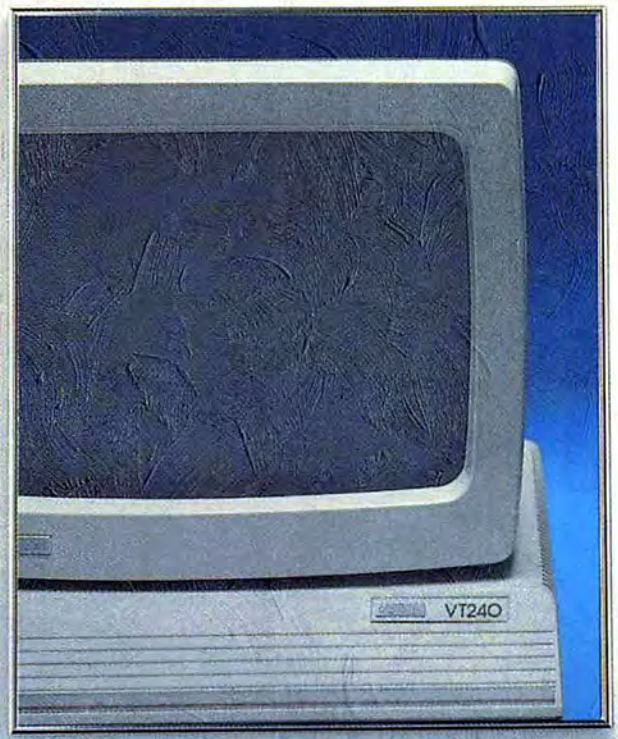

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persoft

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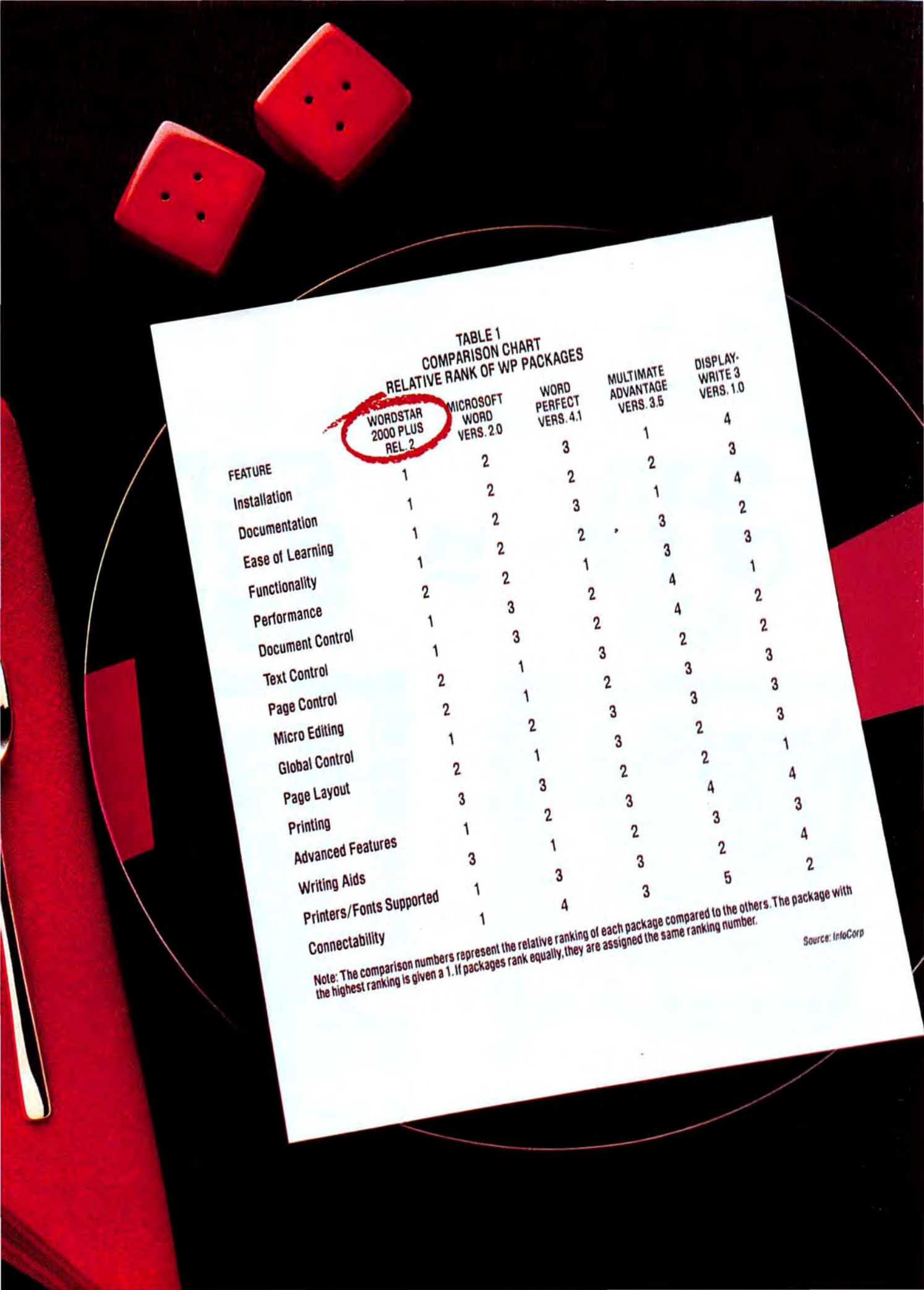

TABLE 1
COMPARISON CHART
RELATIVE RANK OF WP PACKAGES

FEATURE	WORDSTAR 2000 PLUS REL. 2	MICROSOFT WORD VERS. 2.0	WORD PERFECT VERS. 4.1	MULTIMATE ADVANTAGE VERS. 3.5	DISPLAY-WRITE 3 VERS. 1.0
Installation	1	2	3	1	4
Documentation	1	2	2	2	3
Ease of Learning	1	2	3	1	4
Functionality	1	2	2	3	2
Performance	2	2	1	3	3
Document Control	1	3	2	4	1
Text Control	1	3	2	4	2
Page Control	2	1	3	2	2
Micro Editing	2	1	2	3	3
Global Control	1	2	3	3	3
Page Layout	2	1	3	2	3
Printing	3	3	2	2	1
Advanced Features	1	2	3	4	4
Writing Aids	3	1	2	3	3
Printers/Fonts Supported	1	3	3	2	4
Connectability	1	4	3	5	2

Note: The comparison numbers represent the relative ranking of each package compared to the others. The package with the highest ranking is given a 1. If packages rank equally, they are assigned the same ranking number.

Source: InfoCorp

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About its commonsense commands. Tutorials for easy training. Direct Lotus® file input Extensive printer support. DCA connectivity. LANs and site licensing options.

That would be easy to do.

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In a comparative report—the report containing the chart to the left—Robert Lefkowits of InfoCorp said:

"WS 2000+ emerges as a clear winner in overall applicability. InfoCorp believes WS 2000+ would appeal to the largest number and widest variety of users. Its layered functionality, ease of learning, and excellent communications features make it ideal for corporate users, ranging from secretaries to clerks to managers to executives."

And, after reviewing WordStar 2000 Plus Release 2 alongside MultiMate™ Advantage™ and IBM® 's DisplayWrite® 3, International Data Corporation's Jim Chapman concluded:

"WordStar 2000 is our favorite—for ease of learning, ease of use... and for well-conceived and helpful documentation."

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Because when it comes to knowing your company's word processing needs, you're the expert who really matters.

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PCW

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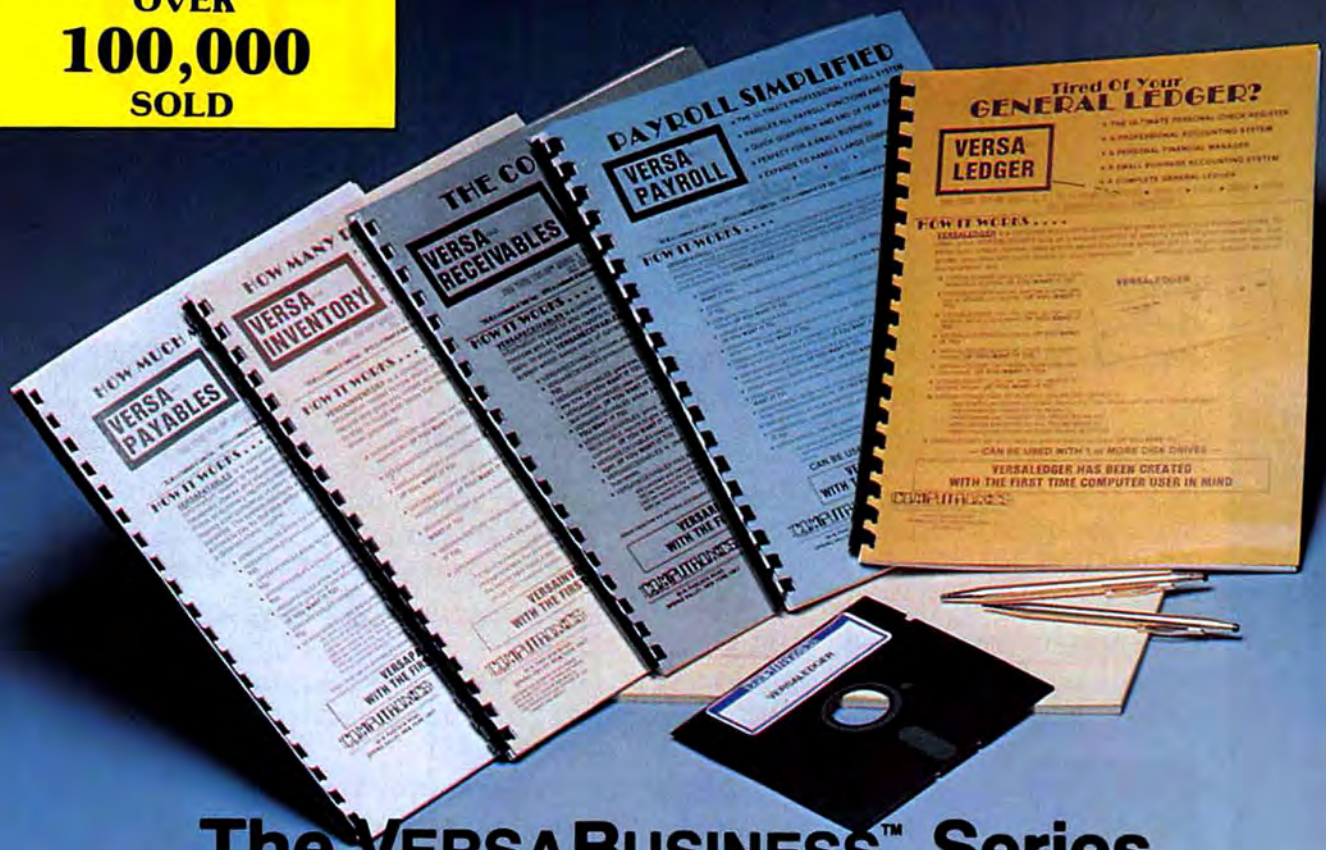

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Minimum Hardware Requirements: IBM Personal Computer XT, AT or true compatible. DOS version 2.1 or greater. 256Kb RAM minimum.

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Ready!™

The resident outline processor from the makers of ThinkTank.™

1 READY!™ is resident. The power of Ready! outline processing is available on demand, always one keystroke away from your favorite word processor, spreadsheet program, database, even other resident software.

2 READY! is an outline processor. To the right is a sample Ready! outline. On paper, the outline just sits there. In action, Ready! animates your outlines. You'll actually have fun learning how to use Ready! Spend ten minutes learning the basics (really!), you'll continue to find new applications months later.

3 READY! can work inside your word processor. Now you can outline while you write! Ever get an idea that belongs in paragraph 10 while you're writing paragraph 3? With Ready! in residence, you can record the idea, then get back to your writing —your hands never leave the keyboard. And outlines transfer into any popular word processor with two keystrokes! Finally, every word processor can have a built-in outline processor!

4 READY! can work inside your spreadsheet. Document your spreadsheet work. Why is the ad budget so high in June? Drop a note in your Ready! outline so you won't forget . . . Use Ready! to design the "left edge" of your spreadsheet, then transfer it into any popular spreadsheet program without messy file conversions! Finally, every spreadsheet can have a built-in outline processor!

```
+ How I Use READY!, by Jack Larson, Anomolated Industries
  + Action Items & Things to Do
    + people to tell about READY!
      - Jack Lombardi, my attorney
      - all my managers and staff
      - Steve Robertson, Chairman of the Board
      - the kids!
    + why I'm so excited about READY!
      - I consider more angles
      - I record ideas immdediately!
      - I think and organize earlier in a project
      - READY! creates time!
    + more things I can do with READY!
      - design spreadsheets for the quarterly report
      - get a "mouse" so I can re-organize more easily
      + make "cheat sheets" of:
        - spreadsheet commands
        - database commands
        - word processing commands
      - keep a list of people I owe favors to!
      - develop itinerary for European tour in March
      - use READY! with a projector at board meeting!
  + Daily Appointment Calendar
    + Wednesday January 8
      + 08:00AM: phone calls
        + Marian Rogers: 415-902-0992, happy birthday!
          - she says I must call Uncle Rudy!
        - Jerry Grange: meet in Chicago on the 19th
      + 09:30AM: Watch videotape of Annual Meeting
      + 10:00AM: meeting with Bart Lewis
        + directions
        + agenda
      + 02:00PM: staff meeting
    + Thursday January 9
      + 08:00AM: phone calls
      + 11:30AM: lunch with Amy Wile
  + Word Processing and Spreadsheet work
    + transfer to word processor: letter to Mom
    + chit-chat
      - the kids are back in school
      - I made $1.3 million this year
      - I quit smoking, January 1, 1986; 09:00AM
    + please don't sell your Anomolated stock
      - I'm having fun running the company
      - I hope I don't start smoking again!
    + documentation for spreadsheet: ROLLOUT.WKS
      + cells F38, G38:
        + increased ad budget for new product rollout
        + ad budget back to normal levels in 90 days
      + cells G59, H59:
        + major trade show in November
        + send 15 employees: (expand for a list of names)
      + row 82:
        + product turns profitable in December
  + Christmas Present List
    + name: Steve Robertson, chairman
    + name: Grandma Larson
      - address: 92 Betty Loop
        city, state & zip: Piedmont, CA 90254
      - amount to spend on present: $99
      - Christmas present: READY! Outline Processor
      - buy at: Downtown Computer Center
    + name: Jack Larson Jr
```

5 READY! is your appointment calendar. What if a meeting moves from Wednesday to Thursday? That's where Ready! really shines . . . just grab the appointment by its "handle" and move it. All your notes move too!

6 READY! is incredibly flexible and adaptive. Other resident programs lock you into four or five pre-defined structures such as a rolodex or appointment calendar. Only Ready! can create outline templates to maintain any kind of list . . . then add a new "record" by pressing a single function key!

7 READY! is your briefcase. Carry all your plans, designs, projects, details, facts, lists, schedules, procedures, appointments, ideas and information with you. Dial a phone number from any headline, not just from a "rolodex." Take notes in your outline while you're on the phone. Time and date-stamp messages, keep your calendar. Ready! is perfect for portable "lap-top" computers.

8 READY! is compatible with over 30 popular software products including ThinkTank™, the number one integrated outline processor/word processor.

System requirements: Ready! uses 128K RAM with a 32K outline (maximum size), runs on the IBM PC, PC XT, PC AT,™ or 100% compatible, requires one double-sided, double-density disk and DOS version 2.0 or higher. **Supported, but not required:** printer, Hayes Smartmodem™ or compatible, Mouse Systems™ or Microsoft® Mouse, Intel AboveBoard™ or compatible, ThinkTank version 2.0 or higher. **Trademarks:** Ready! and ThinkTank are trademarks of Living Videotext, Inc. The names of the products and companies appearing above may be trademarks or registered trademarks.

Ready! is useful *because it organizes facts and ideas the way you do, as lists and lists-of-lists.* ***Ready! is amazing*** *because it's incredibly easy to work with—***anyone** *can be up and running in ten minutes or less!*

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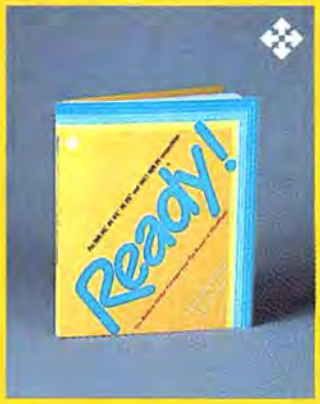

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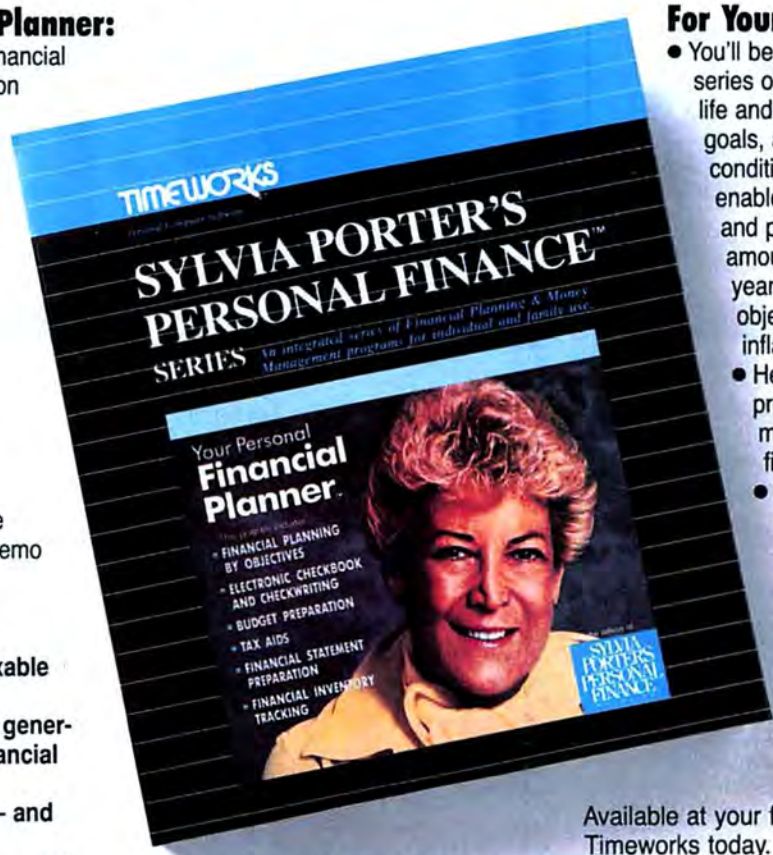

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Letters

Reactions and responses from the PC World community

PC World Profits Pirates?
Since creating retail software accounts for a significant portion of my livelihood, I find myself wondering why I spend my money to subscribe to a magazine that blatantly promotes software piracy. In the entry "Removing Hidden Files" in *The Help Screen* [*PCW*, February 1986], Karl Koessel instructs reader Albert Hayes to move his *Microsoft Word* version 1.00 hidden files to a floppy disk before deleting them from his hard disk and suggests that "although you may not like *Microsoft Word*, your friends might want a crack at it."

A crack is what *PC World* should get—on the knuckles. It may take some time for the software piracy issue to be satisfactorily resolved, but for now piracy is illegal, and a reputable publication shouldn't make such recommendations in print. I'd give anything to hear what Microsoft has to say about this.

David Webber
Richardson, Texas

PC World *has never recommended software piracy, in print or otherwise. Software piracy is illegal, but letting your friends try the* Microsoft Word *that you own is no more illegal than letting them ride your bicycle.*

While the license agreement for Microsoft Word *restricts the program to use "on a single computer," it does not restrict use of the program to only the licensee. Furthermore, the license allows you to "transfer the program from one computer to another provided that the program is used on only one computer at a time," to "make one copy of the program solely for backup purposes," and even to "transfer and license the product to another party if the other party agrees to the terms and conditions of this Agreement and completes and returns a Registration Card to Microsoft."*

Word's *copy-protection scheme, however, does not allow you to accomplish these authorized actions. Transferring* Microsoft Word's *hidden file does not violate the license agreement, and it enables Mr. Hayes to recover hard disk space without losing his $395 investment in* Microsoft Word, *which he is also entitled to sell.*

License agreements for other programs may have different terms. Many restrict program use to a single CPU, in other words, to the computer on which it was originally installed. Readers should also be aware that they may not "loan" their backup copies and that agreements that allow resale require licensees to transfer or destroy backups when they sell the program. —Karl Koessel, Technical Editor

A Word From Microsoft
We appreciate Mr. Webber's concern, but it's clear Mr. Koessel's intention is to encourage sampling, not piracy, of *Microsoft Word*. Copying *Word*'s hidden files doesn't necessarily violate the license agreement. In fact, we encourage sampling of our applications.

Jeff Raikes
Director of Applications Marketing
Microsoft Corporation

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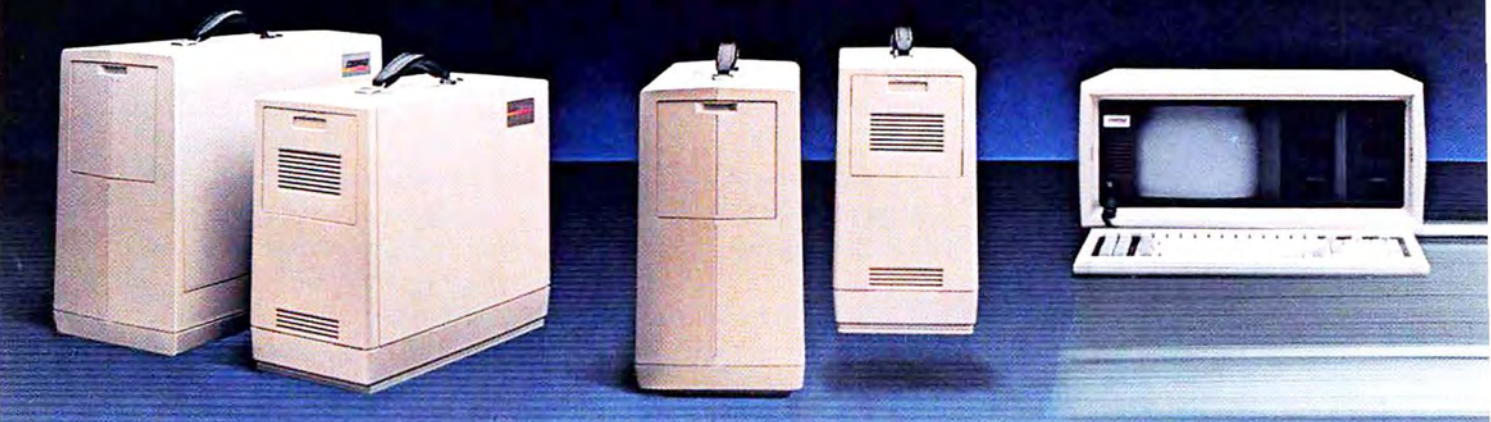

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The Army Cracks Wyse

In *From the Software Shelf, PC World,* August 1985, I found Jon Pepper's review of the Wyse PC– alas, it was discovered a bit too late. Mr. Pepper is not alone in his initial impressions of this little horror. Yes, it is pretty, and yes, it will run software like *dBASE III* and *Symphony.* Unfortunately, it has the staying power of an ice cream cone in the hot sun.

My employer, the U.S. Army, thought the Wyse PC looked like a real bargain and ordered several thousand. Our division innocently bought five WY-1100-2's, and within 41 days three of them simply ceased to function after we typed the routine command Quit in *dBASE.* The cursor froze with the Ashton-Tate warning to back up the data disks lingering prophetically on the screen. Efforts to restart produced not even a glimmer of an error message.

Since Hawaii has no Wyse service facilities, our three machines, along with a few dozen more from other departments, were sent to Wyse the "long way," via Fort Monmouth, New Jersey. At a recent user group meeting we learned that the overall failure rate for the army's Wyse PCs was at least 40 percent within 60 days.

Of our two remaining machines, one gets little use and the other's hard disk requires frequent reformatting because its allocation error rate is horrendous. Meanwhile, my own "trash" Tandy 1200 HD and an elderly IBM XT continue to handle a far heavier

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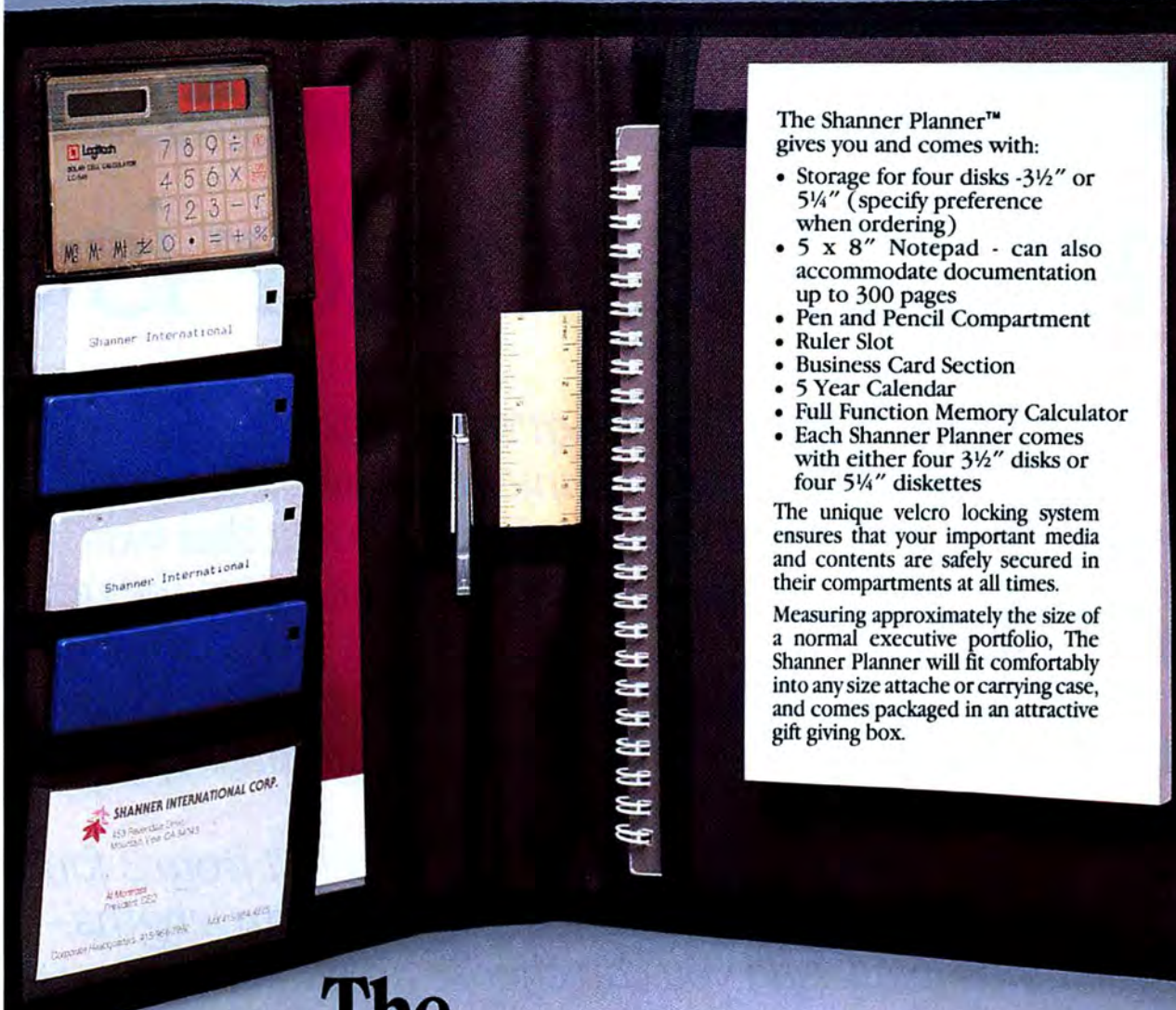
It speaks for itself.



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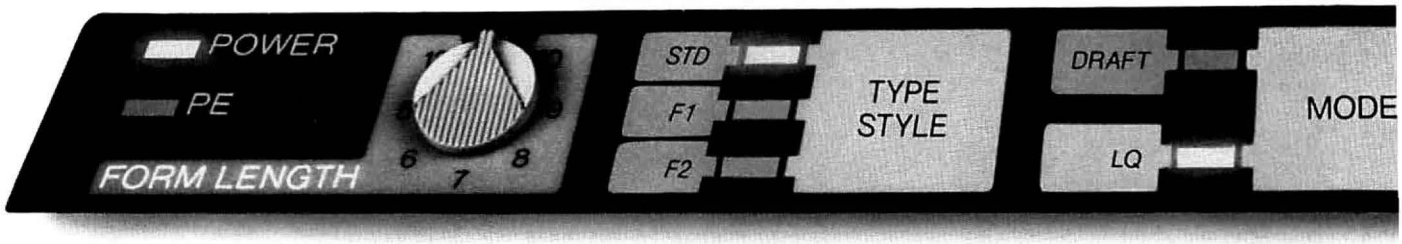

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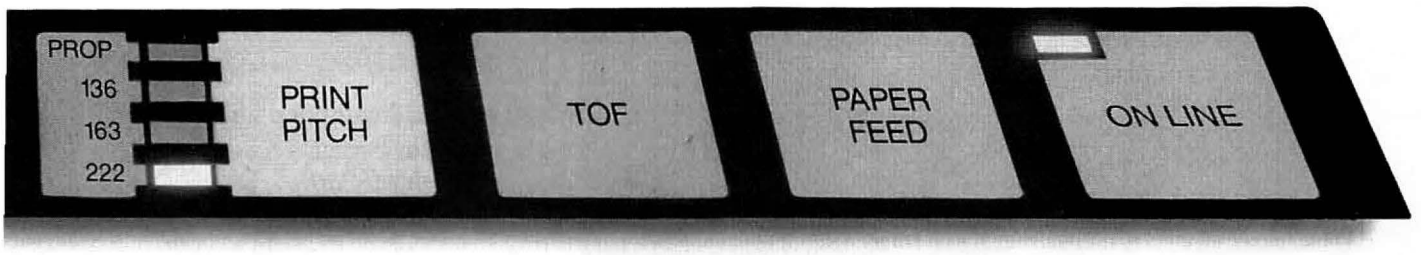

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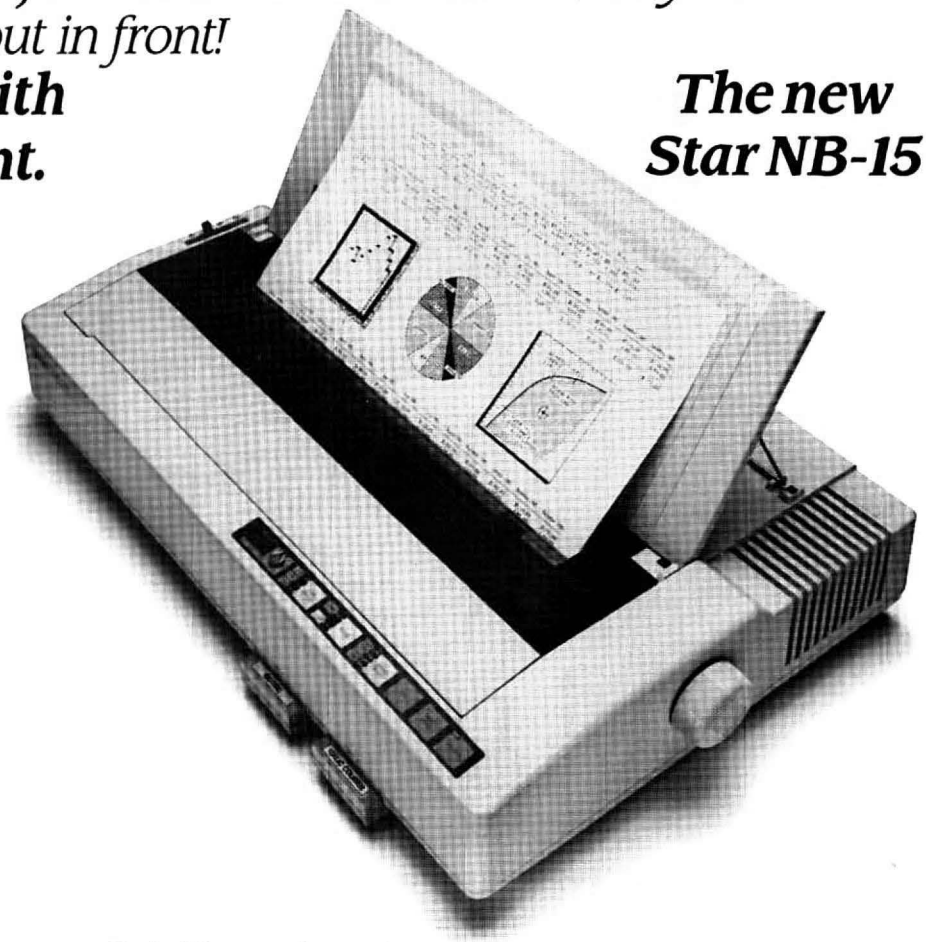

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workload without a hitch. So much for bargains...

Hugh McCaffrey
Wahiawa, Hawaii

Fully Disappointed

Based on several recent excerpts from the book *The Fully Powered PC*, reprinted in *PC World*, I did something I don't ordinarily do. I went to the bookstore and ordered it, sight unseen. Now that I own a copy, I'm disturbed about a number of things.

You should have warned your readers of some important considerations. The section on macro key functions presumes that the user owns *ProKey;* the information on word processing is directed to owners of *WordStar;* and the section on RAM disks presumes that the user owns *Jetdrive.* Consequently, without a considerable investment in software, the book's value is greatly diminished. If your PC has 256K and a monochrome monitor (a standard configuration), the book is reduced to being a tutorial on simple DOS batch files.

Bundled with *The Fully Powered PC* is the PC World Utilities Disk, which contains a BASIC menu-maker program, two RAM disk programs, and a number of public domain programs, among others. These are accompanied by a nasty little "agreement" in which Simon & Schuster goes to great lengths to disclaim any responsibility for the accuracy, applicability, or proper operation of the programs. The "agreement" also disclaims any implied war-

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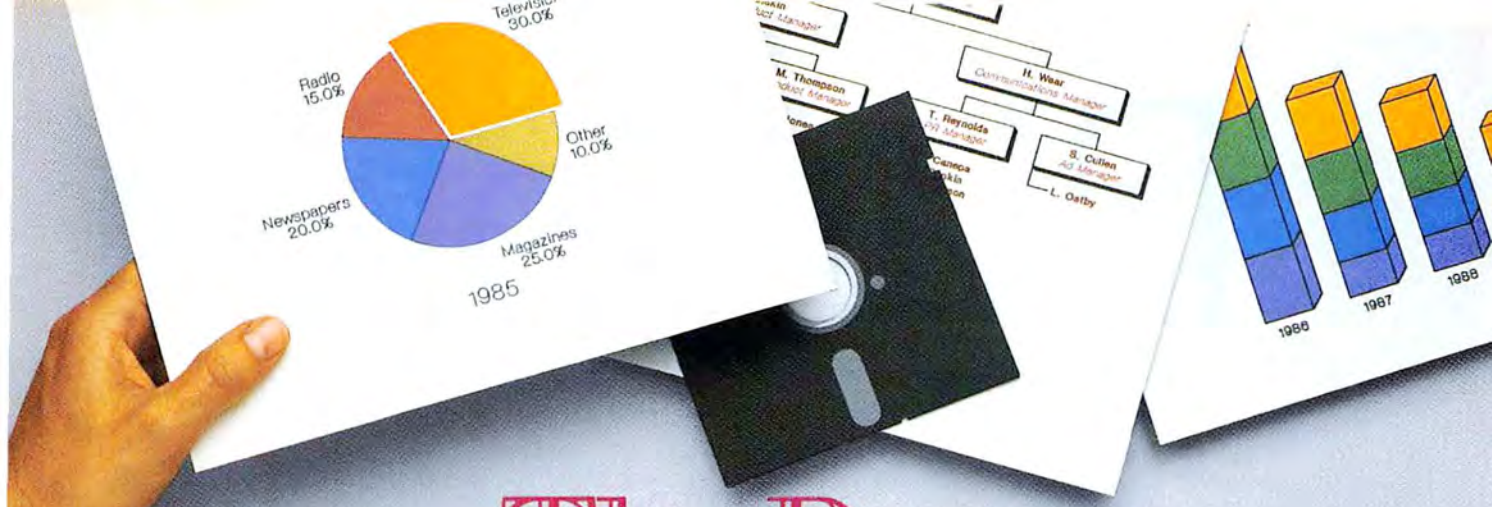

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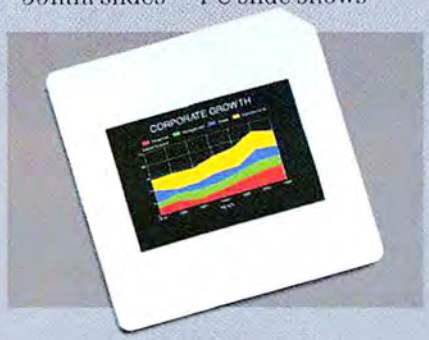

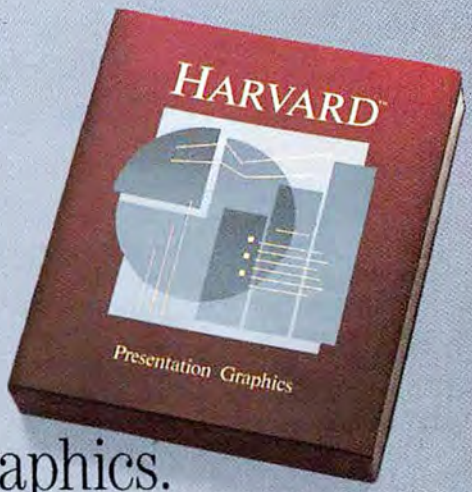

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Diary of an

I traded my 16K machine and all those disks for Lotus® 1-2-3 and 256K. And immediately got the urge to merge. I started by merging regional statements in Maine. But before I could get to Iowa, I ran out of gas.

At 512K, I discovered what the coordinates IV169 looked like. I was so far out there it felt like I was walking on the moon. It didn't take long to find out 512K was nothing more than a walk around the block.

640K! Loads of space until I fell in love with integrated software and was back to cutting up files again. Sure, the other functions make my worksheet more persuasive, but I'm back to slugging in and out disks. Shades of 16K.

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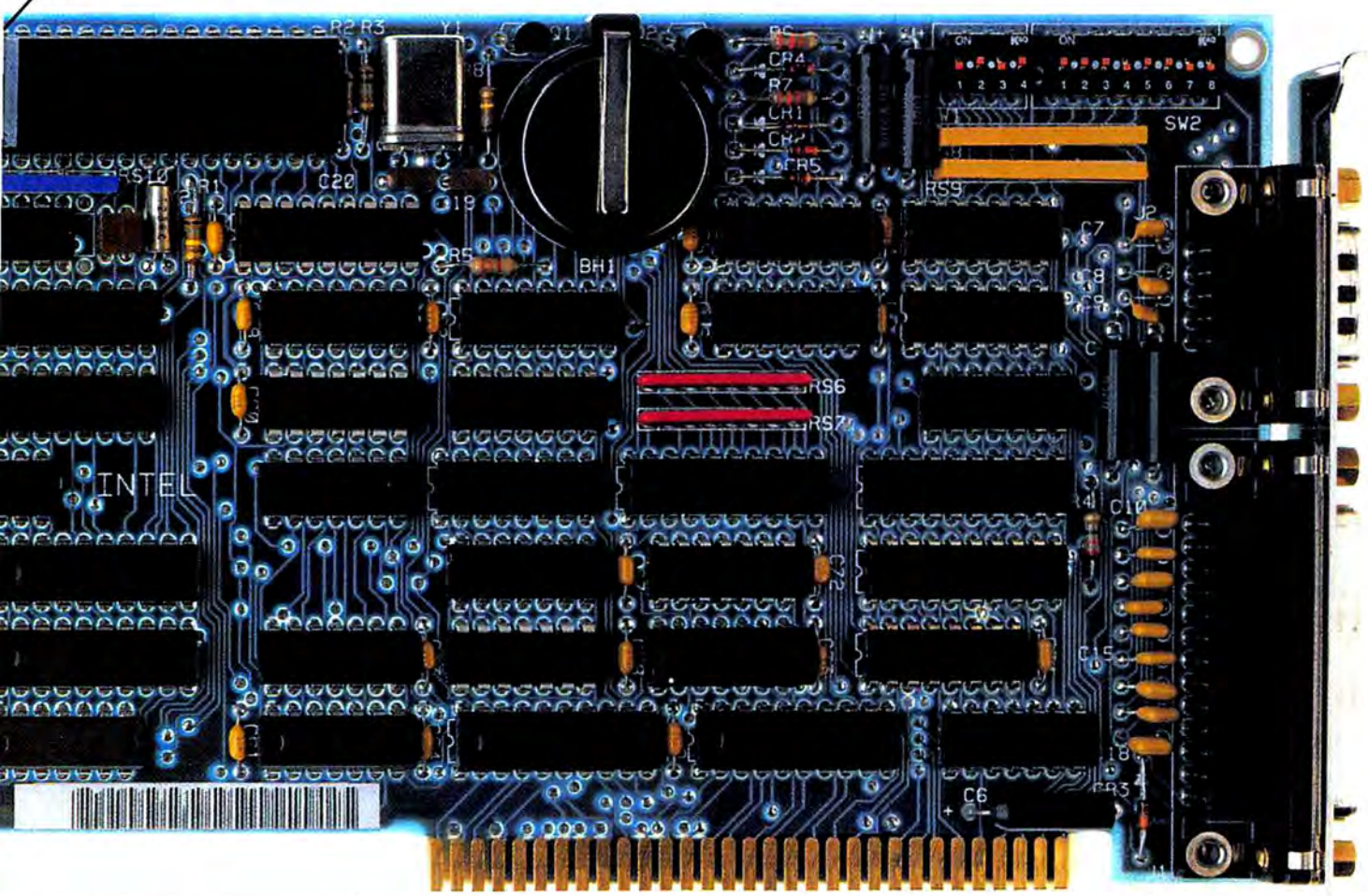
overachiever.

I'm on my way to 1.5 MB and I'm not looking back. Monster spreadsheets, killer models, Microsoft® Windows, and all kinds of pop-up utilities so I can juggle a bunch of balls at once.



RAM speed on everything—even databasing and word processing.

The second-biggest difference between Above Board PS and conventional multifunction boards is the unconventional warranty on it. Five years instead of the usual two.

Ease of installation is nothing to sneeze at either. Its software installs with as few as three keystrokes. It even intelligently customizes your memory allocation.

Above Board PS is part of a family of products for the IBM PC, XT, AT and compatibles.

You can buy them at your favorite computer store. Or call 800-538-3373 for the names of dealers near you.

And re-write the book on overachieving.

Help for the overachiever.

intel®

Circle 300 on reader service card

ranty (stating that the program is sold "as is") and goes on to state that "the entire risk as to the quality and performance of the program is with You," and "should the program prove defective, You assume the entire cost of all [servicing and repair]."

Perhaps I'm old-fashioned, but to me there's no such thing as a one-party agreement.

Robert J. Spear
Accokeek, Maryland

Call us old-fashioned, too. The language of the license and disclaimer on the PC World Utilities Disk was entirely out of our hands and, unfortunately, is not uncommon as software agreements go. –Ed.

True Blue

After reading Carlos Corredor's complaints about IBM in *Letters* [*PCW*, October 1985], I decided to voice my praise of IBM and the AT even though it may be lost in the vastness of the Apple orchard and the PC compatibles jungle.

I don't believe that IBM's at fault for Mr. Corredor's lost files. He's at fault for not making backup files. As for his hard disk troubles, IBM now manufactures its own hard disk for the AT, solving a problem that was entirely out of its control anyway.

I'm completely happy with my 1984 AT, and IBM has given me excellent support through the Product Center and the IBM Service/Exchange Maintenance Repair Center. The company has bent over backward to support my AT as well as the other IBM products I've purchased, regardless of the magnitude of the problem.

Paul Murakami
Lancaster, California

Down and Out With Tandy

I decided to computerize my small data processing executive search business and narrowed the choices

(continues)

THE BEST PC TEXT EDITOR JUST GOT BETTER.

ANNOUNCING SPF/PC™ 1.82

The best full screen editor for the IBM PC now extends support for large files to all PC's, not just the IBM/AT. Invoke your favorite program/compiler from within Edit at any time regardless of file size. CTC's SPF/PC™ 1.82 still looks like its mainframe cousin but executes faster with more options.

NEW FEATURES

- **PAGING** - Editing limited only by capacity of expanded/extended memory or hard disk.
- **SPEED** - Search 1,500,000 byte file with IBM AT in less than 13 seconds. By comparison, the IBM 3081 mainframe takes 48 seconds.

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- Compatible with IBM and Novell Networks
- Modifiable HEX display
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Oakland, California 94611

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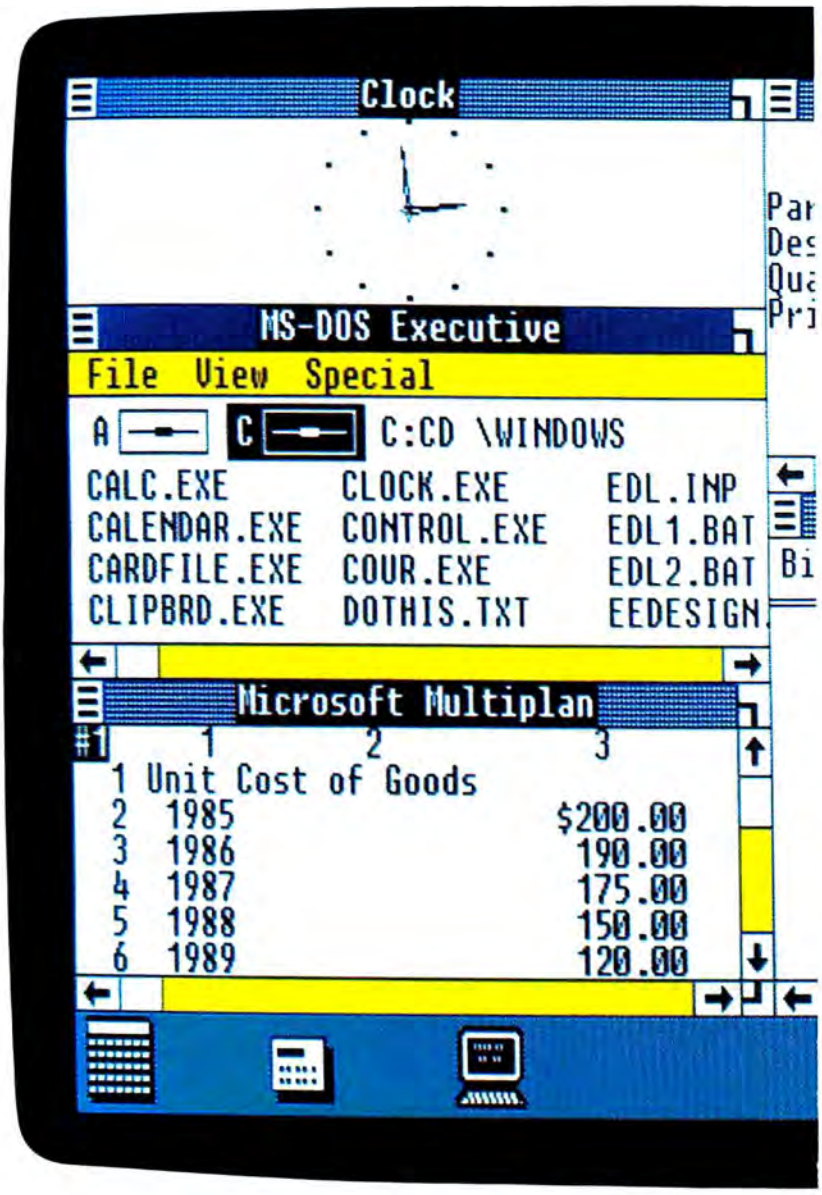
Circle 879 on reader service card

Microsoft Introduces Power Windows.

It's going to open your eyes.



Microsoft® Windows has arrived.

For anyone who uses a computer in earnest, that is extremely good news.

Windows gives you a practical way to integrate programs. It radically decreases the time it takes to move from one application to another. Dramatically simplifies the means of consolidating data from many different programs.

And, as a graphical extension of the MS-DOS® operating system, it gives you a highly visual way to work and to organize your work.

In short, Windows brings efficiency to all those processes of personal computing which have till now been awkward, unwieldy, inconvenient.

The joys of job hopping.

With the advent of Windows, you can work with multiple applications. And switch from program to program with ease.

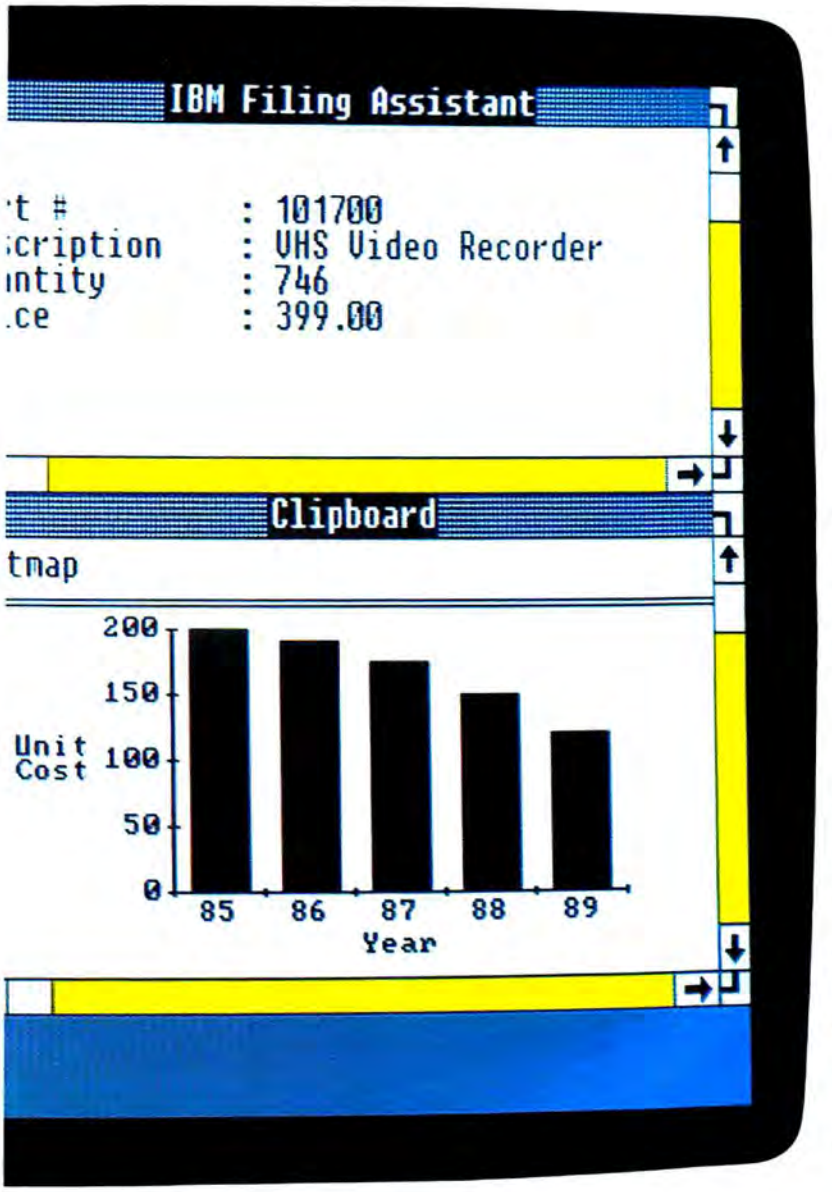
Start up with one application, then another, and another. Leap back and forth between applications as your work routine dictates. Then pick up right where you left off.

The ability of Windows to change quickly from program to program logically and naturally magnifies the utility and productivity of the personal computer. And is a recognition of the way people who exploit the power of PCs really do their jobs.

Breaking the 640K barrier.

Just like you, Microsoft Windows can handle several projects at the same time. Juggle assignments. Deal with frequent interruptions.

And Windows will ignore the 640K limit of your PC, especially if you have a hard disk, the Intel® Above™ Board, or expanded memory. It will execute the rather neat trick of working with more programs than memory can hold at one time.



Spreading knowledge.

Another great service Windows performs is accelerating the movement of information from one program to another.

Collecting and combining that information is as simple as taking a "snapshot" of data in one program. Editing it. Then consolidating it with data from other programs.

With Windows, you can enjoy the advantages of conventional integrated programs without their compromises. Because Windows lets you put together the applications that you know, and that get a job done for you.

Choose your best word processor, spreadsheet, database—you name it. They're all there for you at a keystroke.

Common ground.

Finally, Windows is not only an immensely powerful tool for today, it's also a solid base for a new generation of Windows applications.

As an introductory offer, two of these—Microsoft Windows Write and Paint—are included in the package. Along with more than a dozen other programs.

In Windows applications you have a common interface which includes drop-down menus, dialog boxes, icons. Along with a richer environment that allows you to mix pictures and text. And to summon different type faces and styles at a keystroke.

Windows is a bridge between today's applications and the graphics based software now evolving. A way to work interchangeably with today's programs. And tomorrow's.

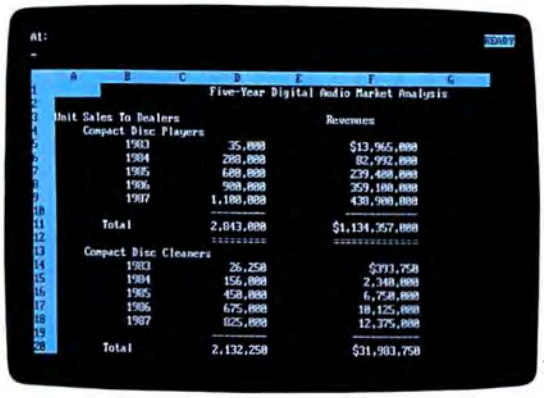
If you're someone who uses personal computing as a natural part of your work life, who capitalizes on the productive powers of sophisticated applications, look into Windows, a new vision of what a computer can do.

Windows breaks down walls.

Windows lets you freely combine information from all your applications. And gives you the means to organize, compose, format and print it.

The staging areas for this consolidation are Windows Write and Windows Paint. Two graphics based programs which are bundled with the Windows package.

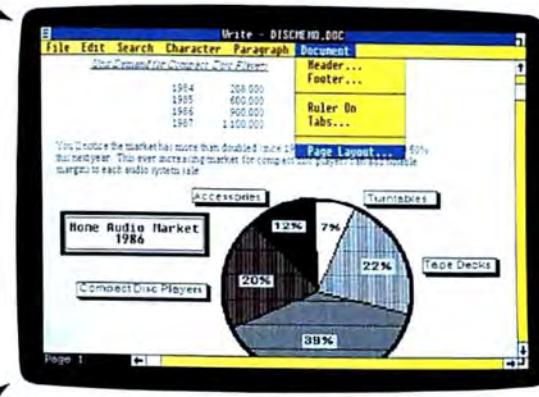
Here you highlight, expand, and compose text, charts, and illustrations drawn from a variety of programs. Then polish it all for printing.



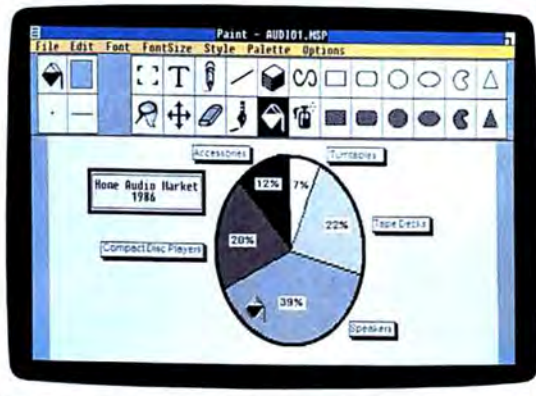
Spreadsheet information from Lotus® 1-2-3® can be captured. And then transferred to Windows Write, our graphic word processing program for consolidating, editing, and formatting.

Data from dBase II® can also be copied and transferred to Write.

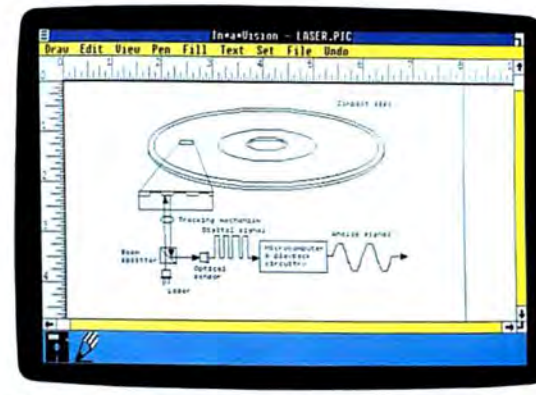
Using your spreadsheet data, build a Lotus chart. Then capture it from the screen. And paste it into Windows Paint.



Windows Write is a straightforward and able word processor. It serves as the "great integrator" in Windows. The place where text and graphics from all your other programs are organized and formatted for presentation. What you see on the screen is what you'll get on the printout.



Windows Paint is an illustrator's studio. A palette of graphic tools. Use Paint to create drawings and diagrams. Or, in this case, to enhance a 1-2-3 chart to emphasize your point.



In-a-Vision, a Windows application by Micrografx, Inc., is a computer-aided design program. Its highly detailed technical illustrations are easily transferred to other Windows applications.

Consumer Audio Incorporated
11705 Wellington Parkway
Morristown, New Jersey 07960

Clifford Swain
Central Audio/Video
2202 W. Market Street
Chapel Hill, NC 27514

Dear Mr. Swain:

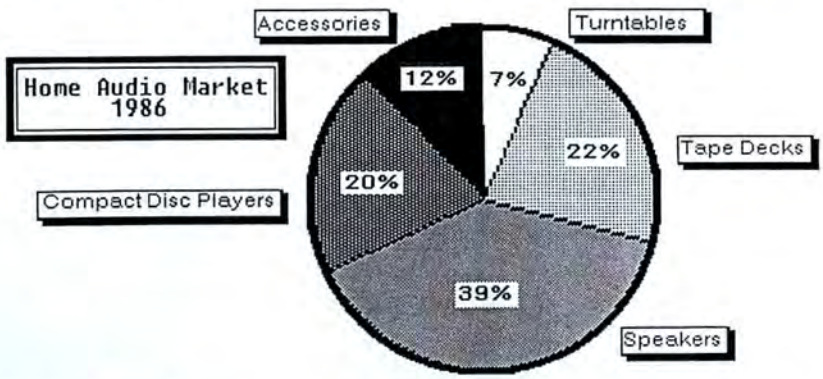
As a major supplier of compact disc players in the audio market, it is my p introduce you to **Consumer Audio**. Our product line includes all major brands of aud ent and accessories including the latest in compact disc technology.

Compact discs have revolutionized the art of sound reproduction. Their accep universal standard for home-use audio has made way for numerous business opp selling related equipment and accessories.

As shown in the table below, the unit demand for compact disc players is rapidly increasi **Consumer Audio** is committed to supporting you in every possible way to capitalize on this tremendous opportunity.

Unit Demand for Compact Disc Players		*Estimated Revenues*
1984	208,000	$ 82,992,000
1985	600,000	239,400,000
1986	900,000	359,100,000
1987	1,100,000	438,900,000

You'll notice the market has more than doubled since 1984 and is expected to grow 50% this next year. This ever increasing market for compact disc players can add notable margins to each audio system sale.



The chart above indicates projected market share of the major segments of the home audio market for 1986. The compact disc segment is a marked increase from 1985.

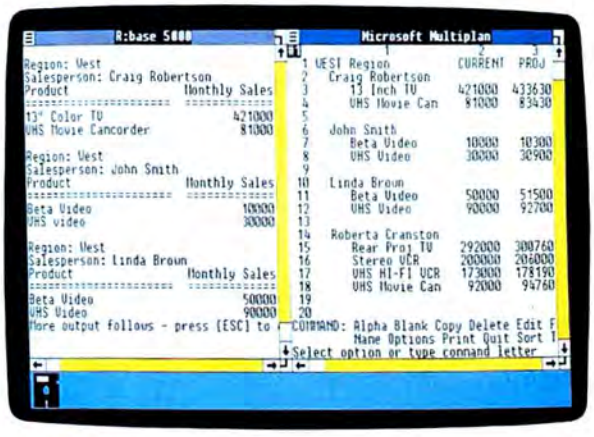
This is Windows' finished product. And it's highly finished, indeed. An exact representation of what you produced on-screen. The better your printer (in this case a laser) the better the results.

Spend a day with us. You'll

One of the great beauties of Windows is that in the here and now you enjoy the benefits of computing's future path—graphically oriented software. Without giving up any of the applications you're happy with today.

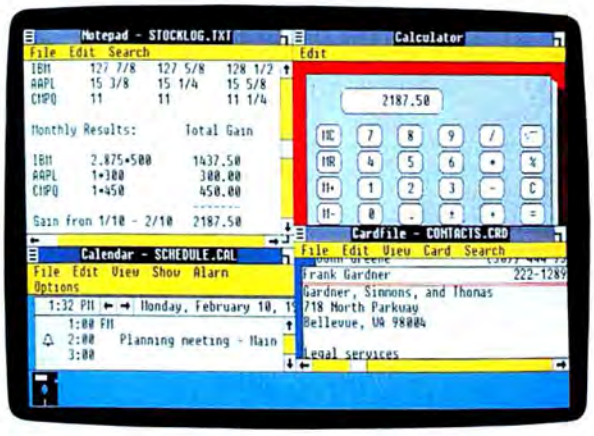
In addition to Windows Write and Paint, the Windows package includes a collection of desktop applications you can use to manage your day-to-day activities. A calendar, cardfile, notepad, calculator, and telecom-

7:45 AM. Early as usual. Opening Windows lands you in the MS-DOS Executive, the Windows command center and file directory. Run the Windows Calendar program and see what's up for the day.



7:55 AM. You've got a report due by the end of the day. A comprehensive sales analysis. Bring up Multiplan® and R:BASE 5000.® Copy regional sales data from R:BASE into Multiplan.

1:30 PM. Market's closed. How'd you do? Open Terminal to dial Dow Jones News/Retrieval® and check the final quotes. Copy and paste them into Notepad.



1:45 PM. You did pretty well today. So use the Windows Calculator to figure your gains. Which you duly note in Notepad. Your good luck, however, requires a call to your tax attorney. A quick click brings up his listing in Windows Cardfile. Another click dials him automatically on your modem.

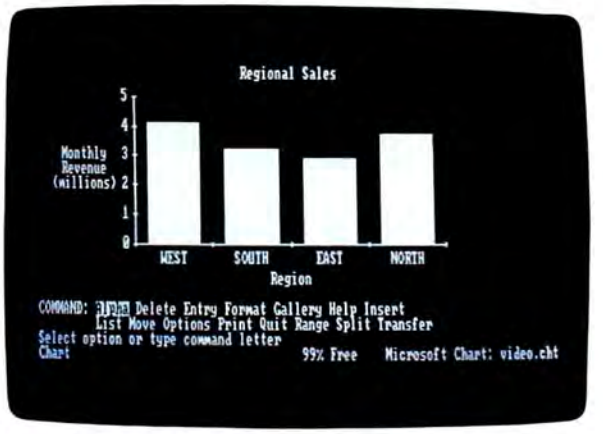
never give up a Windows office.

munications program, just to name a few.

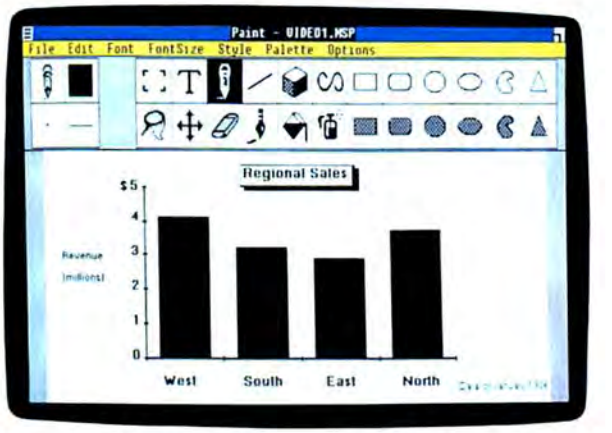
Used together with your standard applications, they can handle an impressive list of office routines.

And because Windows runs standard DOS applications, you can look forward to the future.

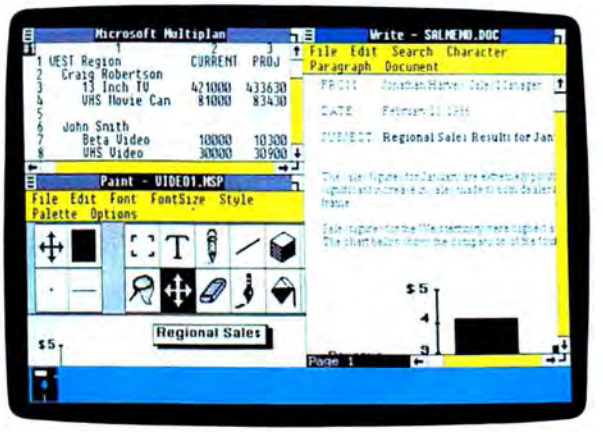
But you don't have to wait on it.



10:30 AM. You've squeezed everything you can out of the numbers. Now open up Microsoft Chart. And let the pictures tell the story. When you've made a chart fit for presentation, capture it from the screen.

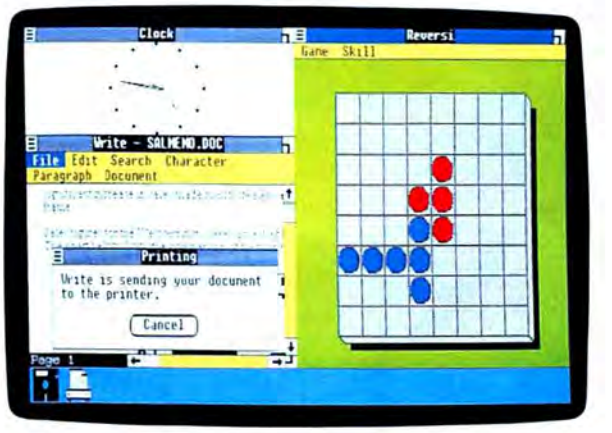


11:00 AM. Paste your finished chart into Windows Paint. Add borders, highlights and illustrative detail. Not only more appealing, but more effective.



1:55 PM. No sooner do you hang up, than your Calendar alarm sounds. Checking the calendar, you find you've got a meeting at 2.

3:00 PM. The meeting went on forever. About time you got back to that report. Copy the chart from Paint, and paste it into Write. It looks brilliant. Now write it so it *sounds* brilliant.



4:48 PM. Everything on screen is looking good. You're ready to print. Open Clock to confirm time. That's right, it's tight. Choose the Print command and send the document off to the printer. Open Reversi for a quick game while you wait. While you beat the clock you can try beating the computer.

5:00 PM. Report printed impeccably. Turn it in and shut down for the day. After all, you were in fifteen minutes early.

The first reviews are in. Here's what they see in Windows.

Prominent reviewers and industry experts have been eagerly awaiting the arrival of Microsoft Windows.

Now they've had a good look. And we're pleased to record their responses to what they saw.

"I'll bet on Microsoft Windows."
Jonathan Sacks, West Coast editor of *Popular Computing* magazine.

"You've got a clear winner..."
Stewart Alsop, editor and publisher of *P.C. Letter.*

"...Windows looks very good..."
Peter Norton in his column in *PC WEEK* 9/24/85.

Of course, all this is going to cost you: $99.

A price that makes Windows the most startling value ever offered in software.

A comparable collection of programs—a switching program, a graphic interface, desktop applications, a word processor, a drawing program—could easily cost hundreds of dollars more.

Windows will instantly deliver you a more productive present. And a leap into the future.

A future which, frankly, we have no interest in keeping exclusive. At this price,* it looks to be arriving in a rush.

Check out the view.

We invite you to visit your Microsoft Dealer and get a screenful of Microsoft Windows. What you see will confirm what others have said, Windows is clearly a winner.

*Price valid only in the U.S.A.

Integration features:

- Work with multiple applications and switch between them.
- Run more applications than fit in memory at one time.
- Consolidate information from standard DOS and Windows applications.

Applications included:

- MS-DOS Executive—DOS file management program. Run programs; format disks; copy, rename, delete files.
- Calendar—Set appointments with optional alarm reminders; daily or monthly view.
- Cardfile—Filing program; cards can include text or graphics, autodial capability.*
- Notepad—Text scratch pad/editor; time/date stamp option.
- Terminal—Telecommunications program; copy session data to other programs or capture to file; autodial capability.*
- Calculator—Common arithmetic operations, plus square root, percent, and memory.
- Clock—Can be displayed anywhere on the screen.
- Reversi—Strategy game; four levels of play.
- Control Panel—Set time, date, communication ports, colors, add/delete printers.
- Program Information File (PIF) Editor—Create or edit PIF files for standard applications.
- Print Spooler—Print files from Windows applications while running other programs.
- Clipboard—View information copied from applications.
- RAMDrive—Setup memory expansion cards as a RAM disk.

Introductory offer also includes:

- Windows Write—Graphics based word processor.
- Windows Paint—A full-featured drawing program.

System Requirements:

- IBM or COMPAQ® Personal Computer 256K memory, DOS 2.0 or higher, two double-sided disk drives, graphics adapter card (IBM Color/Graphics Monitor Adapter, IBM Enhanced Graphics Adapter, Hercules Graphics Card, COMPAQ Personal Computer Graphics Display Adapter, or compatible).

Note:

- 512K memory and a hard disk are recommended when using multiple applications or DOS 3.0 or higher.

*requires a Hayes compatible modem

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You can run Windows with either keyboard commands or by a mouse and keyboard together. Windows admirably exploits the mouse's speed, mobility, and simplicity.

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The High Performance Software™

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0186 Part No. 098-050-202

for an appropriate system to the Tandy 1000 and the IBM PC. I made the costly mistake of selecting the Tandy.

While it was initially cheaper by a few hundred dollars, the Tandy has since exacted in aggravation many times what the savings was worth.

It seems no one at Tandy is really sure what their machines will or will not do. And I don't mean just the local Radio Shack personnel. The staff at Tandy's technical support center in Fort Worth, Texas, haven't the slightest idea, for instance, what the specifications for their printers are, or how Tandy printers interface with popular programs like *Volkswriter Deluxe.*

It also irks me that none of IBM's full-size boards fit into the 1000's slots. This forces users to either buy short boards exclusively from Tandy or hunt down others. Of course, Tandy expansion products cost three times as much as their mail order counterparts. When asked why, Tandy responds that it pays for technical support.

When I installed a hard disk, it wouldn't boot from Tandy's abbreviated version of MS-DOS. I was told that the problem was "probably" the BIOS ROM in my 1000. Of course, a new BIOS ROM costs $15, plus $38.50 for installation, which must be done by Tandy to maintain the service contract. I wouldn't mind that so much, except that it's going to take one month for the new chip to arrive. Tandy must think the pony express is the only way to reach Denver.

I'm tempted to throw this machine out the window, but my lease is almost up. I will never buy a Tandy again.

John Heckers, Jr.
Arvada, Colorado

A Question of Domain

In what appears to have been a coincidence of legerdemain, you published an article entitled "Ledger Domain" [*PCW,* December 1985] in which you failed

(continues)

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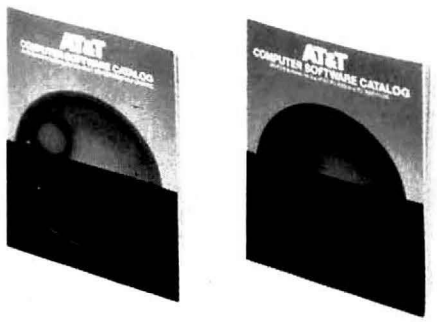

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PC Magazine
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TAS-Plus combines the power of a Relational Database with the ease of a Program Generator. Then TAS-Plus adds a Runtime Compiler to produce lightning-fast finished code.

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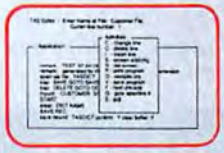

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TAS-Plus has over 86 commands and 200 options available in its Source Code Editor, so you won't run out of room to grow.

Developer's Version $199

For those who need even more power. Open 32 files, save 17 million records. Includes Programmer's Toolkit. (Multi-user $299)

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TAS-Plus comes with a 30 day money back guarantee (less $15 handling fee). TAS-Plus is available for the IBM PC/XT/AT and fully compatible computers. Limited versions available for CP/M and non-IBM machines.

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Circle 444 on reader service card

to acknowledge my program, *Ledger Domain,* a full-featured checkbook management program that operates as a template with *1-2-3* and *Symphony.*

Ledger Domain entered the market in April 1985 and has been advertised in the PC World Directory every month since. I trust that your use of the name was inadvertent—and I take it as a compliment to the ingenuity of my title, an ingenuity that users of *Ledger Domain* have found to be mirrored in the substance and utility of the software.

Richard Rapfogel
Richard Rapfogel Computing
St. Louis, Missouri

Pressing for Peachpit

Ted Nace's author biography in "Son of LaserJet" [*PCW,* February 1986] refers to a book entitled *Laserjet Unlimited: How to Get the Most From Your Hewlett-Packard LaserJet and LaserJet Plus Printer,* published by Peachpit Press. We have been unable to find any listing for this company. Since we have just ordered an HP LaserJet Plus for our office, any additional information about this publication will be greatly appreciated.

Rush Brandis
Washington State Library
Olympia, Washington

To obtain a copy of Ted Nace's book, send $24.95, plus $3.50 for shipping and handling (California residents add 6.5 percent sales tax), to Peachpit Press, 2110 Marin Ave., Berkeley, CA 94707, 415/524-0184. Peachpit Press is also listed in the "Books" section of the PC World Directory in the February 1986 issue. –Ed.

Letters should be mailed to Letters, PC World, *555 De Haro St., San Francisco, CA 94107, or sent electronically to MCI Mail PCWORLD, CompuServe 74055,412, The Source STE908, or Direct-Net 500. We reserve the right to edit letters. All letters must include the writer's name, city, and state before being considered for publication and should not exceed 300 words.*

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(1) **Computer Language,** Feb., 1985, pp.73-102. Reprinted by permission.

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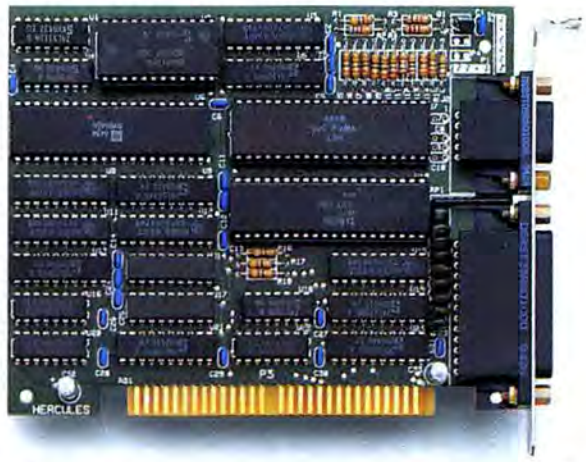

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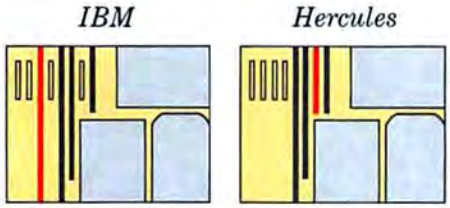

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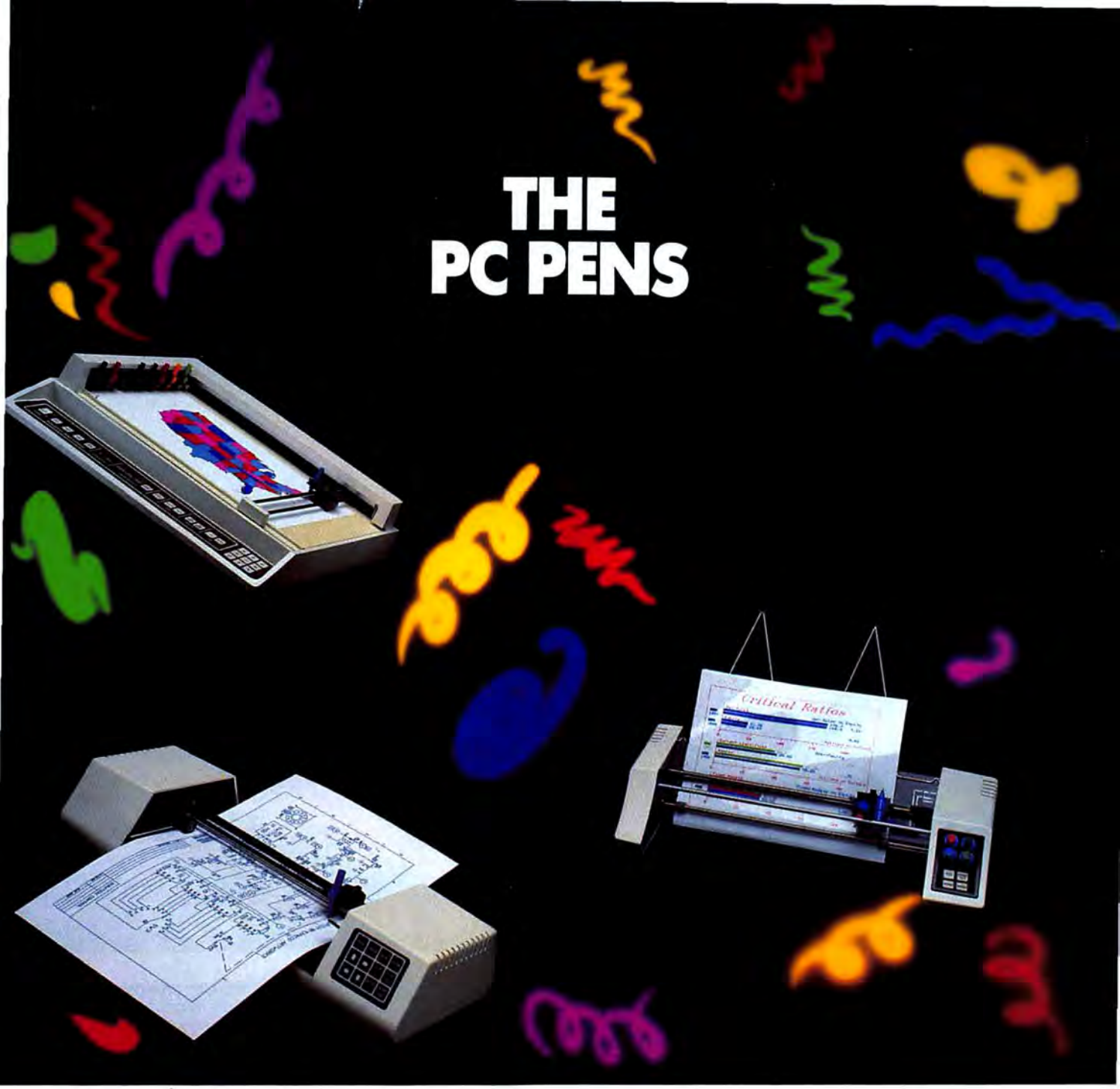

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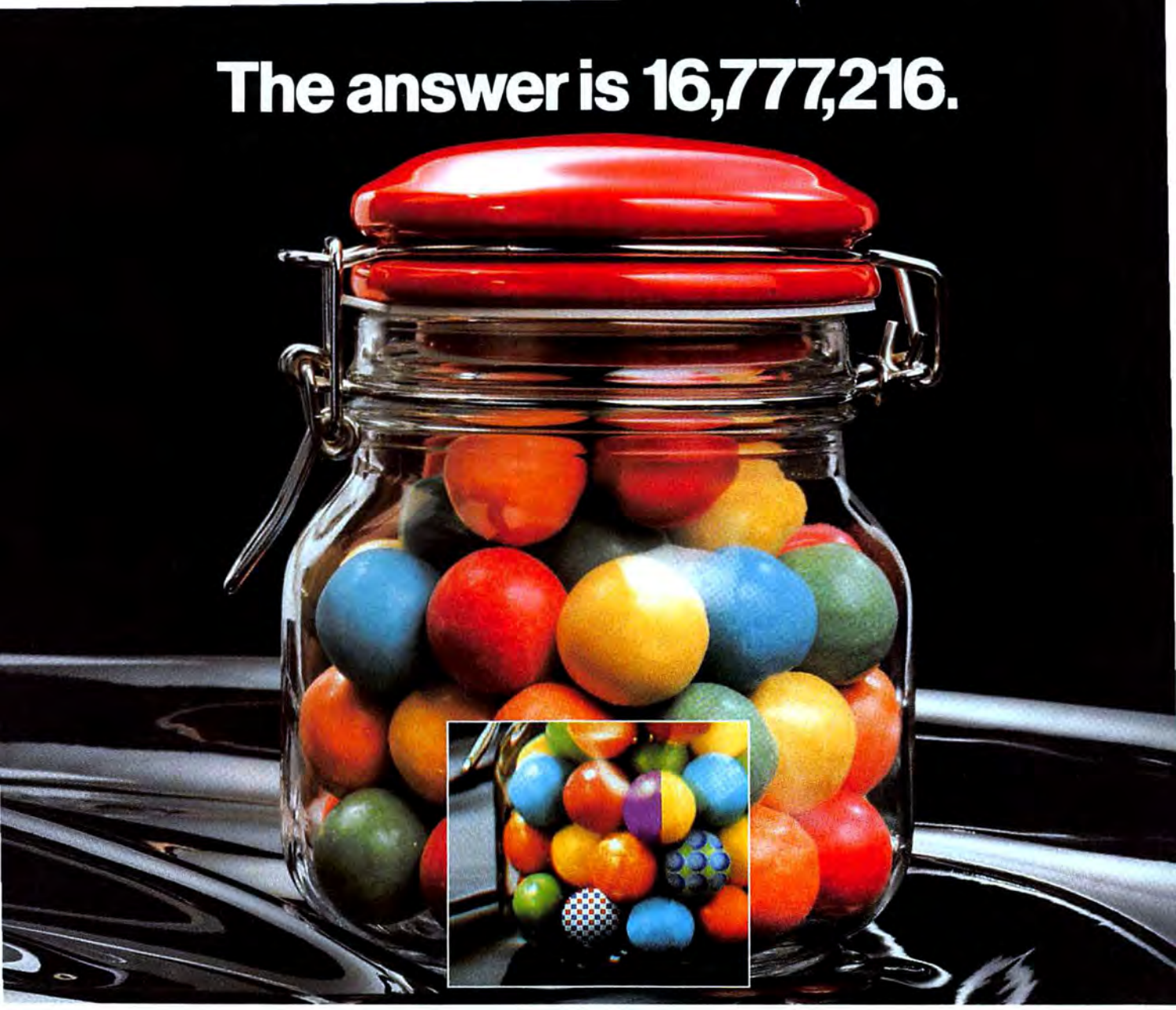

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Sir Isaac Newton (1642-1727) found a slight error in Kepler's calculations, and was able to determine that the solutions were not only ellipses, but also parabolas and hyperbolas due to the gravitational pull of larger heavenly bodies.

The work of these early astronomers and mathematicians paved the way for today's space flights. Modern scientists are now able to calculate the earth-orbit of satellites, send unmaned ships to distant galaxies, and make a pinpoint rendezvous between two spacecraft.

The data strips on the right contain a program called **STUMPFF** by E. H. Weiss, which appeared in the July, 1985 issue of BYTE. The program performs two tasks. It computes the orbit or trajectory of a body of negligible mass (spacecraft or minor planet) in the gravitational field of three massive bodies. It also makes a fast approximation of orbits within our solar system. It is usually accurate to within one part in a thousand.

Read in the data strips and type RUN "STUMPFF" to use the program. It is named in honor of professor Karl Stumpff (1895-1970) who developed the theory upon which the program is based.

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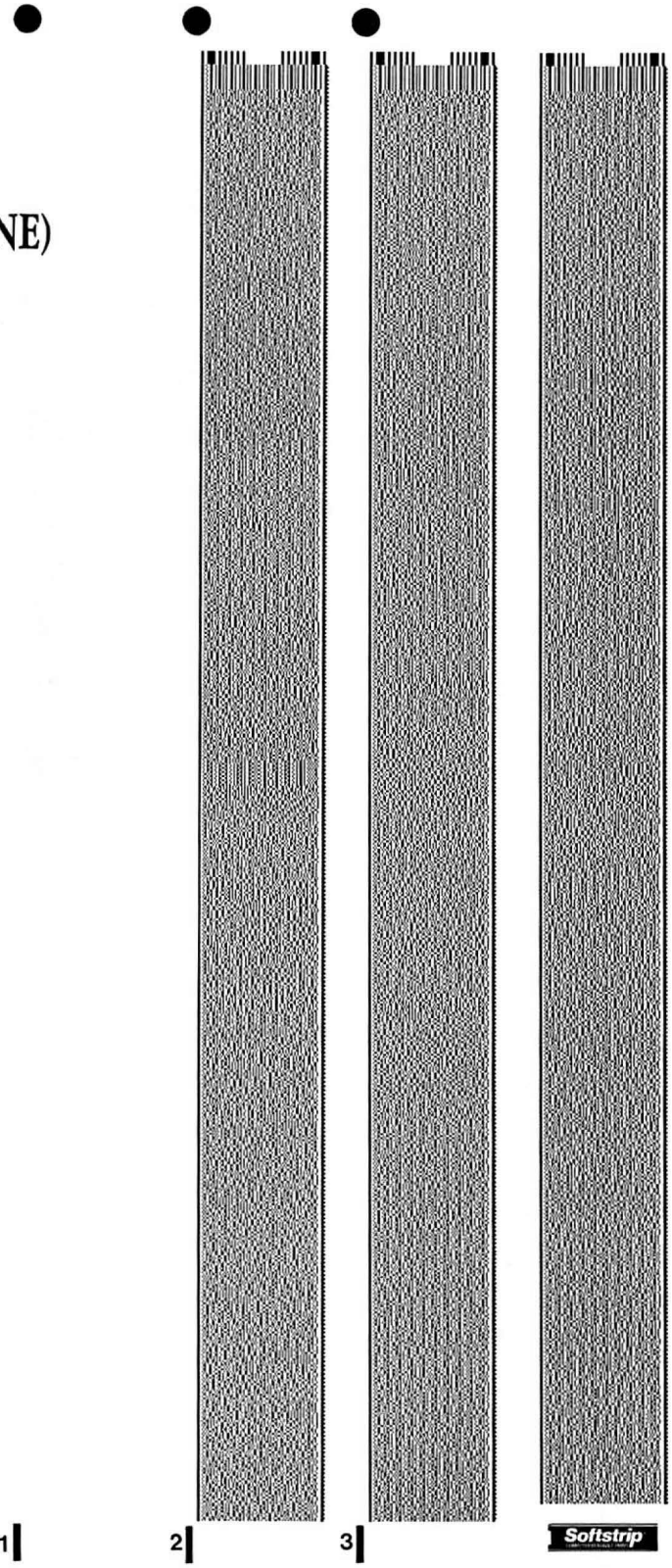

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Pelican offers unequalled capacity and speed

- Just one Kodak high density 5.25 inch diskette stores 2.78 Mbytes of formatted data! So, for example, you could put all your spreadsheet data or word processing files on one HD floppy. Just four diskettes deliver more formatted storage than a hard disk: 11.14 Mbytes to be exact. And you can keep expanding in 2.78 Mbyte multiples, diskette by diskette. So Pelicans deliver storage capacity by the beakful—on a birdseed budget.
- Access your data at least twice as fast.

  The Pelican system accesses stored data at 500,000 bits/second—twice as fast as regular floppy disks. And Pelican software automatically creates cache buffers in the PC memory that mirror data on disk. So it is often presented ten times faster than data coming from disk.

Advantages of removable, expandable storage

- Makes hard disk back-up easy. And inexpensive.

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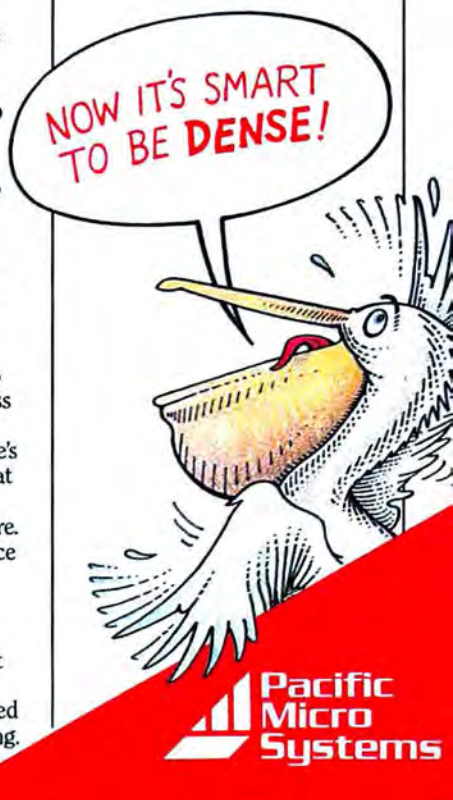

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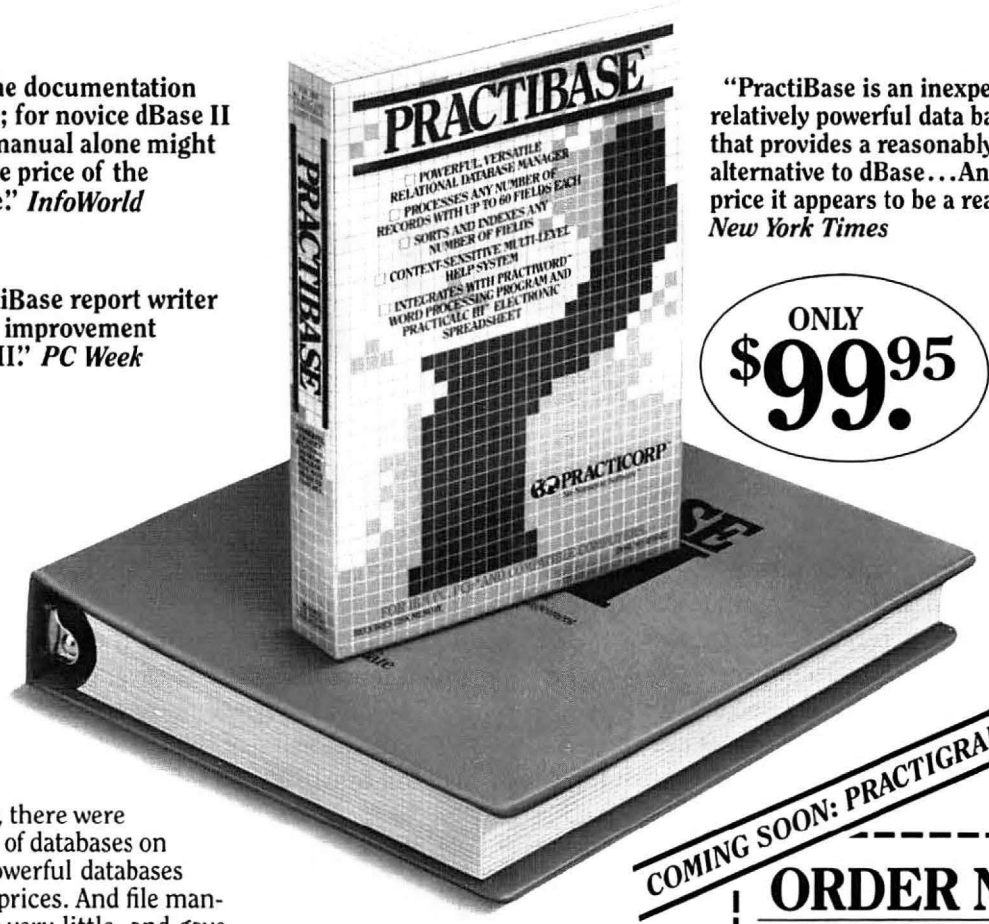

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Why don't other diskette makers go to the same extremes that we do? Quite simply, to save time and money.

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John B. Judis

REMark: The Chips Are Down

The U.S. semiconductor industry, a key to the nation's economic future, shoots itself in the foot as it takes aim at Japanese chip manufacturers.

Of all the current trade gaps bedeviling American industry, none is as significant as that in semiconductor chips, the little silicon slabs that manipulate data bits or store computer memory. Nor is there any trade problem for which the proposed remedies are so inadequate.

During 1985, employment at American semiconductor firms declined 19 percent. And U.S. firms virtually abandoned to the Japanese the market in the new generation of computer chips.

Japan now controls two-thirds of the market for 64K-bit memory chips and 92 percent for 256K-bit chips. According to John Lazio, Jr., of Hambrecht & Quist, "The battle in the RAM market is over."

These are ominous figures. Falling behind foreign shoe or textile producers might be expected of a wealthy industrial nation that has a relatively affluent labor force, but the chip deficit reflects America's postindustrial future rather than its industrial past. If the U.S. cannot compete with Japan in the computer chip arena, it will steadily fall behind in other advanced areas as well. The Japanese economy will surpass the American in the same way that the American economy surpassed the British four decades ago.

But what of the remedies that the American semiconductor industry is currently proposing? American firms, both by themselves and through the Semiconductor Industry Association (SIA), have initiated official dumping charges and allegations of restrictive domestic market practices against the Japanese.

A Myopic View

The SIA—the major trade association for American chip makers—claims that during 1985 Japanese companies, afflicted by a surplus at home, sold memory chips in the States at prices below the cost of production. The U.S. International Trade Commission (ITC), the body that hears trade complaints from domestic producers, has issued preliminary findings that Japanese firms like Hitachi and NEC have been dumping their chips on

(continues)

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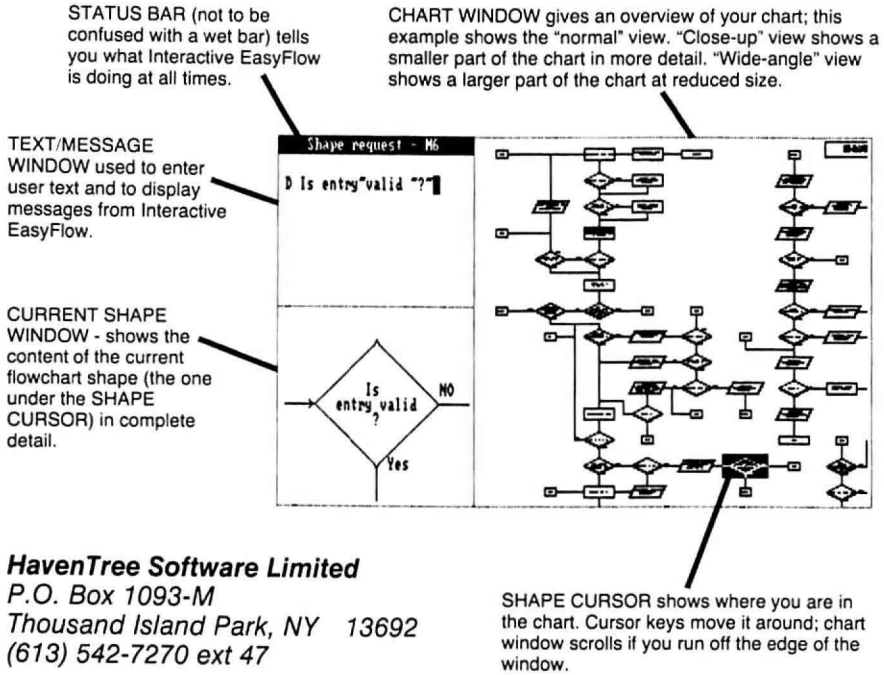
The sample screen display shown below is typical of what you see while editing a chart. Other screen displays are provided for entering titles, changing options, getting "help" and so on.



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the U.S. market at prices about 10 percent below their estimated production costs.

These findings, and the duties that have already been imposed, will have some short-term benefits for American companies like Micron, the Boise chip maker that brought one of the complaints. But it is doubtful whether the ITC findings will substantially reverse the trend of the last decade toward Japanese dominance of the world chip market, since this supremacy was not based on the current unfair trade practices.

The fact is, Japan succeeded in dominating American markets because it produced both higher quality and less expensive chips, and because it beat U.S. firms in the race to develop the technology for 256K and, now, 1-megabit chips. Superior Japanese quality was openly acknowledged by Hewlett-Packard division manager Richard Anderson at an industry conference in March 1980. Anderson's confession sparked an industry shake-up and a new attempt, led by Intel founder Robert Noyce, the cocreator of the silicon chip, to match Japanese quality. But by most reports, that U.S. effort has not been successful. In the spring of 1984, Hewlett-Packard's Robert Frankenburg released studies showing that while U.S. chip quality had improved, American chips still failed tests at three times the rate of Japanese chips.

This particular Japanese advantage has resulted in part from Japanese firms' adoption of Edward Deming's theory of quality control, which emphasizes prevention

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rather than ex post facto error detection. But it also stems from Japan's reliance on its own automated technology to produce chips. In contrast, U.S. firms have farmed out much of their chip production to low-wage assembly lines in southern Asia.

But the most important reason for the Japanese edge has been the cooperation among a triumvirate of powerful Japanese interest groups: the Ministry of International Trade and Industry (MITI); the giant Japanese computer companies like NEC and Hitachi; and the Japanese banks, which, unlike American banks, are allowed to hold stock in Japanese companies. As major stockholders, banks are often more interested in ensuring interest on their loans over the long term than in short-term dividends, and are thus far more likely to encourage long-range investment strategies. Banks also have a stake in keeping interest rates low. Japanese interest rates on capital investments have been half that of American rates.

In 1976 MITI organized and the banks financed a major project in the development of very large-scale integration chips (VLSI). The Japanese emerged from this project in 1982 with a viable 256K chip, well before most American companies were capable of producing it. Boise's Micron, for instance, did not create a viable 256K chip until July 1985.

All the Japanese advantages were mobilized to produce the

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256K chip and its successor, the 1-megabit chip. Chip production required large long-term capital investment, which is beyond the capabilities of the relatively smaller, specialized American firms. And because of the high risk of error when printing hundreds of thousands of components on a tiny silicon slab, the chips must be assembled with the most advanced automated technology, something that American firms choose not to do.

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Unlike Japanese firms, most American firms are ruled by the

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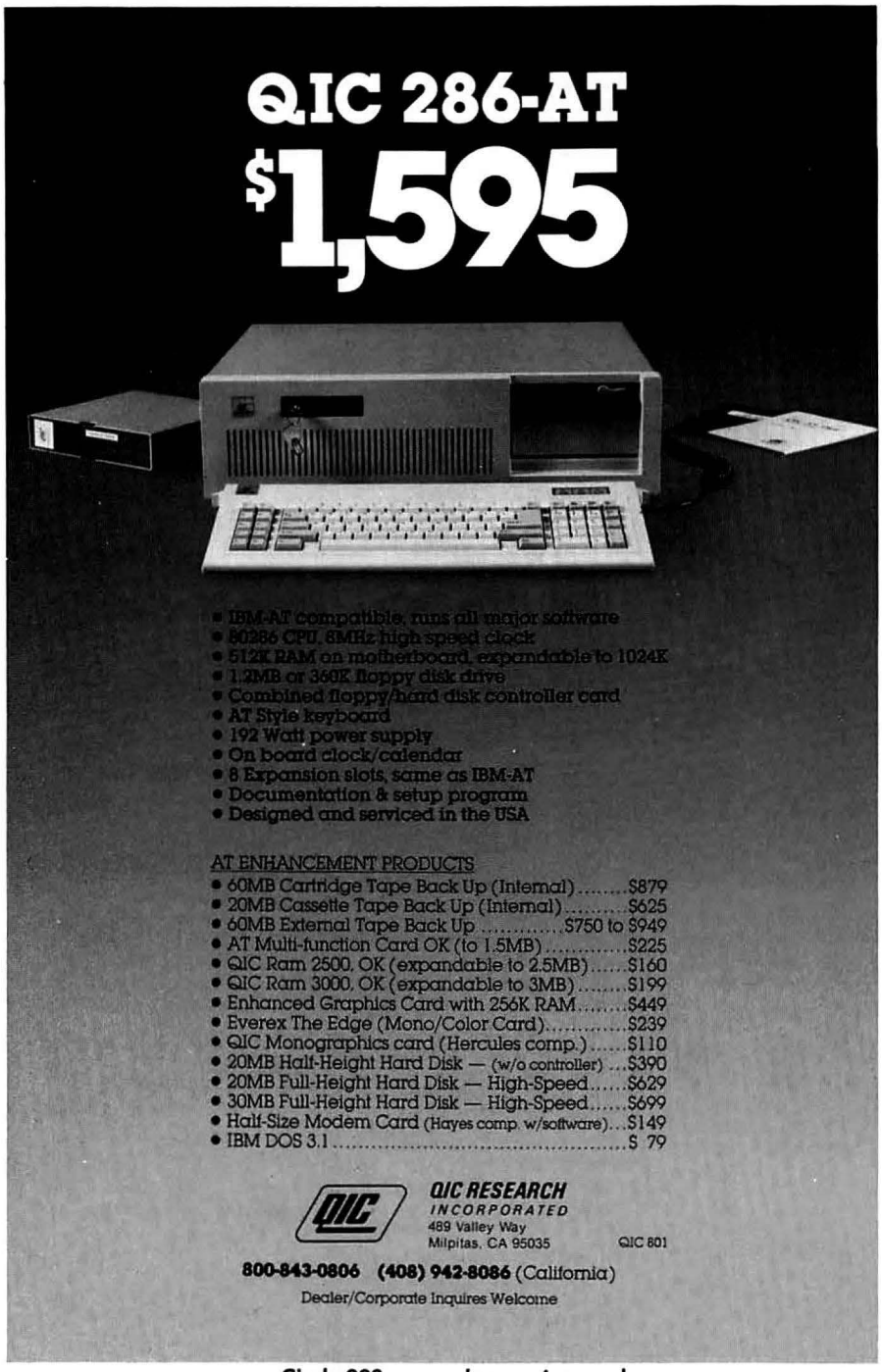

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imperatives of the capital market, which responds to quarterly profit figures rather than to carefully laid plans for the future. "The pressure of management to mortgage the future for the present is particularly heavy in the semiconductor industry because it is very cyclical," consultant Richard Skinner remarked in testimony last year before the ITC. But no branch of industry is in as much need of long-term planning and the acceptance of short-term loss for long-term gain as the semiconductor industry.

As for the contribution of the American government, its commitment to the free market has crippled its ability to assist domestic semiconductor producers. What help the industry has gotten has come largely from military contracts such as the early work on the Minuteman missile guidance systems, which resulted in the first commercially viable chips in the 1960s. But in the seventies and eighties, military demands on chip producers have been too specialized to create civilian applications. As a result, the government has played a largely negative role, actually diverting expertise from civilian research. According to industry analyst Charles Ferguson, most military chip production is "commercially useless."

U.S. Complaints

The American semiconductor industry has systematically ignored the primary causes of the Japanese success, asserting in an SIA brief filed in November that Japan's position "is due not to superior

(continues)

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Japanese innovativeness . . . nor to Japanese effectiveness in DRAM [dynamic random access memory] production technology . . . [but to] the fact that Japan's market lies beyond the reach of free competition . . . and [to] pervasive dumping."

When called upon to provide a broader perspective, SIA spokespeople have attacked precisely those structural features of Japan's industry and government that the U.S. would do well to emulate rather than damn. For instance, in another of its briefs, the SIA complained that "the same companies that dominate Japanese semiconductor production also dominate semiconductor consumption. . . . The small group of producer-consumers are linked by multiple horizontal ties." And the SIA charged that the Japanese government has "encouraged" these firms to "participate in numerous joint R&D programs" and has tried to prevent "excessive competition and duplication of effort among Japanese firms."

The SIA's long-term goal, its statements suggest, is to impose the disabilities of American industry on Japan. Some SIA officials want to limit MITI's role in Japanese industry, and others want to break up the Japanese conglomerates. Advanced Micro Devices vice president George M. Scalise, a prime mover in SIA, advocates "splitting the semiconductor divisions of Japanese electronics companies from their consumer divisions." In his testimony before the Senate last November, SIA researcher Michael Maibach called

(continues)

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B. IDIOTS
C. IDIOM
D. IDIOTIC
E. INDICT
F. IDIOMS
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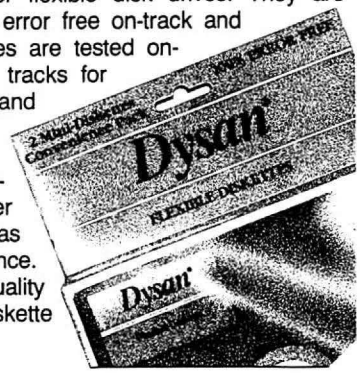

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[redacted]

for "the application of U.S. [antitrust] law" to Japan.

Even SIA spokespeople who acknowledge the real reasons for the Japanese advantage balk at drawing any conclusions for American industry. Alan Wolff, a former Carter administration trade official and the SIA's Washington lawyer, admits that MITI's long-term planning, which he compares to the American space program, was the reason for Japan's success. "The dumping is really the result, not the initial cause of the problem," Wolff said.

Wolff also acknowledges that U.S. firms are not in a position to compete with the Japanese conglomerates. "Is Micron large enough to take on the Japanese government laboratories, working in conjunction with the Japanese companies? No. But no one is."

However, Wolff balks at the conclusion that the U.S. should have undertaken a VLSI project of its own in the late seventies and that to overtake the Japanese, the U.S. government will have to devote to semiconductors the kind of research funds and planning that it has devoted to the space program. "There is a strong belief and a strong tradition that having government involved in R&D can be stifling," he said.

The British Model

The U.S. certainly could regain its edge in semiconductors. The question is whether it will, and signs from recent years are troubling.

(continues)

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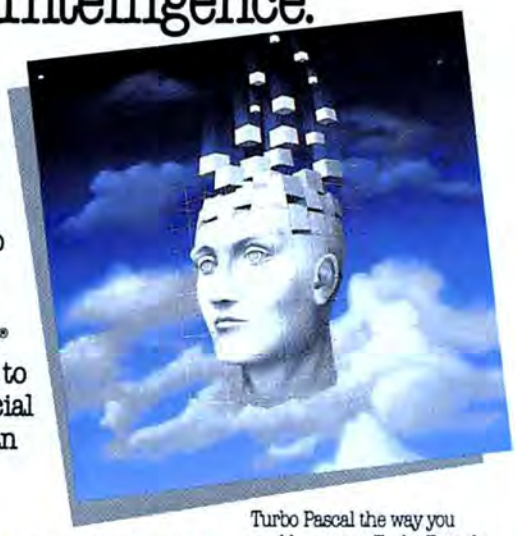

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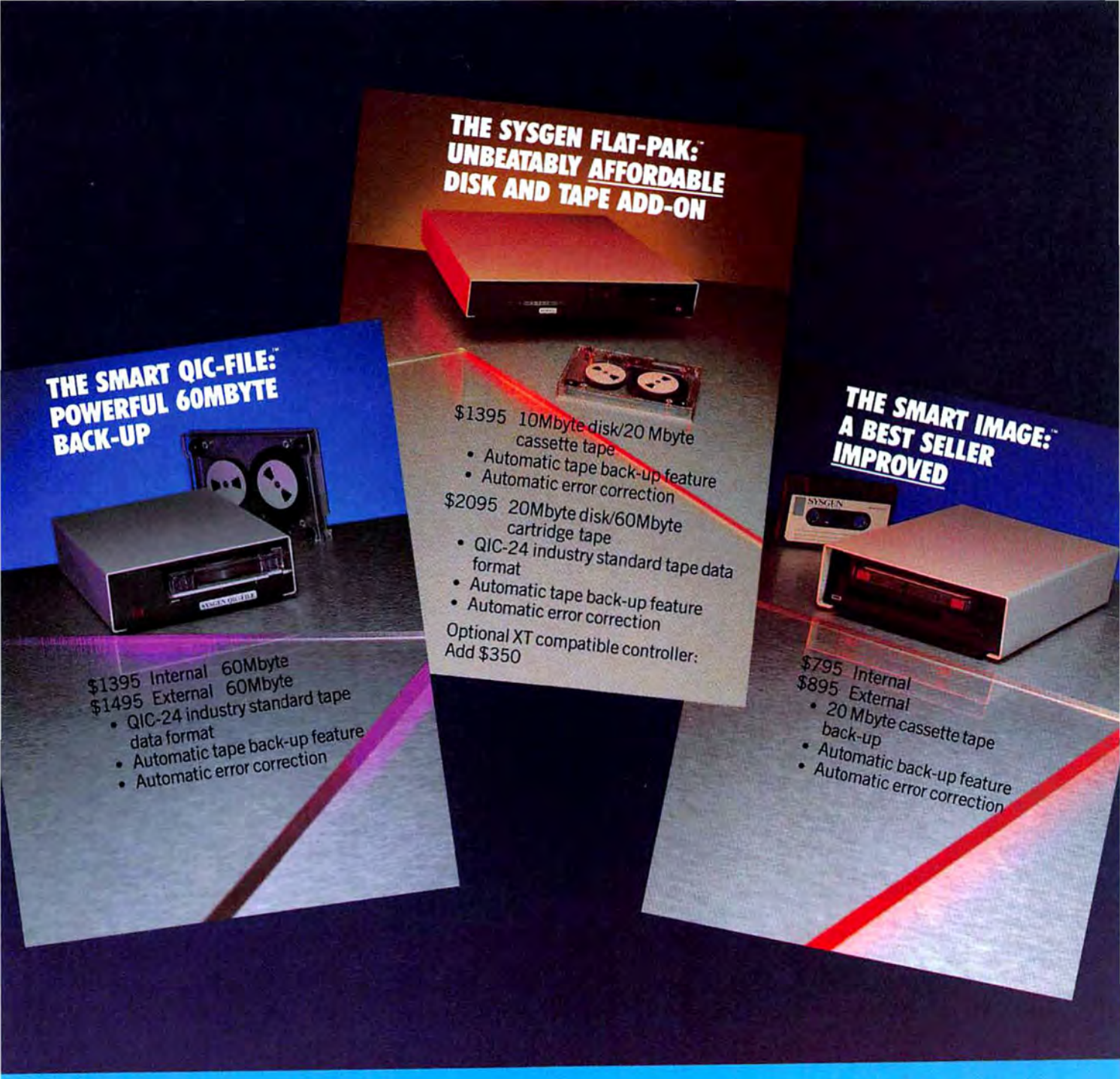

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The Japanese challenge to the U.S. bears a disturbing resemblance to the American challenge to the British early in the century. Just as the British, the pioneers in electrical engineering, saw U.S. industry adapt British designs for televisions and other British products, the U.S., which invented the transistor and the semiconductor, appears destined to watch the Japanese reap the profits from these and other U.S. inventions.

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John B. Judis is a senior editor of In These Times, *a national newsweekly.*

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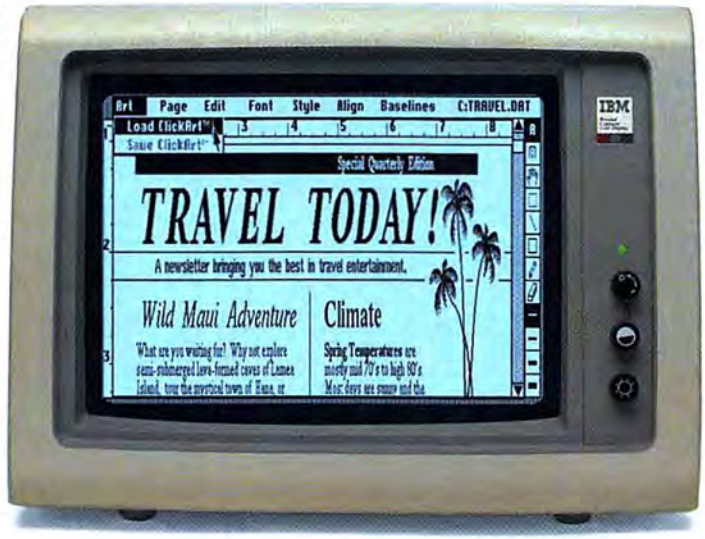

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- The Order Report provides urgent information on every order

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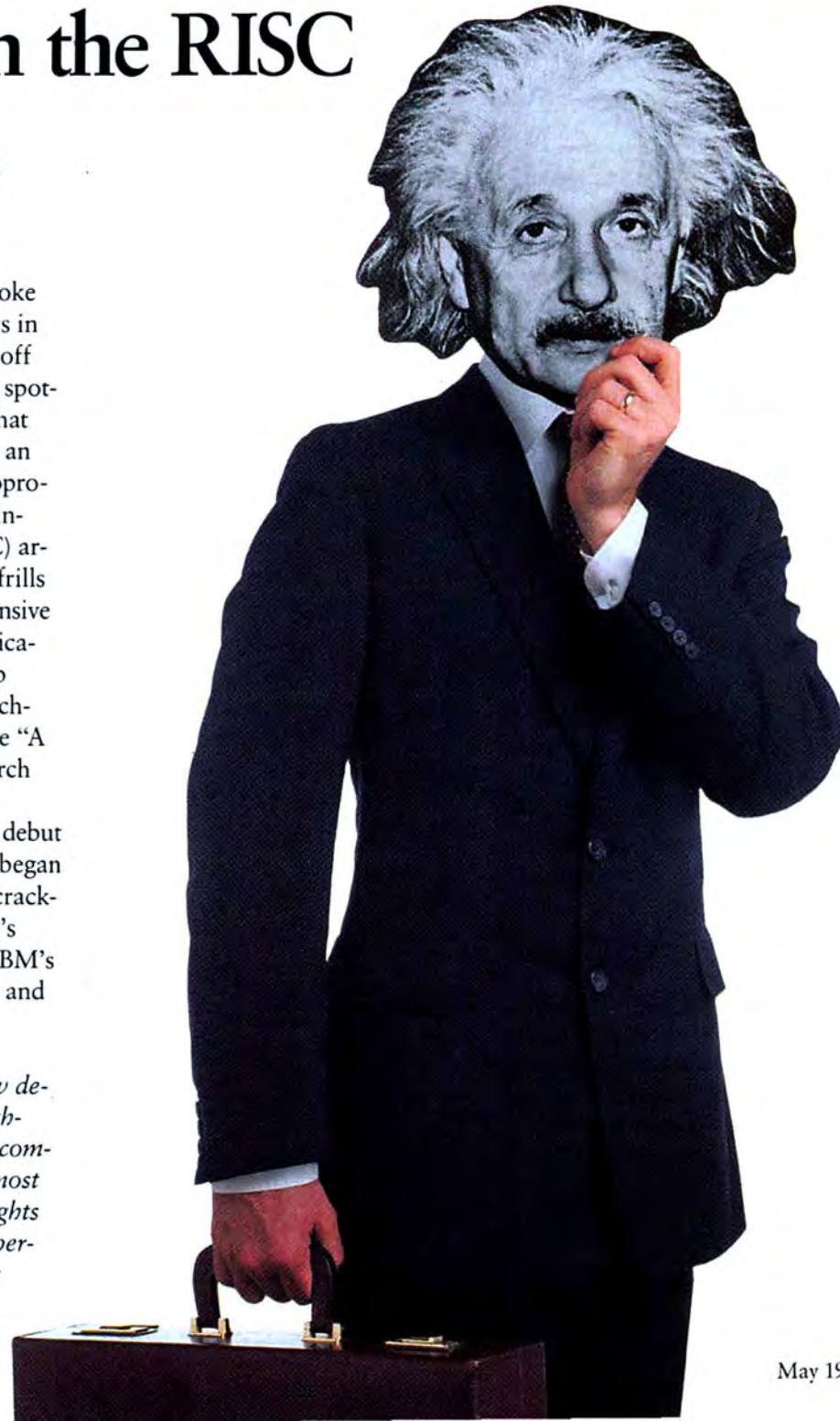
PC WORLD

Puttin' on the RISC

Is Big Blue's latest a Business Machine in disguise?

Trumpets blare, a puff of smoke rises, and some bemused guys in blue coveralls pull the wraps off IBM's new workstation. The spotlight zeros in on a machine that looks like an AT but harbors an IBM-developed, 32-bit microprocessor built around reduced instruction set computer (RISC) architecture, a high-speed, no-frills design fit for calculation-intensive science and engineering applications. Yes, it's time to don lab coats—the IBM RT (RISC Technology) PC is here to stay (see "A Calculated RISC," *PCW*, March 1986).

When the RT PC made its debut last quarter, market analysts began to heap kindling on already crackling fires of speculation. Intel's stock dipped in response to IBM's choice of a proprietary CPU, and



PC World View *reports new developments in computer technology, items of interest to computer enthusiasts, and the most significant and enticing insights about industry trends and personalities.* —*Ken Greenberg*

hard times were forecast for Sun, DEC, and Apollo, the principal players in the RT's computer-aided design, engineering, and manufacturing markets. (Admittedly, IBM didn't help Intel's juggernaut, selling off a portion of its 20 percent stake in Intel and charitably giving back its seat on the company's board.)

Other oracles predicted a UNIX renaissance, resulting from the RT's Advanced Interactive Executive (AIX) operating system, an expanded version of UNIX System V that supports up to eight users. But the biggest controversy still centers around the RT's ultimate market position: Is it really just for scientists and engineers, or will the RT eventually find a home in business?

IBM sources maintain that the RT is expressly designed for technical professionals. A number of analysts concur, noting that the speed gains inherent in RISC architecture can diminish when faced with the large instruction sets common in disk-intensive business applications. In addition, the base prices of the AT look-alike RT PC 6151/10 and the 6150/20 floor-standing model released in March—$11,700 and $14,945, respectively—would seem to speak to a specialized market. Add the $3400 AIX operating system and a $1385 monochrome monitor, and you're more than tripling the price of a fully loaded AT.

But other smoke signals suggest the RT's niche is far from established. Of the three RT software packages released concurrently with the machine and distributed by IBM, only IMSL's *Corporation Problem Solving Systems* is designed for a science or engineering environment. The other packages, Interleaf's *Workstation Publishing Software* and TLB's *Solomon III* accounting series, are hardly intended for quantum physics. In addition, a surprising number of UNIX business application software developers are moving their packages over to the RT in record time, and many of them hint at prior agreements with IBM.

TLB president Gary Harpst is particularly enthusiastic about the RT's future as a multiuser business machine. "We think the RT will set the standard for multiuser systems, just like the PC did for micros," he says. "There's a $5 billion multiuser marketplace, and if IBM doesn't position the RT for the business market, it will be drawn in by demand." Some IBM dealers agree and are already trying to push the RT into the business sector.

The RT's optional 80286 coprocessor, which enables the machine to run AT-compatible

(continues)

It looks like an AT, but the RT PC 6151/10 (right) is really IBM's desktop implementation of RISC technology. The free-standing RT PC 6151/20 (left) adds the ability to act as a host processor for a 5080 graphics system.

A Marriage Of Opposites

Locus Computing wants to be an agent for détente between DOS and UNIX partisans.

Imagine UNIX and DOS coexisting like Rogers and Astaire rather than like Abbott and Costello. If you can hold onto that image for a moment, you'll have a sense of what life is like at Locus Computing.

Locus (the name is an acronym of Local Cooperating UNIX Systems) is Santa Monica's answer to Microsoft and AT&T's response to an age-old strategic conundrum: how to get two otherwise alien operating systems together in one box at one time.

As the base of operations for Locus, Uniform Software (which Locus recently acquired), and Quarterdeck Office Systems, the affluent seaside southern California community has quietly become a haven for those committed to a rapprochement between UNIX and DOS.

Locus gained notoriety most recently by letting the 80286 do what everyone acknowledged it could—run two operating systems at once. It did so with *OS Merge,* a combination hardware and software product developed at AT&T's behest for its PC 6300 Plus, an AT compatible capable of running a single DOS task in 286 real mode while UNIX jobs hum away in protected mode.

Locus's previous claim to fame was the PC Interface, an AT&T-labeled product that links AT&T's UNIX-based 3B series with the PC. Locus views UNIX as the means by which DOS will acquire multiuser and multitasking attributes. Indeed, in the corporate world according to Locus, DOS will be regarded as the "application engine" for UNIX.

To nudge that possibility along, Locus purchased Uniform Software, a neighbor and a developer of the *PC Extender,* a utility that enables *1-2-3* to run on the dark side of the 80286 (see "Committed to Memory," *PCW,* December 1985).

While essentially operating away from the retail limelight, Locus is a company in transition, as the Uniform acquisition attests. The firm isn't tethered inextricably to AT&T and continues to cultivate the titans of hardware—including IBM.

World View recently dropped by Locus to chat with Dr. Gerald Popek, company president, and Dr. Charles Kline, Locus vice president. Excerpts from that encounter follow.

PCW: Why should business PC users—DOS adherents, for better or worse—care about a product like *OS Merge?*

Popek: What we at Locus know well and do well is distributed computing. Machine boundaries are not concepts that people can deal with, any more than they deal with channel programs or other computer science kinds of things.

Puttin' on the RISC
(continued)

software concurrently with AIX programs, is another indication of its broad potential. This hybrid approach, augmented by the machine's PC-compatible 16-bit bus, hints that the RT is a bridge between PC technology and a new generation of RISC machines. The energy that went into developing the operating system—particularly its simplified user interface—could also portend the eventual adoption of AIX across a number of IBM product lines.

Outside its target market, however, the RT remains an enigma. How the machine will affect IBM's System/36 line of minicomputers, and whether RISC technology undermines the future of the 80386 CPU, will depend on how eagerly businesses snap up the RT. You can bet IBM will watch its RISC machines carefully before making any sudden moves.
—Eric Knorr

Nancy Clendaniel

Locus Computing's Gerald Popek: traversing machine boundaries with the greatest of ease

We know how to make the boundary problem go away, and to make using computers significantly easier in the process.

PCW: Is distributed computing consistent with personal computing?

Popek: Absolutely. Distributed computing centers around workstations, which are wonderful because you're guaranteed your piece of the show. It gives you both control and convenience in exchanging information.

PCW: You're drawing a distinction between distributed computing and networking.

Popek: Yes. What we do is distributed computing, not networking. Networking is file transfer and remote log-ons; it requires a wire, which you've got to be aware of while the net is in use. We want to make distributed computing tools transparent, so I can use your application as if it were on my local disk.

PCW: Might your efforts be sidetracked somewhat by DOS 4.00?

Popek: I'm not concerned about future DOS versions. Either they fix DOS or they don't. If they don't fix DOS, we have this other solution.

PCW: But doesn't your solution depend on a critical mass of UNIX applications?

Popek: No. UNIX is a good basic system to build on. It's got multitasking and communications capabilities, but it does have one major problem: lack of software. By running DOS as a task under UNIX, you're bringing 9000 application programs into that operating system.

Kline: With *OS Merge*, the DOS user is actually using the UNIX file system—not a separate disk laid out specifically for DOS. It lets you switch back and forth nicely, running a DOS command, then putting the output into a UNIX command.

Popek: As I see it, DOS will become increasingly UNIX-like. The requirement that users understand UNIX will evaporate to the exent that products like *OS Merge* permit you to run DOS programs. A very good thing has happened: The market is coalescing. And to the degree that you can accomplish tasks transparently—that is, across machine boundaries—everybody wins.

First of two parts. Next month: The view from Quarterdeck's desk.

Need Help? Call Sid.

Your car now warns you in dulcet tones that you're about to run out of gas. Your camera tells you to pop up the flash. And your microwave oven suggests that the roast needs another 10 minutes. With all this appliance chatter going on, is it any wonder that the entire household should begin to talk?

Consumer electronic products featuring voice synthesis and recognition have been making slow but sure inroads on a variety of fronts, even though their curiosity value often exceeds their utility. Now, professional magician Gus Searcy has pulled not a rabbit but a household butler out of his bag of electronic tricks, and suddenly the much-ballyhooed future of talking appliances seems almost credible.

Jeeves it isn't. But Searcy's Butler in a Box, manufactured by Mastervoice, his southern California start-up, is the closest thing yet to a truly useful environmental control system with extensive voice functions. Even in its silent mode, "Sidney," as Searcy dubbed his 7-pound, 10-inch-high black box, can be programmed to automatically turn on and off up to 28 appliances at certain times of the day or night, even varying its routine for weekends and holidays. It also contains an infrared security system to detect household intruders, and serves as a speakerphone extension to a telephone with up to 15 programmed phone numbers that can be dialed on voice command.

Sidney manages all this without requiring a vast tangle of wires to the toaster, the Cuisinart, and the CD player; it simply works via the carrier current flowing through a home's electrical wiring system, with each appliance plugged into a small adapter module at its wall socket.

A longtime computer whiz who flunked computer science in college, Searcy teamed up with programmer Franz Kavan, whom he'd met in a computer store in Downey, California. Six months later they'd put together a rudimentary voice-interactive computer system designed to turn appliances on and off. When they first tried it, recalls Searcy, "I said, 'Lamp on,' and it turned off the air conditioner. I knew right then that we were in business."

A year and $2.3 million in venture capital later, Searcy's magician's assistant had been refined, educated, and transformed into an electronic butler for people who can't afford the real thing. Priced at $1195, the Butler in a Box is sold in retail outlets, along with a

program called *Voice Mouse,* which operates through the Butler to run a PC.

The voice-recognition technology was developed in-house and remains as closely guarded as the Colonel's secret recipe. The Butler has a special knack for filtering out ambient noise and responding only to voices it recognizes. The digitized response ("Pleasant dreams, Master") can be changed to sound like any distinct voice, including that of your favorite celebrity.

Goodnight, Meryl. *–Jon Stewart*

Back to the Roots

The computer business isn't too young for nostalgia.

Consider the West Coast Computer Faire, once a ragtag amalgam of guys who, every spring, would gather the brainchildren of their Cupertino garages under one San Francisco roof. This granddaddy of all so-called "end-user" expos gradually evolved into a more homogenized, less whimsical affair, changing in response to a burgeoning industry.

And now, it's changed back.

This was the year the Interface Group–the COMDEX people–acquired Computer Faire, Inc., from the Prentice-Hall division of Gulf + Western and decided to turn back the clock.

Prior to this spring's confab, Interface Group impresario Sheldon Adelson vowed to "reexamine those original elements of the [West Coast Computer] Faire that made it a catalyst of the computer industry in the late seventies and early eighties." Adelson publicly wooed "innovators, entrepreneurs, home brew enthusiasts, scientists, and engineers"–the very breeds some suggest have been rendered inert by the recent infatuation of business with personal computing (and vice versa). It's noteworthy that corporate types, the Interface Group's usual constituency, are fairly low on Adelson's list.

Thomas Wolfe evidently never met Shelly Adelson. Perhaps you *can* go home again.

NEC's Move?

While the scuttlebutt is that the new crop of microprocessors–including Intel's highly touted 80386–will revolutionize the PC any minute now, one school of thought maintains there's more than ample power left in the aging 8086/8088 series. At the head of that class is Nippon Electric Company (NEC), the Japanese semiconductor leviathan.

Claims for chips with mainframe power notwithstanding, NEC has quietly given a bit more punch to the venerable 8086 with a pair of snappy take-offs on that microprocessor family. The first, an 8/16-bit CPU that NEC calls the V20, is the electrical and logical equivalent of the PC's 8088. The second, designated the V30, duplicates the 8086 with its 16-bit external bus structure. While both chips are functionally identical to their counterparts, the two V-series CPUs boast speed increases of 25 to 30 percent over the Intel duo. Moreover, the gain is achieved without modifying either the system's clock or its I/O interface. Everything happens inside the CPU, and neither you nor the innards of your PC need be any the wiser.

This push on the accelerator reflects NEC's approach to the chips' architecture. Unlike the 8086/8088, which use a single 16-bit internal bus, the V20 and V30 incorporate an advanced interface controller that feeds two internal buses. Accordingly, both process data in fewer ticks of the clock by effectively dividing operations into two groups that can run simultaneously. Procedures that require three steps in an 8086 take just two steps in the V30. Equally decisive, the V-series instruction set features 30 new and enhanced routines.

With a few million 8088s and 8086s chugging away, this gambit would seem too late in the game to matter much. Ah, but that's the best part. Your motherboard can stay; all you need to do is unplug

(continues)

Window on DOS's Future

The hoopla attending February's *Microsoft Windows* Independent Software Developers Seminar—the second in two years and the first since the product left the ranks of vaporware—has by now faded along with the party hats and the punditry.

With the perspective that time affords, it's becoming ever clearer that *Microsoft Windows* is more than the most intensive, best organized, and most generously bankrolled software offering in Microsoft's history. This extension of MS-DOS portends an era of unprecedented simplicity in software usage. But it's also certain to permanently flavor DOS itself.

Even as *Microsoft Windows* provides software developers with standards for writing applications that can run concurrently, exchange data as text or graphics, and generate device-independent output, DOS looms as the ultimate beneficiary. *Microsoft Windows* won't supplant the operating system; instead, look for its multitasking, memory management, and program-switching talents to surface in DOS—where they belong.

For the more than 400 software developers and hardware manufacturers at the seminar, patience appears to have been rewarded. The unusually lengthy gestation period for *Microsoft Windows*—dedicated in part to soliciting feedback from beta testers and software developers—has contributed not only to the product itself but to the quality and quantity of support Microsoft is prepared to give *Windows* developers. No wonder Lotus Development and Ashton-Tate signed on.

So there may yet be a happy ending. The hardware is here and *Windows* is open, just waiting for software to jump through. *—Karl Koessel*

NEC's Move?
(continued)

the CPU in your present computer and pop the NEC equivalent in its place. The entire operation takes about 15 minutes and demands no hardware or software adjustments. It'll cost you all of $30.

Because no machine redesign or plant retooling is necessary, some manufacturers are likely to provide the V-series chips as standard equipment—perhaps just in time for NEC's newest additions to the Intel emulation society. Reports are that V-series versions of the 8087, 80286, and 80287 are in the works.

And this, apparently, is merely where it starts. Assuming software developers begin to incorporate the new instruction set in their products, the PC may soon be capable of serious graphics processing. With NEC's entries to contemplate, Intel is surely equating imitation with something other than flattery. *—TJ Byers*

Bar Code Breakthrough?

Way back when, computers stored data on punched cards, then on magnetic tape, eventually on floppy disks, and now—on Softstrips?

This new data medium, developed by Cauzin Systems of Waterbury, Connecticut, essentially consists of industrial-strength bar codes that are, in principle, much like those slapped on the side of a can of peas.

The strips improve on current methods of data storage in several ways. Softstrips can be produced by the same printing presses that turn out books and magazines; you can print strips yourself with a laser or dot matrix printer or even a photocopier; and data can be read even if you spindle or mutilate the strip. The technology's capacity for data is impressive: Unlike the grocery store bar code, which conveys no more than a dozen characters, a single Softstrip-encoded sheet can contain up to 20 pages of text.

In order to read a Softstrip, however, you need a $200 scanner system that works on a PC, an Apple II, or a Macintosh—and, in the brief life of this promising product, that's been the rub. Few people will buy the scanner unless enough software exists to justify the purchase, yet few publishers will commit software to strips unless there are enough scanners to make the medium worthwhile.

"We have a real 'chicken and egg' problem," admits Rick Mason, Cauzin's director of software development. Hoping to overcome the obstacle, Cauzin is giving away 100 million programs on Softstrips bound into books and magazines from a stellar group of 27 publishers. Cauzin also plans to publish several dozen programs, priced from $2.98 to $12.98, on the Cauzin StripWare label.

Although the technology seems sound, marketing may prove a more perplexing problem. Cauzin, with financial backing from Kodak, Xerox, and General Instruments, is initially promoting Softstrip technology in the consumer market. But Neil Kleinfeld, Cauzin's vice president of marketing, believes Softstrip will eventually be adopted by business as a file-transfer medium for managers who now shuttle paper or floppies between remote locales.

The possibilities are tantalizing: With a flick of the wand, pages of listings in this magazine's "Hands On" section could be committed to floppy disk. Your hands, meanwhile, scarcely need touch a keyboard ... *—John Eckhouse*

Who Has the Ability?

These have not been the best of times for Xanaro Technologies, the Toronto-based software start-up whose sole product, *Ability*, a six-function integrated package, was an ambitious attempt at creating a harmonious software suite (see "Flipping Over Ability," *PCW*, October 1985).

Earlier this year, Xanaro moved rapidly from Canada's version of Chapter 11 bankruptcy to outright liquidation, sunk by debts variously estimated at between $5 million and $8 million. Xanaro reportedly spent some $7 million on product promotion alone, including the marketing tactic of binding demonstration disks into the November 1985 issue of *PC World*. Market research sources peg sales of the program at around 5000 copies.

Migent Software, publisher of *Enrich*, a data manager endowed with a bit of artificial intelligence, has since acquired the source code for *Ability*. The link between the program's incarnations is Carl Gritzmaker, Migent chairman, former vice president of sales for Xanaro, and an alum of Lotus Development and Ashton-Tate. Gritzmaker promises to keep *Ability* available and able.

John Eckhouse is a business reporter for the San Francisco Chronicle, *TJ Byers is a technical writer and author based in southern California, Eric Knorr is an Assistant Editor for* PC World, *Karl Koessel is* PC World's *Technical Editor, and Jon Stewart is the magazine's Managing Editor.*

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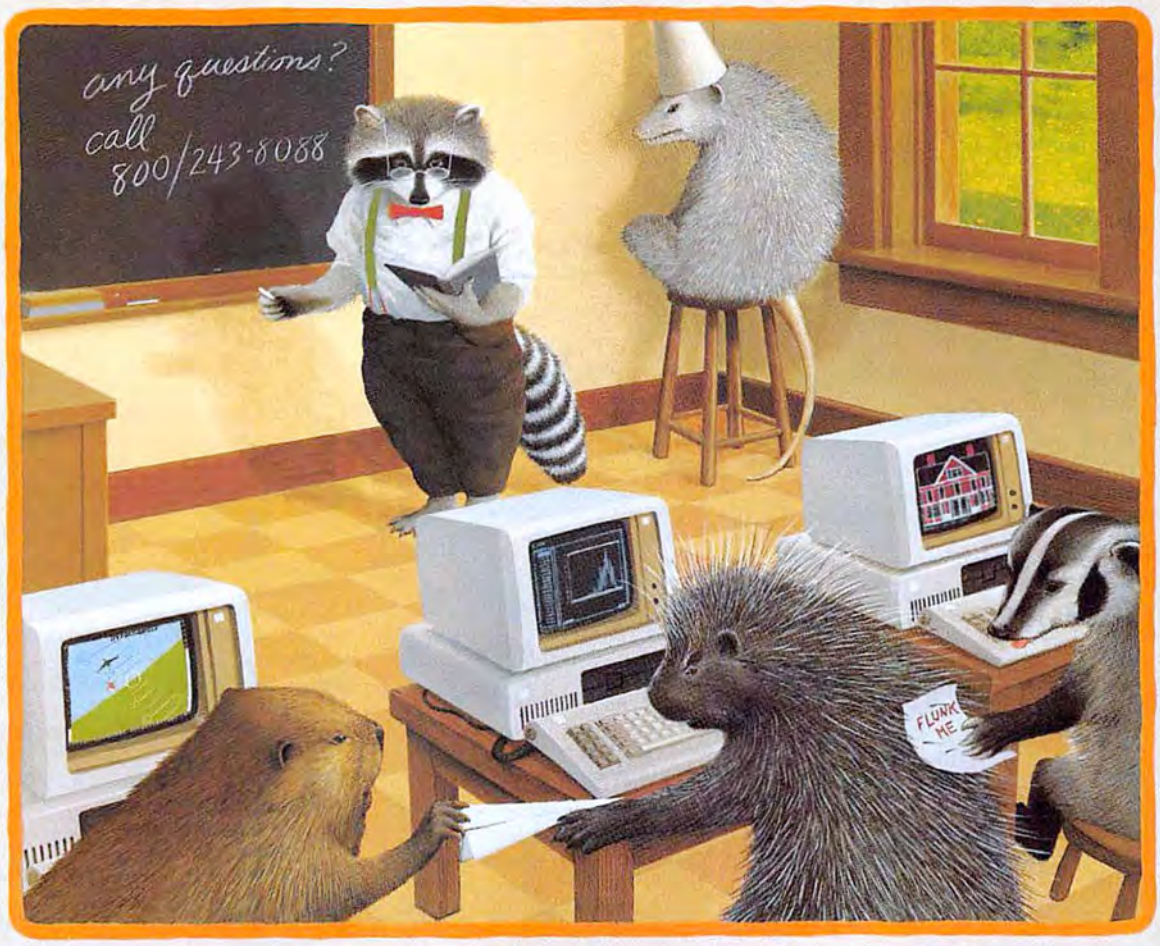

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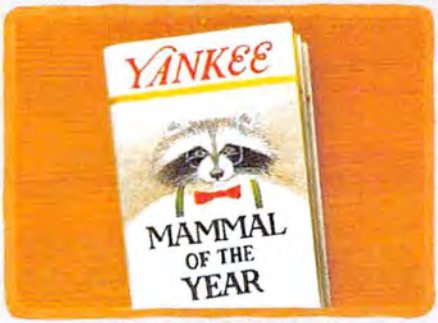

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information illun

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How to Use:
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Wordstar Displaywrite 3
Symphony ..... *each* $43.

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*The Instructor II ..... 35.
*Professor DOS ..... 47.
*Tutorial Set *(both items above)* ..... 75.
*Typing Instructor ..... 39.
*Training for Lotus 1-2-3 ..... 49.
*Training for dBase III ..... 49.
*Training for Project Management ..... 49.

Scarborough Systems
*MasterType ..... 26.

Simon & Schuster
*Typing Tutor III ..... 33.

EDUCATIONAL

Barron's
*Computer SAT ..... 59.

Designware
*Spellicopter *(ages 6 to adult)* ..... 22.
*Grammar Examiner *(ages 9 to adult)* .... 25.

Eduware
*Algebra 1, 2 or 3 ..... 22.

Harcourt Brace Jovanovich
*Computer SAT ..... 49.
*Computer GRE ..... 55.

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Educational Games for Young Computer Users. *(All require graphics board)*
*Face Maker *(ages 3 to 8)* ..... 18.
*Kids on Keys *(ages 3 to 9)* ..... 18.
*Kinder Comp *(ages 3 to 8)* ..... 18.
*Alphabet Zoo *(ages 3 to 8)* ..... 20.
*Delta Drawing *(ages 4 to adult)* ..... 27.

Stone *(requires graphics board)*
*My Letters,Numbers,Words *(ages 1 to 5)* 29.
*Kids Stuff *(ages 3 to 8)* ..... 29.

The Learning Company
*Reader Rabbit *(ages 5 to 7)* ..... 26.
*Rocky's Boots *(ages 9 and up)* ..... 32.

RECREATIONAL

Blue Chip
High finance simulations.
*Baron ..... 32.
*Millionaire ..... 32.

Electronic Arts
*Pinball Construction Set ..... 24.
*Music Construction Set ..... 26.
*Dr. J/Larry Bird One-on-One ..... 28.

Friendlysoft
*PC Arcade ..... 35.

Hayden Software
*Sargon III *(highest rated Chess program)* 32.

Infocom *Difficulty levels shown in italics*
JUNIOR
*Seastalker ..... 25.
STANDARD
*Enchanter *the Witness *Planetfall
*Cutthroat *Wishbringer *Zork I
*Hitchhiker's Guide *Ballyhoo ..... *each* 24.
ADVANCED
*Zork II *Zork III *Sorcerer
*A Mind Forever Voyaging ..... *each* 27.
EXPERT
*Spellbreaker *Suspended ..... *each* 29.

Invisiclues (hint booklets) are available for most Infocom games. Specify game ... 6.

Microleague Sports
*Microleague Baseball ..... 25.

Microprose
*F-15 Strike Eagle ..... 22.

Microsoft
*Flight Simulator 2.12 *(now works with Hercules Mono Card)* ..... 32.

1Step Software
*Golf's Best *(Pinehurst)* ..... 32.
*Golf's Best *(St. Andrew's)* ..... 32.

Parlor Software
*Bridge Parlor *(best Bridge simulation)* ... 49.

PCSoftware
*Championship Blackjack ..... 25.

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*King's Quest II ..... 33.

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*GATO ..... 27.
*Tellstar *(w/Halley's Comet)* ..... 32.

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AST-5251-11 ..... 579.
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Advantage 128k *upgradeable to 1.5 Meg includes Sidekick version 1.5 non-copy protected* ..... 369.
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Amdek
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CABLES
*Smartmodem to IBM Cable ..... 17.
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Color and Monochrome Extension cables 39.
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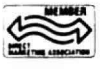

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*✓Smartmodem 1200 ..... $389.
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✓Smartmodem 1200B *(no software)* ..... 309.
*✓Smartmodem 2400 ..... 579.
✓Smartmodem 2400B *(w/Smartcom II)* .. 539.
✓Smartcom II 2.1 *(software)* ..... 75.

Hercules
✓Hercules Color Card *(parallel port)* .... 159.
✓Hercules Graphics Card *(parallel port)* 299.

Innovative Concepts
*✓Flip n' File 50 ..... 16.
*✓Flip n' File 50 w/lock ..... 21.

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✓Above Board AT ..... call
Above Board PS *(multifunct.board)* .. special
8087 *(for IBM-PC & XT)* ..... 129.
8087-2 *(works on 8 Mhz computers)* ... 177.
✓80287 *(for IBM-PC AT)* ..... 225.

Kensington Microware
*✓Masterpiece ..... 94.
*✓Masterpiece Plus ..... 129.
*✓Printer/portable computer stand ..... 17.

key tronic
5150 keyboard ..... 115.
5151 keyboard *(deluxe)* ..... 169.
*jr5151 keyboard *(deluxe)* ..... 169.
✓5153 keyboard *(with touch pad)* ..... 279.

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✓*New!* 3 Button Joystick ..... 35.
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*✓PC Mouse with PC Paint+ ..... 139.
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✓Multisync monitor *(EGA compatible)* ... 549.

Orchid Technologies
Conquest Multifunction Board *Øk fully supports* LOTUS/INTEL *expanded memory specification (EMS)* ..... 264.
✓PC Net Board ..... 319.
PC Turbo 186 w/256k and Daughter Board *expandable to 640k* ..... 379.
✓Eccell Multifunction Board for the AT ... 399.
PC Turbo 286e w/1 Meg ..... 749.

Paradise Systems
✓Color Card ..... 99.
✓Monochrome Card ..... 109.
✓Color/Mono Card ..... 149.
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✓Five Pack w/384k ..... 159.

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Princeton Graphics
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Control Data (CDC)
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✓Bernoulli Box 20 Meg w/PC2 card .... 2349.
✓10 Meg cartridge ..... 48.
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✓20 Meg cartridge ..... 67.
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Mountain Computers
Drive Card 20 Meg ..... call

Seagate
20 Meg Internal Hard Drive *(w/controller and cables)* ..... 469.
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Toshiba
✓AT 360k Drive (5¼") *half-height drive* .. 99.

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✓Verbatim ..... 45.
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INFORMATION SERVICES

Compuserve
*✓Compuserve Information Service *(includes subscription, manual, 5 hours of connect time, monthly publications)* ..... 24.

Dow Jones
*✓Membership Kit ..... 19.

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From the Hardware Shelf

PC World offers first impressions of recent hardware releases

Compaq unleashes the Portable II, Zenith's ZF-158 puts quality where it should be, the Modem Accelerator spurs file transfer, and the Zoom/ Modem throws in the kitchen sink.

Edited by Eric Knorr

Compaq Portable II

In the beginning there was IBM and it was good—until Compaq came along and made it better. Now the company that knows more about portables and PC compatibility than IBM itself has come up with the Compaq Portable II, a sleek new addition to Compaq's venerable line.

This 8MHz 80286-based Portable II is 30 percent smaller, nearly a fifth lighter, and four times faster than the Compaq Portable, the company's entry-level product. Thanks to its eminent luggability, the Portable II won't bang against your leg like its bulkier forerunners, and red-eye devotees should prize the portable's talent for slipping under airline seats. With only two free expansion slots, less space for disk drives, and a small power supply, the Portable II can't quite match the expandability of the Portable 286, Compaq's next step up, but that's just about the only trade-off. For $300 more than the Portable Plus, Compaq's 8088-based hard disk machine, and $1000 less than the Portable 286, the Portable II proffers high-end performance for a mainstream price.

A cool $3499 nets you the 23.6-pound Portable II/Model 1, which has 256K of memory and a one-third-height 360K floppy disk drive. A 9-pin (AT-style) serial port, a parallel port, a composite video port, an RGB port, and a light pen connector are also included. The Compaq Portable II/Model 2 adds a second floppy drive for just $100 and two pounds more. At $4799, the 26.2-pound Model 3 includes 640K of RAM and a 10MB hard disk drive. By shunning expensive, little-used, AT-type components (such as a 1.2MB floppy disk drive and controller), the Portable II keeps its price under control with little sacrifice in functionality.

You can upgrade Models 1 and 2 to 640K by throwing out the 18 socketed 64K-bit RAM chips in the motherboard and plugging 256K-bit RAM chips into those sockets. Without taking up a single expansion slot, you can add a second floppy disk drive, a 10MB half-height Compaq hard disk, and a Portable II-specific 512/1536K extended memory board, which plugs into a special bus connector on the underside of the motherboard. The hard disk controller is integrated into the drive assembly itself and connects by a ribbon cable to the floppy controller.

Aesthetically inclined users should find the streamlined, ergonomic-gray face of the machine a welcome improvement. At 17.7

The box may have shrunk, but the processing power has grown. Nearly one-fifth lighter, 30 percent smaller, and four times faster than the Compaq Portable, the Compaq Portable II offers AT-like functionality to go.

Despite its other diminutive dimensions, the Portable II's screen is actually a shade larger than that of its predecessors.

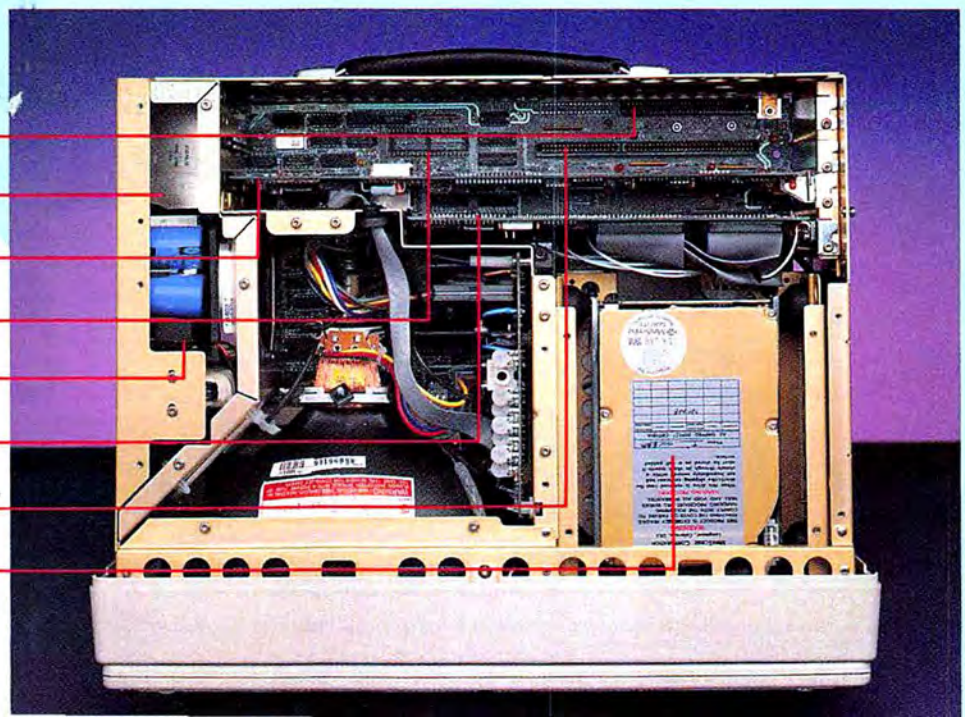
inches wide by 7.5 inches high by 13.9 inches deep, the Portable II is significantly smaller than the company's other portables, but its 9-inch screen is actually a bit larger than those of its popular predecessors. Like its forerunners, The Portable II's screen can duplicate the IBM Monochrome Monitor's crisp characters, or it can display medium-resolution graphics by designating colors as one of four shades of green. Also in the Compaq tradition, the video adapter can drive either Compaq's optional RGB or composite monitor.

The Portable II's keyboard generally imitates the AT's layout, although it's narrower than the original, and the function keys have been placed along the upper left edge. This smaller design doesn't make the keyboard flimsy or toylike. The size and the spacing of the keys remains full-scale, and the touch—like that of all recent Compaq entries—is agreeably snappy. The annoying tension on the keyboard's cord has been reduced, making the tug-of-war you might have experienced with earlier Compaq keyboards a thing of the past.

Inside the Portable II, Compaq has redesigned the chassis without compromising on ruggedness. The lighter, more unified assembly accommodates all the components save the mass storage module, which retains its proven shock-absorbent design. This "uniframe"

(continues)

A look inside the Compaq Portable II



Photographs by David Bishop

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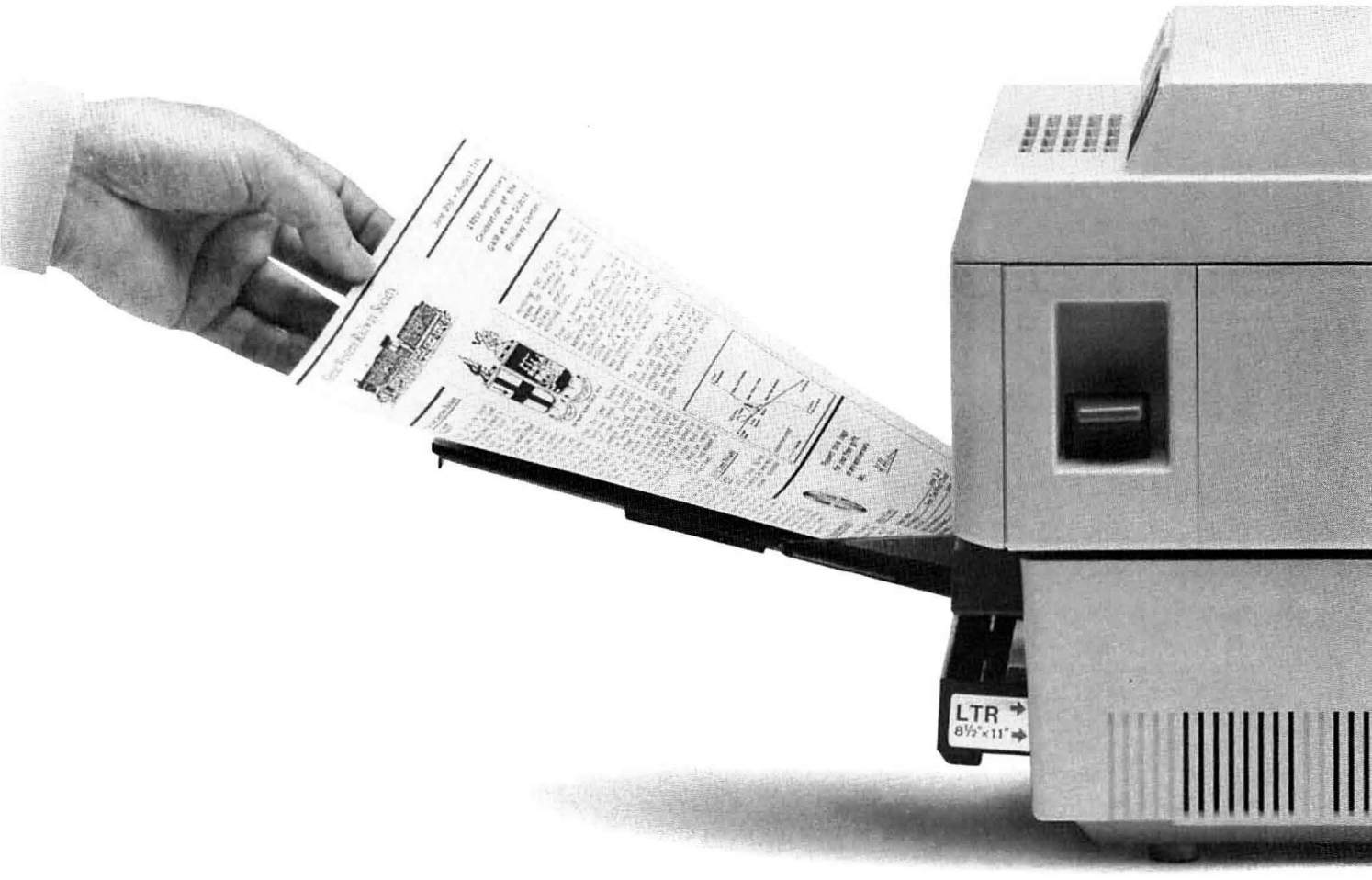

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Dot and Daisy.

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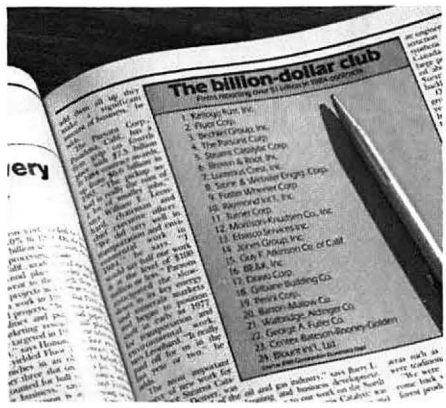

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Source: ENR Construction Economics Dept., *Engineering News-Record*. Issue Date: April 18, 1985.

Circle 148 on reader service card

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construction also promotes quicker manufacturing, service, and enhancement. Power supply components slide in from the side and mount directly to the uniframe, and the CRT and its analog printed circuit board are chassis-less components that slip in from the front.

The Portable II's new shell has flat, one-piece side panels with doors that slide easily, in contrast with the bowed, two-piece construction of the Portable. Extra air vents molded into the forward section of the side panels help ensure that the Portable II's smaller, tighter box does not overheat.

Custom rubber parts insulate the power supply as well as the CRT power leads that run between the frame's struts and the main cavity. For international travelers, an optional circuit board protects the power supply by automatically switching between 220- and 110-volt currents, and you can even opt for a British-style AC plug. A roomy cavity accommodates the power cord, which stows away behind a 12-inch door in the bottom of the machine. The door also folds out to serve as a two-position foot for elevating the machine to a comfortable angle.

With the Portable II, Compaq has taken pricey 80286 power and put it in the range of last year's Compaq Deskpro. For those who like their ATs to go, the Portable II offers an opportunity to move up to the next generation of PC technology without sacrificing traditional Compaq quality, compatibility, or portability.
—Karl Koessel

(continues)

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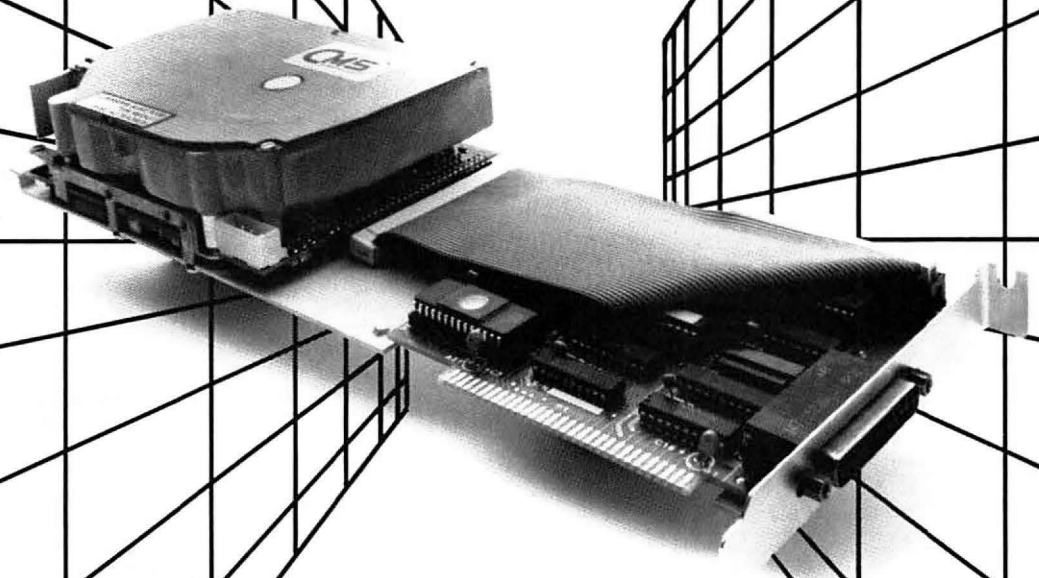

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and in walks Della, smiling mysteriously. "Looks to me like you had yourself a female visitor last night, Perry. Entertaining a new client?"
INFOCOM
You have:
no tea
a loose pile of junk mail
a toothbrush
a flathead screwdriver
your gown (being worn)
It looks like your gown contains:
pocket fluff
The vast yellow ships thunder across the sky, spreading waves of terror and panic in their wake. The voice of the Vogon Captain slams across the country, insisting that the planning charts and demolition orders have been available at the local planning office in Alpha Centauri for fifty years and it's too late to start making a fuss about it now.

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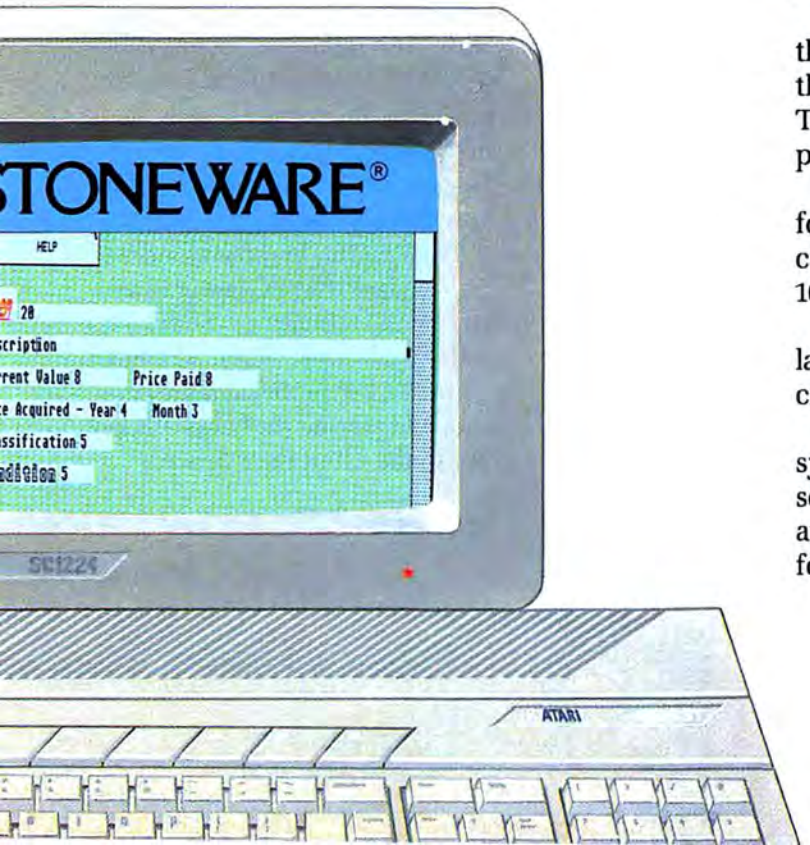
In fact, the software companies who are committing their time, money, and expertise to the ST are the same companies who regularly show up on all the software hit lists.



And it's no wonder that the leading software developers are excited by the power and speed of the ST Computers.

Stoneware®, for example, checked out the speed of the ST Disk Drive in data base applications and flipped. Instead of having to wait forever to manipulate data, thousands of records can be sorted in a fraction of the time that it takes on other computers. And instant responsiveness is the name of the game, not waiting.

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For their needs, Activision® focused on the built-in MIDI ports for attaching synthesizers and other musical instruments. This enabled them to design the ultimate program for playing and composing music.

The list goes on and on. But a designer for Spinnaker® perhaps summed up the capabilities of the 520ST and the new 1040ST best:

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Durable as well as expandable, the Zenith ZF-158 is a favorite on military desk tops. The ZF-158's CPU is on an expansion board, making the machine easy to upgrade and maintain.

Compaq Portable II
Compaq Computer Corp.
20333 FM 149
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List price: 256K RAM and 360K floppy disk drive (Model 1) $3499; 256K RAM and two 360K floppy disk drives (Model 2) $3599; 640K RAM, 360K floppy disk drive, and 10MB hard disk (Model 3) $4799

Zenith ZF-158

After Compaq, there's Zenith. *Zenith?* That's right: The famed maker of TVs and corporate ally of Heath is the second-largest compatibles vendor in the United States. Zenith's healthy market share is largely due to the patronage of a single customer, one that never goes in for anything in a small way—the Department of Defense.

But just because the military loves them, don't put Zenith PCs on a par with $200 hammers or $700 coffee pots. The machines' reputation for cost-effectiveness and easy maintenance is well deserved. Zenith Data Systems' latest entry is the ZF-158, a fully expandable, high-performance compatible that may even make a splash in the private sector.

The ZF-158's monitor has an agreeable, streamlined look, and the boxy, all-metal chassis seems like it could withstand a good deal of kicking around. The footprint is about 25 percent smaller than that of the IBM PC. My ZF-158 came with 256K of memory (expandable to 640K), a monochrome monitor, and two half-height 5¼-inch floppy disk drives. The drives are Shugart SA455s—durable, but a bit noisy for my tastes.

The ZF-158's keyboard modifies the standard IBM PC layout by enlarging the <Enter>, <Shift>, and <Backspace> keys, adding an <Enter> key to the numeric keypad, and placing the backslash key just to the left of the <Space>

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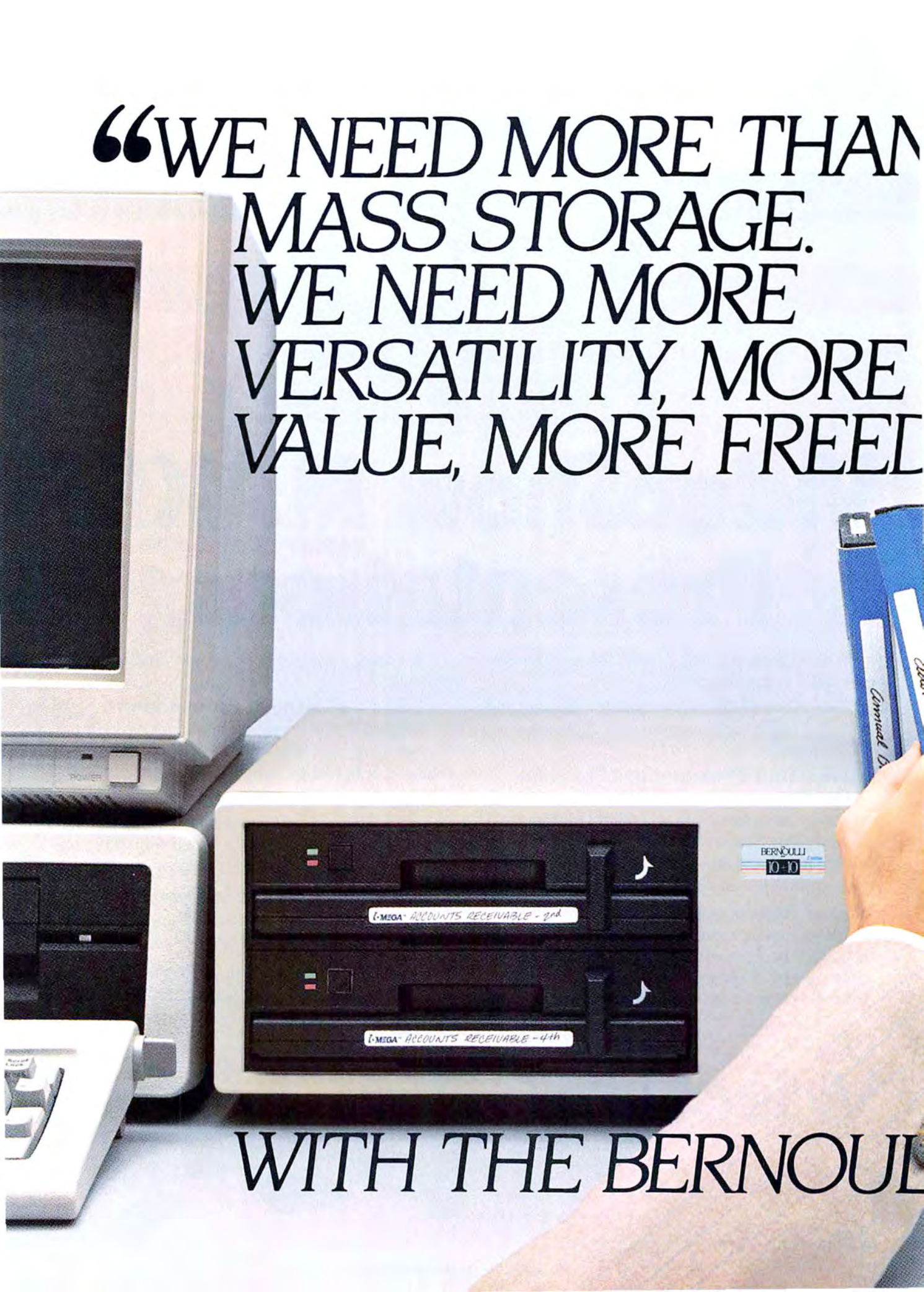
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bar. The keyboard has a pleasant, light touch, and it's quiet except for a clattery <Space> bar.

Designed with easy maintenance in mind, the ZF-158's CPU is on an expansion board rather than on the motherboard. This removable, full-size board contains the machine's 8088-2 microprocessor, related support chips, and the keyboard port. The board also provides a parallel port, a socket for an 8087 coprocessor, and sockets for three banks of 64K or 256K memory chips. An external push-button switch lets you toggle between a 4.77MHz and 8MHz clock rate.

LED indicators on the CPU board augment its serviceability. If the CPU, ROM, RAM, keyboard, system clock, disk controller, or interrupt controller has a problem, the appropriate LED remains lit. Like other Zenith machines, every chip has a socket for easy replacement.

A second plug-in board holds a serial port, a multifunction display adapter, and the floppy disk controller. Jumpers let you control vertical and horizontal sync signals and their polarities, enabling the ZF-158 to work with most monitors. All told, the ZF-158 has eight expansion slots, which leaves six free for whatever IBM-compatible boards your heart desires. The compact but capable 168W power supply ensures that you'll have enough juice for maxing out your machine.

Eight video modes are supported, including 40/80-column text, color/monochrome output, and medium/high-resolution graphics. The ZF-158's display adapter is fully compatible with the IBM Color/Graphics Adapter; unfortunately, text characters have the same low-resolution, 7-by-7 dot array.

As with any newer compatible, the advantages of the ZF-158's 8MHz "turbo" mode turn up only during processor-intensive tasks. Printing, telecommunications, disk drive access, or any I/O activity shows no significant speed increase. The processor-intensive test I chose was recalculating a large *1-2-3* spreadsheet. The operation was 36 percent faster in turbo mode than at 4.7MHz.

Not only *1-2-3*, but *Flight Simulator, SideKick,* and the hardware-sensitive Bruce & James' *Wordvision* ran under DOS 2.10 without a hitch. I also tried *WordStar, Smartcom II, Microsoft Access, Ready, Electric Desk,* and *Easy-Link Instant Mail Manager* without difficulty.

Technically inclined users should appreciate the software stored in the ZF-158's ROM. Similar to DOS's DEBUG program, this program enables you to search for a pattern in memory, fill memory with a pattern, disassemble a program, and view or alter memory contents and CPU registers. Using this firmware, you can also change

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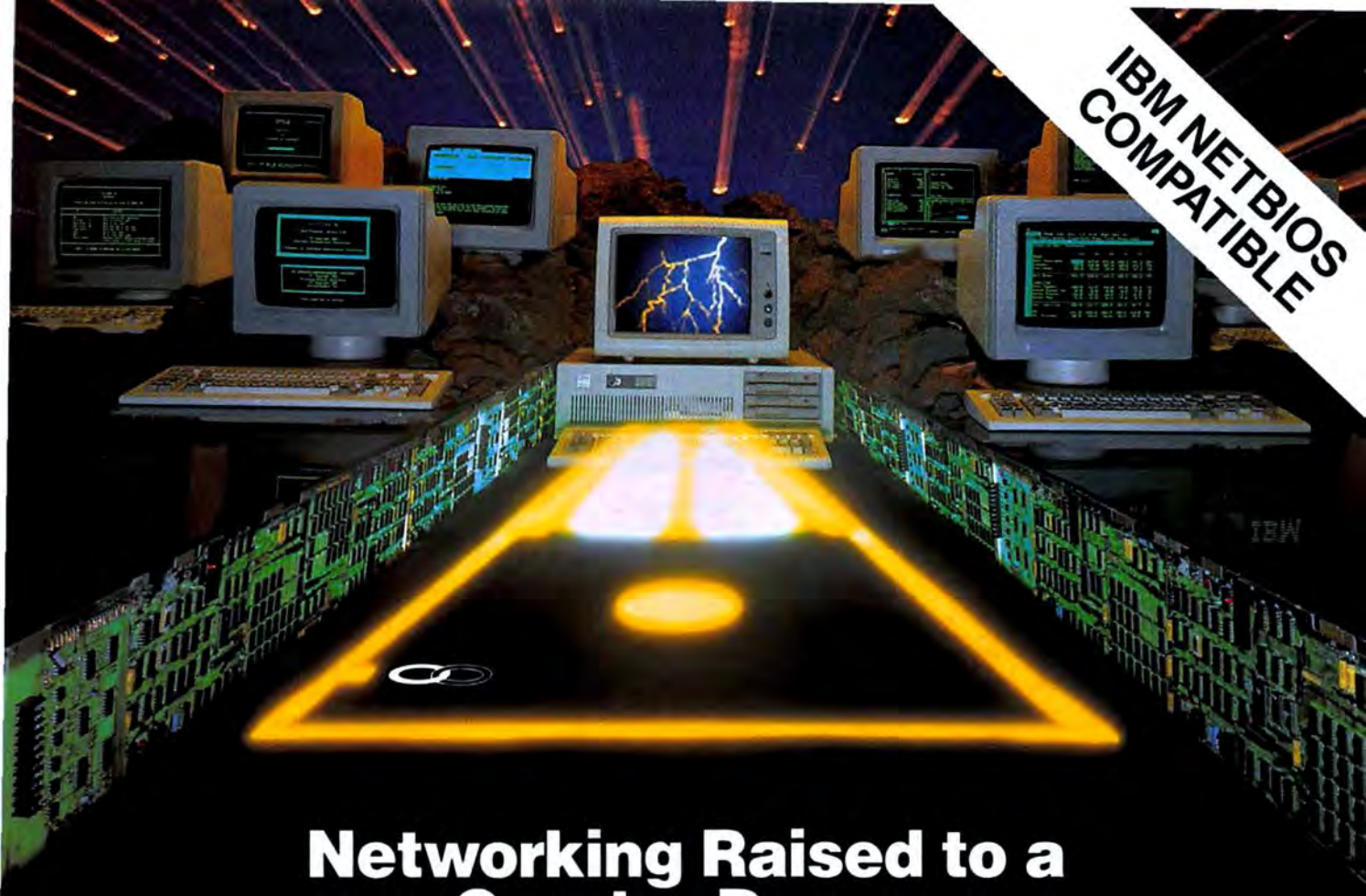

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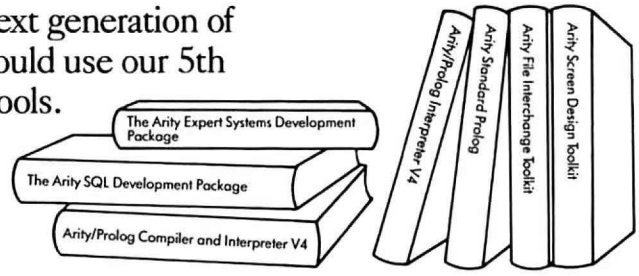

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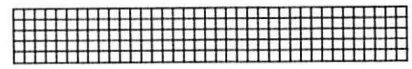

video modes, display a color bar chart, load the operating system, and perform extensive system tests.

The ZF-158 is an inexpensive, solidly constructed compatible that doesn't cut corners. Both its galloping clock rate and capacious expandability make it appealing to power users in or out of the military. The ZF-158 is also available in kit form, and the modular design should make assembly or repairs relatively smooth (provided you can figure out how to remove the snugly fit boards). Zenith's hokey old motto, "the quality goes in before the name goes on," certainly applies to the ZF-158. *–Mark Haas*

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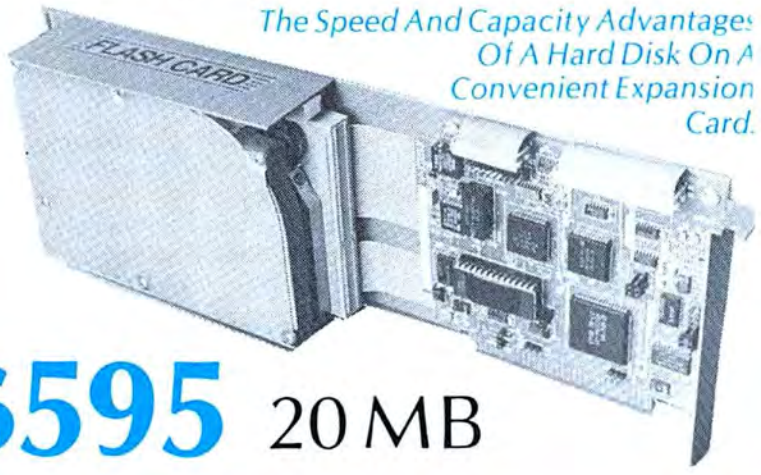

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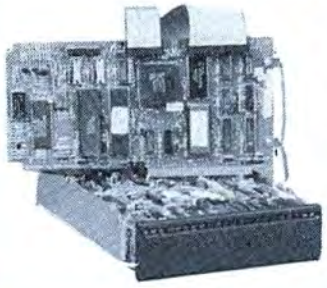

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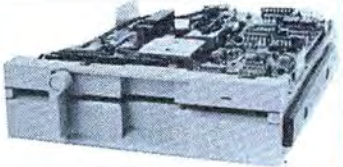

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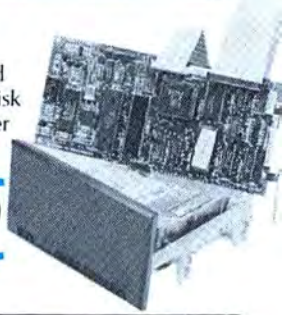

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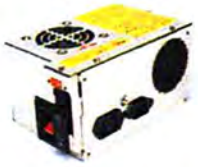

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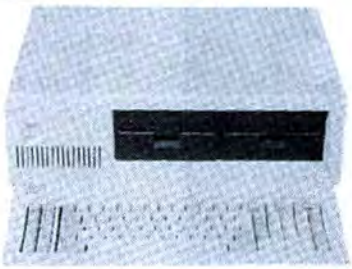

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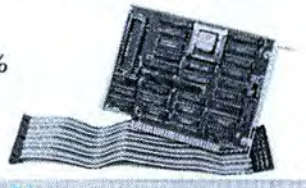

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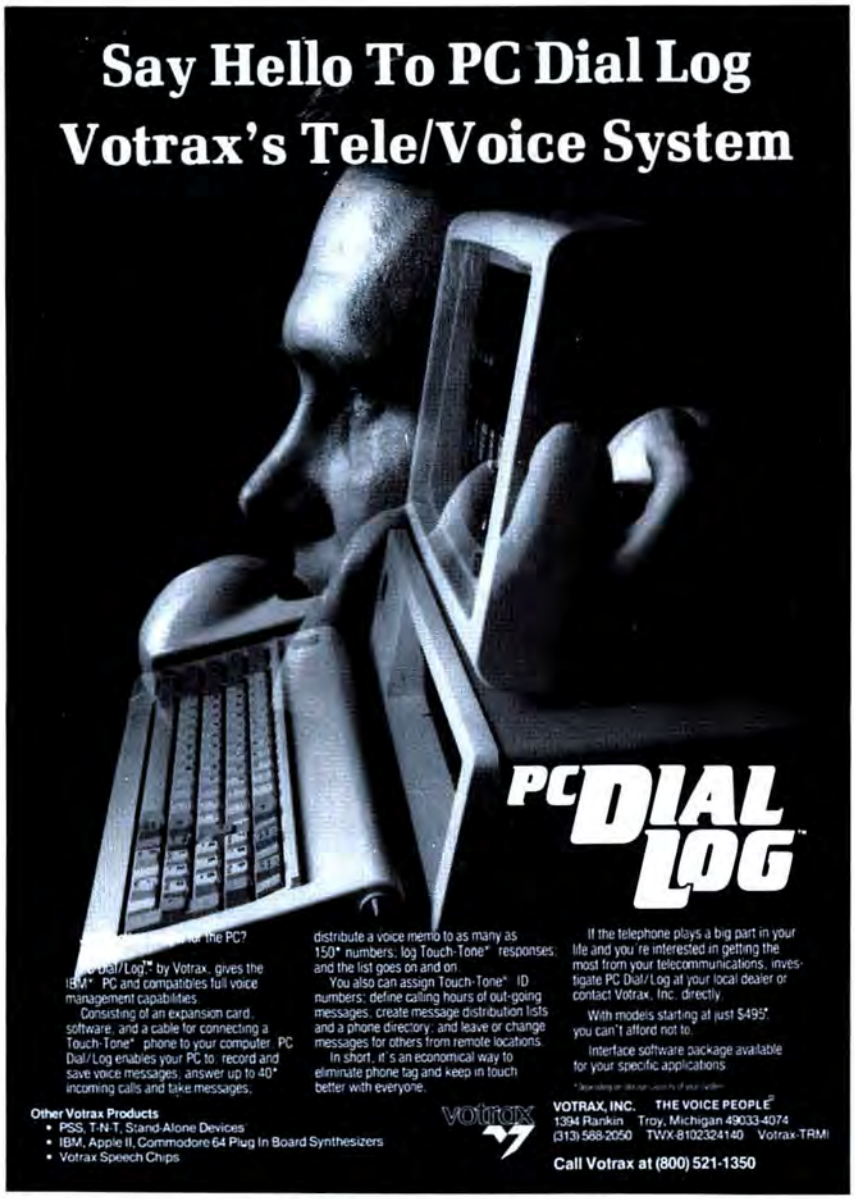

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Your PC Market-Maximizer Account

The *PC World* Directory is a highly cost-effective way to enter the profitable IBM PC market—available in three- and six-month contracts. This comprehensive listing is your best bet for high returns with a minimal advertising investment. See this month's Directory for details.

Kowalski suggested we buy 2400-bps modems, but the bill was too steep. Just as I was gathering the nerve to ask the boss for a budget increase, Kowalski introduced me to a strange device called a Modem Accelerator. "No, it's not a modem," Kowalksi explained. "It's a Symbolic Tokenizer."

"Yeah, sure, Kowalksi, whatever you say," I sighed, but fifteen minutes later I had the straight scoop. The Modem Accelerator, made by Datran Corporation, turned out to be a plug-in multifunction board combined with software. It not only compresses files to a third of their normal size (cutting our phone costs by two thirds), it also performs data encryption and spell-checking.

Even though the $500 per accelerator set me back on my heels at first (you need a Modem Accelerator on each side of the link), it's still several hundred dollars cheaper than buying two 2400-bps modems. What's more, we wouldn't have to buy the spell-checking and encryption software we'd penned into the budget.

The Symbolic Tokenizer that Kowalski was raving about is a microprocessor-based device that matches text with words in a 28,000-word, 4000-phrase firmware dictionary, and transforms them into compact binary symbols, or tokens. The documentation claims that using tokens instead of ASCII code reduces file size by a factor of four, provided your text happens to match the Modem Accelerator's somewhat limited dictionary. Actually, 3-to-1 is the best I

(continues)

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Print your listings
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Press a key, wait 6 secs*

Key in the report data elements on screen

Report Builder automatically writes the program code and links it to your datafile

Print your listing
- Report program source code listings

Compile the report builder code using the Turbo Pascal™ compiler

Attach the new report module to your system menu

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(Typical 10 screen 8 file/index application)

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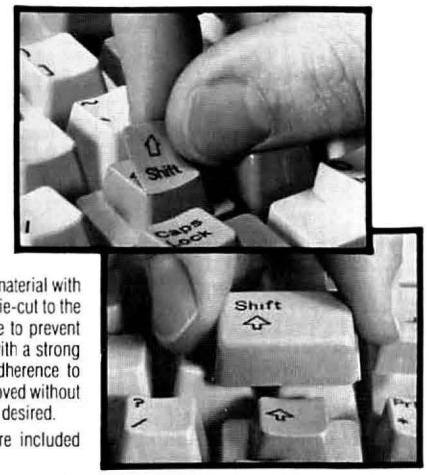

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achieved, but most of my files compressed slightly less than that. A 5-to-2 ratio was the lowest I obtained.

Currently, the Modem Accelerator can compress ASCII, *WordPerfect*, and *WordStar* files. The compression works very quickly (20,000 bps), and the decompression works even faster (50,000 bps). To run the Modem Accelerator, you enter one of several brief commands at the DOS prompt, followed by the appropriate drive, path, and file names.

Although compressed files appear as gibberish to anyone lacking a Modem Accelerator, you can add even more security by appending a /e to the end of a compression command. The /e command encrypts command files with a one-million-bit encryption key. You can save this random number key on disk and lock it away until you need to decode the file.

The Modem Accelerator's firmware-based spelling checker may not be the most sophisticated I've seen, but it's certainly the speediest. Datran claims it's the fastest checker in the world, clocking in at 500 words per second, but I had to test it myself. The Modem Accelerator checked a 5376-byte file in 3 seconds, compared to 20 seconds with Reference Software's quite respectable checker, RefSpell. But the Modem Accelerator lacks the interactive correction features of RefSpell and other major checkers. All you can do is mark or ignore words, or save them to a personal disk-based dictionary that is lim-

(continues)

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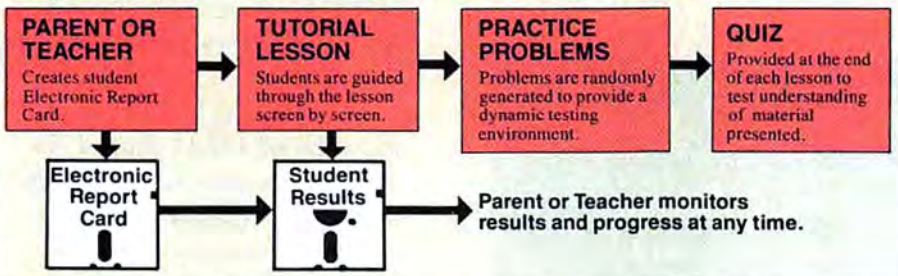

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ited to 500 words. However, you can extend the main dictionary another 10,000 words by purchasing up to five plug-in ROMs.

The Modem Accelerator performed well in its avowed purpose of cutting telecommunications costs. Generally, time saved was directly proportional to the reduction in file size. Datran maintains that you can transmit its compressed files over any modem at any speed using any 8-bit protocol; Kowalksi and I tested it successfully on 1200-bps Hayes Smartmodems using *PC-Talk III*, with the XMODEM error-checking protocol. If you use an electronic mail service, however, it must support binary file transfer to send the compressed files.

Datran plans to add features such as a real-time spelling checker, a real-time thesaurus, and specialty dictionaries. Essentially, it is offering a reference engine in firmware similar to those offered in memory-resident *Turbo Lightning* by Borland and Reference Software's *Reference Set* (see "Random Accessed" for a review of these programs). Datran is also licensing its Symbolic Tokenizer to OEMs for integration into modems, disk drives, tape controllers, and networks.

Thanks to the Modem Accelerator, Kowalksi and I finished our top-secret project on time: an epic miniseries on the life of Mao Tse-tung. Unfortunately, a rival network slayed us during Sweeps Week with a mindless potboiler starring Joan Collins. But Kowalski's got a blockbuster in the

(continues)

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- Produces complete Accounts Payable Reports

ACCOUNTS RECEIVABLE

- Full control over receivables
- Automatic posting of recurring customer charges or interest
- Flexible year-end closing dates
- Customized inquiry and report
- Complete set of Accounts Receivable Reports

BILLING

- Automatic plus last minute invoicing
- Uses standard invoices (customized formats that you design on screen)
- Statements and Reminders
- Design your own
- Flexible ageing 30/60/90/120 or 7/10/14/21 days or any combination
- Complete Reports

GENERAL LEDGER AND FINANCIAL REPORT WRITER

- A 20-digit alpha numeric account code allows unlimited number of Department Accounts and Sub-Accounts
- Handles Multi-company and Divisions easily if needed
- Specific General Ledger accounts may be accessed by Name Key search if account number is not known
- Standard Chart of Accounts can be easily modified as needed
- Design your own Reports. Six Standard G/L Reports are provided:
- Chart of Accounts Report
- Transaction Audit Report
- Trial Balance
- Profit & Loss Report
- Balance Sheet
- Budget Comparison Report
- The G/L Module may be used as a Stand-Alone Cashbook system
- A customized Report Writer feature gives easy access to the financial report format you need

BILL OF MATERIALS

- All files are always in balance
- Modules can run integrated or stand-alone
- Supports service or product related companies
- Load and Go in 15 minutes

SALES LEAD MANAGEMENT

- Tutorials provided On-Disk for sample companies
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- Payroll Management for large or small companies
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FEATURES	SELF TEACHING ACCOUNTANT $99.95	DAC-EASY™ $69.95	EASY BUSINESS™ $595.00 per module
On screen context sensitive help available at all times	YES	NO	YES
On screen editing for errors	YES	NO	YES
Multi-client/Multi-company capabilities	YES	NO	YES
Payroll available	YES (extra)	YES (extra)	YES
On disk tutorial	YES	NO	YES
Custom report writer	YES	LIMITED	YES
Upgrade path to multi-user LAN version of package	YES	NO	YES

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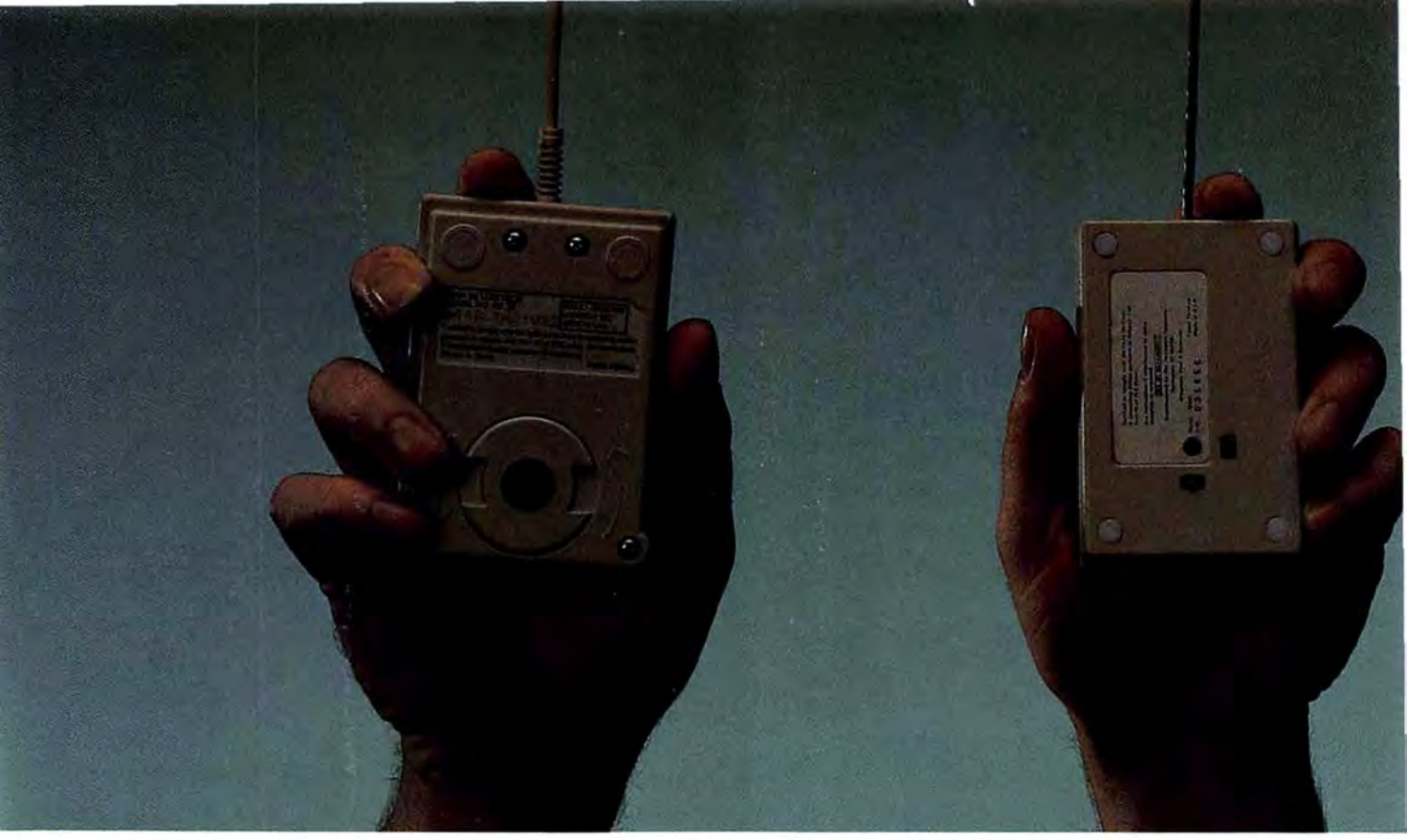

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All of which makes the right choice so obvious you could find it in the dark.

Works longest.

Turn over a mechanical mouse, and you'll see a rubber tracking ball. Unfortunately, it's also a dust-attracting ball, which can gum up its own inner works.

But PC Mouse is entirely electronic. It's optical instead of mechanical (it uses light, not rubber, to measure movement). So there are no moving parts to wear out. No cleaning. No slipping. No maintenance. *And the only three year warranty.*

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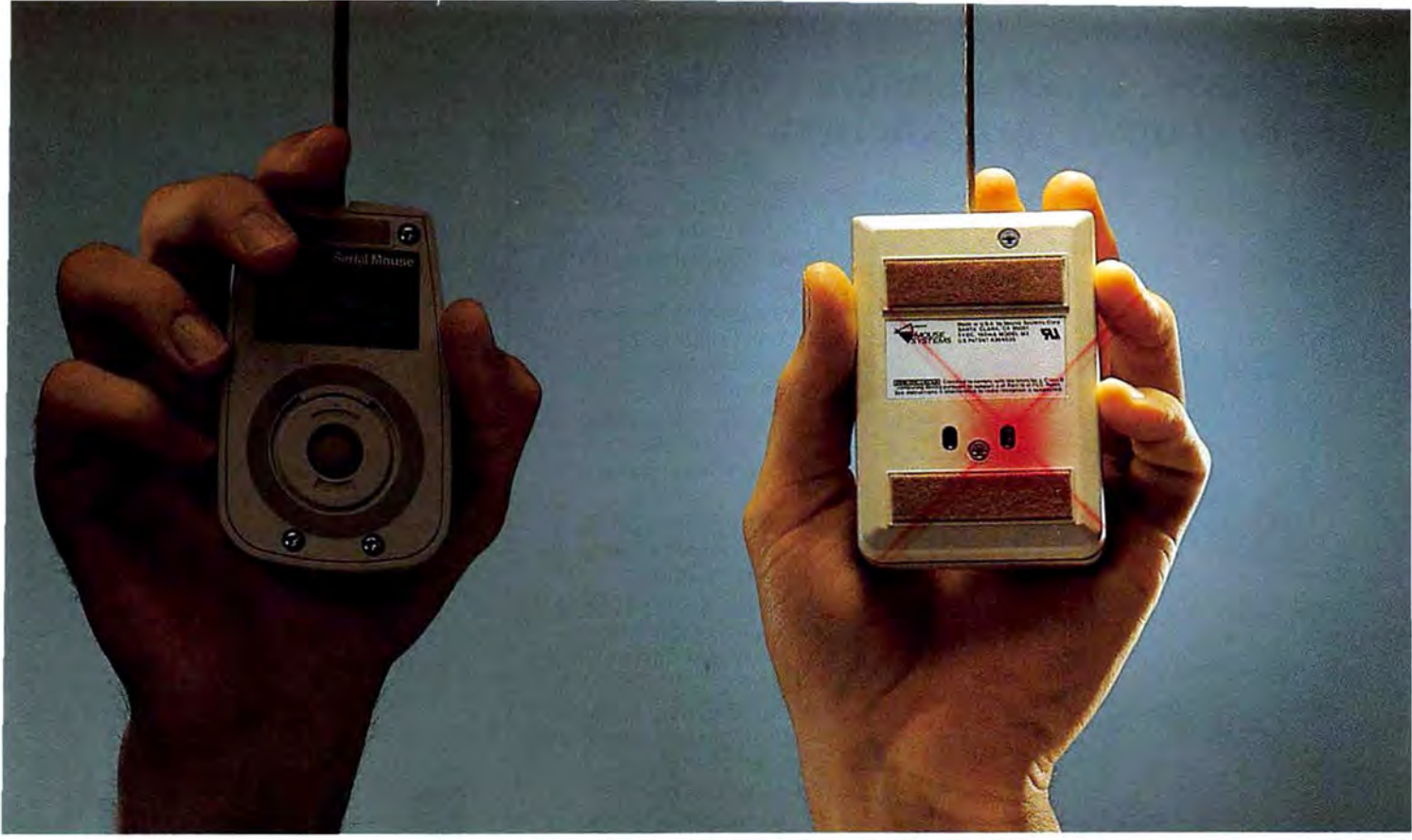
"Unlike Microsoft...the PC Mouse performs well with both mouse-based and keyboard-based software. The pop-up menus...are especially useful, and the PC Mouse is the only mouse we have found that satisfactorily supports spreadsheet work." — INFOWORLD 2-24-86

PC Mouse makes any software designed for a mouse perform at peak — from our own PC Paint Plus business graphics software to Microsoft™ programs like Word™ and Windows™

As for popular programs that were designed to work without a mouse, you'll wonder why they were.

Using Lotus 1-2-3™ with PC Mouse and our Pop-up

"...the only mouse we have found that satisfactorily supports spreadsheet work."
— INFOWORLD



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The mouse that's a system. From Mouse Systems Corp.

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There is evidence that diet and cancer are related. Follow these modifications in your daily diet to reduce chances of getting cancer:

1. Eat more high-fiber foods such as fruits and vegetables and whole-grain cereals.

2. Include dark green and deep yellow fruits and vegetables rich in vitamins A and C.

3. Include cabbage, broccoli, brussels sprouts, kohlrabi and cauliflower.

4. Be moderate in consumption of salt-cured, smoked, and nitrite-cured foods.

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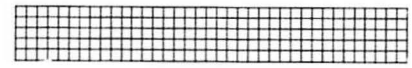

works with Joan Collins starring as Joan of Arc. Now, if only I could find that encryption key ... *–Eric Brown*

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Zoom/Modem PC 1200 XL

Trumped by the Hayes Smartmodem and a pack of inexpensive clones, it's easy for a 1200-bps internal modem to get lost in the shuffle. But when the Zoom/Modem PC 1200 from Zoom Telephonics turned up, I wondered if someone was playing with a full deck. This many features for such a low price?

Even if the Zoom/Modem offered nothing more than its genuine Hayes compatibility, the $399 list price would make it a swell deal. It offers a number of impressive enhancements, however, including call screening, demon dialing, a message buffer, and voice/data switching. Rather rickety construction is the only blemish on this otherwise slick card.

You can execute the Zoom/Modem's special features with an extended set of Hayes-like AT commands or with the included

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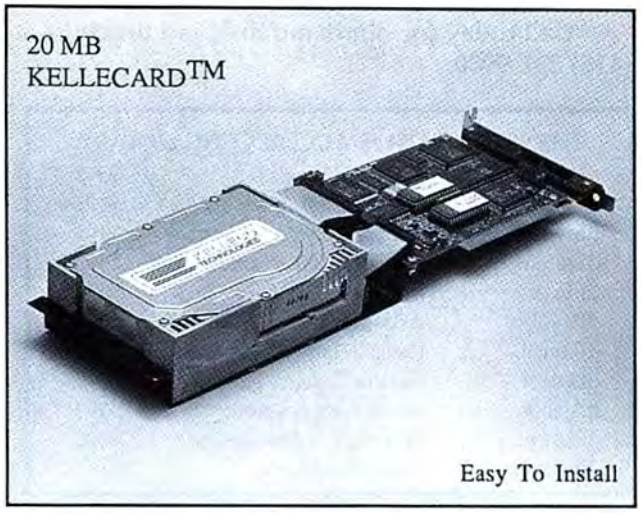

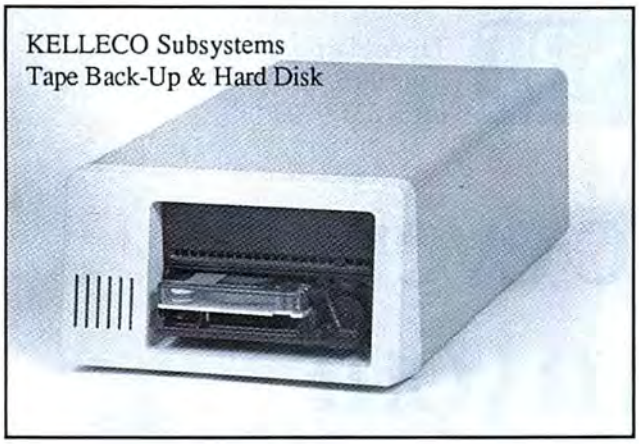

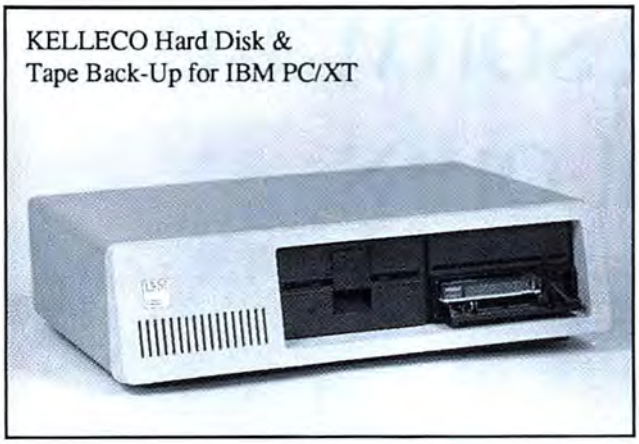

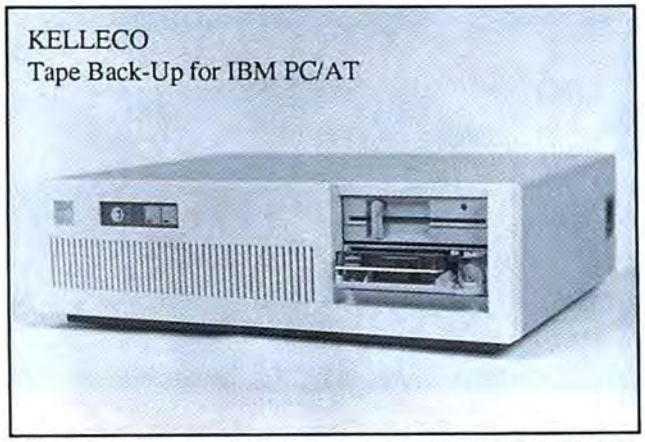

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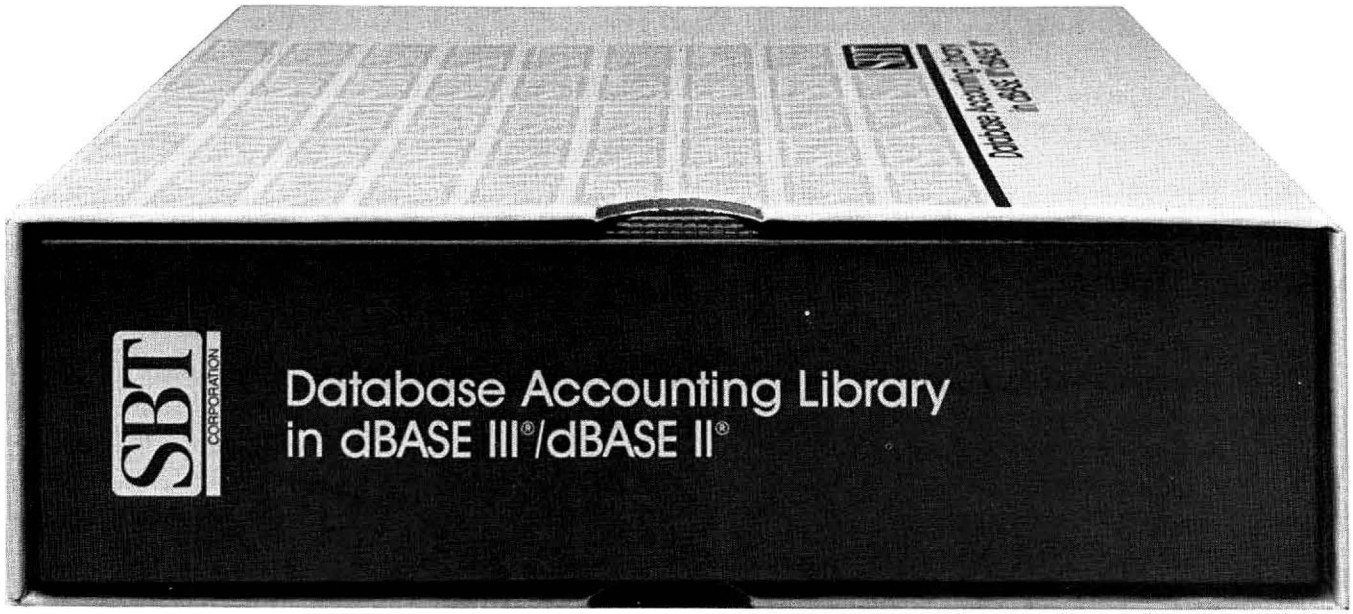

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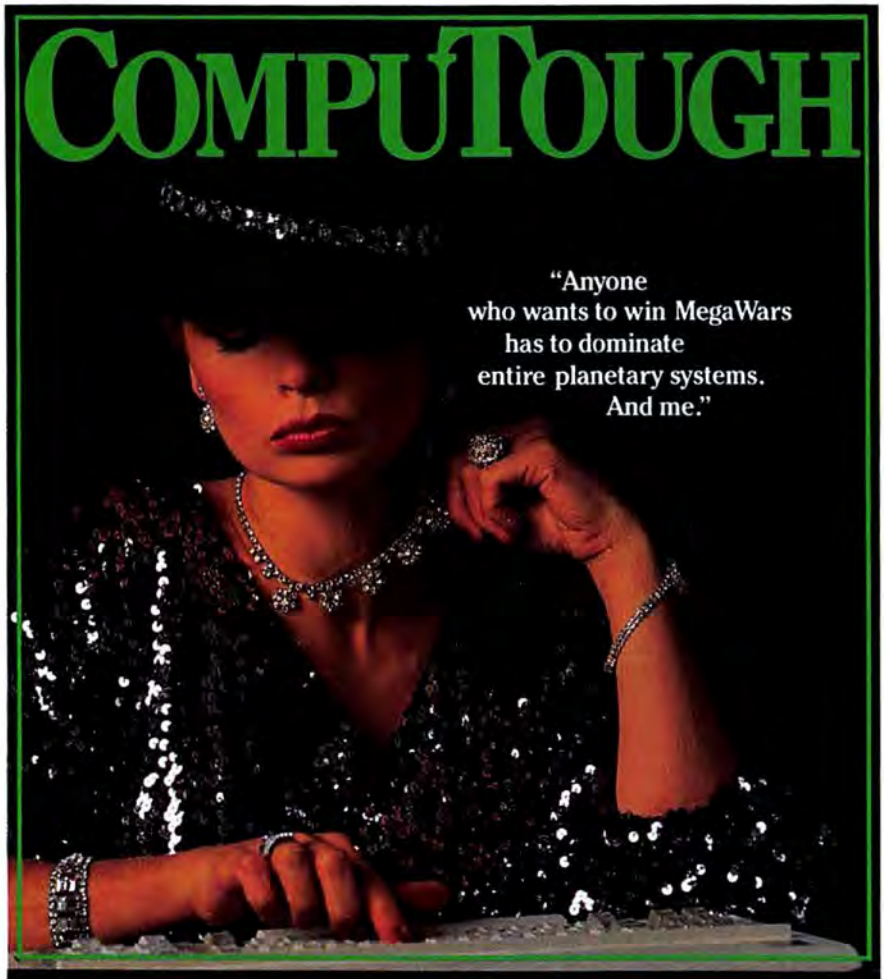

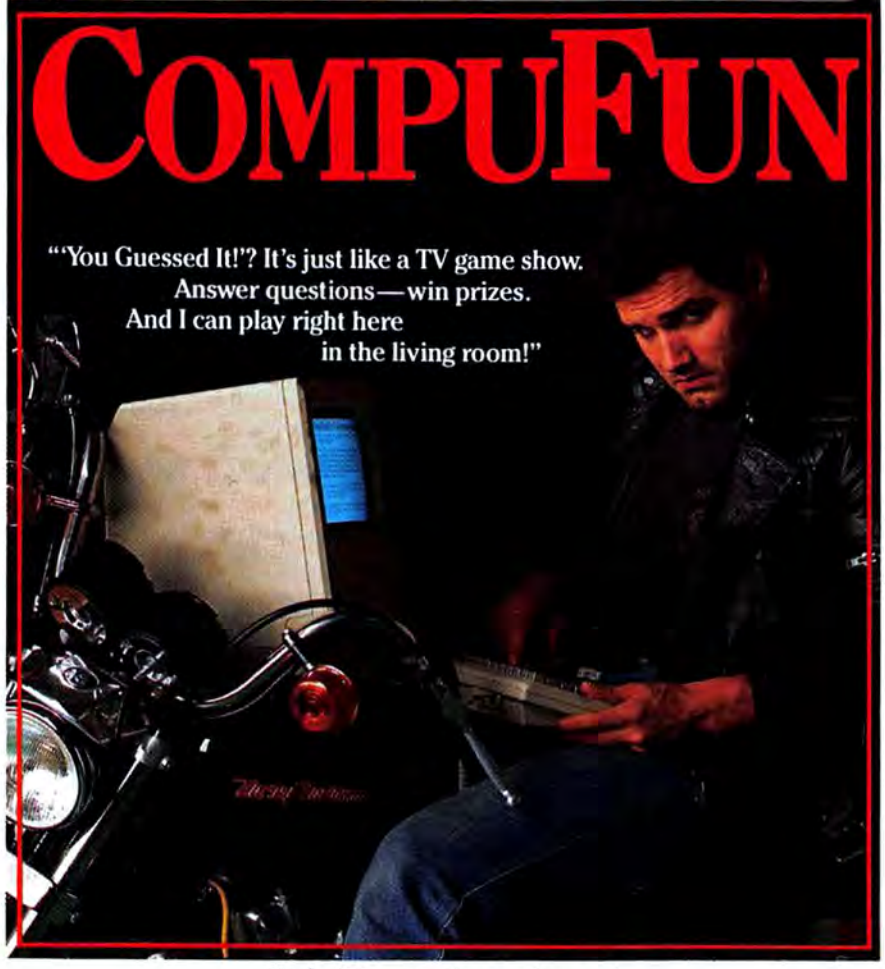

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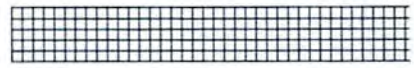


disk of utilities. Off-the-shelf communications software such as *Crosstalk, PC-Talk,* and *pfs:access* worked flawlessly during testing.

Installation is simple, thanks in part to a manual that refuses to assume you install peripherals for a living. The modem fits in one long slot, and the mounting bracket has two standard phone jacks—one connects the modem to a phone line, and the other hooks up to a telephone for voice communications. A small knob on the mounting bracket lets you control speaker volume without opening your PC. The Zoom/Modem comes configured to run as COM1:, but you can change it to COM2:, COM3:, or COM4:.

Both the Zoom/Modem's dimensions and structural integrity leave something to be desired. Its two circuit boards make up an electronic sandwich so fat it barely squeezes into a slot. These boards are not fastened together too solidly, and the soldered connections between them could easily be damaged by heavy-handed users.

The Zoom/Modem's demon dialing feature redials busy phone numbers at high speed until connection occurs. You can use this function in the voice communications mode to call often-engaged parties; the modem's bell tone will sound when you get through.

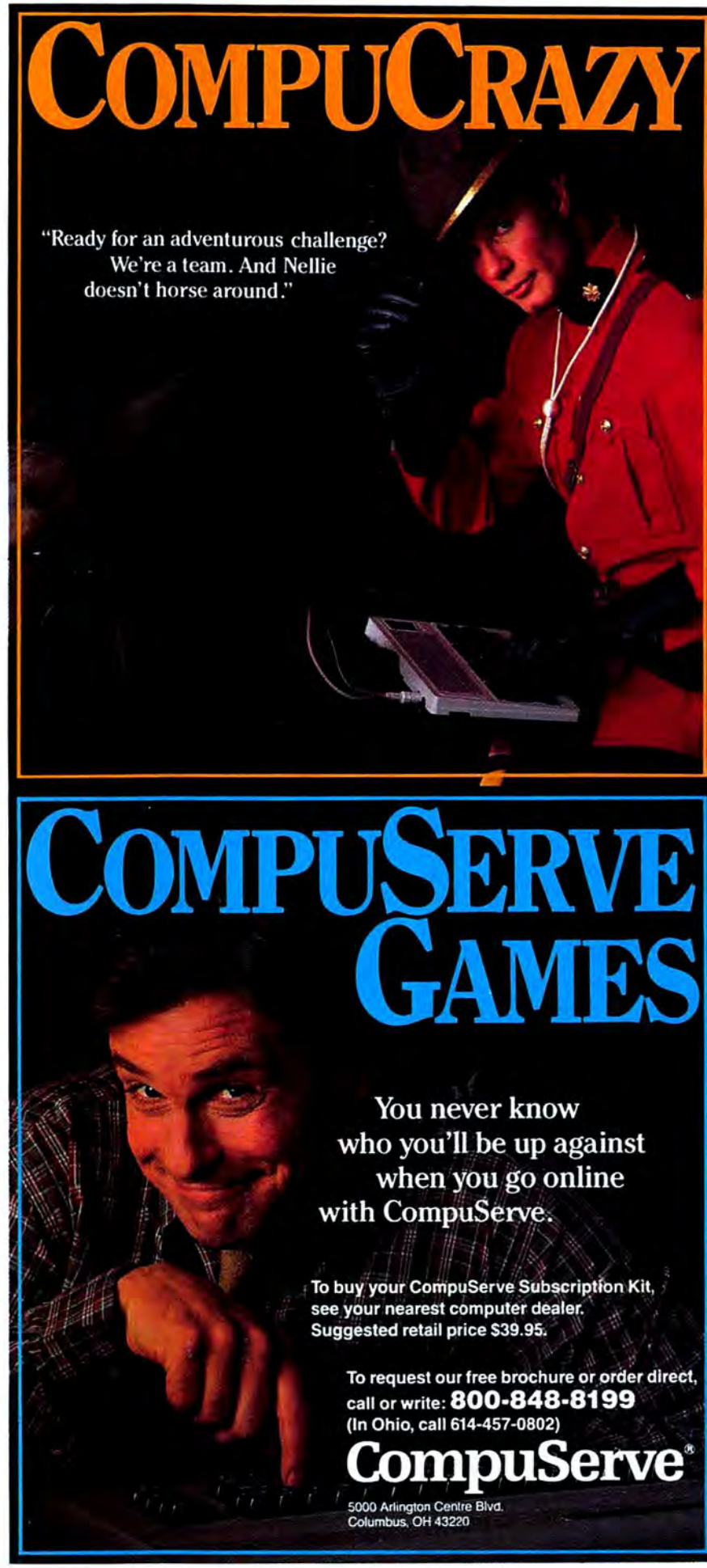
In auto-answer mode, the Zoom/Modem can act as a gatekeeper for incoming calls. A utility included with the unit lets you enter a brief message requesting an ID number, which the modem holds in a special buffer. The Zoom/Modem automatically greets callers by sending this message in text form, and

immediately disconnects parties that enter an unauthorized ID. If you're otherwise occupied, incoming callers can leave messages in the buffer, as if you had your own mini-electronic mail service. Yet the total RAM for incoming and outgoing messages combined is only 8K.

By modifying the provided utilities with a minimum of BASIC programming, you can send ASCII text from the buffer to a speech synthesis board—a variation on the voice mail idea. The Zoom/Modem will also respond to codes dialed from a touch-tone phone, making it ideal for remote order entry applications. As icing on the cake, Zoom Telephonics even throws in a battery-powered clock/calendar. With this much functionality, the Zoom/Modem is a steal—win, lose, or draw.
—David McCune

Zoom/Modem PC 1200 XL
Zoom Telephonics, Inc.
207 South St.
Boston, MA 02111
617/423-1072
List price: $399, with pfs:access $499

Karl Koessel is Technical Editor for PC World. *Mark Haas is editorial director for Osborne/McGraw-Hill. Eric Brown is an Associate Editor for* PC World. *David McCune is president of the Proteus Group, a consulting firm in Brooklyn, New York.* ●



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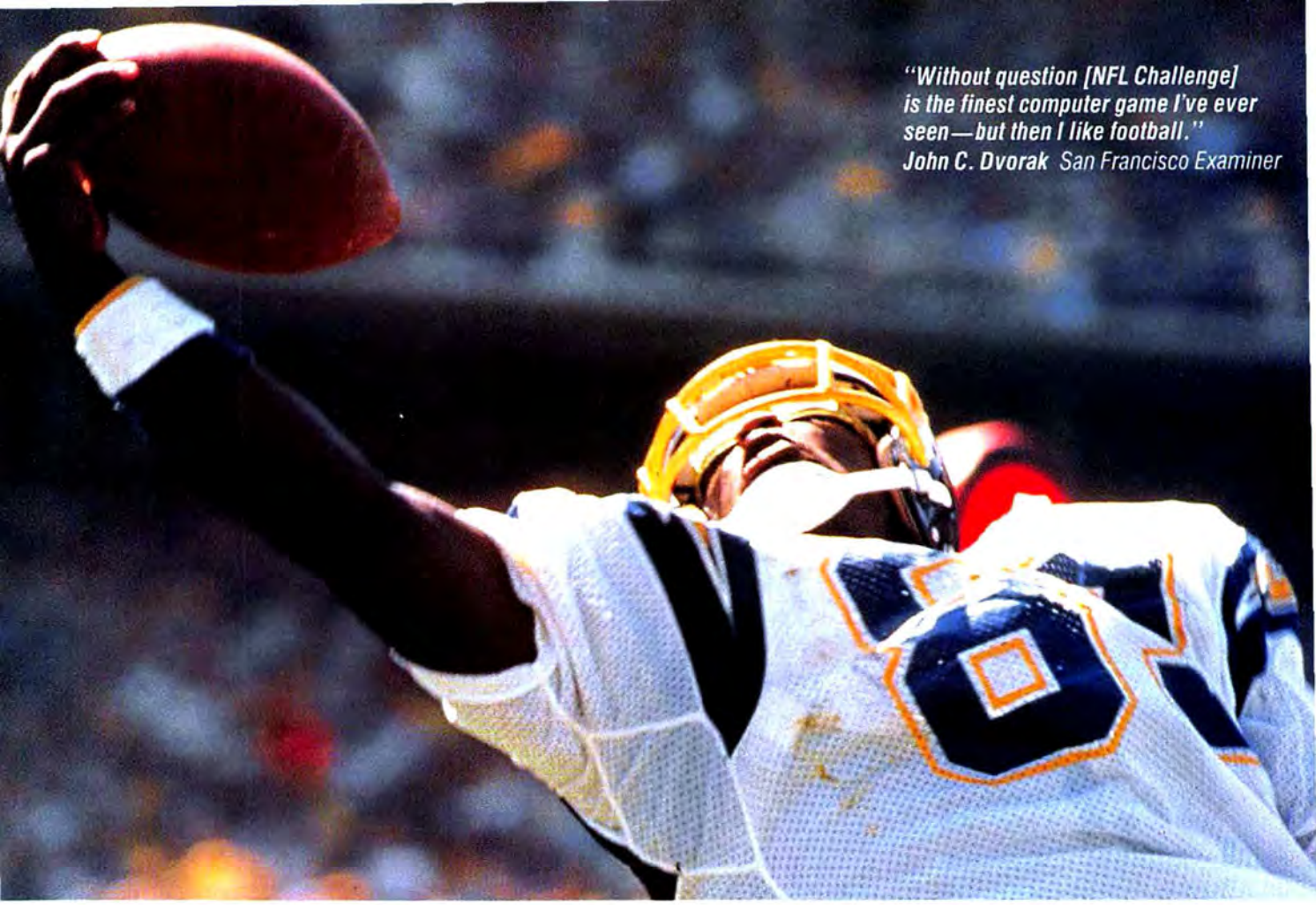

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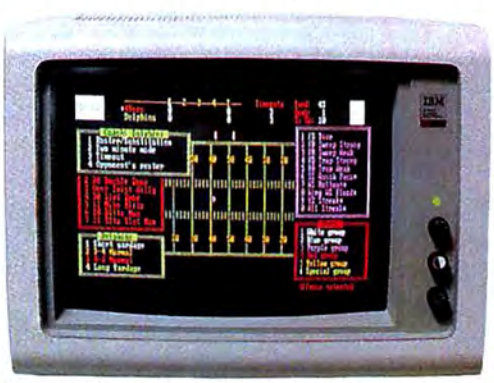

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Circle 764 on reader service card

From the Software Shelf

PC World offers first impressions of recent software releases

This month: a program for macrophobes, a will program with a way, a top-notch Framework tutorial, and how much is that body in the window?

Edited by Robert Luhn

Quickcode 123

1-2-3 may be the spreadsheet of choice in the business world, but the program still has aspects—macros and data base functions among them—that many users love to hate.

Seeing such discomfort as the mother of profitability, *dBASE* utility publishers Fox & Geller have come riding to the rescue with *Quickcode 123*, a memory-resident macro and data base menu generator for *1-2-3* release 2. (*Quickmac* for release 1A owners is also available from the company.) Among *Quickcode*'s special features: a macro learn mode, a macro programming language, and the ability to turn *1-2-3*'s data management function into a menu-driven system.

In learn mode, *Quickcode* captures command sequences, text, cursor movements, and any other series of keystrokes and converts them into *1-2-3* macro syntax—pressing <F9>, for example, records {CALC}. You can either play back the keystrokes, embed the newly generated macro in a worksheet, or save it in *Quickcode*'s macro library and recall it later.

For more demanding applications, you can seek solace in the programming-like constructs of *Quickcode*'s PL/123 language. In *Quickcode*'s pop-up editing window, you can build PL/123 programs that use release 2 variables, DO . . . WHILE loops, and IF . . . THEN . . . ELSE and CASE statements; call other PL/123 subroutines; and include comments—all structures that are cumbersome to reproduce with *1-2-3* macros. Select Load from the *Quickcode* menu, and the PL/123 statements are converted into macros and dropped into the current worksheet or saved as an ASCII file.

A PL/123 program won't do anything *1-2-3* can't, but it will free you from writing reams of macro code. And if you're conversant in BASIC, PL/123 syntax may strike you as far more logical. To create a *1-2-3* macro that sets the first ten

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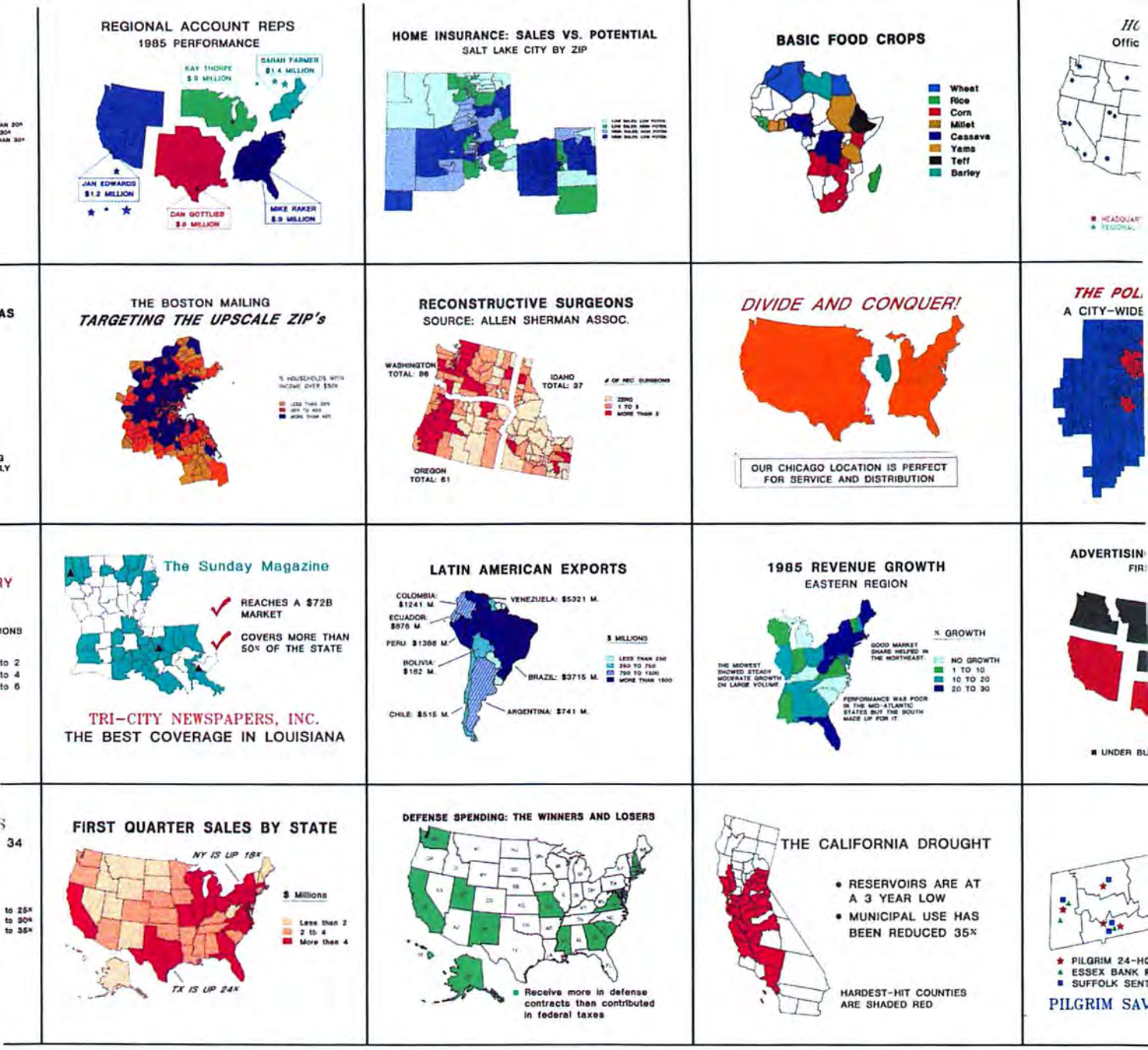

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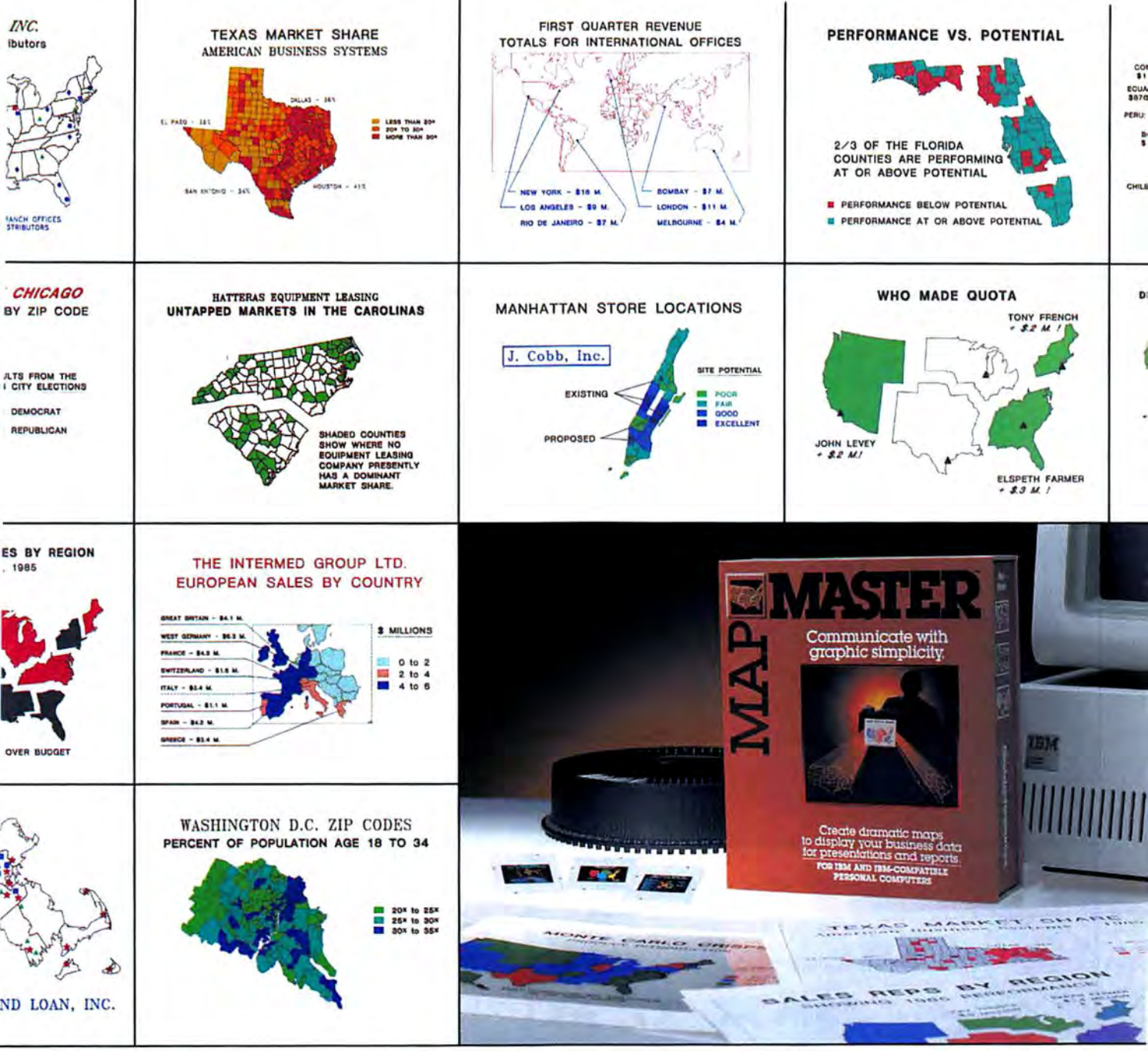

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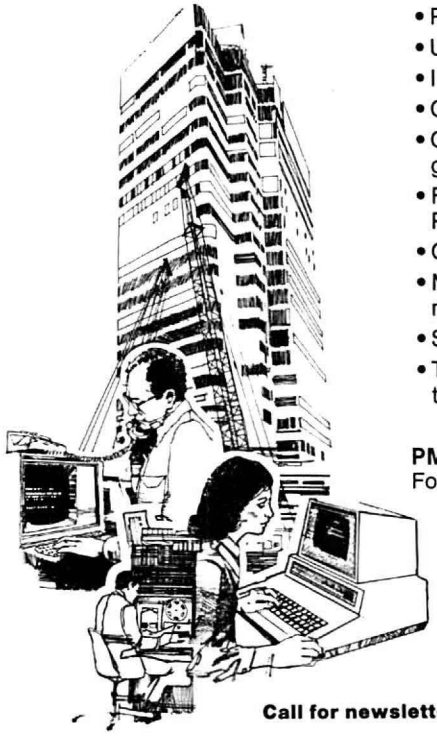

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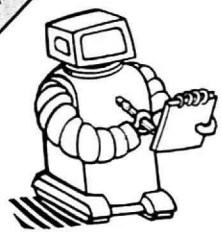

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columns of a worksheet 15 characters wide, you would type, beginning in cell E3:

```
{if #not#(counter<10)}{Branch E7}
/wcs15~{Right}
{let counter,counter+1}~
{Branch E3}
{Left 10}~
/XQ~
```

The equivalent PL/123 code?

```
BEGIN E3
DEF MEM C1..D2
DEF VAR counter
DO WHILE counter < 10
/wcs15~{Right}
counter = counter + 1
ENDDO
LEFT 10
ENDP
```

The third arrow in *Quickcode*'s quiver creates a new menu-driven, form-oriented data base or lays the equivalent framework over an existing data base (see Screen 1). To build a new data base (or restructure an old one), you open a *Quickcode* editing window and enter a few PL/123 statements specifying the starting cell and field names; field widths, field types, and data validation (data type or range) can also be indicated. To convert the PL/123 code, exit to DOS, run *Quickcode*'s macro compilation program, and load the resulting files with *Quickcode*. For a large file the entire process takes about 15 minutes; but the result is worth the wait: A handy data entry/retrieval form and a menu that gives you quick and easy access to sort, query, and other data manipulation functions.

There's a price, of course, for convenience. The first sacrifice is

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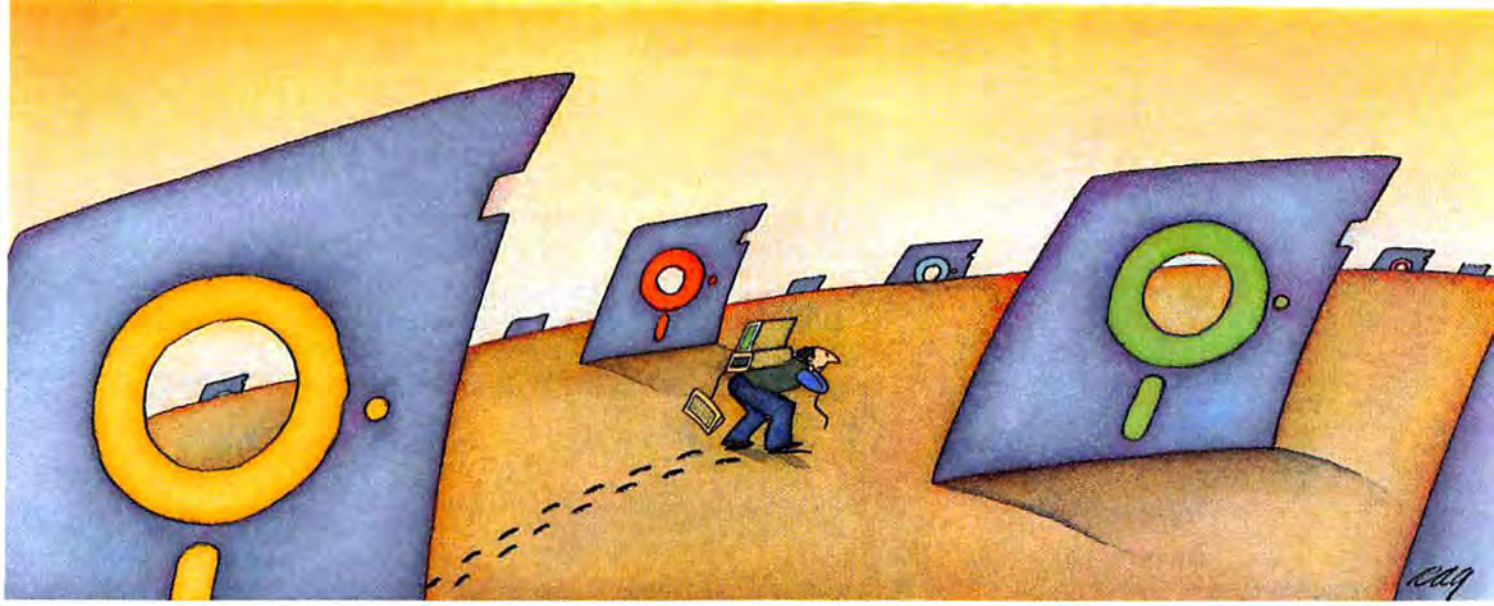

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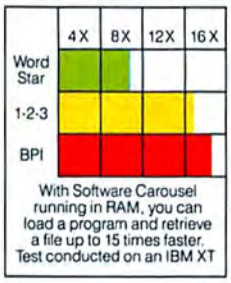

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If you want, Software Carousel will even use your hard drive for swapping. Just allocate a portion for storage, and go to work.

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You know what happens if you try loading two or more RAM resident utilities at once. You get crashed keyboards, frozen screens, all kinds of interference between programs fighting for control.

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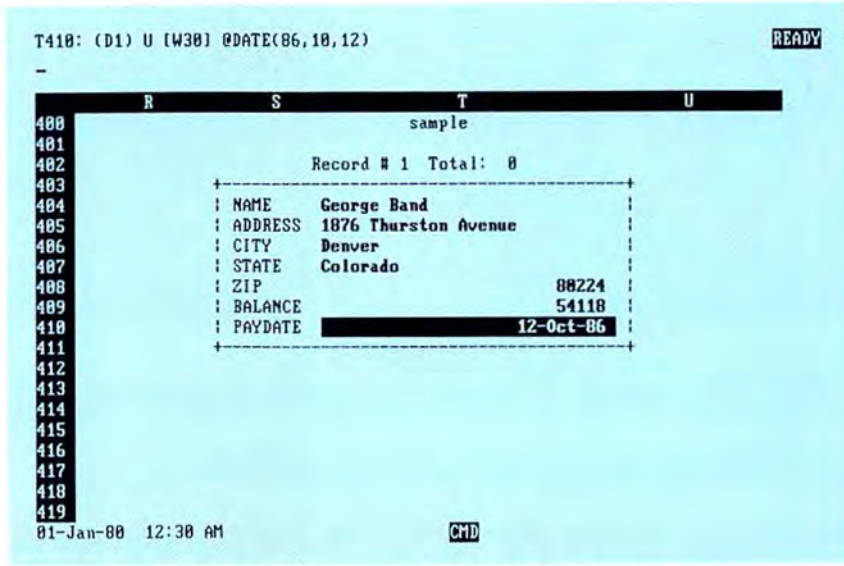

Screen 1: A Quickcode data entry/retrieval form

performance: *Quickcode*'s macro-generated menu and form pack nearly 4000 cells with macros. And though *Quickcode* is something of a virtuoso, the macros it generates aren't quite as efficient as those written by hand. *Quickcode*'s data entry/retrieval form imposes limitations as well. Although a form is easier and faster than a spreadsheet for data entry, it's not the best venue for displaying the result of a query, since only one record is shown at a time. This restriction on data retrieval is one of *Quickcode*'s biggest drawbacks.

Getting *Quickcode* up and running on a dual-floppy system is no simple job either—if you follow the instructions in the user manual. For starters, there isn't enough room on a *Quickcode* work disk for all the files you are instructed to copy. Ignore the manual and place the following statements in the AUTOEXEC.BAT file on your *1-2-3* disk:

```
SET LIB123 = B:\KEYMAC
SET DEF123 = B:\QC123
B:QC123 A:123
```

When the system is reset, put *1-2-3* in drive A: and the *Quickcode* work disk in drive B:; both programs will be loaded. Remove *1-2-3* and replace it with a data disk. If you need a *1-2-3* help screen, you'll have to reinsert the program disk in drive A:.

Once you're in *Quickcode*, don't instinctively use <Ctrl>-<Break> to return to *1-2-3*'s Ready mode. Doing so kills *Quickcode* and sometimes hangs up *1-2-3* as well. Another murderous quirk: If you accidentally try to save a PL/123 program to a write-protected disk, *Quickcode* crashes and takes the file with it.

Despite its faults, *Quickcode* is just the ticket for macrophobes or anyone who wants to create turnkey data bases for inexperienced *1-2-3* users. And if you aspire to macro mastery, peering over

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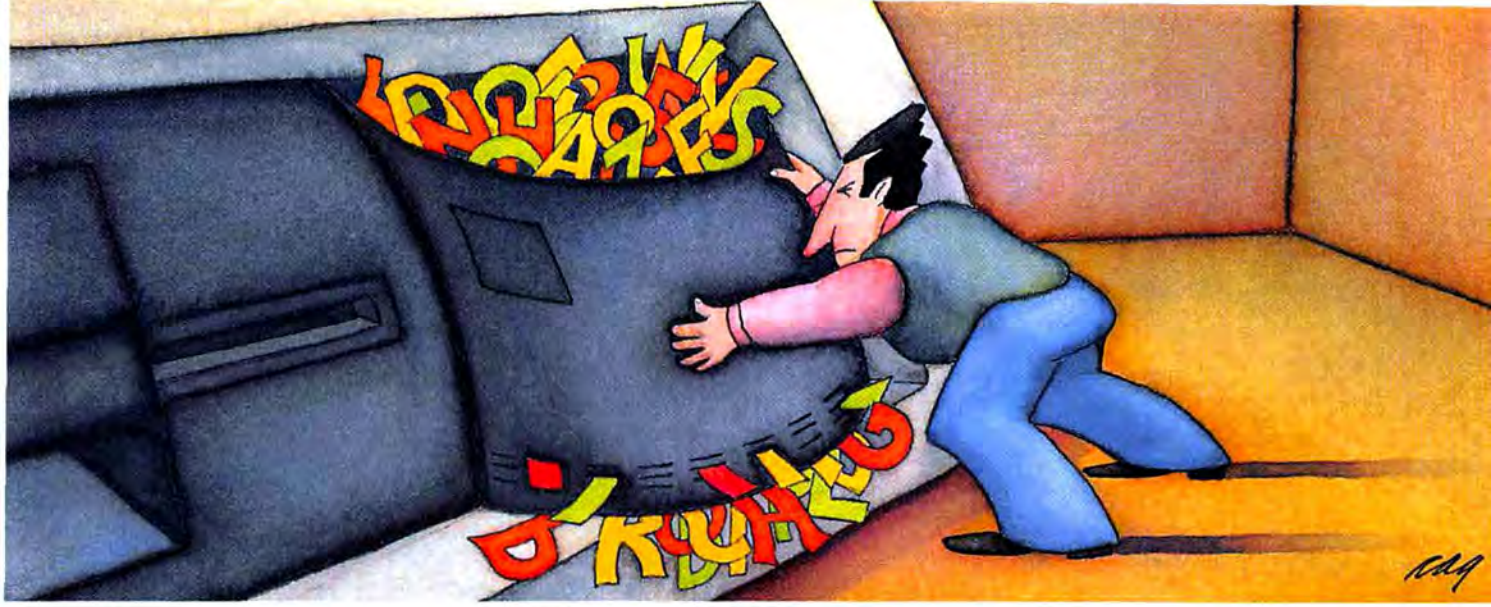

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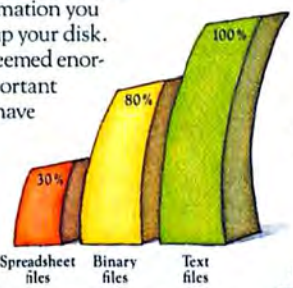

With Cubit, you'll get as much as 100% compression on data files, effectively doubling the storage capacity of all your magnetic media.

What is Cubit?

In brief, Cubit is an advanced software tool that automatically reduces the number of bytes required to store a file, then converts the file back to its original size when retrieved. Some programmers call this effect "data compression," others, "disk expansion." Either way, the result is the same.

Here's how it works. When Cubit compresses a file, it first compares each word to its massive English word dictionary. Words that match are reduced to a predetermined code of just one, two or three bytes each. It then saves the abbreviated version to disk. Decompression works just the opposite.

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Because the vast majority of data created on PC's is standard ASCII text—letters, numbers and other English language symbols—we've optimized Cubit for word processing and database files. With these, you'll get a minimum of 50% expansion on up to a full 100% or more.

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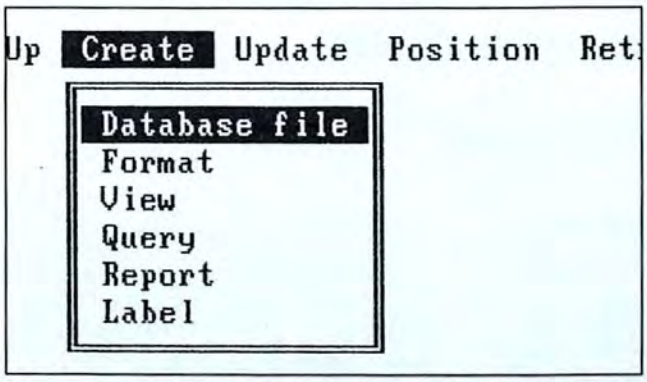

The Assistant helps beginning users accomplish day-to-day data management tasks without programming.

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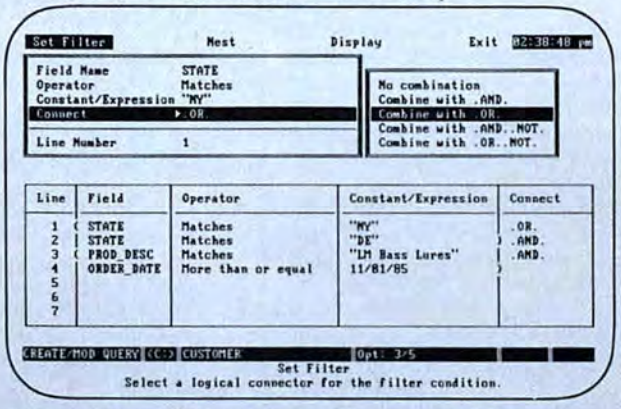

Advanced Query System lets you set up and answer complex queries without programming.

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dBASE III PLUS

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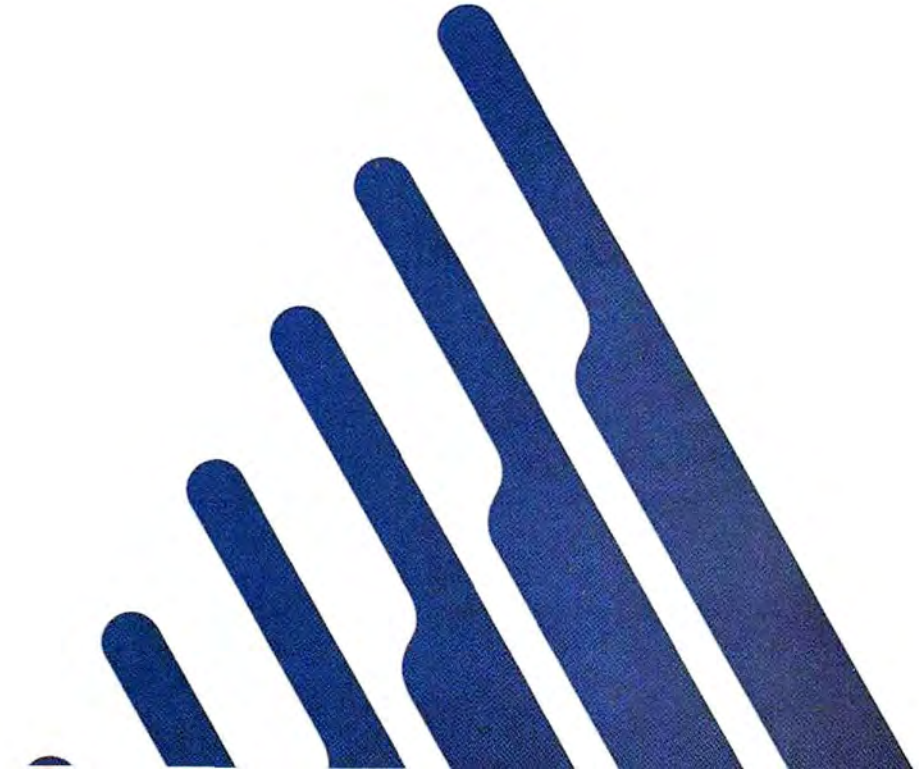

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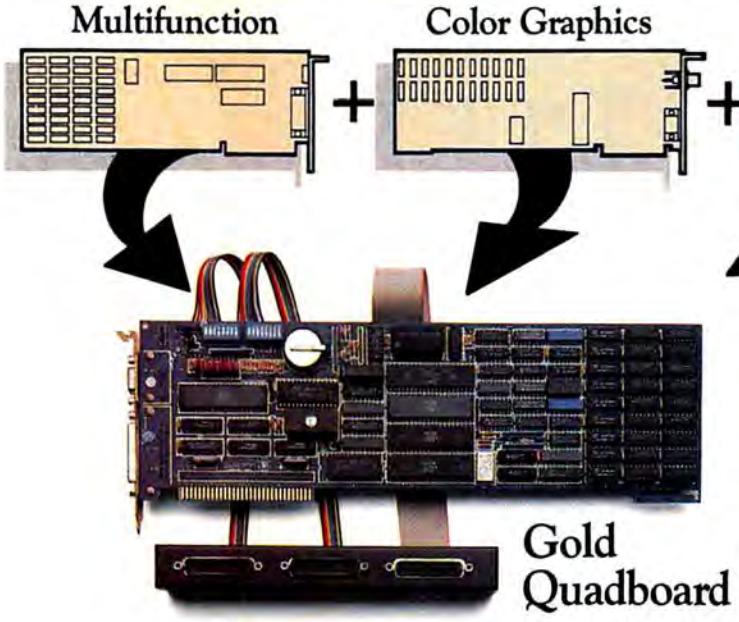

Use Keysaver to protect your data from power outages or misstruck keys, or create keyboard macros to help automate your work. Keysaver even comes with a special security feature that protects your system from unauthorized access.

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Quickcode's shoulder is as good an education as you're likely to get.

But I'm not convinced that such accessibility is worth the price. As an old PC hand, I'm inclined to say, "Buckle down and learn your *1-2-3* data base commands properly!" In the long run it's more efficient, and you'll have the satisfaction of knowing what's going on.
–Andrew T. Williams

Quickcode 123
Fox & Geller
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Elmwood Park, NJ 07407
201/794-8883
List price: $199

Requirements: 384K, two disk drives, DOS 2.00 or later version, 1-2-3 release 2
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WillWriter

The folks at Nolo Press apparently believe that many people would rather study arcane legal concepts than see a lawyer about a will. Hence the genesis of *WillWriter*, a superior program for the do-it-yourself crowd that comes with a well-written and fairly comprehensive textbook-cum-user-manual. With a bit of effort, you can produce a simple will that is valid in all states except Louisiana, at a cost of $39.95 and ten hours of reading.

Although it is possible to generate a will by merely answering the program's questions, the authors wisely implore users to first read the manual's 121 pages of substantive legal discussion, 60-page operations section, and, if necessary, the 14-page glossary of legal terms. Moreover, the text repeatedly urges the reader to purchase and study several other Nolo Press books on estate planning before running the program. Finally, Nolo counsels readers to consult state tax authorities for estate tax rules and to

(continues)

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have a lawyer review any will prepared by the program. Nolo's stated goal is to have "*WillWriter* help you make a good legal will and to have you understand the reasons for all the terms and procedures you use." Law school is a breeze by comparison.

The diligent user will be rewarded for such herculean efforts with a basic will that can leave all property to a spouse or a significant other, divide personal property among as many as 16 lucky recipients, exclude a thankless relative, name a guardian for minor children, and choose an executor to handle an estate. This is known as a "simple" will because it does not allow you to establish a trust, leave different parcels of real estate to different people (such as your house to Bob and your mountain cabin to Jill), give several people partial interests in one piece of real estate, or make provisions for reducing inheritance taxes in large estates. In some instances, the program makes it difficult to leave a gift if a named recipient dies before the person writing the will.

Nolo Press generally produces quality legal books for the layperson, and *WillWriter*'s manual is no exception. It guides the reader carefully, though laboriously, through the process of identifying his or her estate and determining which assets will pass under the will. Discussed are such tantalizing topics as family protection in common law states, limitations on gifts to charity, and the consequences of moving from one state to another. Analytical flowcharts, checklists, fill-in-the-blank forms, and tables abound. The text introduces several estate planning devices designed to limit taxes and avoid probate. Special considerations for children—adopted, legitimate, and otherwise—are discussed. Finally, the formalities of signing, updating, and storing the will are addressed. The manual includes an annotated copy of a will, with a section-by-section translation of the legalese into English.

(continues)

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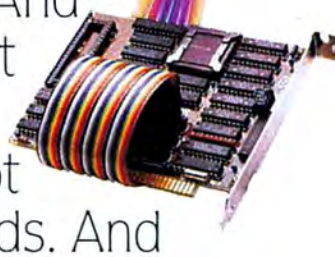

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The manual is marred only by a few significant typos, such as *trustee* where *trustor* was intended, *guardian* where *custodian* is correct, and some deceptively misplaced parentheses. On a few occasions, the text is misleading. For example, the manual explains that the program doesn't require the executor or guardian to post a bond (a type of insurance policy) because "care is taken to appoint persons who are known to be trustworthy." By whom? The computer? The text also declares that revocable living trusts cannot be used to reduce estate taxes. They can, if the estate is split into what lawyers call *A/B Trusts* when the first spouse dies.

The program itself proceeds slowly and cautiously through a series of questions and user responses. Each screen displays one question, a cross-reference to the manual, and a description of available commands. As a precaution against typos or misunderstood questions, every answer must be confirmed with a Y. When a question includes an unfamiliar legal term, pressing the question mark key supplies a definition. You can change previous answers or quit the program and later pick up the session where you left off. If you change a significant answer (relating to number of children, for example), the program forces you to go back and answer related questions. With such mobility, you might lose sight of the forest while amidst the trees. By pressing the asterisk key, you can discover what part of the will the current question relates to.

When all the pertinent questions have been answered, you have the option of previewing the will on screen before committing it to paper. Even after you've printed out the will, the constituent information remains on disk and can be altered when circumstances warrant.

Unlike other vendors of computerized wills (see "Legal Troubles," *PCW*, Vol. 2, No. 5), Nolo Press

(continues)

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has taken the academically correct (and safest) approach with its required and recommended reading. Registered owners also receive information about relevant changes in the law for two years without charge and have the option of buying program updates for $8. *WillWriter* is for erudite, studious achievers who don't place a monetary value on their personal time—the same people who read a treatise on combustion theory before tuning up their car. *—Jordan Breslow*

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Nolo Press/Legisoft
950 Parker St.
Berkeley, CA 94710
415/549-1976
List price: $39.95
Requirements: 128K (compatibles require 192K); one disk drive; DOS 2.00 or later version; BASIC; PC, XT, PCjr, or compatible system

Teach Yourself Framework

I wasn't a Bud-swilling juvenile delinquent in high school—my acts of rebellion were mostly confined to skipping class whenever I got bored. I discovered that I could grasp a subject better (and faster) by working at my own pace at home. (I did share a few of these illicit study sessions with "Leave It to Beaver" reruns, but no matter.) When I recently decided to tackle Ashton-Tate's *Framework*, I turned to *Teach Yourself Framework* from American Training International (ATI), the dominant purveyor to the learn-it-yourself crowd.

Teach Yourself Framework is a menu-driven, interactive program that faithfully reproduces the look and feel of *Framework*. (The company plans to release a version for *Framework II* in 1986.) As the program patiently explains key concepts, conventions, and operations, you actually edit documents, sort data bases, recalculate spreadsheets, and generate graphics (see Screen 2). At the novice level, *Teach Yourself Framework* touches on *Framework*'s menu structure and outline metaphor and the fundamentals of frame manipulation. You also get a taste of *Framework*'s word processor and learn to delete, insert, move, and reformat text. Once you've earned your hash marks (it takes about 4 hours), you're ready to use *Framework* for daily correspondence.

At the advanced level, you move into *Framework*'s other modules, digest a smattering of concepts, and play with a limited number of functions. Don't expect to confront many of the complexities or powers of *Framework*. For example, in the data base and spreadsheet lessons you add columns, search for and sort data, and enter simple formulas. *Teach Yourself Framework* exposes you to the graphics module by simultaneously displaying spreadsheet data in one frame (which can be changed) and the resulting bar charts or line graphs in another.

(continues)

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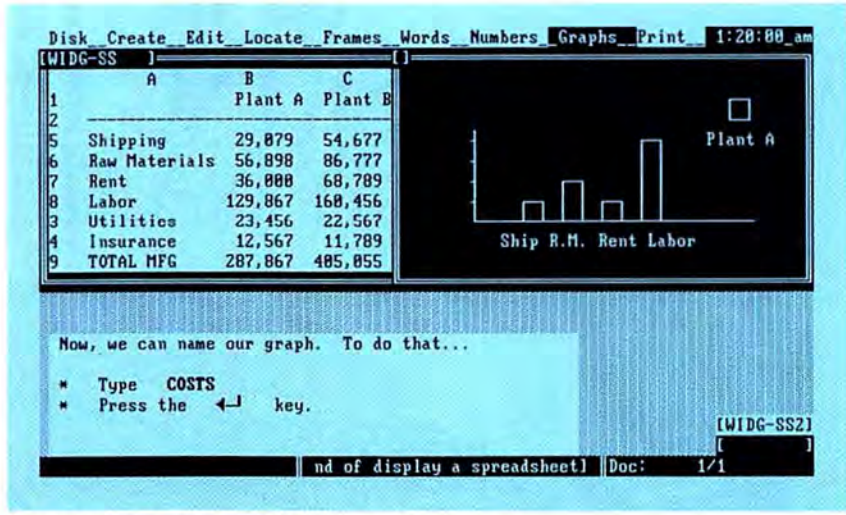

Screen 2: A Framework by any other name. ATI's tutorial works like the real McCoy and teaches as you go.

Unfortunately, the advanced lessons don't delve into *Framework*'s telecommunications module, FRED programming, or creating macros using the toolbox. I was looking forward to simplifying electronic mail sessions by using *Framework* to edit files and automate the downloading process. In this instance, *Teach Yourself Framework* requires you to teach yourself.

And while *Teach Yourself Framework* deserves high marks for its hands-on approach, conceptual discussions sometimes get short shrift. The outline, which is central to managing *Framework*, is barely mentioned, while discussion of *Framework*'s integrated nature and the automatic passing of data among modules is similarly terse.

But on the whole, *Teach Yourself Framework* is a quick and painless way to get a firm grounding in *Framework*. The precocious student will appreciate how the program nimbly moves through the lessons—you won't restlessly squirm in your seat as the same concept is repeated over and over. With *Teach Yourself Framework*, you're in charge—so there's no temptation to cut class. —*May Sui*

Teach Yourself Framework
American Training International, Inc.
12638 Beatrice St.
Los Angeles, CA 90066
800/421-4827 outside California, 213/823-1129
List price: $75
Requirements: 64K, one disk drive, DOS 1.10 or later version
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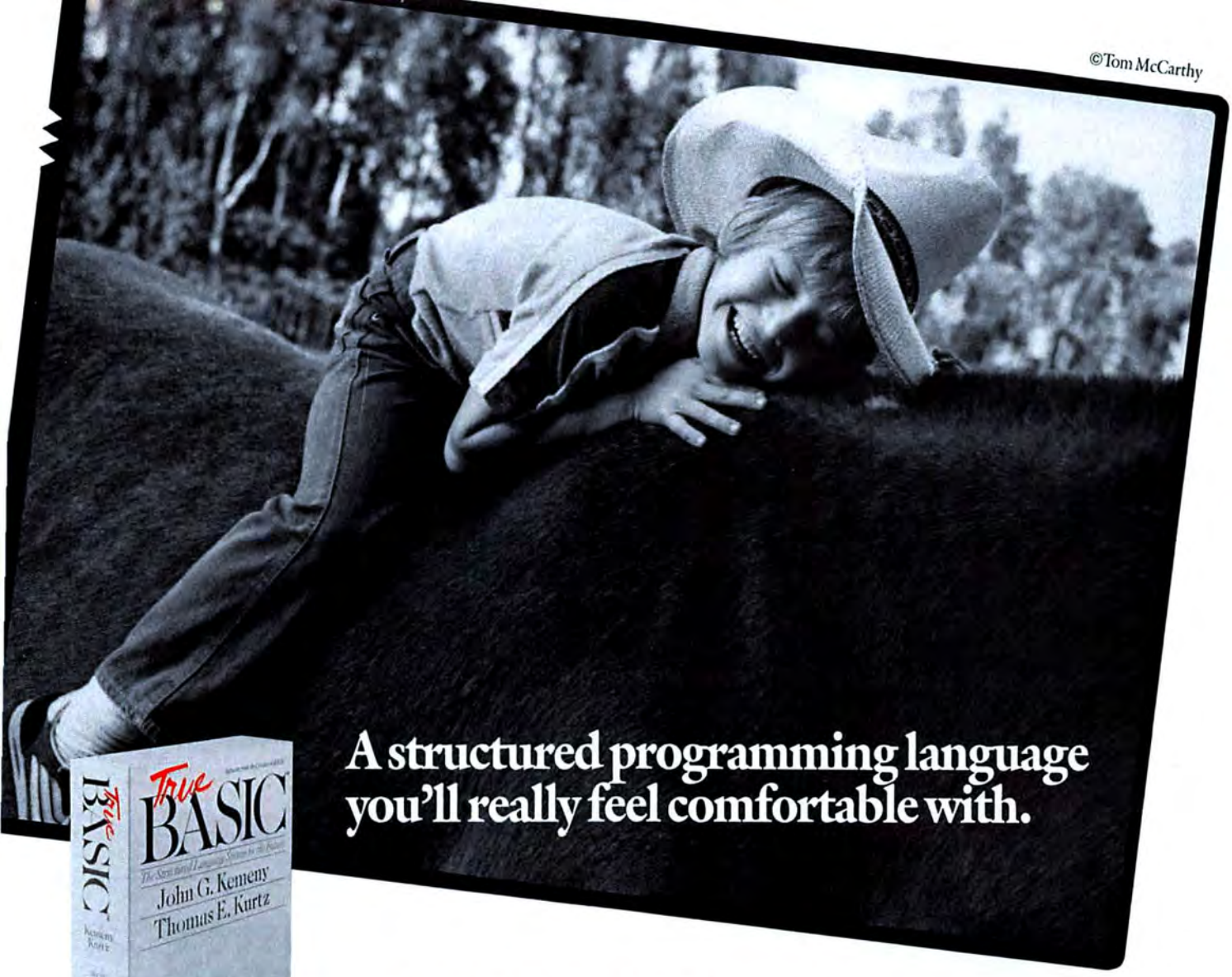

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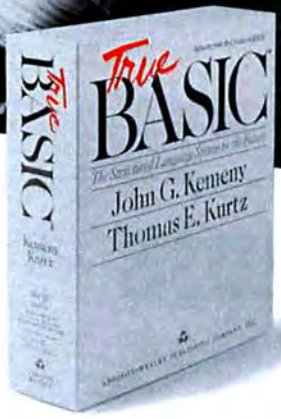

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untraceable that your friends are afraid to eat at your house? Do you tune in to the last half of "Perry Mason," turn the sound off, and still finger the murderer?

Don't expect to breeze through *Suspect,* Infocom's latest interactive mystery game. When Infocom calls this program advanced, they're not kidding. In *Suspect* you're a newspaper reporter at a Halloween party held at Veronica Ashcroft-Wellman's Maryland mansion. When she's murdered by one of the guests, the evidence points to you. You must prove your innocence to the police by demonstrating who committed this murder-most-foul and how; you have 3 hours to solve the mystery.

You can move through the house, question a dizzying parade of costumed guests, examine objects, search rooms, and so on. *Suspect* recognizes over 700 words and uses many more in its narrative. Like most Infocom adventures, the manual lists some vocabulary, but the rest is left for you to discover through trial and error. If you're an Infocom veteran, the idiosyncratic workings of *Suspect* will seem quite familiar.

Unfortunately, I'm not one. I frittered away an entire 3-hour session in one room vainly trying to pump information out of the taciturn guests. Before I knew it, the clock ran out and I was arrested. The second time around my technique was vastly improved. I gleaned all sorts of juicy information from the revelers, stumbled through the house, peered into closets, and smelled people. But when my big chance came to wow the police with my solution of the crime, they ignored me. I don't know if my syntax was at fault or if I accused the wrong person, but I got nowhere expounding my theory. In disgust, I pursued the suspect, accused him, and was ignored. In desperation I tried to kill him, to which *Suspect* serenely

(continues)

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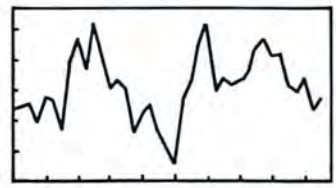

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Mini-spreadsheet	Yes	No	No
Style sheets	Yes	No	No
Sorts	Yes	No	No
Personalized mailings	Yes	No	No

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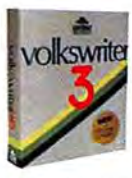

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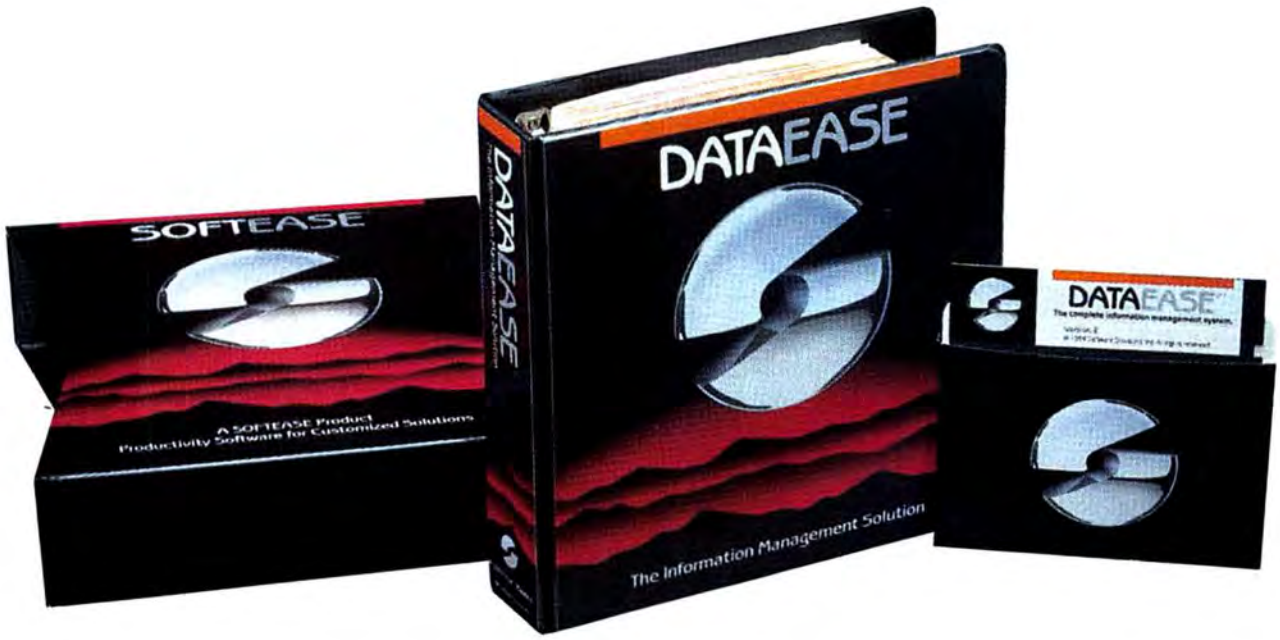

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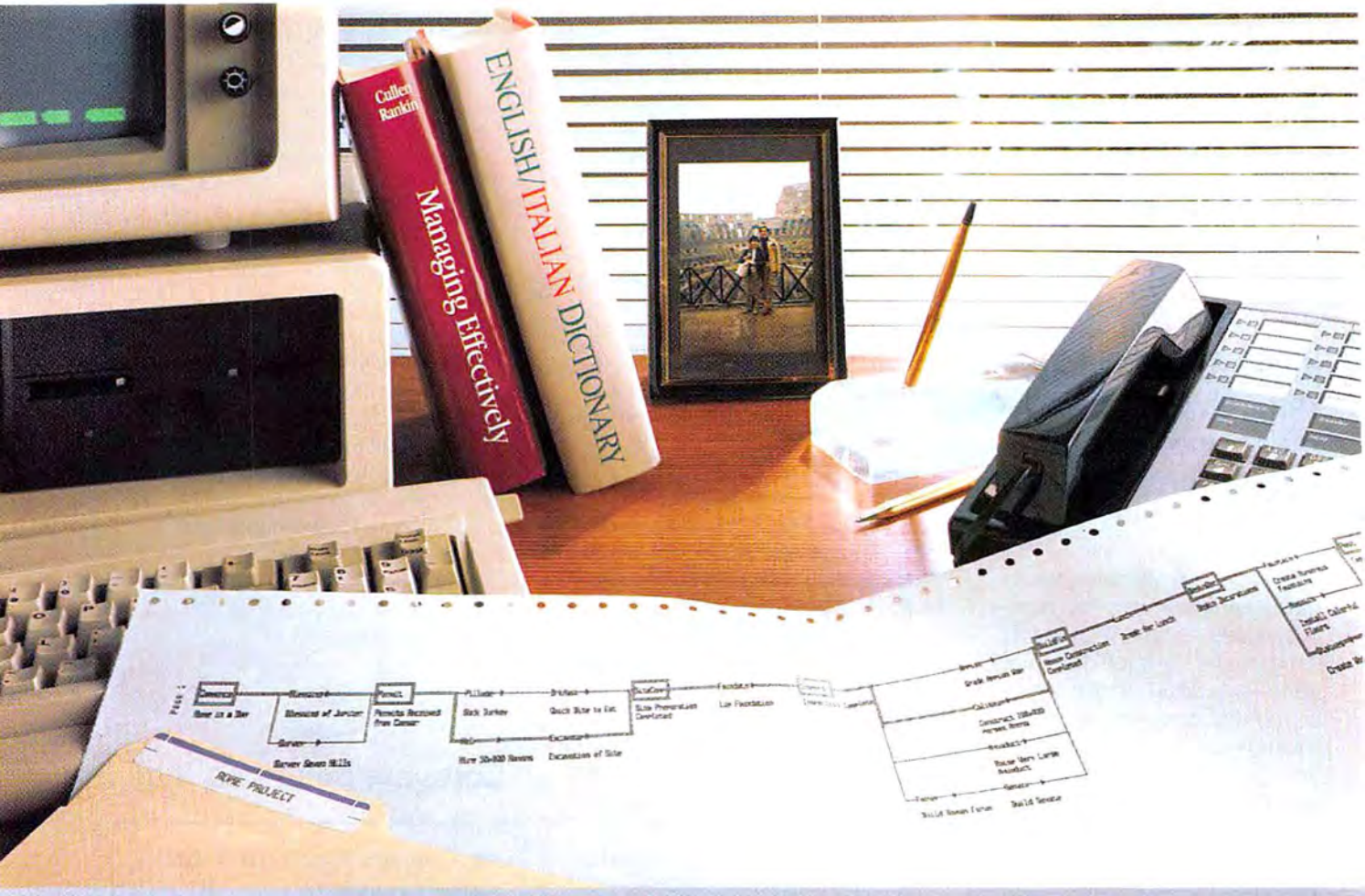

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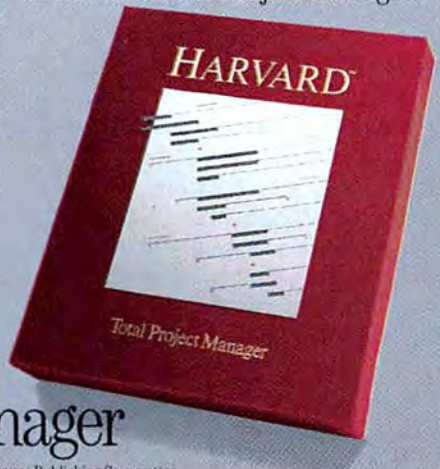

Graduate to Harvard Total Project Manager

Runs on IBM PC, Compaq, Leading Edge, AT&T and other compatible MS DOS computers. A product of Software Publishing Corporation.

responded, "Another murder is not the way to clear up this mess." The clock ran out and I was arrested again. As you might imagine, *Suspect*'s lack of informative feedback is my biggest complaint.

Undaunted, I played several more times. Each game revealed new clues and the program's tremendous flexibility in generating different scenarios and disturbingly apt responses. For example, when I commanded, "Kick the dog," *Suspect* shot back, "Its suspicions confirmed, it bites you on the leg." Nonetheless, the police still refused to hear my accusations.

Other irritations: You can't analyze fingerprints or examine evidence until the police arrive toward the end of the game. It's also difficult to approach and interview a party-goer. The faster I pursued, the faster my quarry eluded me, and the quicker I got muddled in the maze of rooms, hallways, entrances, and exits. If you're really stuck you can save a *Suspect* session and pick it up later when inspiration strikes.

Despite the frustrations, *Suspect* is entertaining enough for any murder mystery addict. You can send for a book of hints from Infocom, but I'm not that desperate—yet. Perhaps if I grill the Werewolf just one more time . . .
—Bonnie Monte

Suspect
Infocom
55 Wheeler St.
Cambridge, MA 02138
800/262-6868
List price: $44.95
Requirements: 48K, one disk drive, DOS 2.00 or later version
Copy protected (one backup copy allowed)

Andrew T. Williams is a Contributing Editor for PC World *and the author of* Lotus 1-2-3, Release 2: ASAP *(John Wiley & Sons). Jordan Breslow is an attorney and legal automation consultant in Walnut Creek, California. May Sui is Editorial Secretary for* PC World. *Bonnie Monte is a Copy Editor for* PC World.

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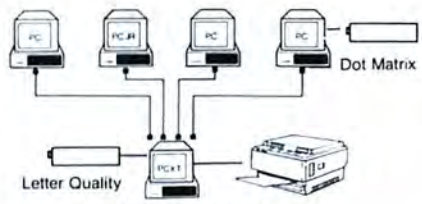

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Automating Small Business: A Survival Guide

Automating a small business is anything but automatic. Here, a consultant shares strategies that may spell relief for businesses overwhelmed by paperwork and in need of competitive rejuvenation.

Daniel Goldsmith

Pacific Muse, a small record company, buys a used computer and a few popular programs, among them *WordStar, SuperCalc,* and *dBASE II,* to handle its contracts, accounts receivable, record royalties, and mailing lists. In the next two years, company growth exceeds 90 percent.

A&G Auto Parts, an operation plagued by flat growth, installs a multiuser system and contracts for a custom *dBASE* application—all told, a $25,000 ex-

Photographed by David Powers at the St. Francis Fountain, San Francisco

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Figure 1: A custom form for small business automation

I Business activity needs analysis

Gross receipts _____
Net profits _____
Monthly transaction volume _____
Earnings projections (%):
1986 _____
1987 _____
1988 _____
1989 _____
1990 _____
Staff size:
1986 _____
1987 _____
1988 _____
1989 _____
1990 _____
Number of administrative centers or remote units _____
Size of inventory _____
Frequency of turnover (times per year) _____
Size of customer base _____
Size of vendor base _____

II Application selection

Business areas to be addressed (number in order of priority):
Accounts receivable _____
Accounts payable _____
Business correspondence _____
Customer lists _____
General ledger _____
Market and sales analysis _____
Inventory control _____
Financial reports _____
Payroll _____
Other _____

Application tools needed (number in order of priority):
Word processor _____
Spreadsheet _____
Data management _____
Integrated package _____
Accounting program: _____
Generic _____ Custom _____
Specialized _____ Other _____

Current areas of manual accounting:
Accounts payable _____
Purchases (cash) _____
Cash receipts _____
Check disbursement _____
Accounts receivable _____
Inventory _____
Payroll _____

Business forms in use:
General ledger _____
Purchase journal _____
Purchase orders _____
Sales invoices _____
Cash receipts journal _____
Time cards _____
Payroll cards _____
Checks _____
Message forms _____
Expense reports _____
Daily schedule sheets _____
Rolodex cards _____
Inventory sheets _____

penditure. One year after automating, A&G posts revenue gains of 30 percent, largely due to improved inventory control and increased mail-order business.

Pacific Muse allotted several thousand dollars to hardware and general-purpose software. A&G spent substantially more, in part for software cut to fit. While it may be facile to credit their improved performance entirely to PCs, the companies' progress has been dramatic. Both businesses enhanced their chances for success by doing the necessary homework before they tinkered with established routines.

The best-run companies depend on proper planning and analysis to make key business decisions. Automating a small business is as critical an operational decision as many small firms are likely to make. Replacing typewriters—or, in some cases, employees—with computers can be an expensive, time-consuming, anxiety-ridden endeavor. PCs are not panaceas, and if you bring them on board, you can anticipate both a change in work flow and a potentially lengthy adjustment period for yourself and your employees.

In a recent poll of Ohio CPAs, nearly 25 percent described clients newly equipped with PCs as using them "somewhat" or "very" ineffectively. The accountants ascribed that situation to ill-informed hardware and software purchase decisions, resulting in systems poorly tailored to the task at hand. The good news is that the glass appears to be at least half full: Some 50 percent reported that their clients went about automation in the right way, selecting software suited to a specific job, then procuring the hardware to run those applications.

Still, for many small firms, the question is not whether to automate but when and how. Another recent survey revealed that among businesses with

III Hardware selection

Amount of memory required for:

Word processor _____
Spreadsheet _____
Data management _____
Integrated package _____
Accounting program:
Generic _____ Specialized _____ Custom _____
Other _____

Amount of storage required for:

Word processor _____
Spreadsheet _____
Data management _____
Integrated package _____
Accounting program:
Generic _____ Specialized _____ Custom _____
Other _____

IV Implementation issues

System users:
Name and title _____
Name and title _____
Name and title _____
Name and title _____

Total budget for automation _____
Number of workstations needed _____
Number of printers needed _____

Budget for hardware:

PC system unit(s) _____
Memory _____
Monitor(s) _____
Disk storage _____
Backup device(s) _____
Printer(s):
Dot matrix _____ Letter quality _____ Laser _____
Graphics board(s) _____
Modem(s) _____

Budget for software:

Accounting modules:
General ledger _____
Accounts payable _____
Accounts receivable _____
Inventory _____
Payroll _____
Other _____
Word processor _____
Spreadsheet _____
Data management _____
Integrated package _____
Other _____

Training and support:

Budget for training and support _____
Source of training:
Vendor _____ Seminar _____
Consultant _____ Other _____
Source of software support:
Accountant _____ Consultant _____
Vendor _____ Other _____
Source of hardware support:
Vendor _____ Manufacturer _____
Consultant _____ Other _____
Nature of hardware and software support:
Hardware installation _____
Software installation _____
Software upgrades _____
Troubleshooting _____
Telephone support _____
Additional documentation required _____
_____
Individual responsible for backup:
Name and title _____
Individual responsible for system maintenance:
Name and title _____

fewer than 100 employees, more than 50 percent either own a PC or plan to buy one within the next three years. Realism and a well-conceived PC strategy—which consists of assessing whether PCs can help, and if so, how—may separate a business that is barely breaking even from one that is as profitable as it is efficient.

Asking the Right Questions

The first step in the planning process is performing a "needs analysis," which entails posing a series of questions about how your business is run and how PCs can assist in getting essential information to the right people. The questions are as varied as the conditions under which your business operates. You can set up a checklist loosely grouped according to the nature of the business, the specific tasks appropriate to automation, and the hardware and software tools available for the job (see Figure 1). Some answers may seem self-evident; others may be elusive, requiring a familiarity with hardware and software that you may not have acquired firsthand. It's an exercise that can suggest the degree to which PC usage makes sense, and where you might need outside assistance. This process is just as useful if, for example, you're already familiar with word processing or

spreadsheets but now want to branch out to communications.

While there's no cut-and-dried formula for introducing a PC into your operation, begin by scrutinizing the nature of your business. In performing the analysis, assess your business by size, focusing on transaction volume (the number of invoices printed, checks written, and documents produced), gross receipts, and net profit. Determine the appropriate forms for data entry, storage, and reporting, your task of first priority, the system's cost—and the savings it may yield. Select your initial application (word processor, spreadsheet, data manager, integrated package, accounting program), then tackle a range of implementation issues: how swiftly (or slowly) to move, when to rely on custom programming, how your company can implement the system as a team, methods of system maintenance and data backup, and plans for system expansion and networking.

Although your needs analysis will likely concentrate on software, your hardware requirements clearly demand more than a cursory glance. The outline of hardware considerations in Figure 1 is admittedly a whirlwind tour—for a more thorough overview of the hardware market, see *PCW*'s December 1985 annual review, "Pacesetters for '86."

When you've concluded this informal exercise, you may want to share your responses with your accountant or a computer consultant (see the sidebar "Micro MIS"). Articulate your expectations about bringing a PC into the fold: If you're like most small business people, you'll want the system to generate an increase in business, improve your cash flow, and/or cut your expenses. You might even expect the installation to pay for itself in a year or two.

Know Your Size—And Your Type

Every needs analysis should elicit precise responses to ever more detailed questions. Even a seemingly obvious question like, "How big is a small business?" hints at a range of answers. Size tends to be related to the sophistication of the system the business will need. A hand-to-mouth operation may be hard-pressed to justify the purchase of a PC and the software to feed it. Depending on your company's size, you may not need to shop for software anywhere other than your neighborhood computer store. The larger the enterprise, the more ambitious the PC strategy and, traditionally, the greater the need for specific software solutions.

Because size can be a slippery notion, you may need to refine it a bit. One of the better indicators of size is a firm's annual gross receipts relative to the type of business. A professional business grossing $500,000 annually (and netting a healthy percentage of that figure) could legitimately be described as large for its class. Conversely, in manufacturing—often a highly capital-intensive activity—an annual gross of $500,000 may not be large at all.

The Small Business Administration defines "small" as a manufacturing firm of up to 1500 employees or a service business with as much as $14.5 million in annual receipts. For our purposes a small business is one with annual receipts of less than $10 million and a PC, an AT, or the equivalent—including a local area network—as its main business computer.

Figures to Decide By

Whatever the nature of your business, defining a PC strategy is a matter of looking closely at several key variables, particularly net profit and transaction volume.

The size of a company's net profit often determines whether a PC is cost-effective and just how elaborate a system the business can use. Net profit is usually closely tied to the type of business. A consultant selling time and operating out of a home obviously keeps overhead low and profit potential quite high. If that professional business grosses $85,000 annually, it may net $55,000. A retail business, which rents prime commercial space, employs a staff, and carries inventory, may need to gross $500,000 annually to equal the consultant's net profit.

Transaction volume and the existence of various lists or data bases (customer lists, items in inventory, number of vendors, number of employees) not only reflect a business's size, but may also reveal problems in the flow of information through existing manual systems.

In sizing up your own business as a candidate for automation, note that transaction volume is generally more of a determining factor than net profit. For

that rare business that grosses $3 million dollars, has 5 customers, and writes 10 invoices a month, a PC may well be a frill. And a shoe-box operation or a brand-new venture may be better off devoting its limited resources to advertising or acquiring additional inventory than to buying a PC. But if a business ages 500 invoices a month and has 2000 items in inventory and 25,000 customers, income is largely irrelevant; there's a real need for a computer and a good accounts receivable program.

Selecting Applications

Aside from helping gauge the relative size of the operation, classifying the business by type says a great deal about how it can use a PC to manage information.

Among the four distinct varieties of small business—wholesale/distribution, retail, professional, and manufacturing—most rely on programs within the three mainstays of PC software: word processors, spreadsheets, and data managers. (Contrary to expectation, accounting packages tend to come a bit later in the process.) Rough patterns have emerged for each class of business, at least where the selection of a first application is concerned.

Most professionals in business—lawyers, doctors, consultants, architects, engineers—generate a wealth of reports, analyses, specifications, contracts, and other documents. Not surprisingly, word processing software is ubiquitous among professional businesses and invariably ranks first on the "software to buy" list. If a professional business grosses $250,000 annually, it's also a likely candidate for a time and billing program.

If word processing tends to be the application of choice for professional businesses, data management software is the ticket for wholesale/distribution ventures, which regularly need to manipulate extensive client lists and keep tabs on inventory (see "First-Class Profits From Third-Class Mail" in this issue). It's also the foundation of a growing body of customized applications. Manufacturing operations naturally gravitate toward spreadsheets as ideal vehicles for monitoring materials requirements and building financial break-even models (see "The Cookie Cutter," *PCW*, October 1985).

Don't underestimate what these bread-and-butter applications can accomplish. Pacific Muse uses just three programs: *WordStar* for writing letters, contracts, and invoices; *SuperCalc* for aging accounts receivable, performing break-even analysis on the production of a record, calculating royalties, projecting cash flow, and analyzing sales; and *dBASE II* to keep tabs on mailing lists that consist of customers (and their musical preferences), radio stations, newspaper and magazine music reviewers, record stores, and wholesalers.

Pacific Muse is something of an early adopter, having automated its office more than two years ago. The company bought all the hardware and software it could afford at the time, but with its increasing size and PC acumen, it's now ready to expand its installation. Moreover, the company has learned that while it's possible to transfer information among the programs—to merge a *dBASE* radio station mailing list with a letter written in *WordStar*, for example—you need a fair bit of expertise to do so. For businesses in Pacific Muse's position—or approaching PCs cold—there's an obvious alternative to the trio of full-featured, stand-alone packages: a five-function integrated program like *Symphony*, *Framework II*, or *Enable*, or an integrated program family like the *Smart Series*. All such programs include the basic trio, plus communications and graphics, and unite them with a single command structure.

Employee resistance to a PC-based system can often be averted by involving every member of the company in PC planning and analysis from the outset.

Micro MIS

Wes Nihei

Tucked away in the lofty towers of the corporate high rise, the MIS (management information systems) department may seem far removed from the neighborhood storefront. But to Kal Stein, a business is a business.

Through Kalman Stein Associates (KSA) in Berkeley, California, Stein uses the MIS approach—long favored by managers in the corporate milieu—to help small businesses stay afloat on the often turbulent waters of the marketplace.

"MIS," says Stein, "supplies the numbers a manager needs to run a business properly." MIS methodology according to Stein consists of a rigorous, heavily automated regimen that includes financial statements and back-up journals and ledgers as well as reports and data such as sales figures, market surveys, and estimates of production capacity. MIS thus encompasses all the procedures required to obtain the facts and figures a manager requires.

If this sounds like Business Management 1A, that's because Stein believes most small business entrepreneurs lack an understanding of the fundamentals needed to set up and maintain top-notch information systems. Other proprietors just aren't keen on doing the books. "Once, at an initial meeting," Stein recalls, "a client produced a year's receipts in a shoe box. He said, 'Gee, I've never paid taxes, shall I start?' That's not uncommon."

In Stein's view, the world is increasingly specialized, and the person starting a small business will find himself or herself playing different roles. The visionary starts the business; the manager keeps it going. Both roles require distinct skills that aren't always embodied in one individual. "A chiropractor spends six years studying chiropraxis," he says, "then must run an office with personnel, books, tax reporting, leases, equipment purchases, and advertising decisions. What do they really know about that? They know bad backs, and that's the way it should be."

Enter KSA. Stein's agency supplies managerial expertise and custom designs information systems for small businesses. Depending on the situation, that can mean placing a professional with MIS skills on-site part-time, providing processing capability through KSA's PCs, or helping the business set up its own PC-based information system.

Stein often finds, however, that automating isn't necessarily in the best interest of a small business. "Sometimes it's clear that a client

shouldn't tie up money in a computer," he says, "but would be better off investing in inventory and advertising. Bringing customers through the door and having more to sell them is what puts bread on the table."

It's also true that for the small entrepreneur, some considerations are almost as important as the bottom line. Says Stein, "Business people usually work 60 hours a week. If we can show them how to save 8 to 10 hours a month for their families or, God forbid, a hobby, that's as good as money in their pocket."

DataFlex
Data Access Corp.
8525 S.W. 129th Terr.
Miami, FL 33156
305/238-0012
List price: single-user $995, multiuser $1250
Requirements: 256K, two disk drives (hard disk recommended), DOS 2.10 or later version
Copy protected

dBASE III
Ashton-Tate
20101 Hamilton Ave.
Torrance, CA 90502-1319
213/329-8000
List price: $695
Requirements: 256K, two disk drives, DOS 2.00 or later version
Copy protected

dBASE III Plus
Ashton-Tate
List price: $695
Requirements: 256K, two disk drives, DOS 2.00 or later version
Copy protected

Enable
The Software Group
Northway 10 Executive Park
Ballston Lake, NY 12019
800/932-0233, 800/338-4646 New York
List price: $695
Requirements: 256K, two disk drives, DOS 2.00 or later version
Not copy protected

Framework
Ashton-Tate
List price: $695
Requirements: 256K, two disk drives, DOS 2.00 or later version
Copy protected

One-Write Plus
Great American Software
9 Columbia Dr.
Amherst, NH 03031
800/528-5010, 603/889-5400
List price: Master Module $295; Accounts Receivable, Accounts Payable, Payroll $245 each
Requirements: 128K, two disk drives, DOS 2.00 or later version
Copy protected

(continues)

Open Systems Accounting Software
Open Systems
6477 City West Pkwy.
Eden Prairie, MN 55344
800/328-2276, 612/829-0011
List price: General Ledger, Accounts Payable, Accounts Receivable, Inventory, Payables $795 each; Fixed Assets, Job Cost, Purchase Order, Sales Order $695 each; Report Writer, Time & Billing $595 each; Project Estimating $395
Requirements: 128K, two disk drives (hard disk recommended), DOS 2.00 or later version
Not copy protected

Paradox
Ansa Software
1301 Shoreway Rd. #221
Belmont, CA 94002
800/547-3000
List price: $695
Requirements: 512K, two disk drives, DOS 2.00 or later version
Copy protected

Rags to Riches
Chang Labs
5300 Stevens Creek Blvd. #200
San Jose, CA 95129
408/246-8020
List price: Ledger, Receivables, Payables, Sales $124.95 each; Ledger Plus, Receivables Plus, Payables Plus, Sales Plus $224.95 each; Plus 3 Pack (Ledger, Receivables, Payables) $594.95
Requirements: 256K, one disk drive, DOS 2.00 or later version
Not copy protected

R:base 5000
Microrim, Inc.
3380 146th Pl. SE
Bellevue, WA 98007
List price: $700
Requirements: 256K (320K recommended), two disk drives (hard disk recommended), DOS 2.00 or later version
Not copy protected

Revelation
Cosmos Inc.
19530 Pacific Hwy. S #102
Seattle, WA 98188
206/824-9942
List price: $950
Requirements: 320K, two disk drives, DOS 2.10 or later version
Not copy protected

Smart Series version 2.0
Innovative Software Inc.
9875 Widmer Rd.
Lenexa, KS 66215
913/492-3800
List price: (single-user) all three programs $895, Data Manager $495, Spreadsheet $395, Word Processor $295; (multiuser) all three programs $1795, Data

Manager $995, Spreadsheet $795, Word Processor $795
Requirements: 256K, two disk drives, DOS 2.00 or later version (multiuser DOS 3.00)
Not copy protected

SuperCalc 3
Computer Assoc.
Micro Products Division
2195 Fortune Dr.
San Jose, CA 95131
408/942-1727
List price: $395
Requirements: 98K (128K recommended), two disk drives, DOS 2.00 or later version
Not copy protected

Symphony
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500
List price: $695
Requirements: 384K, two disk drives, DOS 2.00 or later version
Copy protected

WordStar 3.3
MicroPro Int'l Corp.
33 San Pablo Ave.
San Rafael, CA 94903
415/499-1200
List price: $350
Requirements: 64K, one disk drive, DOS 2.00 or later version
Not copy protected

Accounting for Business

Accounting, the fifth major application area, presents the thorniest conversion problems for most small businesses. Again, business size and type are apt to determine how you approach automated accounting (see "The Big Switch," *PCW,* April 1986).

If your business generates fewer than 30 invoices a month, accounting is best done manually. If you can afford a computer but your operation isn't large enough for a fully integrated accounting system, simple accounting can be done with a spreadsheet, an accounting template written for a spreadsheet, or an inexpensive checkbook-based accounting package like *Rags to Riches* or *One-Write Plus* (see "Accounts Affordable" in this issue). For larger businesses, transaction volume, not a program's price, should be the guide in phasing in a full-featured, modular accounting package. Out of deference to safety and logistics, you'll initially want to run your manual and automated systems in parallel for at least three to six months.

Many businesses mistakenly install every component of a sophisticated accounting system before they need to.

In implementing an automated system, attention to a company's idiosyncracies is crucial. Consider a wholesale book distributor that writes 300 invoices for every 10 purchase orders. The firm must be paid by its retailers before it can pay its suppliers. Accordingly, company management—which wants to watch its aging accounts receivable closely and stay on top of possible late payments—needs an accounting package that emphasizes accounts receivable over accounts payable. Accounts payable transactions might even continue to be done by hand.

By contrast, proprietors of most retail businesses are uninterested in accounts receivable because

most of their customers pay with cash, a check, or a credit card. Retail managers are much more attentive to inventory and accounts payable. Buy too much and you incur costs for carrying excess inventory; buy too little and you lose sales. In addition, some retailers may want an accounting system to link up with their cash registers so they can reduce inventory and evaluate seasonal sales trends (see "Who's Minding the Store?" in this issue).

Implementation Issues

Automation can do a thousand things for a small business, but proves cost-effective for surprisingly few tasks. Even among those assignments that a PC can and should handle, it's essential to establish priorities about what areas of the business you plan to automate and when.

Many businesses mistakenly install every component of a sophisticated accounting system before they need to. Remember that each module imposes a greater burden of time and money for maintenance and support. If you write only 10 purchase orders and 50 checks a month, for instance, linking an accounts payable package with purchase orders would be a waste of time.

The slow-but-steady approach has undisputed merit. Take the case of the retail display case manufacturer whose manual systems were breaking down and whose invoice volume was growing by 22 percent a year. When it came time to automate, the company's only question was what to do first. The firm immediately got its accounts receivable module up and running, enabling the PC to generate invoices and age accounts receivable. Before it could print invoices, the company had to enter both its customer files and its inventory.

Once that module was in place, the firm installed the general ledger component, following that with accounts payable and order entry modules. The business wisely allowed three to four months between installations.

Incidentally, that company's experience ideally illustrates the subtle psychology behind computer-generated bills. Small businesses equipped with PCs are still a bit of a novelty, and there's some indication that customers regard computer-generated bills as more accurate and somehow more worthy of immediate payment. The first batch of invoices brought in a host of seriously overdue checks, most of which the owner was ready to write off as bad debts. The checks paid for the computer system twice over, perhaps proving that you shouldn't underestimate a dot matrix printer's unmistakable imprint.

Vertical Markets and Beyond

Most off-the-shelf accounting programs are fine for a "typical" wholesale/distribution or small manufacturing business. Many major accounting packages also include job costing modules suitable for contractors, engineers, and architects.

Increasingly, so-called "generic" programs—be they accounting or data management or spreadsheet packages—serve as the basis of job-specific, or vertical market, applications. An accounting system tailored to law firms, for instance, might include a court calendar and docket tracking system or a time and billing module appropriate only for attorneys.

Thousands of vertical market packages are available, but most are geared to professional enterprises rather than to retail outlets and job shops. (That situation may reflect a reluctance among plumbers, garages, and painting contractors to adopt PCs and an unwillingness among programmers to seek out such businesses.) The bulk of vertical market programs are several times as expensive as their off-the-shelf counterparts, but compensate in their capacity to handle the special needs of various enterprises.

Although vertical packages are fairly specific, some may not be specific enough for your business; others may not jibe with the way your business works. Hence the increasing popularity of custom-designed applications among PC-savvy small businesses. Much of the custom programming for such operations is done via data management languages, particularly *dBASE III;* also in evidence are *R:base*

5000, Revelation, Paradox's PAL, and *DataFlex*. Reducing development time from two years to three months and cost from $50,000 to $5000 puts a custom system within reach of many neighborhood entrepreneurs.

Elbow Room—And Then Some

When doing a needs analysis, think about the kind of system your business might require in a year or two. If you're immersed in both word processing and accounting, you may well require a second machine. If your PC-based accounting system expands to the point where two or more people need to access the same data, it just might be time to consider installing a local area network and upgrading your single-user system to a multiuser one.

Multiuser software—like *dBASE III Plus* in data management or *Open Systems Accounting Software* in accounting—enables two or more people on a local area network to safely use a file at the same time. Simply put, multiuser software ensures that while the purchasing agent is adding 25 green widgets to the 10 already in inventory, the shipping clerk can't reduce the same 10 green widgets by 3.

Periodically reevaluating your needs should alert you to impending changes and enable your business to expand its system with a minimum of disruption.

Manning the Battle Stations

Employee resistance to a PC-based system can often be averted by involving every member of the company in PC planning and analysis from the outset. When installing the system, allow sufficient time for employees to receive training and become acclimated to the software. It's always wisest to go slowly, bringing in a new program only when your staff feels comfortable with existing packages. If the system has been implemented professionally and is delivering the promised efficiency—and employees view the PC as a means of upgrading their own skills—staff support is virtually assured.

Make the conversion to PCs easier by removing as much of the mystery as you can, via scrupulous documentation and vigilant data backup policies.

Hardware and software may carry a price tag of some $5000, but when your vital business data is committed to magnetic media, "priceless" best describes it. The sensible insurance against lost data is to make frequent copies. Plan to make two copies for backup purposes; keep one copy on-site and, as insurance against fire or theft, take the other to a secure place off-site. Establish data backup as something of a religion, and develop and post explicit procedures for your staff detailing how and when to back up.

Make the conversion to PCs easier by removing as much of the mystery as you can, via scrupulous documentation and vigilant data backup policies.

Document all such procedures and store a copy of those rules in a safe place (see "Conventional Wisdom," *PCW*, August 1985).

Most small business proprietors take a tremendous amount of pride in the skills required to run a successful business. If minding the store has become something of a burden, planning for and installing a PC might be the tonic you need to put the fun back in business. It might even save enough money to inspire your next venture.

Daniel Goldsmith heads Goldsmith & Associates, a consulting firm in Berkeley, California, that specializes in writing dBASE III *applications for small businesses.*

Photography by Robin Ginsberg. Special effects by Bill Morse

First-Class Profits From Third-Class Mail

If you own a retail or mail-order business or are contemplating starting one, you can increase your sales and enhance your customer base with a PC and mail-order management software.

Robert Bryan

Melody Music, a small retail music outlet in Berkeley, California, specializes in rare, collectible woodwind instruments and caters to a select clientele of professional and amateur musicians. The proprietors automated the mail-order segment of their operation in 1983 and enjoyed a 20 percent increase in mail-order sales. Processing an average of 20 orders per day while maintaining an ongoing retail trade, this small business now credits mail-order with approximately 30 percent of its gross annual revenue. Melody Music manages a customer mailing list of approximately 3500 names, from which catalog and flier mailings are generated four to six times per year. This system is capable of producing mailing labels for ranges of postal zip codes, customers interested in specific products, or a combination of the two as well as providing inventory control and mail-order invoicing. This thriving segment of their businesses, the owners maintain, would be difficult to manage without the aid of automation.

If you want to take advantage of the burgeoning mail-order market, consider the benefits of computerization. PC-based mail-order is a cost-effective way to expand your business and an affordable alternative to renting time on a mainframe or minicomputer.

New Trends in an Old Game

New players have begun appearing in the mail-order market, an arena that formerly nurtured such mainstays of middle Americana as Sears Roebuck & Company and Montgomery Ward. Postal Service statistics show that in August 1985 there were 789,000 holders of third-class permits for bulk mailing in the United States, representing an average increase of 20 percent each year since 1970. The Direct Marketing Association, a nonprofit organization providing informational services to direct marketers, estimates that 50 percent of these permit holders are businesses with fewer than nine employees.

One reason mail order is attractive to the small business owner is that the heart of the mail-order system—the customer mailing list—is an excellent tool for tracking buying habits. As a mail-order merchandiser you have your customers' names, addresses, and purchasing records in the customer data base and order records. You can use this information to determine such trends as the effect of geographical location and seasonal changes on sales, or the price ranges to which your customers respond.

But Will It Sell?

Some products sell consistently through the mail while others fail miserably. Any product not readily available in the local marketplace is a potential mail-order best-seller. Traditionally, low cost has been the basis of selling through the mail; vendors sell for less and still retain a healthy profit margin because their expenses are low. Newer mail-order companies are finding that incentives such as toll-free telephone ordering, generous customer support, guaranteed prompt shipment, and clearly stated return policies are helping them attract enough sales to gain an advantage over their retail competition.

Mail order has always been appealing, but not always practical, for the small business owner. To get your money's worth, you must edit your mailing list regularly to avoid mailing out catalogs and fliers that won't bring in sales. Managing a list of 8000 customer records would be an overwhelmingly tedious and expensive task to assign to an employee, but it's a breeze for a computer. Software designed specifically for mail order is making the task increasingly easier.

If a consultant tells you that you'll need to change your inventory habits to accommodate his or her software, get a second opinion.

Before You Buy

When considering mail-order software, ask yourself if the package will allow you to thoroughly manipulate your customer list using editing, sorting, and printing functions. If your product appeals to buyers in a limited geographic area, be certain that the software allows you to produce mailings for specific regions. A package that allows you to sort the customer records by city, state, or zip code will suffice.

Software designed for the volume merchandiser probably won't cater to small business needs because the enterprises employ radically different marketing tactics. Mail-order firms dealing in volume use the "shotgun" approach to marketing, mailing millions of pieces and hoping for a 2 to 4 percent return. For the small mail-order firm with less money to spend, "targeted" mailings to customers who have a strong interest in a particular product line can produce responses as high as 30 percent on mailings of only 300 pieces. The software must perform field-by-field sorts, enabling you to focus the mailing on customers interested in a particular price range, a particular product, or both.

At the very least, any mail-order operation, regardless of volume, needs a good list-management program. You should be able to create a data base of customers in which each record contains at least the name and address; additional descriptive information is highly desirable. Did the customer respond to that sale on imported ski gloves, or was she attracted to the promotional discount on ski tune-ups? A generic data management package will support this feature, but you'll find it much easier to use mail-order software designed specifically for mailing

list management, thus saving you the trouble of creating templates or boilerplates.

Sometimes the list or mail merge feature of a generic data management or word processing program will serve your purpose, if only temporarily. The owner of a wholesale sporting goods business learned this when his store suffered cash flow problems due to fast growth and laggard payments from customers. He hired an accountant to install an accounting package; the accountant pointed out that cash flow would improve if the business emphasized more mail-order sales, in which payment comes with the order. The owner had been treating mail-order as a casual sideline, mostly for customers who could not reach retail outlets. Using a simple mailing feature in the accounting package, he started mailing fliers out more frequently. The store's mail-order business grew from 10 percent to 35 percent, and the cash flow problem eased.

Growing Up and Out

If you depend on a generic business package, you may find yourself growing out of its data management features and into mail-order software. Software publishers usually design mail-order management software as a line of separate modules for list management, order entry, inventory control, sales and marketing analysis, and accounts receivable/payable. Modular software is a sensible choice if you already have a strong business management system in place: Some specialized mail-order packages can read *1-2-3*, *WordStar*, and *dBASE* files. If your accounting methods are finely tuned, don't duplicate your effort by creating a separate system for mail order; incorporate the mail-order transactions into the existing accounting system.

If your goal is to automate every aspect of the mail-order process, but your budget dictates restraint, start small by building on the three essential modules: list management, order entry, and inventory management. You can automate the entire mail-order cycle of establishing an inventory, soliciting buyers, and receiving and filling orders with just these three components. Most order entry modules also provide simple accounts receivable features, enabling you to indicate in each record whether or not payment was received and if so, how payment was made.

Many consulting firms and software houses are using existing business application packages such as *dBASE III* to design mail-order programs for small business owners. Often clients are interested in complete mail-order automation—from creating the customer list to analyzing the sales results of mailings. Custom software can be expensive—as much as $20,000 including installation—but it is designed to handle your firm's special needs.

Such software can fully automate your mail-order operation, including your accounting, recording, and ordering processes—even if your methods are somewhat unorthodox. Don't base your decision to use custom software on your sales volume or the length of your customer list. It is far more important that custom software adapt to your business practices; if a consultant tells you that you'll need to change your inventory habits to accommodate his or her software, get a second opinion before you even think of restructuring your business procedure.

Get Your Money's Worth

Increasing numbers of small business owners are deciding that a carefully implemented custom system is worth the expense. An exclusive clip art service selling the

Robin Ginsberg

works of a well-known cartoonist uses custom-designed software to run its entire mail-order system, including invoice generation, acounts receivable, and maintenance of a 3000-name customer list. The proprietors are now adding a customized marketing analysis module to determine the effectiveness of their advertising dollars. The business has grown by 30 percent in the last fiscal year.

Some mail-order packages go far beyond the standard management tasks and provide mail route sorting and check or credit card verification by modem. While these packages are attractive, don't be taken in by frills. If you aren't sending more than 50 fliers to a single zip code, the sort capability in a list manager will suit your needs. As an established retailer, you probably subscribe to credit card and check validation services and use dedicated hardware or your own telephone to communicate with the service; find out if you can use a PC with the verification service before you invest in the software.

If you decide to buy an inexpensive package now and upgrade to a more versatile package later, be aware of the "compatibility factor." Will your next program read files from your first package? If not, when you upgrade, expect to face the onerous task of manually reentering your customer list. In addition, the less expensive package may not accommodate large data bases. Assess your prospects for growth during the coming years; software that partially suits your purposes or, again, requires that you reorganize your business methods is of little value at any price.

Hardware Needs

Hardware considerations for mail-order management are really quite straightforward. You don't necessarily need an AT or an 80286-based clone. You do need at least 10MB of hard disk space. Thus equipped, you can handle a list with as many as 20,000 names, although most programs will be overburdened at that point. The only other requirement is a durable dot matrix printer capable of printing mailing labels and invoices; some packages require a 132-column print capability.

Will your next program read files from your first package? If not, when you upgrade, expect to face the onerous task of manually reentering your customer list.

Put It to Work

Before implementing a mail-order system, you need to create a customer data base. You can attract mail-order clientele, as well as gather insight into their buying habits, with customer sign-up sheets placed around the store. In-store sign-up is a proven technique that requires little effort. One retailer placed catalog sign-up sheets in each of her three outlets and within a year generated a list of 8000 customers. Use the sign-up technique to your advantage and include a brief questionnaire on the form. Ask questions like, "What products interest you most?" to determine buying habits and, "How did you hear about us?" to help you gauge whether your advertising is effective. Use the answers to construct customer profiles.

If you've purchased software for inventory management and order entry, your next move should be to seek out support. Businesses that don't already have a computer should find a consultant who specializes in putting small businesses on line. Some vendors selling high-end packages offer on-site support in the purchase price of the software; if you pay for support, use it.

Should you opt to install the system yourself, be especially concerned about how the simpler operations work. Can you perform sorts consistently and accurately? Can you design your own data and order entry forms to contain all the fields you need?

Most important, be aware of the features that you use daily or even hourly. Can you enter telephone orders directly into the computer while a customer is on the phone? Are you writing phone orders on paper and entering them later? If the computerized mail-order system is clumsier than your manual system, something is awry.

Technical problems can often be handled by the vendor or manufacturer: You probably paid for that kind of support when you bought the software. If you think that the software just doesn't fit your operation, a consultant or programmer may be able to alter the program to solve your problem. The cost of modification depends on the extent and nature of the changes, the time required, and the hourly rate charged by the programmer. It might cost as little as $70 to have your mailing list rewritten to allow a new type of sort, or as much as $1000 to add inventory-tracking capabilities. Programming fees range from $20 to $100 an hour, so extensive modifications may easily exceed the original cost of the software.

Don't be surprised if you need consultation, even after you've gone to great lengths to find software that does everything you want it to do. You can't predict fluctuations in the market, nor can you always predict how fast your company will grow and change. Your mail-order system will prove itself over time: Make an informed decision now and the hardware kinks can be smoothed out, the software shortcomings modified, and the return on your investment great. ●

Robert Bryan is a consultant specializing in computerized mail-order for small businesses.

*Data*Easy PC Mail Order System*
Data Consulting Group
12 Skylark Dr. #18
Larkspur, CA 94939
415/927-0990
List price: $395 plus shipping
Requirements: 192K, two disk drives (hard disk recommended), DOS 2.00 or later version

Direct Mail Manager
Perelman/Calmus Custom Business Software
P.O. Box 241758
Los Angeles, CA 90024
213/394-0499
List price: $1495
Requirements: 512K, hard disk, DOS 2.00 or later version

Leadnalysis
Inquiry Services, Inc.
12842 Pennridge Industrial Dr.
Bridgeton, MO 63044
314/298-0599
List price: $1290 (includes program and day of training at Inquiry Services), $2000 (includes on-site installation and training at buyer's location)
Requirements: 512K, two disk drives, DOS 2.00 or later version, wide-carriage dot matrix or letter quality printer, Hayes 1200 or 1200B optional

List Pro
Professional Publications, Inc.
P.O. Box 199
San Carlos, CA 94070-0199
415/593-9119
List price: $295
Requirements: 128K, hard disk, DOS 2.00 or later version, 132-column printer recommended

The Mail Order Accountant
Goldsmith & Assoc.
48 Shattuck Square #86
Berkeley, CA 94704
415/540-8396
List price: $750
Requirements: 256K, hard disk, dBASE III

Mail Order Pro
Professional Publications, Inc.
P.O. Box 199
San Carlos, CA 94070-0199
415/593-9119
List price: $395
Requirements: 128K, two disk drives (hard disk recommended), DOS 2.00 or later version, 132-column printer

Response
CoLinear Systems, Inc.
P.O. Box 11562
Atlanta, GA 30355
404/433-3217
List price: base system containing order processing, customer service, inventory control, fulfillment, and password security $2950; additional modules range from $50 to $450
Requirements: 256K, 10MB hard disk

SalesBASE/PC
Business Systems International, Inc.
20942 Osborne St.
Canoga Park, CA 91304
818/998-7227
List price: $295
Requirements: 256K, two disk drives, DOS 2.10 or later version

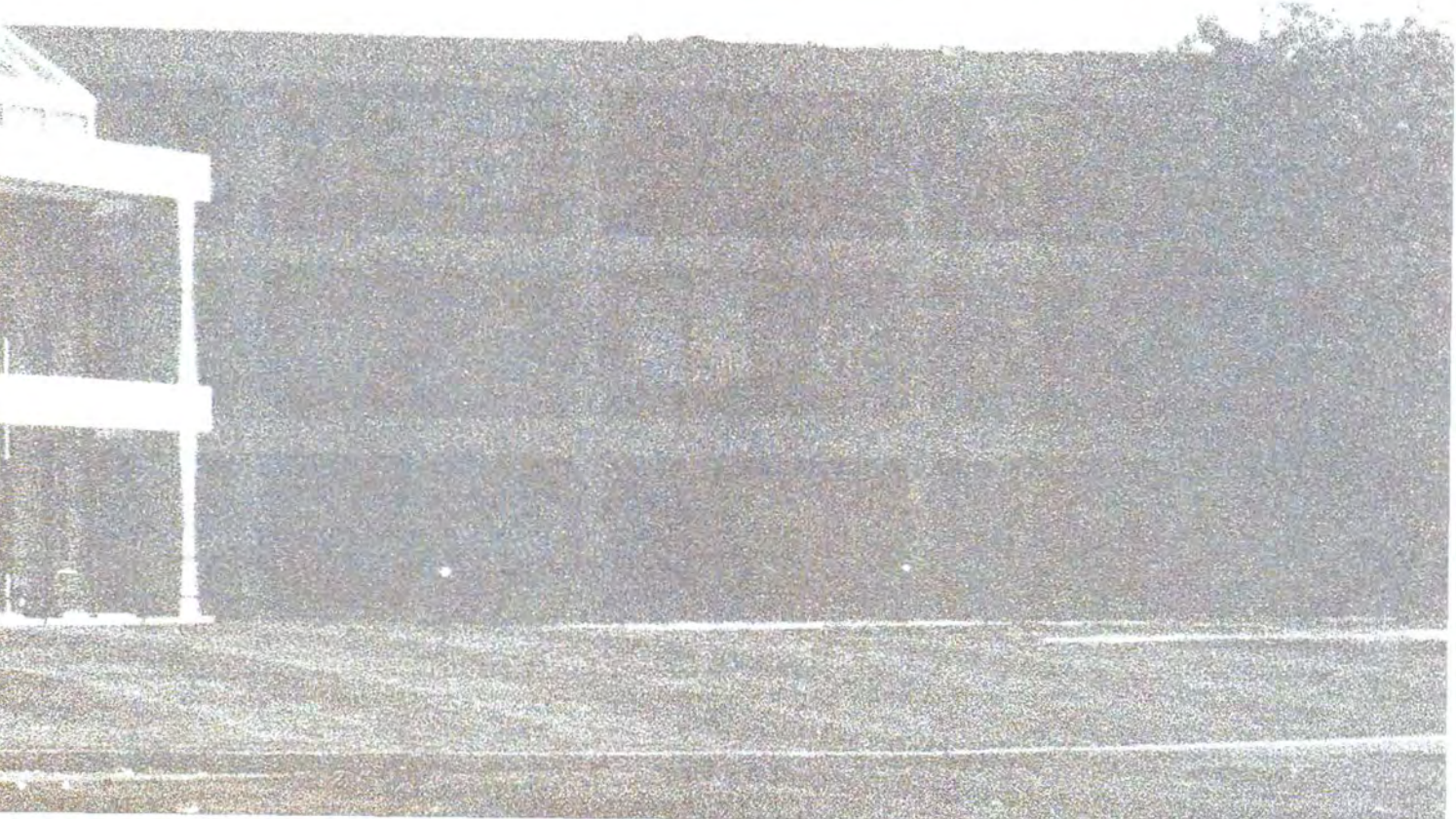
IBM: Practicing What They Preach

At IBM headquarters everyone's got a PC. Management at the corporate offices of the world's largest computer company has transformed a staff of 4400 into PC users—and is keeping them happy to boot.

Steve Ditlea

Apocrypha, vigorously denied by IBM, has it that the first personal computer to impress managers at corporate headquarters in Armonk, New York, didn't travel north from Entry Systems Division (ESD) in Boca Raton, Florida. Instead, in the days before there was an IBM PC, a headquarters staffer lugged a Radio Shack TRS-80 from home to office. The maverick then offered colleagues a demonstration to suggest the major role a personal computer could assume during the workday in this, the epicenter of the computer industry.

So while the late Philip "Don" Estridge, the ESD president who's credited with the genesis of the PC, is revered at Armonk, neither he nor others in ESD were directly responsible for the decision to install PCs throughout headquarters. The idea belongs



Steve Ditlea

partly to Allen Krowe, a senior vice president for finance and planning. When IBM introduced the PC in August 1981, Krowe was the first headquarters executive to champion the objective of placing one on every desk. A 1983 IBM-sponsored study revealed that the PC, when used as little as 20 minutes a day, was found to justify the installation costs.

According to Krowe, the policy of turning every IBM headquarters employee into a PC user has led to some real success stories. "We realized that the PC could play a significant role in the daily work life of our employees," he explains. "It has increased productivity, enhanced our ability to communicate with one another, and enriched our jobs."

A centralized support structure precludes potential incompatibility, haphazard training, and poor system selection—expensive, time-consuming problems that plague any large firm.

By the end of 1985, Armonk had achieved its goal: PCs, XTs, ATs, 3270 PCs, and PC Portables, all outfitted with 512K of RAM, are now running business application software familiar to PC users in other corporate settings.

Befitting IBM's bottom-line sensibility, almost half of PC time is devoted to such spreadsheet applications as budgeting, planning, and financial analysis, often based on data downloaded from a headquarters mainframe. Word processing for individual correspondence and interdepartmental reports ranks second in popularity. Also pervasive are data management and presentation graphics applications.

Armonk's Information Systems department (IBM's equivalent of an MIS department), headed by Frank Palm, eased the transition to PC use first with a streamlined process for acquiring PCs—initially all it took was a department head's approval for a staff member to order a PC—and then with an expanded network of support systems and services available to the installed base as it grew.

Not With a Bang

The momentum for adopting PCs at IBM, a company that still derives most of its income from mainframes, peripherals, and office equipment, appears to have grown gradually. Four years ago, when the PC was in its infancy, barely 100 IBM machines were available to a corporate headquarters staff totaling more than 4400. PC growth at headquarters has mirrored the increase in PC usage generally. In 1983, some 750 PCs were scattered about headquarters. That figure has since swelled to 5300, counting PCs allocated to departments as well as to individuals. According to Palm, "There are now more PCs than employees at IBM corporate headquarters. This underscores how important a working tool the PC is to us." In addition, IBM has installed 300 PCs in the homes of key managers, many of whom use their PCs to communicate with IBM offices around the world. IBM also offers all employees discounts on PCs for personal use.

From managers with their own terminals to secretaries who could type like blazes on a Selectric, few headquarters employees initially found much incentive to use a personal computer. Yet when Information Systems personnel began equipping all employees with PCs as "intelligent workstations," they found little resistance. (For more on how IBM's large-account strategy focuses on the PC as an "intelligent workstation," see "A Candid Conversation With William Lowe," *PCW*, March 1986).

The key to PC acceptance by headquarters employees has been the machine's serving double duty, providing desktop computing as well as a link to corporate mainframes. Armonk's PCs are, in part, smart terminals. They all communicate via IBM's *Professional Office System (PROFS)* software on its central mainframes. With IBM's own 3278/3279 terminal emulation software running on a PC, any user with an appropriate ID can call up a *PROFS* menu and choose appointment scheduling, electronic mail, or document storage on one of seven mainframe VM/SP host environments (see the sidebar "Profile of PROFS").

The benefits of putting a PC on every desk range from good public relations to improved intracompany communications. According to International Technology Group's veteran IBM watcher Brian Jeffery, IBM doesn't mount such a project without an eye to creating a paradigm for other corporate users. Armonk showcases the PC as a flexible, inexpensive workstation installed throughout the company. Less tangible but just as important to IBM is efficiency in communication via electronic mail.

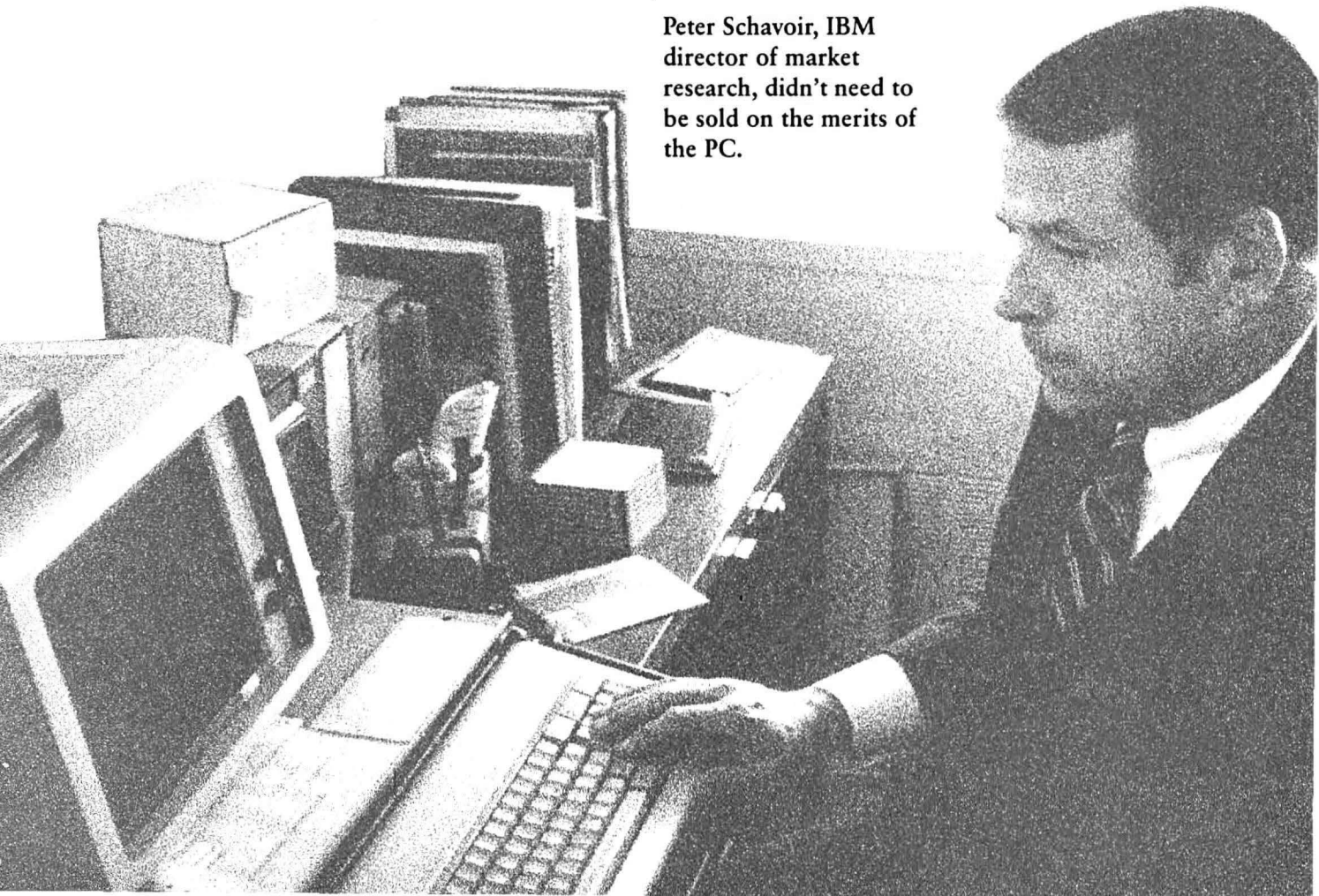
Means of Support

As PC use at Armonk grew, headquarters support evolved from ad hoc, user-to-user assistance into a full-blown, centralized support structure. Such a structure precludes potential incompatibility, haphazard training, and poor system selection—expensive, time-consuming problems that plague any large firm installing a vast number of personal computers.

At first, pioneering enthusiasts swapped advice, but this informal information-sharing often left unsophisticated users confused and sophisticated users frustrated. In early 1982 a single part-time PC coordinator helped select and install equipment.

That October, Palm and the Information Systems staff established a PC support group to provide training and hand-holding for headquarters staff, from the rank-and-file to senior executives. At that early stage, the support group was semiautonomous. A full-time manager and four professionals were responsible for support during the first year. By its second year, the organization had expanded to include 12 full-time employees and 10 college interns.

Consistent with IBM's traditional management controls, once PCs had been placed on every desk, the rules for equipment acquisition tightened. Now orders for additional hardware and software require two levels of management approval. As before, the support group "burns in," or tests, all equipment before delivering it.



Peter Schavoir, IBM director of market research, didn't need to be sold on the merits of the PC.

Profile of PROFS

Armonk's smooth adoption of PCs owes much to the IBM *Professional Office System (PROFS)*. This mainframe communications and utility software, base priced at $22,000, was introduced for VM/CMS operating system mainframes so office functions could be performed on the same terminals used for interactive problem solving. *PROFS* was installed at IBM headquarters in mid-1984 and was augmented for IBM's specific needs.

An IBM employee can start a session with *PROFS* by calling up memory-resident terminal-emulation software. On screen, the notice for *PROFS* features the initials for Armonk Virtual Machine (ARM/VM), the designation for headquarters' information systems mainframe. *PROFS* asks for the user's ID and password. Armonk has enhanced *PROFS* to require a password change every 60 days.

PROFS' main menu includes the current time, a 30-day calendar, and instructions for 12 "PF keys," mapped to the PC's function keys plus <Shift>-<F9> and -<F10> (see Screen A). This menu offers business communications, time management, document preparation, and search and retrieval functions. Users occasionally find a notice of 'mail waiting' at the bottom right hand corner.

A single keystroke enables a user to "open the mail"–in this case, bring up a screen with a list of messages identified by sender, time received, and topic. Boldface text highlights messages that haven't been read. These can be viewed, then forwarded, commented on, or answered; *PROFS*

```
                    CHQ's OFFICE SYSTEM

Press one of the following PF keys.                    Time:   12:16 PM
PF1  Process schedules
PF2  Open the mail                                  1986    JANUARY    1986
PF3  Search for documents                          S   M   T   W   T   F   S
PF4  Process notes and messages                                1   2   3   4
PF5  Prepare documents                             5   6   7   8   9  10  11
PF6  Telephone Directory                          12  13  14  15  16  17  18
PF7  Process the mail log                         19  20  21  22  23  24  25
PF8  Check the outgoing mail                      26  27  28  29  30  31
                                                          Day of Year: 008
PF10 Add an automatic reminder
PF11 Look at main menu number 2
                                                      PF9 Help   PF12 End
For ASSISTANCE type AID and press Enter - Highest level - IBM Confidential



===>                                          MAIL WAITING
```

Screen A: After typing in a valid password, an Armonk employee can access PROFS' first main menu and pick up electronic mail.

provides the address and subject heading for the reply. Messages can be sent to individuals or to an entire distribution list. *PROFS* at IBM headquarters includes an on-line corporate organization chart so users can ferret out the names of potential electronic mail recipients. Another headquarters enhancement to *PROFS* consists of an on-line telephone directory of the company's far-flung global facilities.

On a daily or monthly basis, *PROFS'* scheduling functions handle appointments, "to do" lists, and reminders for particular events. These reminders are flashed on the main menu screen at the appropriate time (see Screen B). *PROFS* excels as a scheduling tool; group meetings can be arranged by entering the names of those *PROFS* users who should attend, the meeting's duration, and timing alternatives. The program searches all participants' schedules, provides possible times, and once a selection is made, automatically sends out electronic notification to each attendee showing time, purpose, and conference location.

By centralizing communications, scheduling, and document handling, *PROFS* lives up to its billing as the "Professional Office System." At Armonk, it's successfully serving as the nexus between the PC and the mainframe.

(At press time, IBM announced *PROFS PC Support,* host-based software enabling PC users on a *PROFS* system to prepare most documents locally and to exchange large documents over the network. Unlike its predecessor, *PC Connection*—a standalone package—*PC Support* is installed on the mainframe; its pricing scheme is based on the number of PC users supported.)

```
                    ADD AN AUTOMATIC REMINDER

To have PROFS remind you of an                    Time:   1:46 PM
event, type in the date and time
you want to be reminded. Also,                 1986    JANUARY    1986
type in the note you want PROFS                S   M   T   W   T   F   S
to show you at that time.                                  1   2   3   4
                                               5   6   7   8   9  10  11
Date: 01/08/86                                12  13  14  15  16  17  18
                                              19  20  21  22  23  24  25
                                              26  27  28  29  30  31
Time: 10:00                                          Day of Year: 008

Note:
Meeting with John
------------------------------------------------------------------------

To have PROFS remind you several times, type below the number of times you
want the reminder repeated and the number of minutes between each reminder.

Times: 2  Minutes:  5
       -            --

Then, press ENTER to send the information to PROFS.

PF9 Help   PF10 Next Month   PF11 Previous Month   PF12 Return
```

Screen B: PROFS provides an on-line appointment book, reminding users of the date, time, and purpose of upcoming meetings.

Carolyn Barnabo, manager of headquarters' Information Systems, Education, and Productivity Center, says the center "provides centralized support for PCs, including one-stop shopping, hardware and software recommendations, training, and a telephone hot line."

Information Systems professionals staff the hot line, the most popular form of support, from 8 a.m. to midnight. Members of the support group also make office visits to consult on user needs and to repair equipment; often one person is assigned full-time to an IBM department.

In addition, the PC support group circulates hardware and software tips and announcements in the glossy *CHQ (Corporate Headquarters) Information Newsletter* and the more casual *IWS (Intelligent Workstation) Journal.* Under the auspices of the extracurricular IBM Club, a PC user group meets monthly, drawing IBM employees from management, research, and manufacturing facilities throughout the surrounding area.

For Candace Byers, manager of market information and analysis at IBM, the PC has replaced the telephone as the central communications tool.

Off the Shelf

For all of IBM's reliance on its own hardware—no PC compatibles are in evidence—software is another matter. The list of programs supported at headquarters reads like that of any corporate PC installation. Familiar names—*1-2-3, dBASE III,* and *Smartcom II*—coexist with IBM's own titles.

It wasn't always so. Initially, the strategy was to use only IBM-labeled products. The PC support group soon changed its tack when some third-party programs seemed to do the job better. These days the support group samples a wide variety of new software, casting an eye to utility as well as to performance. "We look for mainstream programs," says

Barnabo. "We want to offer general-purpose tools, if possible." In line with this policy, the PC support group won't write full-blown application programs, batch files, or even spreadsheet macros.

On the Levels

Around Armonk, IBM uses a carrot, not a stick, to ensure that users adopt software best suited to their applications. The support group first determines the software's general utility and then classifies it according to the degree of support the group can provide. At Level One, the workhorses—the standard business packages—are fully supported, with classes available at IBM's nearby Tarrytown training facility, equipped with about 70 PCs of its own. In addition to programs like *1-2-3* ("We bought 100 copies the day *1-2-3* was released," Barnabo recalls) and *dBASE* or *R:base* for data management, Level One features IBM's own word processors, *DisplayWrite 3* and *Writing Assistant.*

In general, Level One programs are available to both power users and those who prefer software that is easy to use. Recommended for the latter is IBM's *Assistant* series, with spreadsheet, graphing, and data management titles, which, like *Writing Assistant,* are adapted from Software Publishing's best-selling *pfs* packages. *Word Proof,* a sophisticated spelling checker/thesaurus from IBM's employee-written software line, is the writing utility of choice. Also supported at Level One are professional on-line data bases like the Westlaw and Lexis legal services and Nexis news service.

IBM's 15 top executives have received one-on-one PC training and continue to get special attention in the form of executive templates, an executive hot line, a newsletter, and private consulting.

As applications become more specialized, support becomes more limited. Level Two, which includes hot-line support, is available for software like Decision Resources' *Chart-Master.* Level Three software is supported only on a "can do" basis.

In some cases, "can do" means a lot.

IBM's 15 top executives—including president John Akers—have received one-on-one PC training and continue to get special attention in the form of executive templates, an executive hot line, a newsletter, and private consulting.

Corporate Users

Like many IBM senior managers, Peter Schavoir, IBM director of Market Research, was attracted to the PC soon after its introduction. Schavoir, who was involved in market planning for the PC and describes himself as a "bit of a tinkerer," was eager to see what he could do with *VisiCalc.* He soon became a confirmed spreadsheet disciple. Often reporting to IBM's top executives with market studies and business data, Schavoir appreciates being able to integrate information on his XT.

Schavoir doesn't consider himself a power user. He can generate his own *1-2-3* models but prefers to work with applications created by members of his 25-person staff. Still, one of his favorite time-saving applications is his own *1-2-3* travel expense report template, which lets him quickly dispatch what was once a tedious chore. "I spend an hour a day on my PC," says Schavoir. "I wonder how I did all my work for 20 years without one."

IBM middle managers like Candace Byers, head of Market Information and Analysis, find that a PC can be a more effective communications tool than the telephone. "Forty percent of my time on the PC is spent handling communications and scheduling," says Byers. Byers gives high marks to *PROFS* "for increasing our communications hit rate"—the number of messages answered within hours—while suggesting a more subtle motive behind growing dependence upon electronic mail: "If you don't use electronic mail you're seen as behind the times."

A financial analyst whose expertise lies in evaluating corporate acquisitions and divestitures, Byers uses the PC to access data banks like the Inventory of American Business and Chase Econometrics' demographic analyses. She also relies on decision support software written specifically for her department to

evaluate data from domestic and overseas operations.

"Another 20 percent of my time on the PC involves the *Writing Assistant*," she adds. Such word processing packages have enabled IBM to automate its personnel evaluations. Certainly, periodic employee assessments are as much a part of IBM corporate culture as are blue suits.

The More Things Change

At Apple Computer, five months after a one-page memo from then-President Mike Scott mandated an Apple for every employee, the term *secretary* was abolished and replaced by *area associate*—a telling acknowledgment of how personal computers expanded the scope of clerical duties. While few typewriters remain at IBM headquarters facilities, nothing as drastic as a job-title change seems to be in the offing.

Do PC users enjoy greater upward momentum through IBM's ranks? It's too soon to tell, but Byers points to her secretary's increased on-the-job responsibilities and satisfaction: "Secretaries can take on administrative assistant functions and receive greater job enrichment," she says.

Today, IBM executives and middle managers think nothing of keying in the first draft of a letter themselves, thus debunking the myth that corporate brass won't touch a keyboard. As a result, secretarial duties increasingly deal with editing, production, archiving, and communications. Among the more valued secretarial skills is the ability to transfer *DisplayWrite* files to *PROFS* and vice versa. That, in turn, is changing one modus operandi at Armonk: fewer memos on paper.

Debbie Kassay, Byers' secretary, is typing less and enjoying it more. She can now devote her time to scheduling and planning functions, with special attention to IBM's semiannual strategic planning conferences. "I use *PROFS* to view executives' schedules on their electronic calendars and check their availability," she explains.

With an increasingly PC-literate staff at headquarters, IBM can rely on new methods for delivering employee services. For example, a brochure outlining corporate benefits is now accompanied by a personal financial planning program and an instruction booklet; employees can now figure personal budgets and cash flows electronically.

With an increasingly PC-literate staff at headquarters, IBM can rely on new methods for delivering employee services.

IBM has linked burgeoning PC applications at Armonk to its own productivity targets. According to Barnabo, "The company's goal of enhancing staff productivity means everyone will have to handle more work and improve efficiency. You can be sure PCs will be a key to increased productivity at IBM." Given its success at penetrating the Fortune 1000 PC market, IBM will have nothing to lose by demonstrating that, like charity, productivity gains via PC use begin at home.

Steve Ditlea, editor of Digital Deli *(Workman Publishing, New York, New York, 1984), is a freelance writer based in Armonk, New York.*

1-2-3
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500
List price: $495
Requirements: 192K, two disk drives
Copy protected

Assistant Series
IBM
P.O. Box 1328-W
Boca Raton, FL 33432
800/447-4700, 800/322-4400 Illinois, 800/447-0890 Alaska and Hawaii
List price: Document Retrieval Assistant, Drawing Assistant, Filing Assistant, Graphics Assistant, Planning Assistant, Voice Phone Assistant, Writing Assistant $149 each; Mainframe Communications Assistant $199; Reporting Assistant $129; Home Solutions, Executive Solutions $69 each; Accounting Solutions $89
Requirements: 128K, one disk drive, DOS 2.00 or later version
Not copy protected

Chart-Master
Decision Resources, Inc.
27 Sylvan Rd. S
Westport, CT 06880
203/222-1974
List price: $375
Requirements: 192K, two disk drives, color graphics board with color monitor or Hercules board with monochrome monitor
Copy protected

dBASE III
Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
213/204-5570
List price: $695
Requirements: 256K, two disk drives, DOS 2.00 or later version
Copy protected

DisplayWrite 3
IBM
List price: $450
Requirements: 256K, two disk drives, DOS 2.10 or later version
Not copy protected

pfs series
Software Publishing
1901 Landings Dr.
Mountain View,CA 94043
415/962-8910
List price: pfs:file, pfs:graph, pfs:write, pfs:access, pfs:plan $140 each; pfs:report $125; pfs:proof $95
Requirements: pfs:file, pfs:report, pfs:graph, pfs:proof, pfs:access, pfs:plan 128K, two disk drives, DOS 2.00 or later version; pfs:write 256K, two disk drives, DOS 2.00 or later version
Not copy protected

Smartcom II
Hayes Microcomputer Products
5923 Peachtree Industrial Blvd.
Norcross, GA 30092
404/449-8791
List price: $149
Requirements: 192K, one disk drive, serial port
Not copy protected

Word Proof
IBM
List price: $39.95
Requirements: 128K, one disk drive, DOS 1.10 or later version
Not copy protected

Nothing Succeeds Like Simplicity

Software Publishing Corporation is known for its easy-to-use programs, which have attracted several million users worldwide. This pioneering software producer has prospered by emphasizing simplicity and focusing on customer needs.

Kristin Anundsen

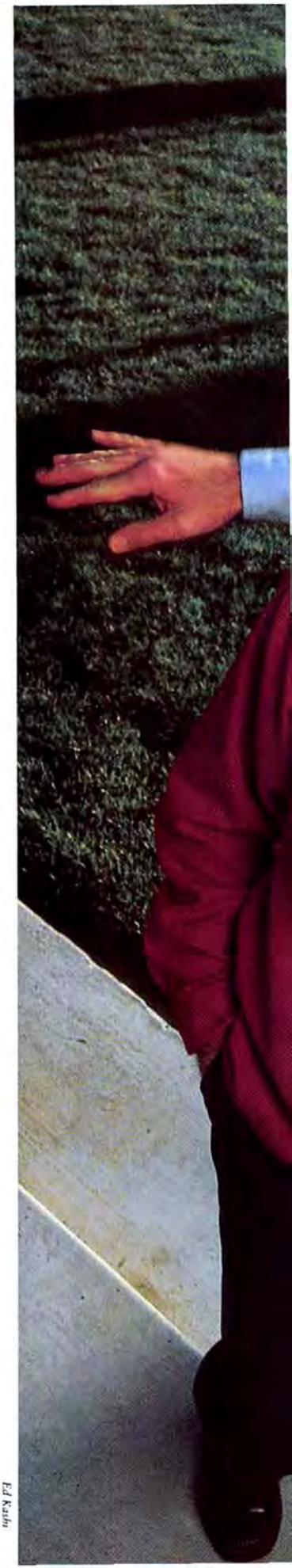
One of the prevailing myths associated with personal computers is that everybody who gets a machine is destined to become a power user, crunching data and devising formulas with dazzling speed and efficiency. In the real world, however, power users are a minority, far outnumbered by the klutzes and the merely functional.

One company, Software Publishing Corporation (SPC) of Mountain View, California, has made its reputation and based its considerable success on producing programs for the adequate majority—those users who are not looking for the ultimate whiz-bang from their software but simply want to get a job done. The company's products are not designed to dazzle or to include every feature imaginable. Instead, Software Publishing operates, according to cofounder John Page, on the "principle of least astonishment."

In Select Company

Software Publishing has been profitable since its first year in business (1980), and sales revenues for its fifth fiscal year, which ended last September, hit the $37 million mark. The company is ranked among the top four in the software industry, along with Lotus, Ashton-Tate, and Microsoft. And as if to underscore Software Publishing's success, it has recently begun to attract imitators—and to take steps down the acquisitions road.

Software Publishing achieved its stature in the industry with its highly regarded *pfs:* series—*pfs:file,*



Ed Kashi

"Separate but synergistic talents" characterize SPC's team approach, says cofounder Janelle Bedke, pictured here with president Fred Gibbons (left) and cofounder John Page.

pfs:report, pfs:access, pfs:write, pfs:graph, and *pfs:plan*–which is often described as "low-end" software (see the sidebar "What's in a Name?"). Company president Fred Gibbons doesn't like the characterization, suggesting that it has led to misunderstanding. "We build easy-to-use products, but that doesn't mean they're not powerful," he asserts. "We tackle complex problems with simple software."

Company cofounder Janelle Bedke, vice president and general manager of the productivity software division, echoes that sentiment: "Our software is simple in the sense of elegant, not simple-minded."

Cofounder Page, who is now vice president of corporate research and development, shares his colleagues' viewpoint. For a technical whiz (he designed the company's first products himself), Page is surprisingly reluctant to extol the power of computer magic. "Most things don't work," he points out. "Success springs from more than just whizzy technology. We know who our customers are, and we figure out how to take current technology and make it useful to them."

Management's philosophy has certainly proven to be a hit with users. *pfs:* products go to all the right parties; to date, Software Publishing has reportedly shipped nearly 1 million units. The *pfs:* family's popularity has been abetted by the company's well-publicized arrangement with IBM, in which Big Blue labels and remarkets the *pfs:* line as part of its *Assistant* series.

The Major Players

Gibbons, Bedke, and Page–all former Hewlett-Packard managers–founded Software Publishing five years ago, and they still appear to be very much a team. In Silicon Valley, where the shelf life of corporate relationships (not to mention corporations) is notoriously short, this is quite a feat.

"We're three people with separate but synergistic talents," says Bedke. "We don't step on each other's toes."

Of the three, Gibbons is considered (by the other two and by most observers) the visionary and the entrepreneur–the person who primarily determines the business direction of the company (for a profile of Gibbons, see the sidebar "Bouncing Back"). It was he who recognized a need for the company's first product, the modest data management program *pfs:file,* and poured his life savings into its development for the Apple II. At that time, in 1979, no similar personal computer-based package existed.

Gibbons is not one of your stereotypical entrepreneurs with an aptitude for starting businesses but no idea of how to run them. He has solid credentials, including a Harvard MBA and five years at Hewlett-Packard, during which time he served as marketing manager for HP's small business computer lines.

Boyishly eager, confident, and energetic, Gibbons considers himself a conservative in business–willing to take risks but only calculated ones. "We could have been bigger sooner if bigness was our objective," he stated. "We take a pragmatic view of business–no moon shots or big-bang products."

John Page's mission is to transform the SPC philosophy into products. Formerly a research designer at Hewlett-Packard, he now monitors technological trends, which he sees as inseparable from customer needs. He's fond of striking up conversations with people he sits next to in airplanes to find out whether they're computer owners. If the answer is no, he wants to know why. (Page can identify with those being grilled; he still doesn't have a personal computer at home.)

Software Publishing's first office was the proverbial garage–Janelle Bedke's garage. There, Bedke wrote the first manual, handled sales negotiations, and generally kept things running. She still does, although Software Publishing's office, which is company-owned, is now 50,000 square feet, houses 185 employees, and markets a growing product line to more than 3500 customers, which include distributors, independent sales representatives, dealers, and original equipment manufacturers (OEMs).

The Team Approach

The team concept at Software Publishing begins at the top and extends throughout the company. Each of the three principals shares in the decisions and the profits more or less equally. The company went public in November 1984; each cofounder retains 13 percent of the shares. All of them work in open cubicles–including Fred Gibbons, although his cubicle is slightly larger than the others. The company has no secretaries; even senior managers take their own calls and communicate by electronic mail.

For each product, teams of representatives are formed from various departments, including R&D, marketing, manufacturing, and

What's in a Name?

Originally, *PFS* stood for *Personal Filing System*–Software Publishing's first product, now called *pfs:file*. The *pfs:* family has since expanded to seven products. In order of birth, they are: *pfs:file*, a file management system; *pfs:report*, the report writer for files created with *pfs:file; pfs:graph*, which produces full-color bar, line, and pie charts; *pfs:write*, a word processor; *pfs:access*, a communications package (see *Password: Communicate, PCW*, September 1985); *pfs:proof*, a spelling checker, now part of *pfs:write;* and *pfs:plan*, a straightforward spreadsheet program.

These products are loosely integrated–freestanding but modular and cooperative, working in conjunction with their siblings. For example, charts created with *pfs:graph*, reports from *pfs:report*, and worksheets from *pfs:plan* can be incorporated into documents created with *pfs:write*.

Although the products don't have every conceivable feature, they do include enough to get most jobs done. Software Publishing figures that simplicity and ease of use are more valuable for more people than throwing in the kitchen sink.

pfs:plan is a case in point. The program provides fewer rows and columns for spreadsheets than *1-2-3* release 1A, but makes up in flexibility and friendliness what it lacks in functionality. You can name rows and columns in any way you wish, rather than having to refer to cells strictly by their coordinates.

Diversification has been the byword at Software Publishing in hardware support as well as in software. The *pfs:* family is available for a broad range of computer systems–although not every program is available for every system. In addition to the Apple II line and PCs and compatibles, *pfs:* products have been released for the Macintosh, for DOS machines from DEC and Texas Instruments–and even for the Commodore 64.

In addition to *pfs:*, Software Publishing is building a group of products under the Harvard name. This second line currently includes *Harvard Project Manager*, a critical path analysis program for tracking projects, and *Harvard Total Project Manager*, an enhanced version that also offers cross-project resource allocation and cost-tracking capabilities.

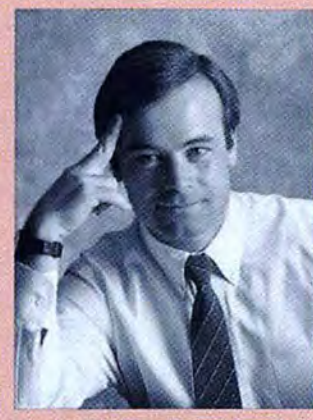
For Harvard as well as *pfs:*, the emphasis on simplicity remains–but where Harvard is concerned, with enough functionality to merit the distinction "high end."

Bouncing Back

Jon Stewart

Three days before Christmas, 1985, Software Publishing's president, CEO, and cofounder, Fred Gibbons, took an uncharacteristic, head-over-skis spill while descending one of the more challenging runs at Squaw Valley in California's high Sierra. When the snow settled, Gibbons, an avid skier, windsurfer, and pilot, lay inert, partially paralyzed on his left side. Doctors are still divided over which came first—the fall or the burst of a blood vessel in the right thalamus of the brain, an incident commonly known as stroke.

The otherwise healthy and energetic 36-year-old Gibbons was confined to a hospital bed for more than two weeks while the news of the trauma—and the rumors about his condition—swept through Silicon Valley and the international computer community. Coming at a time of important transitions for Software Publishing, the accident naturally added fuel to speculations about the company's future, including a prominent story in the *Wall Street Journal*.



Fred Gibbons: The spirit is willing and able.

Gibbons, however, is not one to take such speculations lightly. True to form, he was up and, with the aid of a brace, back in his office within a month of the fall—a clear demonstration that he intends to remain a key player on the winning team he helped create five years ago. A vigorous regimen of physical therapy has resulted in marked improvement in his walk, and his speech is forceful if slightly slurred, says company spokesperson Kim Domino, adding that Gibbons' limitless energy and drive are undimmed.

He attended the ninth annual Personal Computer Forum in Phoenix, Arizona, in mid-February, where his demonstration of determination and the obvious speed of his recovery roused the participants to a standing ovation. According to Domino, Gibbons is back to work on a part-time basis while aggressively pursuing his physical therapy. "He continues to be involved in strategic planning and consults regularly with [cofounder and vice president] Janelle Bedke, who has assumed day-to-day operational responsibilities," says Domino.

Has the brush with fate caused Gibbons to re-evaluate any of his long-range views, as similar experiences have affected other people? "No," says Gibbons, matter-of-factly and with an emphatic period. If anything, he adds, it has engendered a "rededication to work and an appreciation for the quality of people in our industry."

Jon Stewart is the Managing Editor of PC World.

sales. "At each stage, different team members have different levels of participation," Bedke notes. Engineering and manufacturing are done on the premises to ensure quality control. "Assembly is done outside, but we do the final testing," she adds.

Every time a new product is shipped, there's a high-spirited party. Once, when a product code-named Orangutan was completed, employee creativity was let loose on a jungle theme, complete with ape costumes and banana daiquiris.

Employees at Software Publishing are encouraged to get involved in areas other than their own. Marketing people spend two hours a week answering the toll-free product support line, and all employees were invited to participate in an "adopt a dealer" program that involved visiting stores in their neighborhoods.

Customers First

The company's senior management is unshakable in its philosophy that it's wiser to focus on the customer than on technological fireworks. "Great, lasting companies," says Gibbons, "have two characteristics: a big, loyal customer base and great sales capability. Software producers should not ask themselves what the technology can do but rather what is really useful. We sell each of our customers more and more products–which most software manufacturers don't do–and we rebuild each product every year."

As part of this philosophy, Gibbons, Bedke, and Page regularly call on dealers to size up the success of their products and to identify additional needs. "We used to telephone the owners of our products directly to see how they liked them," Gibbons adds, but telephone contact is now handled primarily by support staff.

Gibbons believes that a significant portion of the software market remains unserved. And that, he affirms, means business. He says that in this market, the computer industry in general has concentrated on power users who want the PC to perform increasingly sophisticated tricks, because "that's where the big bucks were. The reason we haven't yet tapped the available business market is that there's a prejudice against 'easy-to-use' in large corporations.

"MIS managers think everyone in the company is a power user. But when I was addressing an MIS user group recently and asked how many in the audience felt they weren't getting their money's worth out of their personal computers, a third raised their hands. The MIS managers just aren't segmenting their market."

Because MIS managers are themselves so taken with computers, adds John Page, they aren't aware that "four-fifths of the users at the company are just as skeptical as home users. They don't realize that people are going out on their lunch hours and buying *pfs:* software with petty cash."

The Industry

Too often, Page believes, major figures in the computer industry focus on "hot" new products and technologies, ignoring the established products preferred by a large proportion of users. The industry "is inbred and listens to its own lies," he maintains. "Key industry influences don't necessarily influence the customer."

Still, Gibbons concedes that his company's growth is tied directly to the unit growth of the personal computer market, which he claims is far from moribund. In fact, he predicts that market growth will exceed 35 percent as PCs become more integrated into office automation strategies, displacing dedicated word processors and dumb terminals tied to minicomputers or mainframes.

Page suggests that there's stability as well as growth in the market. "Personal computers are coming out of their adolescent phase, during which there was a lot of experimentation, instability, and rebellion against the establishment–just like human adolescence–and no standards," he says. "Now they're entering their more boring adult years, which isn't necessarily bad.

"The PC has emerged as a standard. If a manufacturer's machines aren't IBM compatible, they won't be able to find anyone who'll write software for them."

What all these developments mean for the software industry, Page believes, is more opportunity. "Standards make the market explode–you can use anything on everything."

Most significantly, as prices drop, a vast, hitherto-untapped market will open up. "Many more people don't own computers than do," Page explains. "When the cost gets low enough, these nonowners will begin to buy computers for personal use. 'At that price,' they'll say, 'why not?'"

Fred Gibbons has a good idea of what this market-opening price point will be. "When someone

breaks $795 for an IBM-compatible PC and markets it aggressively, a gold rush will follow. There'll be a whole new group of customers." He's disappointed that hardware manufacturers have not yet delivered such a machine.

Part of Software Publishing's success has been its ability to match price with value. While not a pricing revolutionary from the same mold as Borland's Philippe Kahn, Gibbons doesn't think much of the prevailing patterns of software pricing and consumption. "The industry sells overpriced solutions," he says. "We in the industry have been victims of our own greed."

The SPC Strategy

Software Publishing has not rested on its laurels or its sales figures, however. In response to the growth and change within the computer industry, the company has purchased another software firm, adding a new product line; sold its mail-order division; nearly doubled its R&D staff and increased its R&D budget; and entered into the licensing agreement with IBM.

Why rock the boat when Software Publishing is already sailing smoothly and smartly, having pretty well cornered the market for low-end software? First of all, says Gibbons, "You can't plan to be a $100 million company on one product line."

That's why the firm purchased Harvard Software last summer. By many accounts, the $395 *Harvard Project Manager* sits atop the PC

Ivy League Graphics

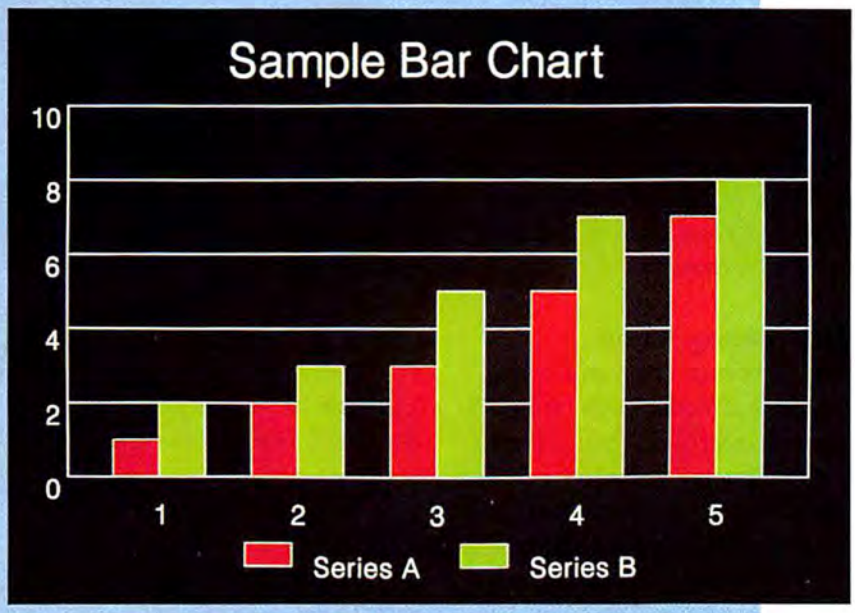
Eric Knorr

Harvard Presentation Graphics is the latest building block in Software Publishing Corporation's "second tier" of software. While the company's *pfs:* series addresses the entry-level market, the *Harvard* line targets experienced users, adding full functionality to the company's ease-of-use tradition. *Harvard Presentation Graphics* is clearly a shot at the high end, featuring a complete selection of charts, high-quality output, and extensive editing.

The program's multilayered menus let you create charts on the fly using default formats and generate more ambitious presentations with a wide array of customizing features. You enter numeric data and text labels in a convenient columnar format, and the program makes it easy to try different chart types until you find the one you want. In addition to the usual pie, bar, and line graphs, *Harvard Presentation Graphics* offers scatter plots, high/low/close charts, trend lines, and organization charts. You can stack, overlap, or cluster bars and create pie/bar combinations. The package also offers some limited three-dimensional capabilities and features a wide array of frames, borders, and fill patterns.

Once you generate a chart, you can add lines, arrows, and text labels and move or copy these enhancements anywhere on screen. Portions of graphics or text can easily be reduced or enlarged, and ten type fonts are available. The program boasts a particularly wide selection of preformatted word charts, which you can manipulate using word processing style commands.

Like a number of its competitors, *Harvard Presentation Graphics* enhances *1-2-3* graphs. Instead of grabbing the picture file, however, *Harvard Presentation Graphics* imports the raw data, enabling you to redraw charts from scratch. The program also reads ASCII and *pfs:graph* files.



Slide created using Harvard Presentation Graphics

On the output side, *Harvard Presentation Graphics* is oriented toward hard copy. It supports a full range of printers, plotters, and slide cameras, including the HP LaserJet and the Polaroid Palette. Depending on the purpose of your output, you can send a file to the printer in draft, standard, or high-quality mode. Although it takes time, the high-quality mode produces impressive results, even on a low-end dot matrix printer.

Although a number of graphics packages offer features similar to those supported by *Harvard Presentation Graphics,* it's rare to see so many in a single package, especially in the $300 to $400 range. The program even enables you to set up "slide shows" for display on your PC's monitor as actual presentations or as previews. Clearly, amenities like these demonstrate Software Publishing's desire to offer sophistication without sacrificing the ease of use that's won so many *pfs:* devotees.

Eric Knorr is an Assistant Editor for PC World.

project management heap, along with the $495 *Harvard Total Project Manager.* Harvard was acquired for 400,000 shares of Software Publishing stock, then valued at more than $4 million, and moved from Massachusetts to the company's California headquarters. The company also vigorously recruited two key engineers from Harvard Software, and both agreed to make the move.

With its expanded product line, Gibbons says, his firm is positioned to address three types of customers: the personal, work-at-home user; the businessperson who uses a personal computer daily as a productivity tool but doesn't need a lot of fancy functions; and the organization that has many personal computers linked by networks.

Software Publishing has just announced a second product bearing the Harvard name, *Harvard Presentation Graphics* (see the sidebar "Ivy League Graphics"). The company was working on the program even before the Harvard deal was concluded, but the Harvard name will stick, heralding a new line of products for the so-called high end.

Are more acquisitions in the works? Gibbons rejects the idea of acquisition for acquisition's sake. "We didn't buy a company, we bought a product. We got it for the same cost as building it ourselves, we got it quicker, and it was a proven product," he says. Software Publishing, he declares, will consider new acquisitions only under conditions similar to the Harvard purchase: compatible products and the right people to go with them.

Shortly after the Harvard purchase, the company recouped some of its outlay by selling its software mail-order division, Power UP!, in a leveraged buyout to Edward Lauing, who had been the division's director of marketing. Software Publishing retains a 10 percent equity in the mail-order operation, which Lauing has renamed Channelmark Corporation. Gibbons says the sale enables the company to focus all its energies on the retail market.

Looking Over Your Shoulder

The acquisition of Harvard Software marked the firm's first move into new territory, and observers have been quick to note that Software Publishing now faces real competition for the first time. More than 100 vendors already produce PC-based project management packages.

More important, perhaps, is the fact that Software Publishing is also beginning to encounter rivals on its own turf, the novice-user market. MicroPro has released a low-end version of its popular *WordStar,* called *Easy,* and Symantec Corporation recently introduced an AI-based data manager/word processing program called *Q&A,* which uses a *pfs:*-like interface and enables users to request information using English sentences. *Q&A* accepts data files from *pfs:file* and *pfs:write* (and IBM's equivalent *Assistant* programs), as well as Ashton-Tate's *dBASE II.*

IBM itself has begun placing greater emphasis on in-house development of software for the PC family. At present, however, IBM is contributing to Software Publishing's success by marketing the *pfs:* applications under its own logo. This gives Software Publishing much broader distribution through IBM's retail, direct, and international trade channels.

"Our objective," Gibbons states, "is to offer companies like IBM fast delivery, proven design, and market acceptance, so it's better for them to buy from us than to make their own."

Looking Ahead

Gibbons, Page, and Bedke declare that Software Publishing's business direction remains consistent despite new tactics to counter competition. Ease of use will remain the focus and the unsophisticated user the company's major customer.

Now that the frenzy over tightly integrated packages has subsided somewhat, the Software Publishing approach to integration–that is, reliance on basically autonomous programs that can converse with one another–seems to have been validated in the marketplace. The Software Publishing attitude toward the *Frameworks* and the *Symphonys* has always been that the whole is less than the sum of its parts, that major compromises are inevitable, and that the total package is invariably unwieldy.

The company is putting increasing energy into marketing, including marketing abroad. English-speaking countries outside North America represent an important and growing outlet for Software Publishing, according to Bedke, and in 1984 the company began translating versions of its software for the non-English-speaking market.

Nothing is being done hastily, however. "We want to make sure that as we grow, we do so profitably," Bedke explains. She believes the reasons for Software Publishing's success when other Silicon Valley companies have collapsed are simple: "We don't spend more than we make. We want to be here 20 years from now; not many companies think in those terms."

Kristin Anundsen is a freelance writer based in San Francisco.

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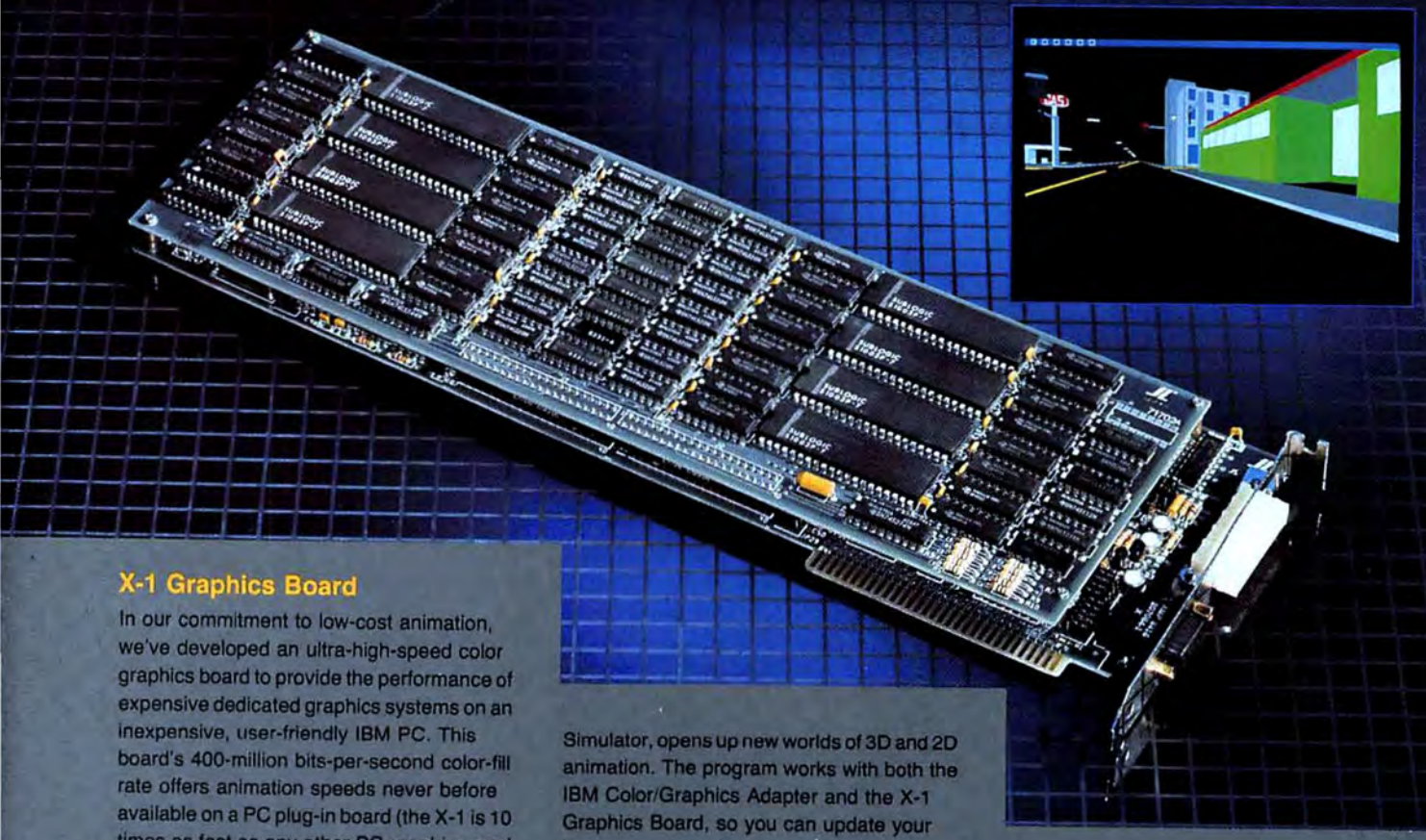

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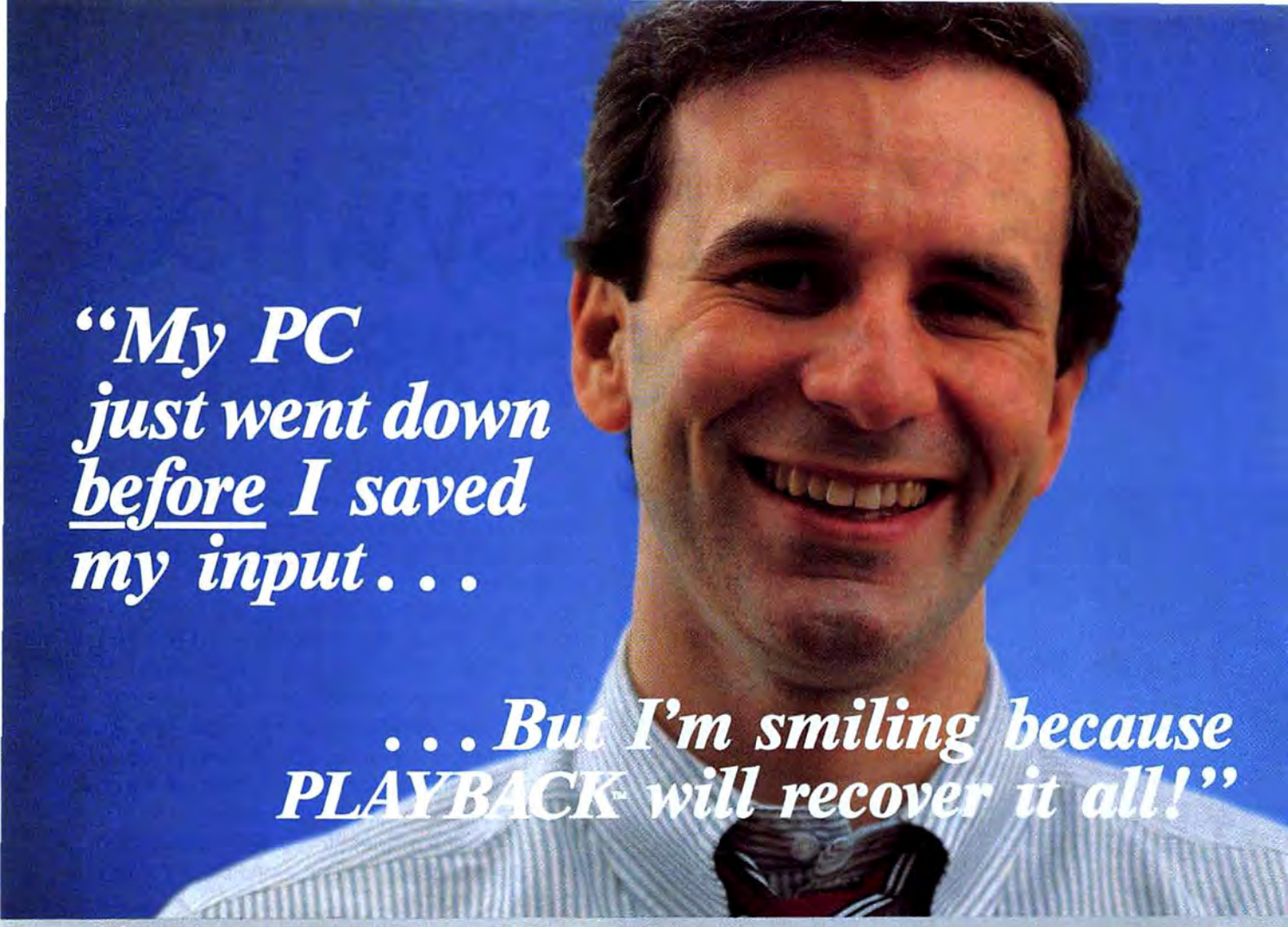

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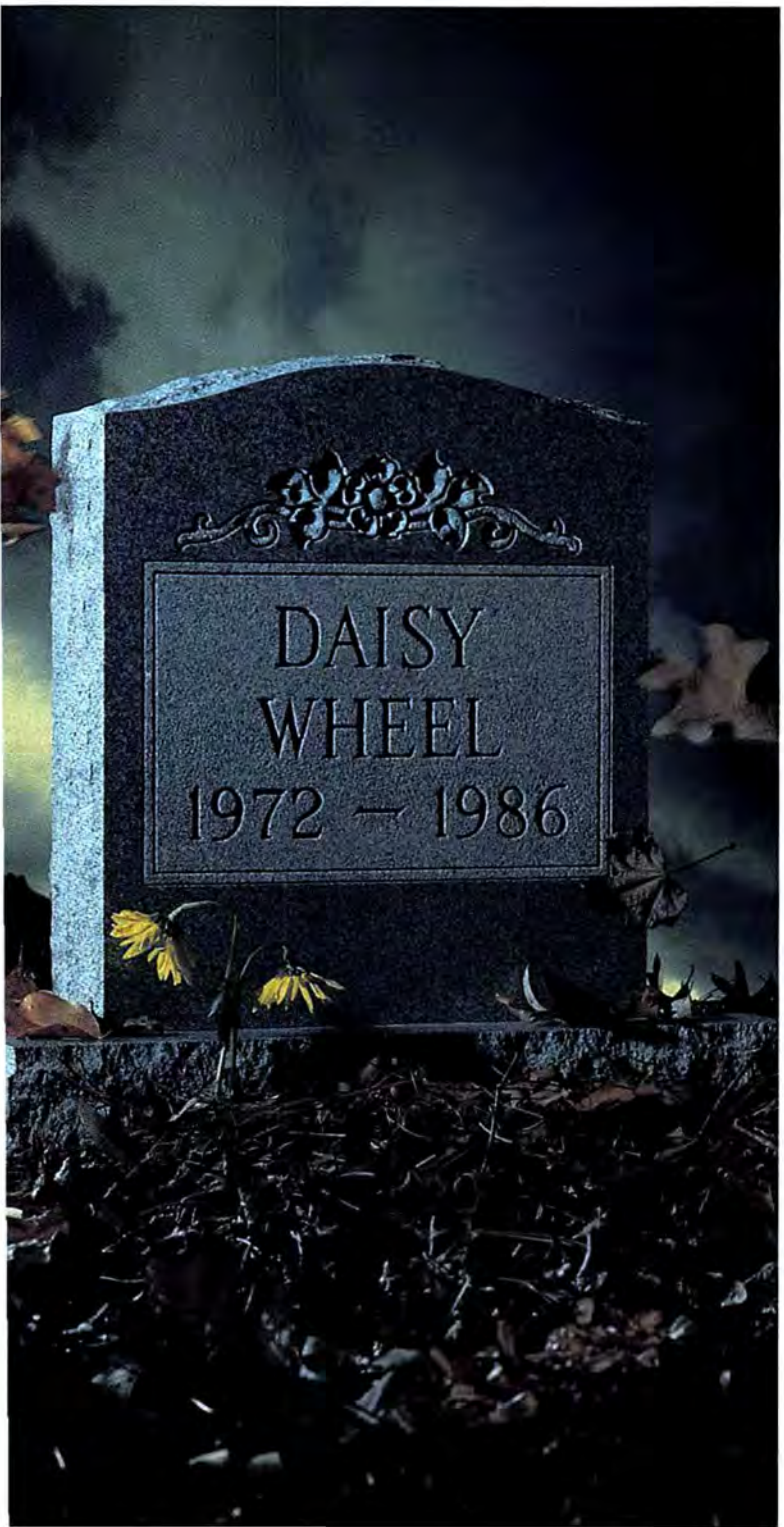

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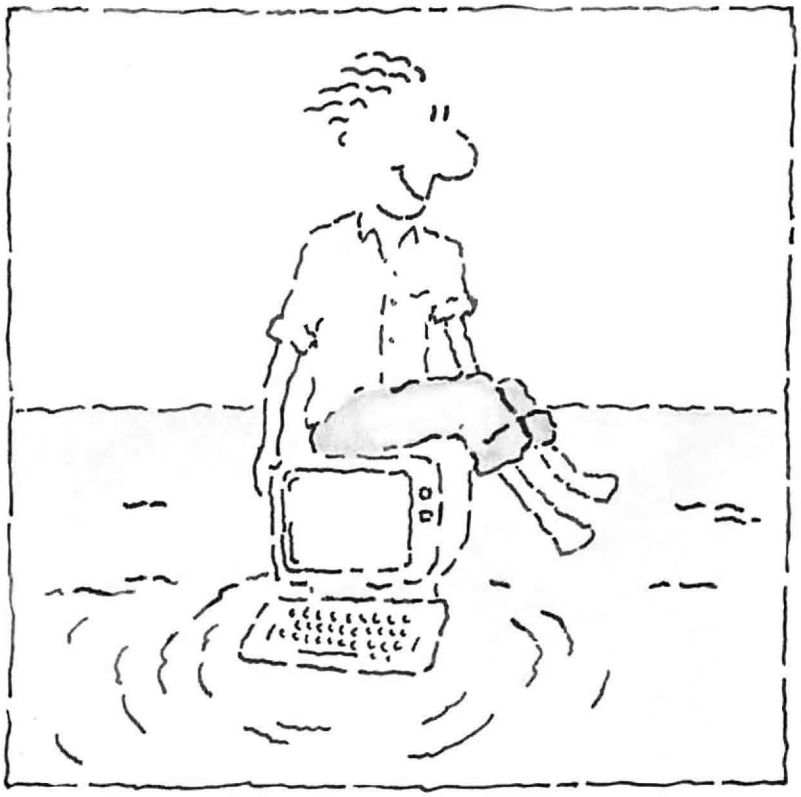

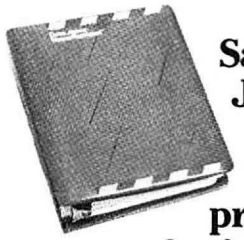

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☐ Bill me later Charge to: ☐ AmExp ☐ MC ☐ VISA

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Signature_____

Name _____

Company_____

Address _____

City/State/Zip _____

Daytime Phone Number _____

Computer Make & Model_____

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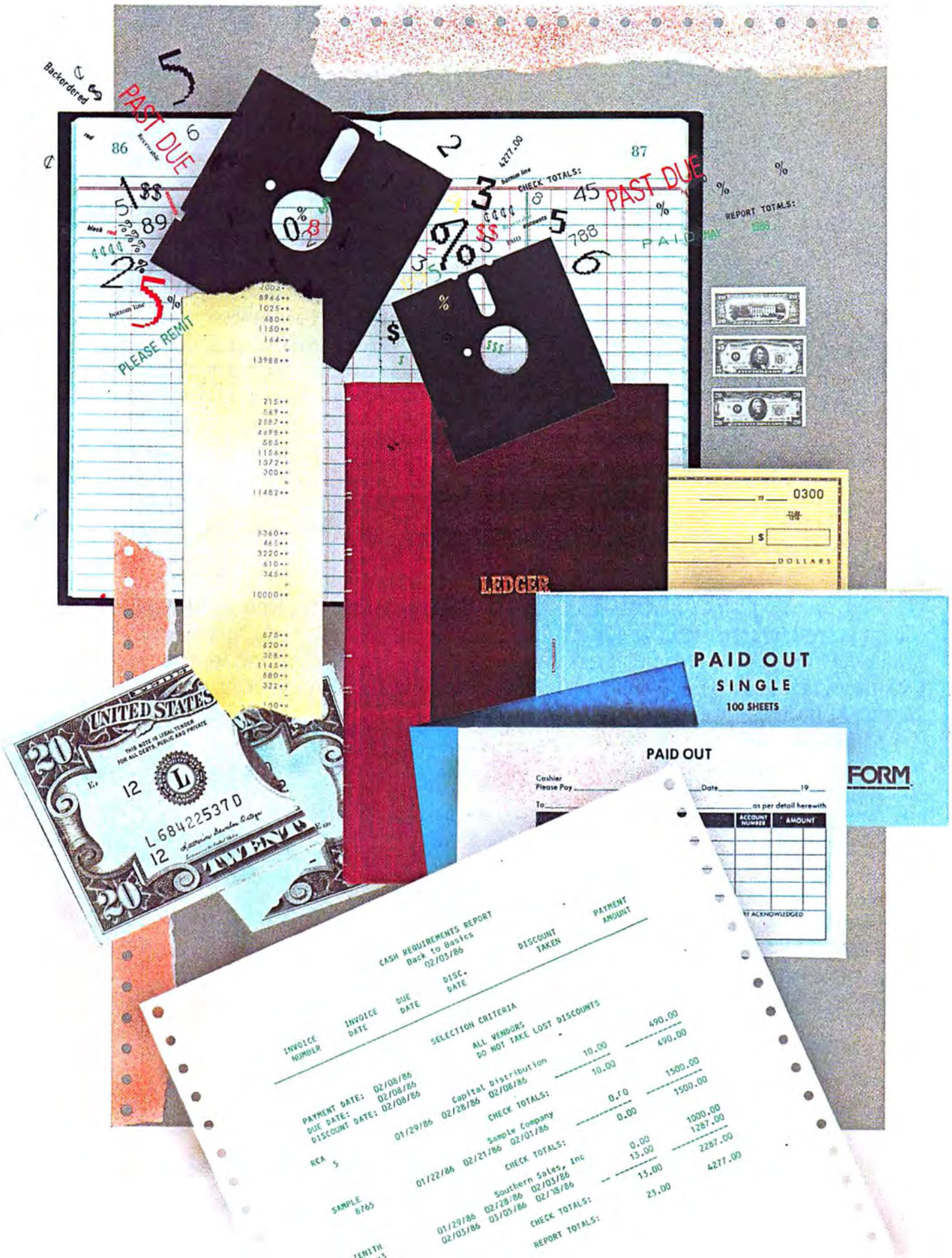

PAST DUE
PLEASE REMIT
CHECK TOTALS:
REPORT TOTALS:
LEDGER
PAID OUT
SINGLE
100 SHEETS
PAID OUT
FORM
UNITED STATES
CASH REQUIREMENTS REPORT
Back to Basics
02/03/86
SELECTION CRITERIA
ALL VENDORS
DO NOT TAKE LOST DISCOUNTS
INVOICE NUMBER
INVOICE DATE
DUE DATE
DISC. DATE
DISCOUNT TAKEN
PAYMENT AMOUNT
Capital distribution
Sample Company
Southern Sales, Inc
CHECK TOTALS:
REPORT TOTALS:

Accounts Affordable

Three entry-level accounting programs stake out their turf in small business territory, offering a cure for high-end overkill.

Charles E. Rundgren

Would you hire the Chicago Bears to do your yard work? Buy a Lear jet for a 5-mile commute? Ask a big-ticket consultant to calculate the depreciation on your Trinitron? Buying a six-module, $3500 accounting series for small business applications makes only a little more sense.

With over 13 million small businesses in the United States, it's not surprising that a number of established companies that offer high-end accounting packages are now marketing low-cost programs tailored to entry-level users. Three such programs, Peachtree's *Back to Basics Accounting System,* Real-World's *4-in-1 Basic Accounting,* and Open Systems' *Open for Business II,* clearly demonstrate that there's more than one way to tackle small business accounting.

Skin deep, the three programs have basic similarities. Each one includes general ledger, accounts receivable, and accounts payable functions. All the packages are menu-driven and allow most or all financial statements to be displayed on screen. For a small business, however, the most significant common feature is low cost: If you added together the prices of all three programs, the total would still be about $1000 less than a single high-end accounting series.

Beneath these programs' hides, however, you'll find some fundamental distinctions. *Back to Basics* contains only general ledger, accounts receivable, and accounts payable modules, while *4-in-1* tacks on payroll, and *Open For Business* includes inventory control. Aside from modular differences, the biggest variations among these programs lie in their reporting features. Although they all print basic financial statements, those generated by *Back to Basics* and *4-in-1* contain only current-year information. On the other hand, *4-in-1* also breaks out percentage differences in accounts, and *Open for Business* allows you to use data from previous years. Although they're targeted for small businesses, these packages keep your books on an accrual basis rather than a cash basis. In other words, revenues are recognized when they're earned, not when they're received, and expenses are recorded as they're incurred instead of when payment is made.

Laura Tarrish

While *Open for Business*'s reporting fuctions are the program's strong points, *Back to Basics* excels at trouble-free data entry. *4-in-1* is the only package to print payroll checks and record employee payment information. By emphasizing different aspects of accounting, each package attempts to carve its own niche in the small business accounting market.

Back to Basics Accounting System

At $595, Peachtree's *Back to Basics* takes the smallest bite out of your capital, yet it's also the easiest to use of the three contenders. Although its account capacity is on the lean side, *Back to Basics*' data entry elegance, on-screen display of entire reports, and handy credit-limit verification reflect a thoughtful design.

Back to Basics' general ledger, accounts receivable, and accounts payable modules can either stand alone or integrate with one another. In this case integration means periodic file transfer rather than instantaneous updating among modules. Thus, data from accounts receivable and accounts payable does not affect the general ledger until posting.

The maximum dollar amount for *Back to Basics* is, oddly enough, $21,474,836.47, and the maximum single transaction amount comes in at $999,999.99. Although *Back to Basics* supposedly handles up to ten departments, the chart of accounts supports only 254 4-digit account numbers—small pickings for departmental accounting.

What really makes this program shine are its data entry features. The straightforward menus are logically arranged and offer a number of conveniences. *Back to Basics*' ability to establish default accounts for cash receipts and cash disbursements is especially useful. Not only does this option eliminate a lot of keystrokes, it greatly reduces the risk of applying cash entries to the wrong account.

A number of other impressive cash-handling features make *Back to Basics* particularly well suited to small businesses. From the main menu you can record cash disbursements and receipts, print checks, and void entire transactions. You can also use the general ledger to record cash register sales, as well as to reconcile the day's cash taken in and paid out.

When you're making journal entries, pressing the question mark key while the cursor is in the account number field gives you instant access to the chart of accounts. The system also performs partial keyword searches on customer and vendor names; you only have to enter the first few characters of an account name to retrieve a desired record.

Like most accounting programs, *Back to Basics* supports recurring entries, a feature perfect for automating repetitive monthly chores such as typing in depreciation entries. A handy safety feature prevents errors by keeping you from posting these entries more than once per period. However, the program's

Table 1: A comparison of general ledger, accounts receivable, and accounts payable features

	Back to Basics	4-in-1	Open for Business
General Ledger			
Data:			
Account number length	4	7	9
Number of accounting periods	12	12	13
Departments	●	●	●
Recurring entries	●	●	
Budgeting by period			●
Prior year actuals			●
Reports:			
Trial balance	●		●
General ledger	●	●	●
Transaction journals	●	●	●
Balance sheet:			
Current year	●	●	●
Current year vs. prior year			●
Income statement:			
Current year	●	●	●
Current year vs. prior year			●
Current year vs. budget			●
Columnar comparison		●	●

	Back to Basics	4-in-1	Open for Business
Accounts Receivable			
Customer data:			
Name, address, phone	•	■	•
Balance forward	•	■	
Balance forward or open item			•
Terms	•		
Credit limit	•		
Current balance	•		
Year-to-date sales	•		•
Date/amount of last sale	•		
Sales invoicing/processing:			
Automatic invoice numbering	•	■	•
Credit limit checking	•		•
Compute sales tax	•		•
Advance payments			•
Reports:			
Customer list	•	■	•
Sales journal	•	■	•
Cash receipts journal	•	■	•
Aged trial balance	•	■	•
A/R detail by customer	•[1]	■	•[2]
Invoices		■	•
Customer statements	•	■	•
Mailing labels	•		•

[1] Current month only
[2] Included in aged trial balance

	Back to Basics	4-in-1	Open for Business
Accounts Payable			
Vendor data:			
Vendor name, address, phone	•	■	•
Terms	•		
Current balance	•		
Year-to-date purchases	•		•
Date of last purchase	•		
Date/amount of last payment	•		•
Invoice data/processing:			
Vendor, invoice number, invoice date	•	■	•
Amount, account distribution	•	■	•
Due date	•		•
Discount date	•		•
Discount amount	•		•
Defer invoice for payment			•
Recurring invoices		■	
Cash disbursements:			
Multiple cash accounts	•	■	•
Partial payments	•		•
Select invoices by date	•		•
Select invoices by vendor	•		
Reports:			
Vendor list	•	■	•
Purchases journal/invoice register	•	■	•
Check register	•	■	
GL distribution register	•	■	
Open invoice register	•		•
Cash requirements	•		•
Aged trial balance	•	■	
Vendor activity	•	■	
Mailing labels	•		

maximum of one debit account and one credit account per recurring entry is somewhat limiting.

In contrast to its data entry features, the general ledger's reporting features are pretty prosaic. The obligatory reports are all there (see Table 1), but financial statements that compare last year's figures with those of the current year are conspicuously absent.

Back to Basics' accounts receivable module features the same thoughtful approach shown by the general ledger's data entry provisions. These niceties include the ability to perform partial key searches, scroll through the chart of accounts, and check a customer credit limit during invoice entry (see Screen 1). You can also view the customer and invoice files during data entry. Sales tax on customer payments is computed automatically.

One potential drawback of *Back to Basics*' accounts receivable is that it offers only balance forward accounting. While some customers may not approve of the lack of line-item detail, *Back to Basics*' balance forward approach makes start-up a snap. You simply enter beginning customer balances directly into the proper aging categories, and the balances are current. Cash receipts may also be applied to any aging period. You can even create your own dunning messages and have *Back to Basics* print them on statements according to aging period, from "Have a nice day" to "Please submit payment immediately!"

Back to Basics' accounts payable module supports a maximum of 500 vendors and permits three different checking accounts for vendor payments. The vendor file shows not only the vendor terms and balance due for each entry, but also year-to-date purchases, as well as the date and amount of the last purchase and payment.

```
          Modify Customer Information

CUSTOMER ID: BISHOP
CUSTOMER NAME: Steve Bishop
ADDRESS: 989 E. Marietta Drive
ADDRESS:
CITY: Marietta            STATE: GA
ZIP: 30069                PHONE: 404-255-2298
TEMPORARY (Y/N)? N        TAXABLE (Y/N)? Y
ADD FINANCE CHARGES (Y/N)? Y
CREDIT LIMIT: $5000.00
TERMS: 4   2/10, Net 30
SALES Y.T.D.: $10000.00
FINANCE CHARGES Y.T.D.: $0.00

      0 - 30 DAYS            $    7000.00
     31 - 60 DAYS            $    1000.00
     61 - 90 DAYS            $     750.00
     OVER 90 DAYS            $    1250.00
                              -----------
     TOTAL BALANCE           $   10000.00


          Press "Esc" to return to menu
```

Screen 1: Back to Basics' screen for modifying customer information facilitates quick customer queries plus easy entry of beginning balances.

As an added bonus, *Back to Basics* includes a Cash Requirements Report (see Figure 1) that enables you to select vendor invoices for payment based on due date or discount—a real plus for a system of this size. For a bargain price, *Back to Basics* provides a lot of punch, especially for businesses with heavy cash-handling requirements.

4-in-1 Basic Accounting

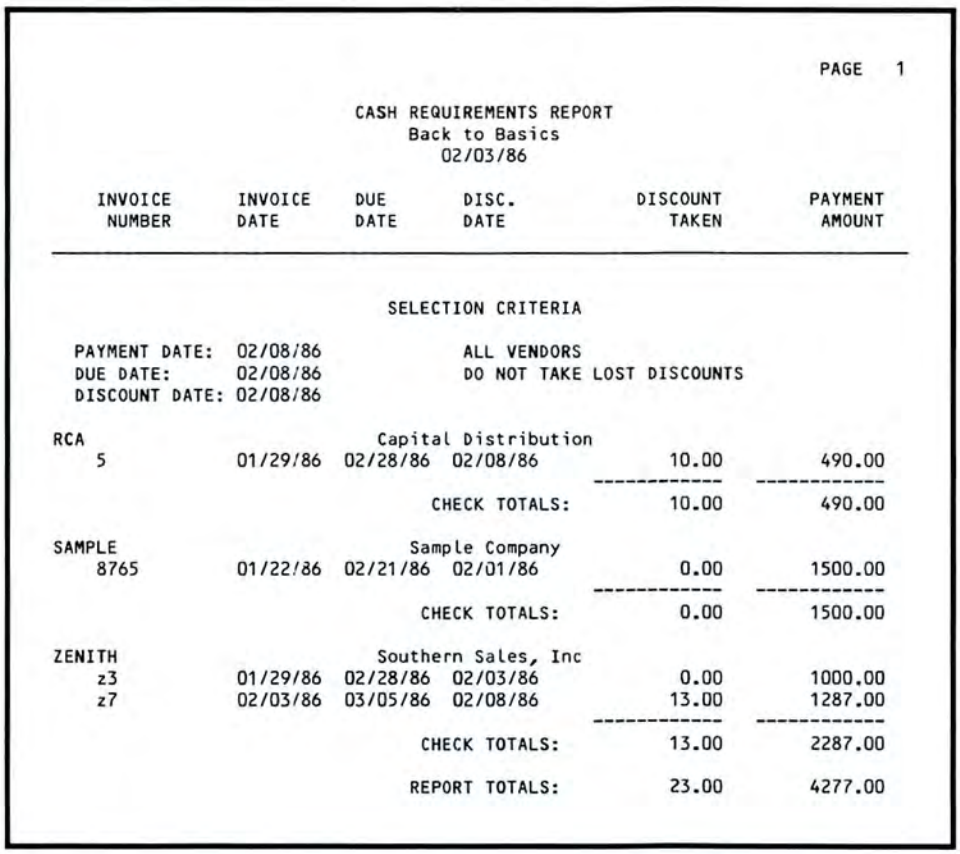
If *Back to Basics* is the most pleasantly surprising of the three packages, RealWorld's *4-in-1 Basic Accounting* is in some ways the most disappointing. Intended for businesses with less than $2 million in revenues, *4-in-1* has some outstanding qualities, but curious flaws mar its generally solid design.

Overall, *4-in-1* is a well-integrated program, as evidenced by its main menu, which includes 27 options listed under five major functions (see Screen 2). While this screen may be a little crowded for some tastes, it saves time by eliminating one layer of menus. Another convenience is the inclusion of three default charts of accounts—one each for a wholesaler, a retailer, and a manufacturer. General ledger account numbers are 4 digits long, but you can add a 3-digit suffix if you need departmental accounting.

Like *Back to Basics*, *4-in-1* makes ease of use a keynote, exemplified in part by the liberal use of function keys to enter default information such as account numbers and report dates. On-line help is available, but the user interface is so simply designed that help seems superfluous. However, the documentation makes life difficult by omitting an index, and raw beginners could have used some sample practice data.

4-in-1 includes a full-fledged report writer, an unusual bonus for an entry-level package. Using a simple set of commands, you can custom design up to nine different financial statements. Although the financial statements contain only current-year information, the income statement scores points by indicating each line item's percentage of total sales.

The other reports available in *4-in-1*'s general ledger are a little more confusing. For example, the General Journal Transaction Edit List shows all accounts in a journal entry batch in account number order rather than by journal entry, making verification difficult. In addition, the Trial Balance is misnamed; it's actually a printout of the general ledger.

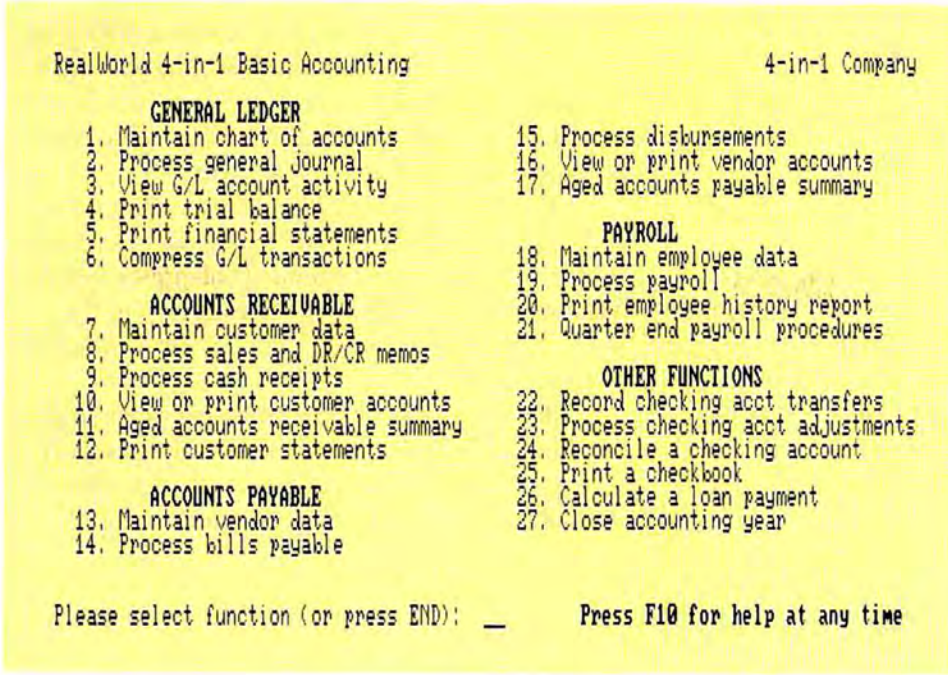


PAGE 1

CASH REQUIREMENTS REPORT
Back to Basics
02/03/86

INVOICE NUMBER	INVOICE DATE	DUE DATE	DISC. DATE	DISCOUNT TAKEN	PAYMENT AMOUNT
SELECTION CRITERIA					
PAYMENT DATE: 02/08/86			ALL VENDORS		
DUE DATE: 02/08/86			DO NOT TAKE LOST DISCOUNTS		
DISCOUNT DATE: 02/08/86					
RCA		Capital Distribution			
5	01/29/86	02/28/86	02/08/86	10.00	490.00
			CHECK TOTALS:	10.00	490.00
SAMPLE		Sample Company			
8765	01/22/86	02/21/86	02/01/86	0.00	1500.00
			CHECK TOTALS:	0.00	1500.00
ZENITH		Southern Sales, Inc			
z3	01/29/86	02/28/86	02/03/86	0.00	1000.00
z7	02/03/86	03/05/86	02/08/86	13.00	1287.00
			CHECK TOTALS:	13.00	2287.00
			REPORT TOTALS:	23.00	4277.00

Figure 1: Back to Basics' Cash Requirements Report helps you decide which bills to pay first.



RealWorld 4-in-1 Basic Accounting — 4-in-1 Company

GENERAL LEDGER
1. Maintain chart of accounts
2. Process general journal
3. View G/L account activity
4. Print trial balance
5. Print financial statements
6. Compress G/L transactions

ACCOUNTS RECEIVABLE
7. Maintain customer data
8. Process sales and DR/CR memos
9. Process cash receipts
10. View or print customer accounts
11. Aged accounts receivable summary
12. Print customer statements

ACCOUNTS PAYABLE
13. Maintain vendor data
14. Process bills payable
15. Process disbursements
16. View or print vendor accounts
17. Aged accounts payable summary

PAYROLL
18. Maintain employee data
19. Process payroll
20. Print employee history report
21. Quarter end payroll procedures

OTHER FUNCTIONS
22. Record checking acct transfers
23. Process checking acct adjustments
24. Reconcile a checking account
25. Print a checkbook
26. Calculate a loan payment
27. Close accounting year

Please select function (or press END): _ **Press F10 for help at any time**

Screen 2: 4-in-1 groups the major options for all four modules on a single main menu.

Inexplicably, RealWorld has not integrated *4-in-1*'s income statement with its balance sheet. In other words, the current period net income is not added to retained earnings, making the balance sheet perpetually out of balance. You can correct this error easily with the report writer, but the discrepancy is not even mentioned in the documentation.

4-in-1's accounts receivable module is a balance forward system that automatically applies a cash receipt to the oldest outstanding balance. Because this arrangement is fixed, a customer paying an invoice other than the oldest one will throw off the aging periods. One pleasing touch is the ability to print both invoices and bank deposit slips.

Transactions in *4-in-1*'s accounts payable module can be distributed among a maximum of ten general ledger accounts. During data entry, you type in the vendor name, the transaction type (vendor invoice, debit or credit memo), the date, the invoice number, a reference description, and the amount. The one item missing is the due date, making a cash requirements report (which flags items for payment based on their date due) an impossibility.

The program's inventory functions are enhanced by Open for Business's *robust reporting functions.*

4-in-1's payroll module seems like an afterthought. It prints payroll checks and W-2 forms and accumulates your data for preparing quarterly payroll tax returns. Unfortunately, you can only track one deduction other than federal and state withholdings; any additional deductions must be grouped together and entered in total. But the biggest problem with the payroll module is that it doesn't send payroll data to the general ledger, and it won't calculate payment and tax information for employees. You make these computations yourself and enter the data before printing payroll documents.

Future versions may address the program's current flaws, but for now *4-in-1* doesn't quite live up to its potential. For every good feature there's a downside: Including a report writer seems generous, until you find out about the discrepancies; the payroll module looks like a strong addition, until you discover it doesn't compute payroll. *4-in-1* is an adequate, easy-to-use package that fails to fulfill its great expectations.

Open for Business II

Open Systems's *Open for Business II* is the most ambitious of the three packages, principally because it includes an inventory module and a multifaceted business analysis report. The program's inventory functions are enhanced by *Open for Business*'s robust reporting functions.

The program's data entry features are its weakest aspect. Many users may find *Open for Business*'s reliance on the function keys rather than on <Enter> or the cursor keys a bit cumbersome. In addition, the menu options aren't as clear as they might be. For example, it's hardly obvious that you must use the Enter Sales/Print Journal option in accounts receivable to add a customer.

The menus and data entry screens are divided into three areas. The top half of the screen includes the menu options or data fields, below which is reserved an area for on-line help messages. The bottom of the screen is dedicated to data entry.

Because *Open for Business* supports open item accounting, you have to enter individual invoices representing a customer's beginning balance by date for accurate aging. However, you must return to the main accounts receivable menu every time you enter a new invoice date.

The program's healthy reporting capabilities are crowned by a unique Business Analysis Report, which is actually a series of reports that give brief financial analyses of cash flow, accounts receivable,

sales by customer, net income, and inventory. The Cash Flow Report shows the amounts of cash received and disbursed over the last four months plus an aggregate figure for the last three months. In addition, it displays a comparison of the current period's cash receipts against the prior three months' average (see Figure 2).

The Financial Overview Report includes a table indicating sales by category for the current period and the average for the last four months. In addition, information relating to trends in sales, cost of sales, operating expenses, and working capital are written out in an easy-to-understand text format.

The other reports provide analysis of accounts receivable turnover, reports on your five best customers based on current month sales, plus a listing of the ten best customers based on year-to-date sales. You can also break out the ten best-selling and ten worst-selling inventory items based on year-to-date sales, and the ten most profitable and ten least profitable items based on the same year-to-date data.

The inventory module itself maintains a full range of data, including the item number, description, unit of measure, vendor stock number, unit sales price, average cost, reorder point, and on-hand and on-order quantities. Item numbers may be up to 10 characters in length. Average cost, the only costing assumption supported, is calculated automatically. Inventory quantities are updated when you issue invoices or credit memos through accounts receivable. But if you record a sale without printing an invoice, you can still enter the sales data directly into the inventory module.

Three inventory reports are available, all of which you can display on screen. The Stock Status Report shows the unit selling price, the average cost, the extended cost, and the quantity on hand and on order. Printing a Stock Reorder Report gives you the quantity on hand and on order, as well as the reorder point. To see which items require immediate attention, you can print out a variation of the Stock Reorder Report that lists only the items that have fallen below their reorder point. The Sales Analysis Report reveals the units sold, the sales amount, the cost of sales, the gross profit, and the gross profit percentage by item for the current period and year to date. Clearly, unless your reporting needs are unusually demanding, *Open for Business* can keep you well abreast of of your business's inventory activity.

```
FEB 04 '86              *DEMO* DOME HOMES, INC.                    PAGE   2
                        CASH FLOW ANALYSIS
                        FOR THE END OF PERIOD  3

     Your total of cash received to checks written is improving
     for the current period.

                TOTAL CASH RECEIVED  =   $13,988
                TOTAL CHECKS WRITTEN =   $11,482
                NET CASH FOR PERIOD  =    $2,506


                   TOTAL CASH RECEIVED   CHECKS WRITTEN        PERCENT
                   -------------------   --------------        -------

          Period  3            $13,988          $11,482          82.1%

          Period  2            $10,000           $3,500          35.0%

          Period  1               $250              $0           0.0%

          Period 12                $0               $0           0.0%

     Your cash flow for the past three months has been $9,256+.

     Your cash received for the current period is 309.40+% higher than
     previous 3 month average.
```

Figure 2: The Cash Flow Analysis Report produced by Open for Business includes comparative figures plus text summaries of your business activity.

A Well-Rounded Trio

Installing each package was relatively quick and easy, generally consisting of defining the start-up date, company name, hardware specifications, and password (if desired). None of the programs is copy protected. Setup procedures tended to vary with the complexity of the package, with *Back to Basics* the simplest and *Open for Business II* the most complex.

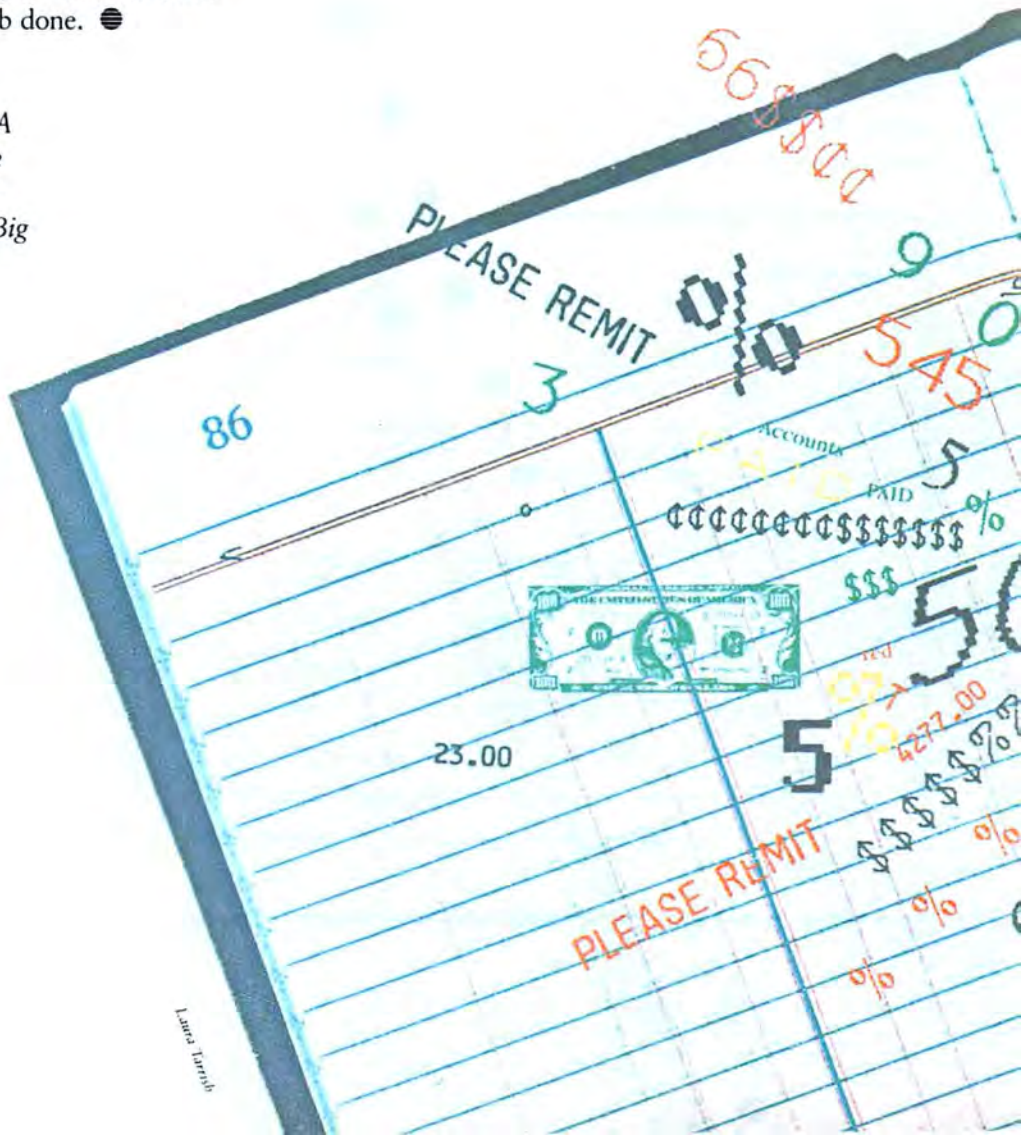
Back to Basics' user interface has the most bells and whistles, which should make it a favorite with data entry personnel. *Open for Business*'s business analysis reports tilt it toward the small business owner, but ease of use is hardly its strong suit. Finally, businesses should find *4-in-1*'s payroll functions useful, even though the program has some serious flaws.

Designed to free small business owners from bookkeeping drudgery, any one of these packages can help you measure your business's performance without adding unnecessary procedures demanded by high-end systems. They're cost-effective solutions, each with its own peculiarities, but none of them lacks the capacity to get the job done. ●

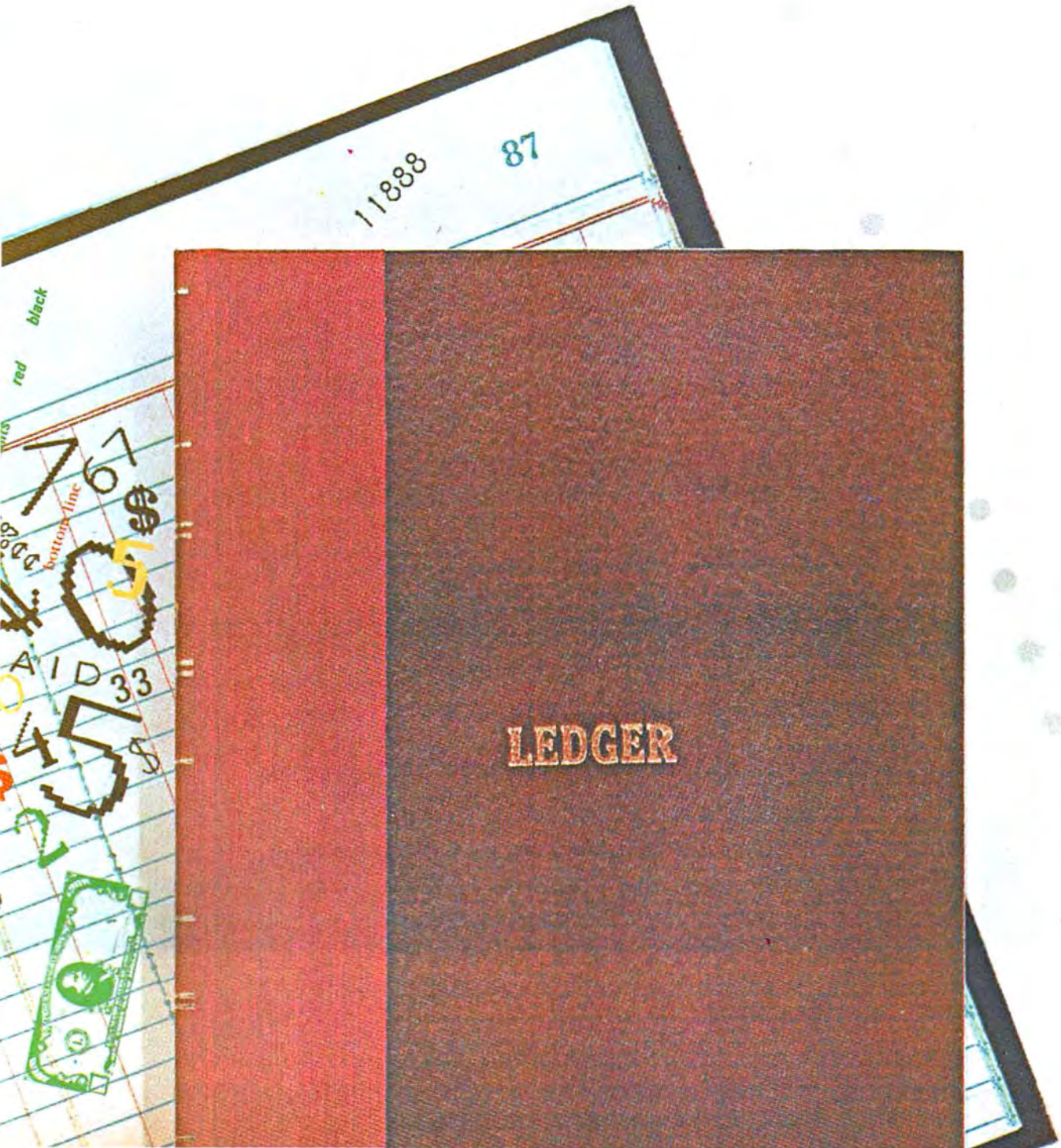
Charles E. Rundgren is a CPA and consultant in the Orange County, California, office of Deloitte, Haskins & Sells, a Big Eight accounting firm.

4-in-1 Basic Accounting
RealWorld Corp.
Dover Rd.
Chichester, NH 03263
800/255-1115
List price: $995
Requirements: 128K, two disk drives
Not copy protected

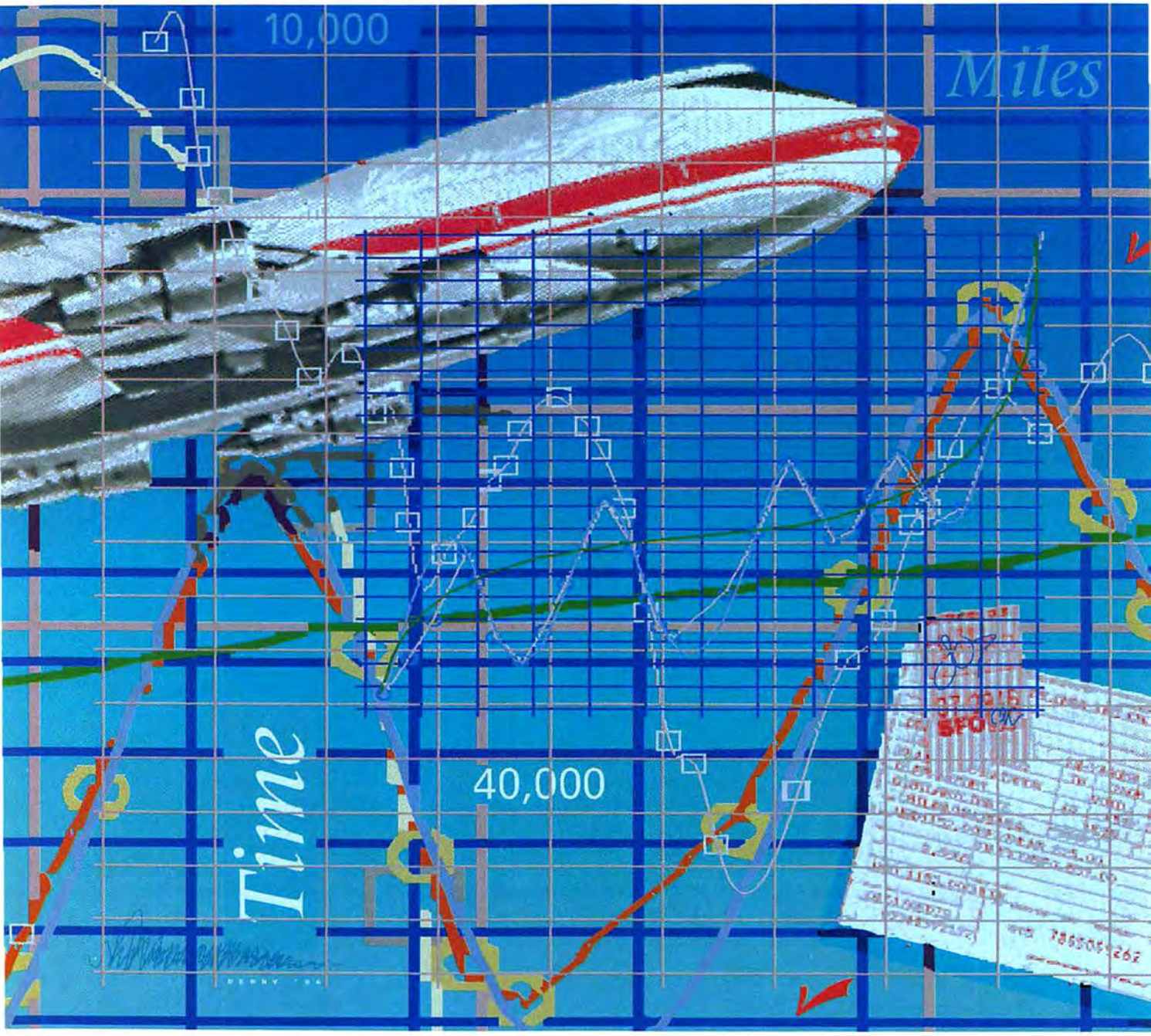
Back to Basics Accounting System
Peachtree Software, Inc.
4355 International Blvd.
Norcross, GA 30093
800/554-8900
List price: $595
Requirements: 128K, two disk drives
Not copy protected



Open for Business II
Open Systems, Inc.
430 Oak Grove
Minneapolis, MN 55403
800/328-2276
List price: $995
Requirements: 128K, hard disk,
132-column printer
Not copy protected



A Fitting Forecast



To forecast is to forearm. Applied to your company's sales history, the quantitative models in this set of 1-2-3 templates can temper some of the guesswork in your business plans.

John B. Gordon

Decisions, decisions. Decision makers in small companies need to predict sales trends. Yet few can afford a staff of professional forecasters armed with statistical mainframe software and data bases crammed with two decades' worth of the company's sales history. The retailer puzzling over whether to augment a dwindling swimsuit inventory in mid-July; the entrepreneur hoping to establish credit and credibility with the local bank's loan officer; the department head recommending layoffs during a slack period—all would benefit from business projections generated by more than wishful thinking.

For these managers and others like them, *1,2,3 Forecast* could prove an inexpensive solution. A menu-driven set of *1-2-3* release 1A templates, the program reads existing .WKS files to create, save, and graph sales projections suitable for either short-term or strategic planning. A bargain at $75, *1,2,3 Forecast* performs like some dedicated forecasting programs costing $400 or more and requires only two to three years' worth of quarterly or monthly sales figures to make projections.

The program's forecasts are based on textbook models of sales history. To understand fully how these models work, however, you should be familiar with the basics of regression analysis. Unfortunately, the jargon-ridden manual won't help the forecasting novice; neither will the on-line tutorial, which assumes prior experience in basic statistics. If you're new at forecasting, be prepared to spend much more than the recommended one or two hours with the tutorial before tackling your own data. On the other hand, if you have some experience in regression analysis, you'll appreciate how the tutorial walks you step-by-step through a problem in forecasting airline passenger miles—that industry's basic sales unit—with 42 quarters of historical data supplied on disk.

Modeling Classes

1,2,3 Forecast provides two kinds of statistical models: regression and time-series forecasting. Simply put, a regression model establishes a cause-and-effect relationship between two variables. You could run a linear regression model on your data, for example, defining sales revenues as the dependent variable and advertising expenses as the independent variable. The resulting equation would help you predict sales figures based on the amount of money you allocated to advertising costs.

The results, however, could be misleading—there may not be a good correlation between advertising and sales. So *1,2,3 Forecast*'s other model—time-series forecasting—enables you to simply project the average growth rate or a trend in sales. If you've ever used a ruler to try to fit a straight line to a plot of sales history, you get the general idea.

1,2,3 Forecast includes nine worksheet files totaling 165K, not counting data. The largest file claims about 35K of RAM. The templates, designed to minimize RAM requirements, necessitate repeated disk access; a hard disk certainly speeds things up.

Although you can type in figures as you go, you'll probably want to use data from existing worksheets. *1,2,3 Forecast* retrieves such data only if you've stored it in a named range and in column—not row—format. The templates handle a data set of up to 84 observations or data points. But this limit isn't critical: Characteristics of sales and other business data tend to change over time, making the most recent data the most relevant for forecasting. If you have more than 84 observations, just name the last 84 as the range to be used.

You can work with one or two data sets at once, loaded in the files 1Input and 2Input. These files check data-formatting conventions and also give you the option of forecasting with linear, exponential, or s-curve trend lines, all estimated by using the method of least squares. As you work with *1,2,3 Forecast* you'll learn to choose the trend most relevant to your data.

The s-curve, for example, describes a product's entire life cycle—20 years or more—predicting slow growth just after a product is introduced, followed by a period of exponential growth, and then a plateau as the product matures. The sales history of the PC, for example, has followed the s-curve pattern thus far. As many forecasters learn the hard way, exponential trends, finite at best, are most useful as short-range forecasting models.

Seasoning the Data

Besides applying regression models to your data, *1,2,3 Forecast* enables you to account for seasonal changes in your market through the main menu's Season option. Airline passenger miles, as the tutorial demonstrates, peak during the summer—the third quarter. Retailers, on the other hand, can usually project a sales peak in the last quarter because of anticipated Christmas sales. If you're uncertain whether a set of data is influenced by seasonal fluctuations, give the Season option a try. The program tells you whether the seasonal pattern is significant enough for use in forecasting (see Screen 1).

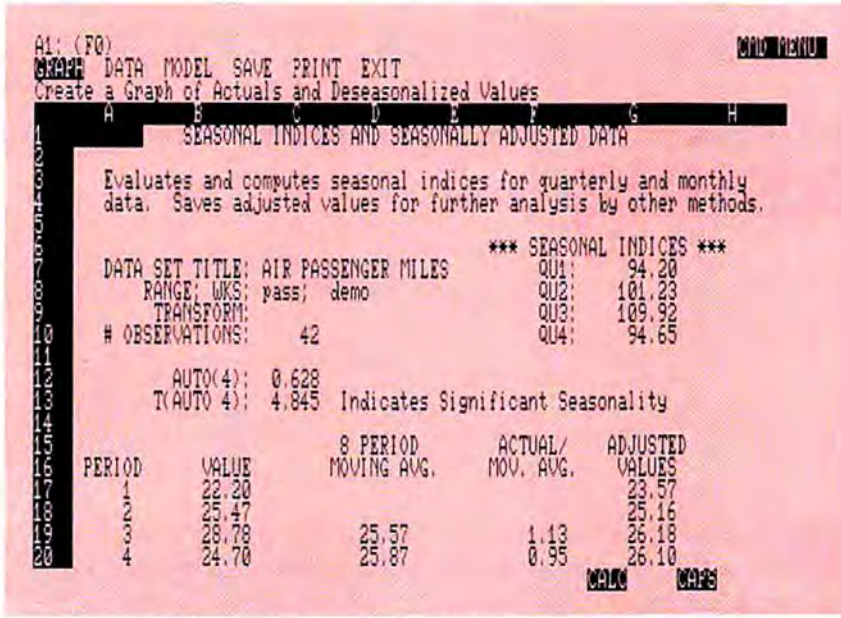
From Season, you can return to an Input file to use the trend models on seasonally adjusted data. Or you can proceed to one of the forecasting files: Expo (exponential smoothing), Average, Decomp (decomposition analysis), and Reg (regression analysis with one or two independent variables).

Finessing the Forecast

At first glance, Expo may seem redundant. Like the regression models in the Input files, Expo computes trend lines. But Expo produces different results because it uses weighted data. The weights decline with age—the most recent data point gets the greatest weight, the next most recent, a lesser weight, and so on. The aim is to adjust the trend line so that it yields the best fit for the most recent data.

In contrast, Decomp, *1,2,3 Forecast*'s most complex model, is designed for long-range forecasting—that is, more than a year into the future. It breaks down a set of data into three components: trend, seasonal cycle, and an apparent long-term or business cycle related to growth or decline in the economy.

But don't expect news from the Delphic oracle here. Decomp makes no attempt to forecast the business cycle—a job beyond the program's scope. It simply reports on the past business cycle, asks you to make estimates for future



Screen 1: 1,2,3 Forecast's template for all seasons adjusts data to reflect annual market patterns—in this case, a predictably busy summer season in the airline industry.

cycles, and then adds its own forecast of the trend and seasonality to produce a final forecast.

Note that *1,2,3 Forecast* doesn't enable you to derive valid forecasts from any and all data sets. Here's where Decomp can be especially valuable: It estimates what part chance plays in your data's fluctuations. If another model is producing unreasonable forecasts, running Decomp may evidence extreme randomness, which indicates that using any forecasting model would be futile. This randomness results from an unpredictable market factor. (After a new product introduction, sales may fluctuate wildly.) In such instances, your forecasts depend in part upon your own resources of judgment and market savvy.

Of the two remaining forecasting files, Average—which bases forecasts upon a simple (unweighted) average of the last few data points—is so limited a model as to be useless in serious forecasting, and Reg is so complex that only someone with a solid background in the discipline can tap its powers.

Despite the manual's muddy prose, you should find the templates easy to use. Menus are consistent; error messages appear at the appropriate times. The program won't, for example, let you adjust the same data twice for seasonality. On the other hand, once you have adjusted your data for seasonality in all forecast files but Decomp, the program won't reverse such adjustments. Writing your own procedure to do so is further complicated by the program's design: The forecasts are in one file, the seasonal adjustments in another. Getting the twain to meet and figuring out which forecast goes with which index is a problem the publisher should have foreseen. Generally, improvising with *1,2,3 Forecast* isn't recommended. The documentation cautions that overriding the menus by invoking your own native *1-2-3* commands can crash the program.

According to the manufacturer, a version of *1,2,3 Forecast* for release 2 of *1-2-3* should be available by the time this review appears. New features in the beta version I saw include the ability to handle any seasonal data (not just quarterly or monthly data), the use of up to 150 observations in a named range and up to 10 independent variables in a regression analysis, and a host of new statistics to help choose the best forecasting model. Let's hope for better documentation as well.

Templates for releases 1.0 and 1.1 of *Symphony* are currently available at the same price and with the same functions as the *1-2-3* release 1A templates, according to the manufacturer. For the statistician superintending a company's future, such forecasting tools provide an inexpensive alternative to casting the dice. ●

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1,2,3 Forecast
P.O. Box 12582
Salem, OR 97309
503/585-8314
List price: $75
Requirements: 192K, two disk drives, DOS 2.00 or later version, 1-2-3 release 1A

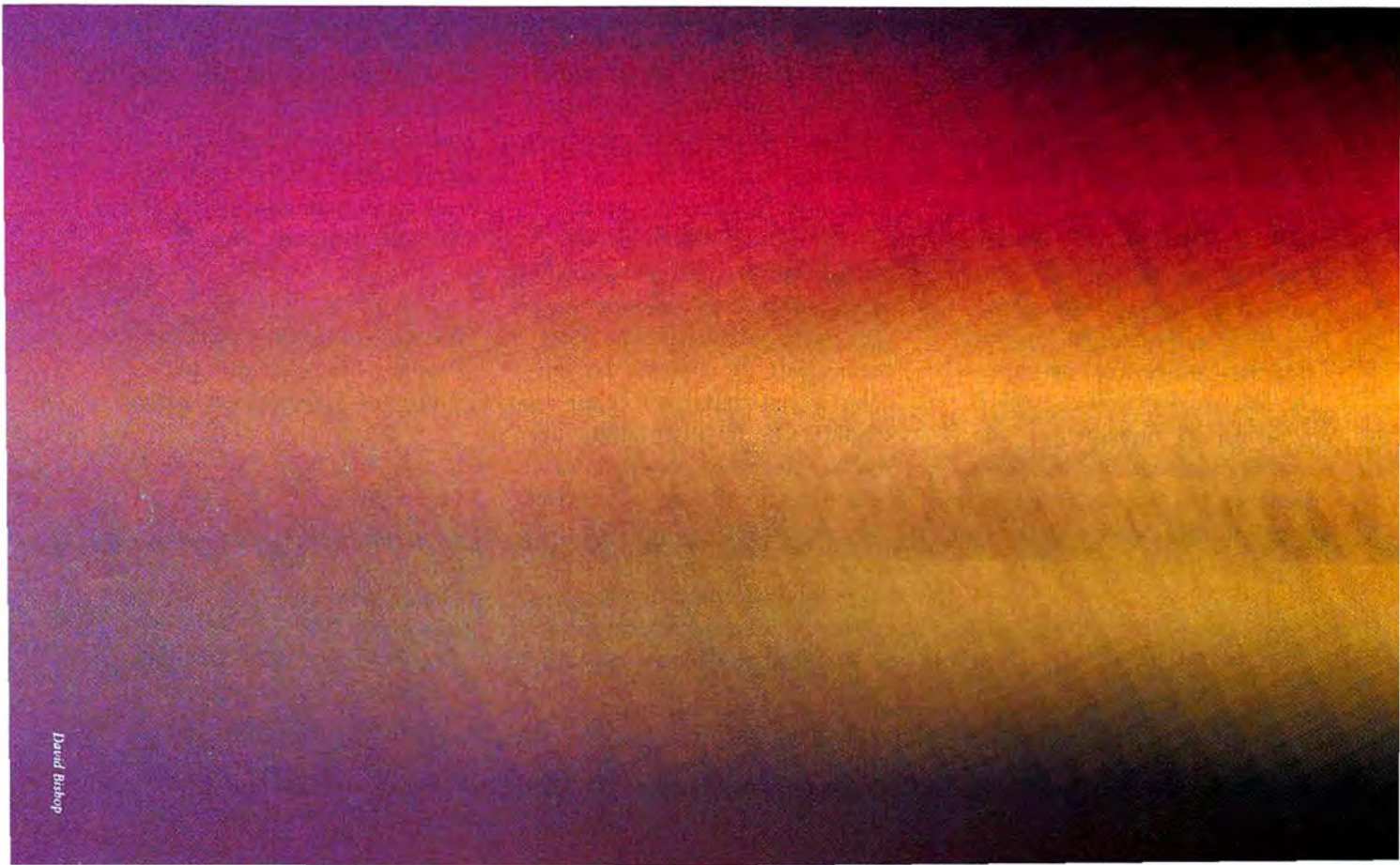
No-Frills Word Processing

The word processor market heats up as new offerings from MicroPro and Multimate join veteran pfs:write in the battle for the beginner.

Jim Heid

First there was lite beer. Now there are lite word processors. In an era of megamemory boards, artificial intelligence data managers, and integrated packages that include the kitchen sink, two of the heavyweight word processing purveyors have put their efforts into programs that do . . . less. MicroPro, famed maker of *WordStar,* has leapt into the fray with *Easy;* also gnawing away at *pfs:write*'s market is *JustWrite* from Multimate International.

The trend toward slimmed-down word processing is hardly surprising. Thousands of business users treading the sometimes perilous path to PC literacy have relied on Software Publishing's *pfs:* line for word processing as well as data management and communications. No doubt MicroPro and



David Bishop

Multimate (both creators of expensive professional word processing packages) have also noticed the multitudes embracing the elegant simplicity of the Macintosh and *MacWrite*. As opportunities in the high-end PC word processing market dwindle and new users continue to enlist in the PC cause, *pfs:write* will find its profitable turf increasingly challenged.

Three of a Kind?

Easy, JustWrite, and *pfs:write* are designed for those who are just starting out or who have modest, occasional word processing needs. Accordingly, all three programs are easily installed, rely on a few menus for command selection, come equipped with spelling checkers, and do considerably less than popular powerhouse word processors (see Table 1). You won't find fancy formatting features, windows that look into other files, the ability to display double-spaced text (except with *Easy*) or print multiple columns on a page, or some of the other niceties that users of *WordStar 2000, Microsoft Word,* and *WordPerfect* take for granted.

But a word processor that lacks advanced features is not necessarily better for beginners. Any well-designed program—be it *pfs:write* or *WordPerfect*—minimizes the technical demands it makes on a user. Installation is straightforward; menus, direct and precise; command conventions, logical and consistent. Thus, a good word processor at any level gets you up and writing quickly. Since a document's final resting place is on paper, printing out a report shouldn't be a monumental task; a capable program should effortlessly unlock a printer's special features, such as underlining and boldface. And because a beginner is not forever, the program shouldn't impede you once you master it.

The word processing packages reviewed here measure up to this design ideal with varying degrees of success. Keep in mind that performance and functionality are sometimes sacrificed for ease of use. If you're new to word processing but know you'll soon need to generate complex reports on a laser printer, it may pay to bite the bullet and tackle a program that's more capable though less accommodating.

Easy

As its packaging, user manual, and opening screen state repeatedly, *Easy* is "from the makers of *WordStar.*" Depending on your point of view, this may or may not be a propitious recommendation. (One wag has suggested that the company rename *Easy*'s famous

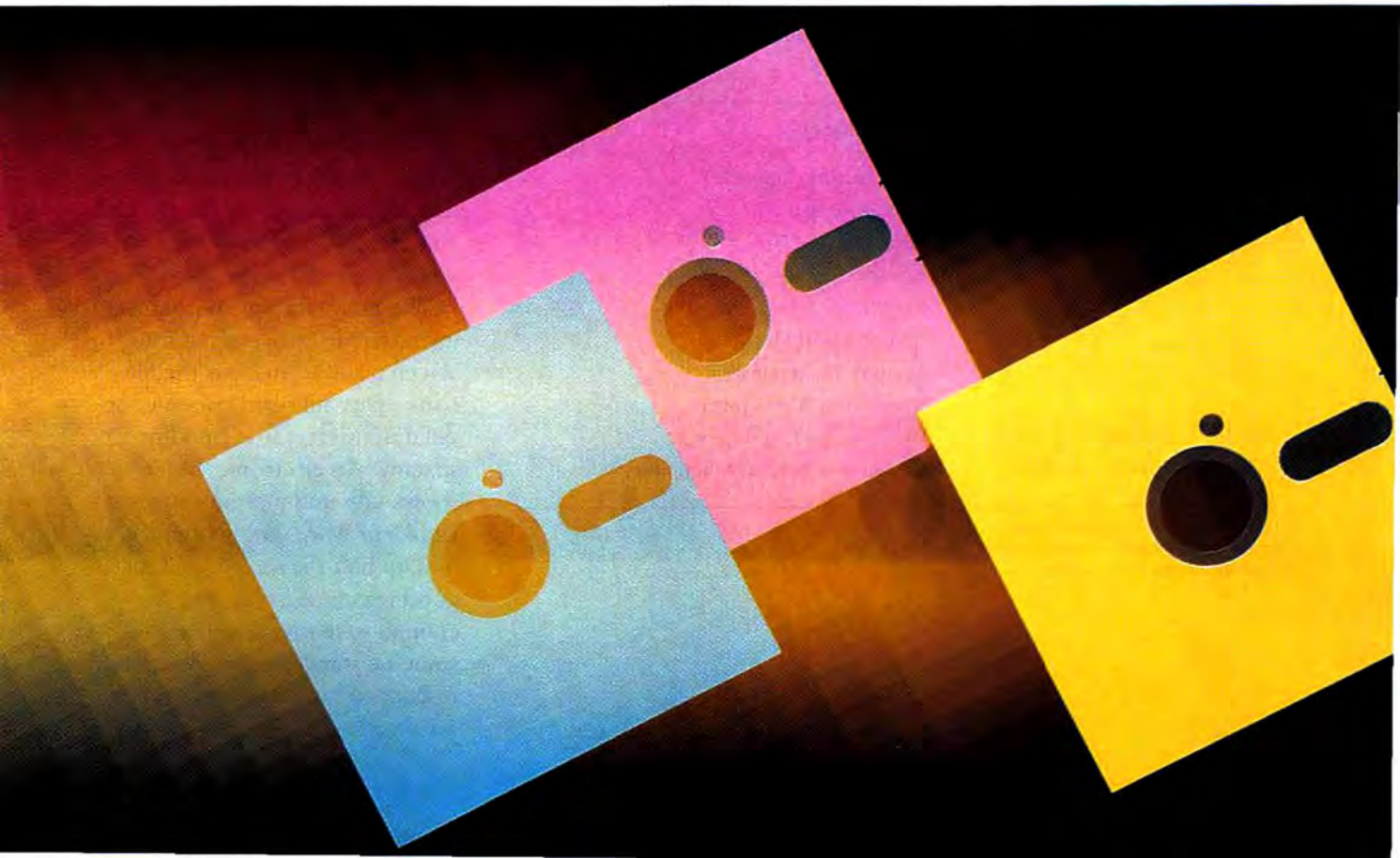


Table 1: Three lite word processors compared

Easy	JustWrite	pfs:write	Features
			Formatting and Editing
limited by disk storage	limited by disk storage	32 pages	Maximum document size
240	132	250	Maximum line width
	•		Footnotes
•	•	•	Tabs
•		•	Decimal tabs
	•	•	Save margin and tab settings
•		•	Automatic page breaks
•	•		Automatic text reform
•		•	Restore deleted text
•	•	•	Center text
•		•	Display page breaks
		•	Display headers and footers on each page
•			Display double spacing
			Printing
•	•	•	Bold text
•	•	•	Underlined text
•		•	Sub/superscripts
•	•	•	Different print pitches within document
		•	Accept printer control codes within file
		•	Print to disk file
[1]		•	Form letters
			Miscellaneous
•		•	Subdirectory support
•	•	•	Disk directory
•	•	•	Delete files
•	•		Rename files
•	•		Copy files
•		•	Accept ASCII files
•			Convert WordStar files
		•	Save files in ASCII format
65,000	50,000	75,000	Words in spelling dictionary
750[2]	5000	600[3]	Capacity of auxiliary dictionary

[1] Mail merge possible with EasyMail
[2] Per dictionary; number of auxiliary dictionaries limited only by storage
[3] Capacity increases with memory

predecessor *Hard* for the sake of honesty.) But *Easy* has many noble qualities and generally lives up to its name. Unfortunately, the program often operates in slow motion and has set some traps that can destroy data.

Installing *Easy* is just that. Insert the Install disk in drive A:, type **Easy**, and follow the directions for copying program and dictionary files to either a hard disk or a pair of floppies. Type **Easy** again at the DOS prompt, and the program's main menu appears. From here you can access menus for editing and printing documents, managing files, and changing program defaults. Type/Edit, the most frequently used command, is thoughtfully highlighted by the program. To select a command from the main or subsidiary menus, move the cursor to the command and press <Enter>, or type the command's first character.

Choosing Type/Edit displays a directory of the files stored on disk (see Screen 1). Unlike the other programs reviewed here, *Easy* provides simple access to the file last edited—you just press <Enter>. To open another file, either set the cursor on the file name and press <Enter>, or type the name in the 'Filename' field.

The *Easy* editing environment is uncluttered. At the top of the screen a status line lists the file name, page number, cursor coordinates, insert status, and line spacing. An electronic "ruler" shows tabs and margin settings. Unlike in *WordStar,* no menu gobbles up half the screen, and for good reason: *Easy* is simple enough to master without constant assistance, although limited in-context help is available via <F1>.

In the Editing Room

Easy is true to its *WordStar* heritage—your fingers seldom stray from the "home" keys, and navigating around a document is relatively simple. <Home>, <End>, <PgUp>, <PgDn>, and the cursor keys function as expected. Pair some of these keys with the <Ctrl> key, however, and your power to propel the cursor is extended. For example, <Ctrl>-<CursorLeft> and <Ctrl>-<CursorRight> move the cursor a word to the left and right, respectively; <Ctrl>-<Home> and <Ctrl>-<End> shoot the cursor to the beginning and end of a line, while <Ctrl>-<PgUp> and <Ctrl>-<PgDn> move it to the beginning and end of the document.

If you find relying on <Ctrl>-*key* combinations loathsome, fear not: *Easy* works with *ProKey* and similar macro processors that allow you to store any sequence of commands and cursor movements on a single key. *Easy* is amenable to keyboard customizing, since it reserves only <F1> and <F2> for program use.

But logical design doesn't count for much if a program acts as if it's underwater. Fast typists may be unnerved by watching characters appear several seconds after they're entered. *Easy*'s lethargy is particularly noticeable when text is inserted in the middle of a paragraph—the program takes a few seconds to digest the entry and properly readjust the paragraph. But at least *Easy* reforms paragraphs automatically—a *WordStar* omission that its critics rightfully harp on.

Unfortunately, MicroPro's concept of *automatic* could stand some rethinking. An *Easy* paragraph is reformed only when you erase text with the <Del> key. If you remove text with the Delete Text command from the Type/Edit menu, you must manually reform the paragraph. Worse still, *Easy* won't automatically adjust an entire document if the left or right margin changes—and no global reform command exists. In other words, changing a document's margins involves manually reformatting every paragraph. Easy this isn't.

Easy Formats

In the days when *WordStar* and its minions ruled, underlining or boldfacing text meant bracketing it with control characters, such as ^PS. *Easy* (as well as *JustWrite* and *pfs:write*) abjure this convention for the WYSIWYG principle—what-you-see-is-what-you-get. Although all three programs fall short of the WYSIWYG ideal, they manage to partially capture on screen what the printed page will show. In the case of *Easy*, single- or double-spaced text can be displayed, and bold and underlined characters simulate their printed appearance. On a color monitor, *Easy* text is green on a black background, while bold, underlined, and sub/superscripts are red, blue, and orange, respectively.

In keeping with its trim design philosophy, *Easy* keeps menus out of sight until they're needed. To delete, underline, boldface, reform, move, center, or search for text, simply press <F2>, and *Easy*'s editing menu pops up (see Screen 2). *Easy* prompts you throughout the process, even pointing out where to place the cursor for deleting, moving, or reforming text.

To reform a paragraph, you merely place the cursor at the beginning of the paragraph and press <Enter>. To move text, you mark the beginning and end of a block by pressing <Enter>, which highlights the affected text. To complete the job, move the cursor to the desired destination, press <Enter> again, and the block is inserted. If this seems like one trip too many to the <Enter> key, you can simplify the process by suppressing the prompts at the Change Preferences menu—which also tells *Easy* to assume that the beginning of a block is at the current cursor position.

Setting margins and tabs is similarly straightforward. Pick Tabs and Margins from the Type/Edit menu, move the cursor across the screen, and press L and R to indicate left and right margins. The document ruler immediately reflects the choice. T and D set tabs and decimal tabs (the latter align decimal points in a column of numbers). Unlike *JustWrite* and *pfs:write*, however, *Easy* can't save margin and tab settings with a file. You must specify settings every time you open a file—an annoying chore if you frequently create columns or complex tables.

Easy has also inherited a handful of *WordStar*'s dot commands. To insert headers and footers (such as a recurring title or name), you must embed .he and .fo (followed by text) within a document. To omit page numbering and to force a page break, insert .op and .pa, respectively. With a little practice, you'll find that dot commands are convenient and practical.

Easy Printing

The number of printers a program supports isn't important, provided yours is among them. But for the record, *Easy* works with 120 printers—more than *JustWrite* or *pfs:write*. *Easy* can also print superscripts and subscripts—a feat *JustWrite* can't claim. Installing a printer for *Easy* is a matter of running a separate program and selecting a printer from the list.

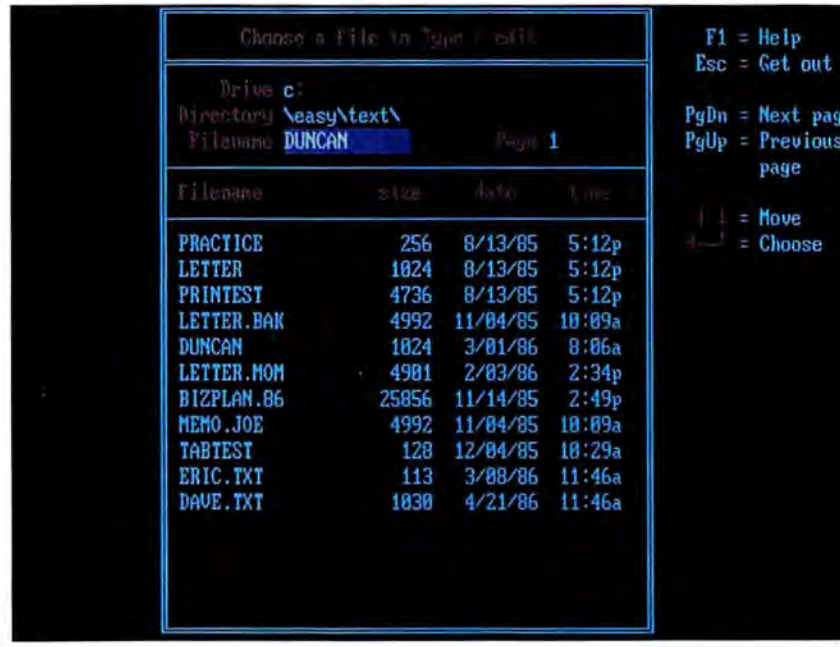
Printing a document is equally uncomplicated. *Easy*'s print menu steps you through the process—you specify the number of copies, the pages to print, and whether single sheet or tractor-fed paper is being used.

Extras, Extras

Less-than-literate lexicographers will appreciate *Easy*'s spelling checker, a 65,000-word subset of the *American Heritage Dictionary*. As with many of its breed, you can initiate a spelling check anywhere in a document. When the checker encounters an errant word, it stops and suggests alternate spellings. You can instruct the program to ignore a suspect word, add the word to a supplemental dictionary (750 words maximum), or insert an alternate with a keystroke. As Figure 1 illustrates, *Easy*'s spelling checker is reasonably fast.

MicroPro has also released *EasyMail*, a program for creating and managing mailing lists, labels, and form letters. Like its mate, *EasyMail* is menu-driven and offers on-screen assistance; standardized formats included with the program simplify data entry and printing. MicroPro claims that as a stand-alone program *EasyMail* can store and sort mailing lists and print out labels and envelopes. As a companion to *Easy* or *WordStar*, *EasyMail* merges name-and-address files with form letters to create "personalized" correspondence.

Screen 1: An Easy disk directory. You open a file by highlighting the file name and pressing <Enter>.



Easy Does It, but Slowly

Between *Easy*'s comfortably paced disk tutorial, generally useful on-line help, and keyboard overlay, you can learn the program without studying the user manual. Not that the manual is imposing: Its 93 pages barely cover *Easy*'s features, and you won't find such niceties as a list of error messages and possible remedies.

This seemingly minor omission can lead to major frustrations, because *Easy* doesn't always handle errors gracefully. If you try to save a file to a nearly full disk, you are not alerted and returned to the document; instead, the main menu appears, and *Easy* discards any unsaved text. And to rub salt in the wound, *Easy* chides: 'To avoid a repeat of this problem, use a text disk with more space.'

On a dual-floppy-drive system *Easy*'s spelling checker can likewise ambush your data. When you start a spelling check, you must swap the *Easy* program disk for the dictionary disk, then exchange them again when proofing is complete. However, if you accidently insert the wrong disk for the second swap, a cryptic 'MENU.EZ not found. Check your installation.' message flashes on screen. Touch a key and *Easy* dumps you to DOS, exterminating any data that hasn't been saved. So take heed: Save your document before initiating a spelling check.

Easy's other major problem is sluggish performance. The program crawls, especially on a dual-floppy PC. Sloppy programming is largely responsible—the program

accesses the disk for almost every command. Even in a RAM disk, *Easy*'s basic operations–displaying typed characters, reformatting paragraphs, and highlighting text–do not accelerate appreciably.

If you write only occasionally or don't mind drumming your fingers a bit, you might consider *Easy*. It is easy to use, it won't impede experienced users, and its printer support is excellent. But beware of full disks, carefully read labels when swapping disks, and above all, learn the value of patience. *Easy* has some fine qualities, but foolproof error handling and swiftness aren't among them.

JustWrite

While *Easy*'s packaging strives for asceticism, *JustWrite*'s strikes a more upscale, "what, me worry?" pose. The word-processing-kind-of-guy face plastered on the box is more evocative of a mouthwash ad than a computer program. What's odd is the fellow's smug expression–he doesn't look like someone who's just learned that his new word processor can't print headers or footers or break pages automatically.

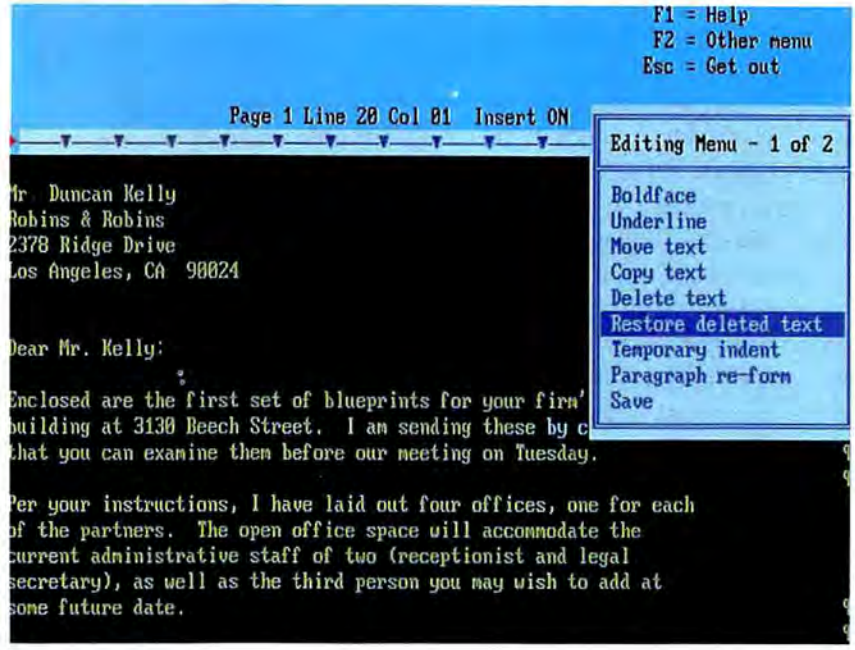
JustWrite superficially resembles its *MultiMate* brethren, which are patterned after the Wang dedicated word processor. But in truth, *JustWrite* consists of stitched-together swatches of *MultiMate* instead of being designed from the ground up with the beginner in mind. The result of such patchwork program design is a disk-dragging, cantankerous program with an uneven mix of features.

JustWrite requires little in the way of installation. To specify the disk drive where documents reside and the monitor type, you must run SETDRIVE. Typing SETDRIVE BC, for example, signifies that documents are kept on drive B: and that the system uses a color monitor.

Like its competitors, *JustWrite* revolves around a main menu and a second level of menus that give you passage to editing, printing, and file-handling functions. Electing to create a new document lists existing files and remaining disk space. You can't classify files with extensions (such as .LET for letter) because *JustWrite* automatically assigns the extension .MJR. (Footnotes are held in special files with the .FTN extension.) Unfortunately this is not merely a naming convention–*JustWrite* uses a special file format and cannot exchange data with other programs, save *MultiMate*. The company claims that a recently included utility allows *JustWrite* to export or import ASCII files.

Another failing is *JustWrite*'s inability to support DOS 2.00 subdirectories, a tidy way of organizing related files into discrete groups. (For instance, it's often useful to store letters in one subdirectory and reports in another.) Considering that PC-DOS 2.00 just passed its third birthday and that hard disk prices are continuing to fall, this is a curious and severe oversight.

Screen 2: Menus on call. Easy's Type/Edit menu is available at the touch of a key. Less frequently used commands are stored on the menu's second page.



Editing à la Mode

JustWrite's editing slate is spare. A status line at the top of the screen notes document name, page number, cursor position, and remaining memory. Just below this line, a ruler much like *Easy*'s spans the screen (see Screen 3). A second status line at the bottom of the screen indicates spacing, printing pitch, and the cursor's movement mode–one of *JustWrite*'s least enviable personality traits.

In most programs, moving the cursor a word to the right or left is an uncomplicated process. But *JustWrite* makes the user jump through hoops. To move the cursor a word at time, you press <Alt>-W. How does *JustWrite* know which way to scoot it? If 'Prev' appears in the status line, the cursor moves a word to the left; if 'Next' is displayed the cursor moves to the right. <Ctrl>-<CursorLeft> and <Ctrl>-<CursorRight>–key sequences that many programs find adequate to this entire task–merely trigger Prev and Next modes. Other <Alt>-*key* commands move the cursor a line, a sentence, or a paragraph at a time–a reasonable approach, if you didn't have to switch between Next and Prev modes.

This mode mania naturally complicates deleting, moving, or copying blocks of text. For example, deleting a word to the left of the cursor requires <Del> <Ctrl>-<CursorLeft> <Alt>-W <Del>. (<Del> marks the beginning and end of a block.) Fortunately, *JustWrite* works with most macro processors, so these grueling sequences can be played back with one or two keystrokes.

Give Me a (Page) Break

If *JustWrite*'s cursor commands seem crude, its page control is positively barbaric. Unlike virtually every contemporary word processor, *JustWrite* does not break a document into pages automatically–you must insert a break manually whenever a page is filled to the brim. The page is then saved to disk as an insular unit and removed from the screen; the spillover text is dumped onto a new page. This compartmental approach to page manipulation (a trait the program shares with the *MultiMate* line) makes it impossible to display the end of one page with the beginning of another. You can edit only one page at a time–a terribly slow process that makes *Easy* look like the Concorde.

Pagination isn't one of *JustWrite*'s talents either–you must type <Alt>-= on any page you want numbered. Thus, if you add a paragraph to the first page of a ten-page document, you must rebreak and renumber the subsequent pages, counting lines, copying text, and so on as you go. Add a character position; to narrow a document by five spaces, you would move the cursor into the ruler and delete five periods. The document is reformatted automatically, albeit slowly, as the margin changes. If you need to use different formats on the same page, you're in luck: A page can accommodate (and save) up to 19 rulers.

Function keys are largely dedicated to centering text, setting line spacing, saving the current page, pagination, and similar functions. <Alt>-*key* combinations control such features as underlining, boldface, and footnotes. But *JustWrite*'s maddeningly slow performance, and what you have is a PC that works like a typewriter. All that's missing is the platen.

With its combination of practical features, logical design, and swift performance, pfs:write *wins the battle for beginners hands down.*

Formatting Follies

JustWrite relies on an on-screen ruler and a mix of function keys and <Alt>-*key* commands to control the look of a document. *JustWrite* likewise aspires to the WYSIWYG standard and does a good job of representing bold and underlined text on screen. Text on a color display is green on black, with bold and underlined text shaded purple and yellow.

The *JustWrite* ruler is a visual guide to a document's margins, tab placement, and line spacing. Each period in the ruler represents

Write's design complicates even these elementary functions. For example, to indicate boldface text, you place the cursor at the beginning of a word and mark each character in turn with <Alt>-B. You cannot mark an entire word, sentence, or paragraph at once. Attaching footnotes to a document is equally nettlesome, since you essentially create, manage, and save a separate document for each entry. The status line doesn't reflect footnotes when displaying the number of lines on a page, further complicating repagination.

JustWrite's central design flaw–treating each page as a separate entity–not only cripples program performance but makes document-wide reform essentially impossible. Changing the ruler at the beginning of a document has

Figure 1: Performance results[1]

[1]Tests conducted on a 512K, dual-floppy-disk-drive system with a 1600-word file

no effect on succeeding pages; you must copy the modified ruler to every page. If a new margin pushes text off a page, you're sentenced to rebreaking and renumbering the entire document.

Just Desserts

There's little to recommend *JustWrite*. The program's command sequences are needlessly complex; the spelling checker is excruciatingly slow. The user manual offers feeble assistance, and the program's single help screen provides no advice for creating and paginating large documents. And like a house with a hot tub but no bathroom, *JustWrite* provides luxuries at the expense of necessities. Although the program can't break and number pages or print headers and footers on each page, it can, unlike its competitors, print and automatically number footnotes. *JustWrite* even includes a special key glossary for storing frequently used phrases.

But state-of-the-art gimcracks do not a word processor make. *JustWrite* fails on virtually all counts—it's slow, difficult to learn, forbidding to use, and lacking in essential features. Multimate International unblinkingly emblazons the package with, "Don't think about word processing." One session with *JustWrite* and you'll run gratefully back to your Selectric. In its present form, *JustWrite* isn't.

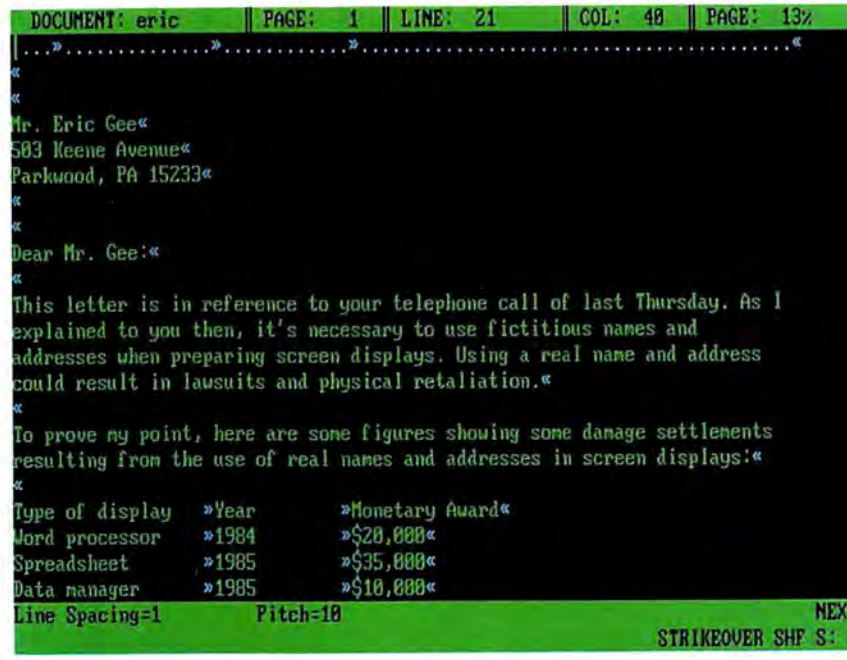
pfs:write

There's no substitute for experience. Software Publishing's *pfs:write* was one of the first kids on the block and has undergone three major revisions since its 1983 debut. With its combination of practical features, logical design, and swift performance, *pfs:write* wins the battle for the beginner hands down. As a standalone package, *pfs:write* is word processor enough for many intermediate users. Merged with the *pfs:* family, it's part of a powerful integrated system that can generate personalized form letters and include graphs, spreadsheet tables, and data base information in documents. You won't have any complaints about performance: The program and all active files dwell entirely in memory. While this arrangement limits document size to approximately 32 pages, the tradeoff is worth it.

pfs:write's installation procedure is almost nonexistent. If you use a hard disk, a serial printer, or a monochrome monitor attached to a color graphics board (as with the Compaq), you must run a setup program. Otherwise, you can use *pfs:write* straight out of the box. The program is copy protected, and although floppy disk users are limited to one backup, Software Publishing doesn't penalize hard disk users.

The setup program will copy *pfs:write* to as many as five hard disks; you don't need a "key" disk to load the program.

Screen 3: Page by page. JustWrite displays only one page at a time.



Consistent Conventions

Like its peers, *pfs:write* is a menu-driven program that employs a ruler and a status line to indicate current page, margins, tab settings, plus memory remaining for new text. Unlike *Easy* and *JustWrite*, *pfs:write* lets you immediately open a new file without first naming it. The program also displays a file directory that you can refine with the DOS wild cards * and ?—a trick that neither *Easy* nor *JustWrite* can equal.

pfs:write closely adheres to the WYSIWYG principle. On a monochrome monitor, bold and underlined text are twins of their paperbound counterparts. (Other enhancements, such as italics and compressed print, are also displayed bold.) On color monitors, *pfs:write* automatically sets white text against a blue background and shades underlined characters blue (see Screen 4).

pfs:write is an excellent program—it's easily grasped by the beginner, yet capable enough for more experienced users.

The program's editing and formatting philosophy is the most consistent of the three programs reviewed. Whether you're enhancing text or moving a block, the sequence of actions is essentially the same: Highlight the text in question, then specify the action. *pfs:write* uses <F3> and <F4> to move the cursor to the previous and next word. Preface either key with <Shift> and the cursor jumps to the beginning or end of a line. The program works amiably with macro processors from *ProKey* to *SuperKey*, but they can't remedy *pfs:write*'s curious lack of top-of-screen and bottom-of-screen mobility. The <Home> and <End> keys, normally dedicated to these moves, take you to the beginning and end of a file.

Formatting options that involve an entire document—margins, page length, and headers or footers—are available with the main menu's Define Page command. If you insert text, the paragraph is reformed automatically; document-wide reforming can also be promptly accomplished. You have a choice of conventional page numbering or section-style numbering (1-1, 1-2, and so on).

Excellent Printing

Printing is yet another area where *pfs:write* excels. The program works with 73 printers and can easily take advantage of special print enhancements. Printing functions are controlled by embedding asterisk commands in a document. For example, *new

page* forces a page break; *justify yes* and *justify no* turn right justification on and off. If your printer supports compressed or double-width printing, you can insert the necessary escape codes after the *printer* command.

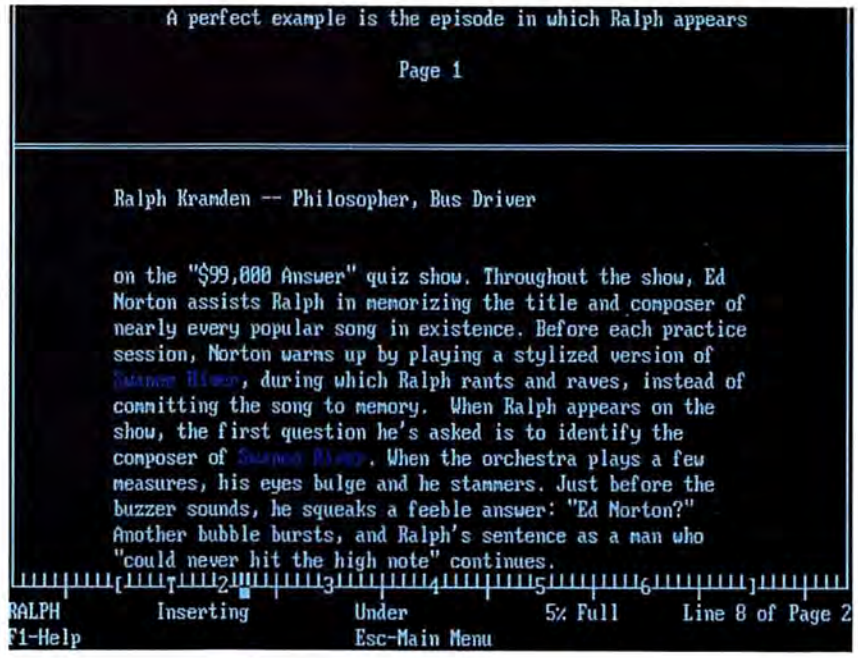
The program also includes a gangbusters envelope-printing feature. To address an envelope, you needn't create a special file. Follow the directions for printing a letter, merely specifying Envelope at the printing menu. *pfs:write* will search through the letter in question, extract the address, and print it out.

pfs:right

The care Software Publishing has lavished on this latest version of *pfs:write* is evident in the package's new spelling checker. The checker will proof from the current cursor location to the end of the document. When it encounters an unfamiliar word, it gives you the option of adding that word to the main or supplemental dictionary, typing in the correction, or using one of the suggestions supplied. Though it operates much like *Easy*'s spelling checker, this checker is the fastest of those reviewed here.

In short, *pfs:write* is an excellent program—it's easily grasped by the beginner, yet capable enough for more experienced users. Unlike *Easy* and *JustWrite*, *pfs:write* performs swiftly and smoothly; its generous array of features is well chosen, and both documentation and on-line help are clear and concise. At this point in the low-end word processor wars, *pfs:write* is top dog.

Screen 4: A pfs:write editing screen shows where page breaks and headers and footers will appear at print time.



Nonetheless, sample the spectrum of word processing software before you buy. For all its charms, remember that *pfs:write* limits a document to 32 pages. Anticipate your future needs—you may be better off buying a feature-laden program and mastering it gradually. After all, a lite word processor, like a lite beer, is worthless if it doesn't suit your taste. ●

Jim Heid is a freelance writer, a contributing editor of Macworld, *and coauthor of* The Complete Guide to the Tandy 1000 *(Ashton-Tate Publishing, Culver City, California, 1985).*

Easy, version 1.00
MicroPro Int'l
33 San Pablo Ave.
San Rafael, CA 94903
415/499-1200
List price: $150
Requirements: 256K, two disk drives, DOS 2.00 or later version
Not copy protected

JustWrite, version 1.0
Multimate Int'l Corp.
52 Oakland Ave.
East Hartford, CT 06108
203/522-2116
List price: $145
Requirements: 128K, one disk drive, DOS 2.00 or later version
Not copy protected

pfs:write, version C
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94043
415/962-8910
List price: $140
Requirements: 256K, one disk drive, DOS 2.00 or later version
Copy protected

Random Accessed

Reference Set and Turbo Lightning offer on-the-spot spell-checking and synonym suggestions while promising to deliver a wealth of memory-resident reference works.

Ken Milburn

Who needs a program that interactively checks spelling and suggests synonyms? Anybody with a rarely used dictionary or a dusty thesaurus, that's who. The fact is, most dictionaries sitting on corporate desks see very little use—we're all too busy to take the time to look things up. Even if you have a batch-mode spelling checker that inspects a document from beginning to end, most likely you rarely find the time to use it.

Of course, there's always a good excuse: A business letter must go out immediately; the application that needs spell-checking isn't a word processed document; or maybe you figure nobody will notice a minor typo. Unfortunately, people do notice. If your report contains misspelled words, you could appear sloppy or illiterate.

The other trap businesspeople fall into is the overuse of pet words, which often turn business correspondence into bland soporifics. If you seldom check your spelling, you are even less likely to take the time to use a bound thesaurus or a separate program to look for synonyms.

Enter *Turbo Lightning* from Borland International and *Reference Set* from Reference Software, two memory-resident programs that can check the spelling of or find a synonym for any word highlighted by the cursor. A two-keystroke command pops up a list of words, whereupon you can automatically replace the original word by choosing the appropriate correction or synonym.

A key difference between these programs and full-document batch-oriented spelling checkers is that you aren't limited to checking word processed documents—spreadsheets and data management programs are also fodder for these programs' instant verifications. You can even correct your spelling or look up a synonym while you're telecommunicating.

The two programs are quite similar. Both license the same Random House dictionary and thesaurus from Wang Laboratories: The spelling dictionary boasts 83,000 words; the thesaurus contains 50,000 synonyms and recognizes 5000 keywords. Borland has enhanced the *Lightning* dictionary with frequently used proper names, computer terms, and abbreviations.

What sets these programs apart from the rash of memory-resident spell-checking competitors that have appeared recently is how ambitious they are. Behind the dictionaries and thesauri are software reference engines designed to access information in *any* word-indexed reference work. Imagine accessing a pertinent quotation in seconds; or instantly looking up a word's proper pronunciation,

hyphenation, and definition; or finding supporting information for your report in a world almanac. In the next few months some of these applications should become available from both companies.

Installation: The Memory Game

Lightning's user manual is a slim, understandable 82-page paperback. The *Reference Set* manual is even slimmer and much drier, but equally straightforward. Although neither program is copy protected, installation can be difficult, especially if you use several other memory-resident programs, switch applications frequently, or use a RAM disk.

Since these programs are designed to be used with various types of software, they must understand the different methods used by each application to move the cursor and insert and delete words. *Reference Set* requires you to run a brief, menu-driven configuration program for each application environment before start-up. *Lightning*, on the other hand, allows you to change environments and other defaults on the fly, using pull-down menus. Unlike *Reference Set*, *Lightning* can be configured to work in the graphics mode of programs such as *Microsoft Word*, *Framework*, and *Reflex*.

The two programs work best on hard disks. Although either will work on systems with 128K and two floppy drives, that's hardly a practical configuration. You don't really have an interactive reference system if you have to swap program and dictionary disks every time you look up a word. Furthermore, floppy disk users are restricted to the smaller dictionaries that fit on a disk with the program. Both programs offer a choice of using the floppy dictionaries or the larger, hard-disk dictionaries. In addition, *Lightning* provides three different-size RAM-based dictionaries for its automatic spell-check-as-you-go mode.

Depending on your choice of dictionaries and features, *Reference Set* uses between 24K and 44K of system memory; *Lightning*, between 84K and 104K. Both support the Lotus/Intel/Microsoft expanded memory specification, allowing you to place the entire disk-based dictionary in RAM for lightning-fast reference.

Interfacial Differences

Once you have successfully installed either program, you may never have to look at the documentation again. You can execute commands either from a menu or with one- or two-keystroke "hotkey" sequences. The *Lightning* menu pops up as a horizontal bar on the top line of your screen (see Screen 1). *Reference Set*'s menu takes over the full screen (see Screen 2). Using the hotkeys is much faster than ploughing through menu sequences, and you can redefine them yourself.

Verifying a word's spelling with either program is a simple matter. Say you want to use the word *sownds* but it doesn't look quite right. To check the word with *Lightning*, place the cursor on the suspect word and press <Alt>-D. This hotkey combination bypasses the main menu and immediately triggers the spelling checker. After a brief pause, *Lightning* opens a small vertical window that lists the six alternatives that come closest to your phonetic spelling. <PgUp> and <PgDn> allow you to scroll additional possibilities through the window; the most probable replacement, *sounds*, is at the top of the list (see Screen 3). Confirm your choice either by highlighting the word and pressing <Enter> or by typing the letter that appears next to the word. To add the original word to an auxiliary dictionary, press G, shown at the bottom of the menu.

Reference Set works similarly but displays alphabetical lists of up to 47 words at a time in a half-screen, horizontal window at the top or bottom of the screen—depending on where the cursor is. Unlike *Lightning*'s vertical windows, which often conceal the current sentence (and sometimes even the word in question), *Reference Set*'s window placement allows you to see the word in context.

Reference Set does not tag the suggested alternatives with letter key selections as *Lightning* does (see Screen 4). You must highlight choices with the cursor keys, then press <Ins> to insert the word in text. Oddly, you press <Enter> to return to text if you don't select a word; *Lightning*'s use of the traditional <Esc> key for this purpose makes more sense. Although you can't add words to an auxiliary dictionary in *Reference Set*, pressing <End> stores words in a glossary—a macro function that holds ten words or phrases of up to 72 characters each.

Screen 1: Turbo Lightning's status-line menu and pull-down Options menu. Both programs allow you to redefine the hotkeys that bypass their menus.

Why did *Turbo Lightning* find 24 words for *sounds* when *Reference Set* found only 5? The variance has to do with the different search algorithms of the two programs. *Lightning*'s scheme is more comprehensive: First it checks a list of commonly scrambled words (like *hte* for *the*), then checks similarly pronounced words, and finally compares word length.

Reference Set simply looks for sound-alikes. However, it also recognizes an asterisk as a wild-card character, so you can display every word that starts with a specified string of letters. For example, if you can't remember how to spell *curmudgeon,* you can enter *cur** and receive a list of 140 words.

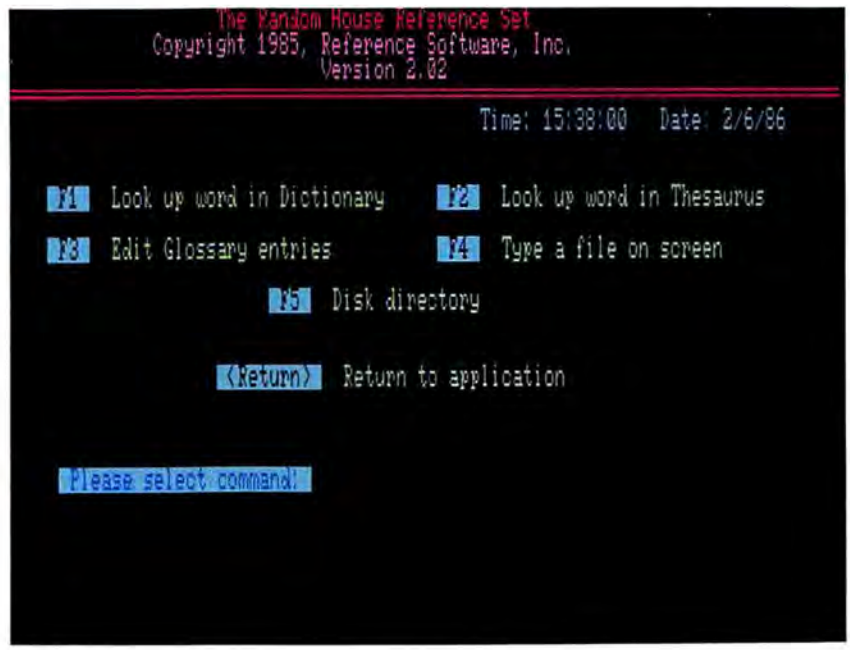
Lightning and *Reference Set* catch most transposition typos as long as the first letter is correct. However, both programs fail to recognize nontext characters except for apostrophes. For example, if you check *appro8priate,* neither program will provide *appropriate* as a possible spelling.

Lightning and *Reference Set* provide an alternative to single-word checking—you can also check a full screen. Unfortunately, the screen-at-a-time checking routine (nearly identical in both programs) is clumsy. It highlights all the errors at once, then turns the highlights off with the next keystroke. You have to remember where the flagged words were, move the cursor to those locations, and check each word in turn. At least *Reference Set* lets you load the full-screen checker separately, in case you want to conserve 20K of RAM. *Reference Set* is also better behaved: Pressing any key turns off the highlights and returns you to the primary application. With *Lightning,* if the key happens to be <Space> or <Enter>, the keystroke registers in your text.

The Spelling Beep

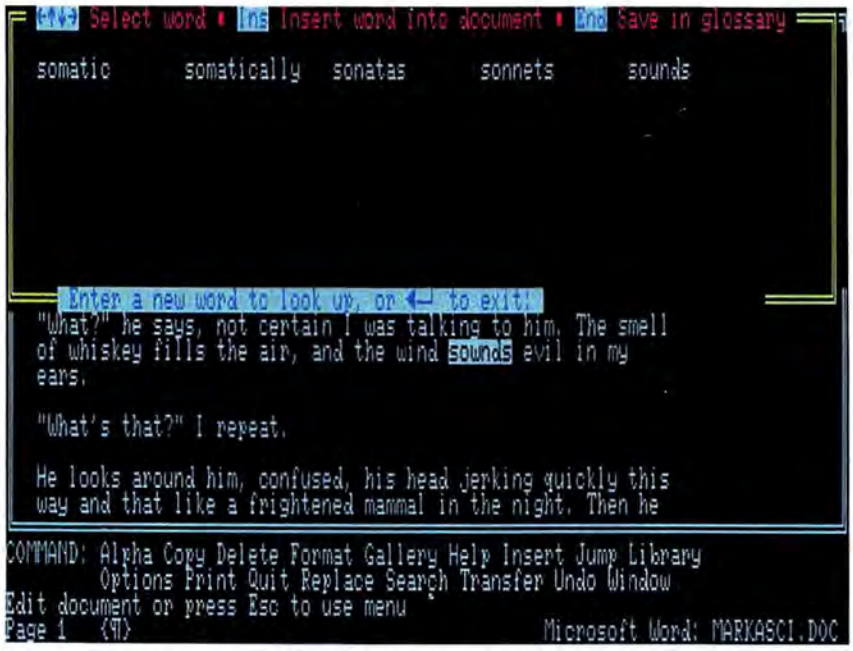
Lightning provides a third alternative to its full-screen and hotkey approaches—a spell-as-you-type auto-checking feature. As you type each word, the program checks it against a memory-resident dictionary and beeps if it doesn't find a match. *Lightning* also lets you check the last "bad"

Although you can't add words to an auxiliary dictionary in Reference Set, *pressing <End> stores words in a glossary—a macro function that holds ten words or phrases of up to 72 characters each.*



Screen 2: Reference Set's full-screen menu. Aside from spelling and thesaurus functions, Reference Set provides a glossary function to store keystroke macros.

Screen 3: Turbo Lightning's word-by-word spelling checker supplies alternate spellings for "sownds." The correct choice heads the list; 24 sound-alike words can be accessed by scrolling. Lightning also provides an auto-checking mode that beeps when you misspell a word.



Screen 4: Reference Set's word-by-word spelling checker produces sound-alikes for "sownds."

word. This is useful because you may not want to stop writing the instant you hear the auto-check beep.

Auto-checking could be as annoying as seat belt buzzers and talking elevators, but Borland has made the feature as unobtrusive as possible. The beep is short, its pitch is not shrill, and best of all, you can turn it off by pressing <Alt>-<F5>.

Users who don't already own a full-document spelling checker will welcome *Reference Set*'s separate batch-mode checker. Called RefSpell, this fully interactive checker is based on the *Random House Proofreader* by Aspen Software. After you select a file to check, the program tells you how many words are in the document and how many of those are unique—a helpful tool for studying your writing style.

RefSpell uses the same dictionary as the word-by-word checker. You have the option of marking all the words in a list for later correction or of making corrections interactively. RefSpell's many options for correcting errors rival those of the top proofreading programs on the market (see Screen 5).

RefSpell has one especially clever and time-saving talent. If the program encounters a word that's been corrected earlier in the document, it automatically asks if you'd like to make the same correction.

Vocabulary Building

One problem with spelling checkers is that most people use words that are not found in a standard dictionary: a potpourri of company names and contacts, trade jargon, and abbreviations. That's why any capable proofreading program lets users establish one or more auxiliary dictionaries.

Lightning and *Reference Set* work with auxiliary dictionaries in very different ways. Although RefSpell provides the option of creating auxiliary dictionaries, you can't add to them or access them from *Reference Set*'s memory resident spell-checker. Only *Lightning* allows you to add words as it checks. You can also create a list of words in ASCII format and store the list as a dictionary. Any file name with an .AUX extension can then be used as a personal dictionary, provided it doesn't contain more than 300 words. *Lightning* lets you call up different auxiliary dictionaries without exiting the program, but you can only draw upon one at a time.

Lightning's manual hints that future developments will allow you to compile your own special lists and incorporate them into the main dictionary, eliminating the need for extensive auxiliary dictionaries and speeding up the program's checking routines.

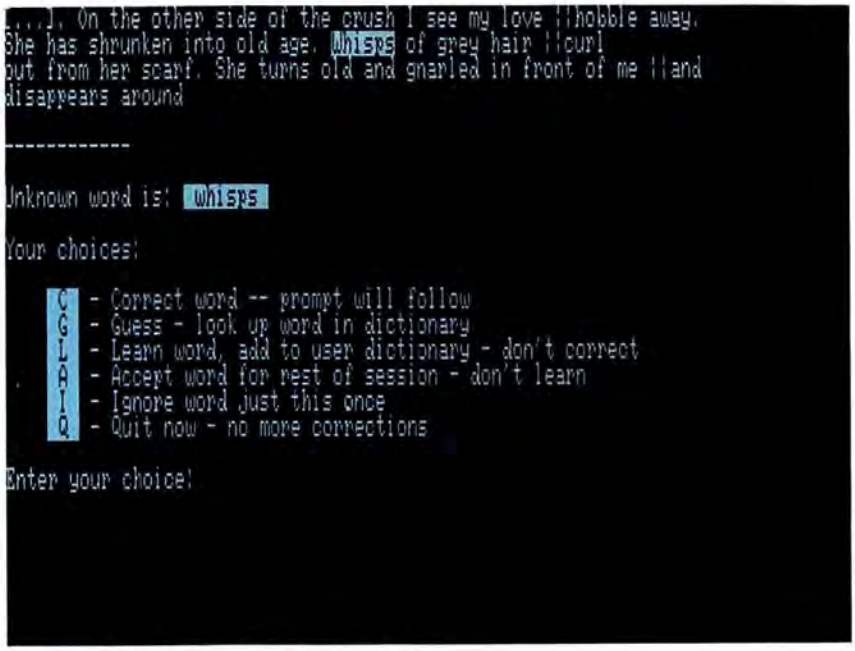
Interestingly, that is the only way to personalize the *Reference Set* dictionary. Although you cannot create separate auxiliary dictionaries, a utility will take any list of words (separated from each other by a nonalphabetic character) and compress, index, and append it to the main dictionary. Neither program makes provision for adding synonyms to the thesaurus.

Searching for the Synonym

Choosing a synonym in either program is similar to selecting a spelling correction, except that you use a different hotkey and the word lists are identified by parts of speech (see Screen 6). *Lightning*'s thesaurus window is a little larger than the program's spelling window, displaying 15 entries instead of 6 (see Screen 7).

Both thesauri are helpful, but hardly comprehensive. If you are one of the lucky few possessed of an outstanding vocabulary, you may have trouble finding words you haven't already thought of. Because these thesauri are always at your fingertips, however, they can at least help on those maddening occasions when you know the right word, but it just refuses to reveal itself.

Reference Set's thesaurus is the stronger of the two, thanks to its ability to cross-reference the synonym list: A tap of the <GrayPlus> key at a highlighted word on the menu finds a synonym for a synonym. This feature



Screen 5: Reference Set's stand-alone, full-document spelling checker. The interactive menu allows great flexibility in checking your document.

hints at the power to come when *Roget's* becomes available on line.

One of the biggest limitations of these thesauri is that they don't recognize the roots of plurals. For example, both programs report that *alternatives* is not in the thesaurus. *Reference Set* tells you that it would be between *alternative* and *although* alphabetically and asks you to either type in a new word or exit. *Turbo Lightning* tells you to press <F2> for a list of sound-alike (not synonymous) words.

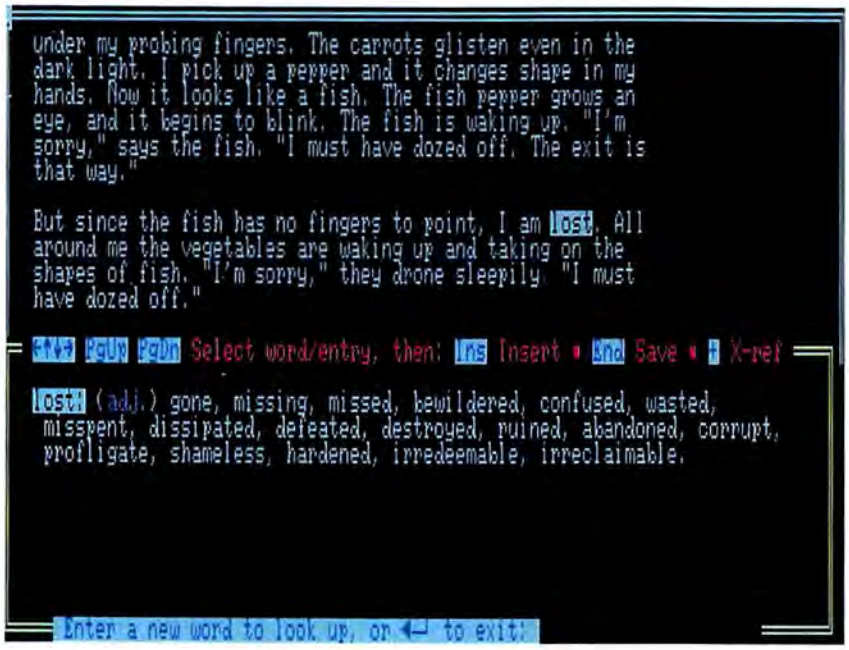
Compatibility and Performance

Turbo Lightning and *Reference Set* are possessed by the same demon as all memory-resident programs: They tend to conflict with other memory-resident programs, so be prepared to do without a beloved utility. Further complications arise because both programs are supposed to be loaded last—which may cause conflicts with many like-minded programs. However, I managed to get *Lightning* and *Reference Set* to work with *SideKick, SuperKey, Instant Recall,* and even with each other. *SideKick* worked fine with both programs, except that *Reference Set* was unable to insert a synonym or spelling correction into *SideKick*'s Notepad.

On a hard disk PC, both *Reference Set* and *Lightning* display the word list from the hard disk dictionary in less than 4 seconds. Copying the dictionaries to a RAM disk cuts that time in half. However, on a floppy-based system things slow down considerably. Furthermore, performance of your applications can bog down even on a 640K hard disk system if you have several other RAM-resident programs contending for memory.

Lightning enjoys one performance edge: If a checked word is correct, the program flashes a 'spelling confirmed' message before your fingers leave the hotkey. Unlike *Reference Set, Lightning* wastes no time writing a word list on screen. Because in auto-check mode *Lightning* only checks words as they are input from the keyboard, it doesn't impede operations in a primary application, like recalculating a spreadsheet or browsing a data base.

As hard disk storage drops in price and compact laser disks (CD-ROMs) proliferate, an instantly accessible, multimegabyte on-line library becomes conceivable.



Screen 6: Reference Set's on-line thesaurus in action. Unlike in Lightning, you can also search for a synonym of a synonym.

The Promise of Reference Engines

Both programs' potential for putting voluminous reference works at our fingertips is mind-boggling. Wang Laboratories has several more ambitious reference works available for license, including *The Concise Columbia Encyclopedia, Roget's Thesaurus, John Bartlett's Familiar Quotations, Black's Law Dictionary,* and *Stedman's Medical Dictionary.* Since these works

were put into electronic form by the same company, they are already presumed compatible with both *Reference Set* and *Lightning*. At press time, Borland had announced but was not yet shipping *Roget's* and *Columbia Encyclopedia* at $99.50 each.

According to Borland and Reference Software, the two products are targeted for different market segments. Like the rest of Borland's office productivity software, *Lightning* is designed with the general business user in mind. Borland has also opened the system for development by end users and independent programmers. Reference Software sees *Reference Set* as the core of a writer's tool kit and plans to add grammar and style checkers, foreign language and rhyming dictionaries, and more extensive thesauri.

All that stands in the way of accessing the Library of Congress through our PCs is the practical limitations on the available system memory, mass storage, and cash. As hard disk storage drops in price and compact laser disks (CD-ROMs) proliferate, an instantly accessible, multimegabyte on-line library becomes conceivable.

A Close Call

The interactive nature of *Lightning* and *Reference Set* may help you become a better and more productive writer. You won't find yourself staring blankly at the screen puzzling over the spelling of a complex word, and you can quickly find a synonym with just the right flavor to express your thoughts.

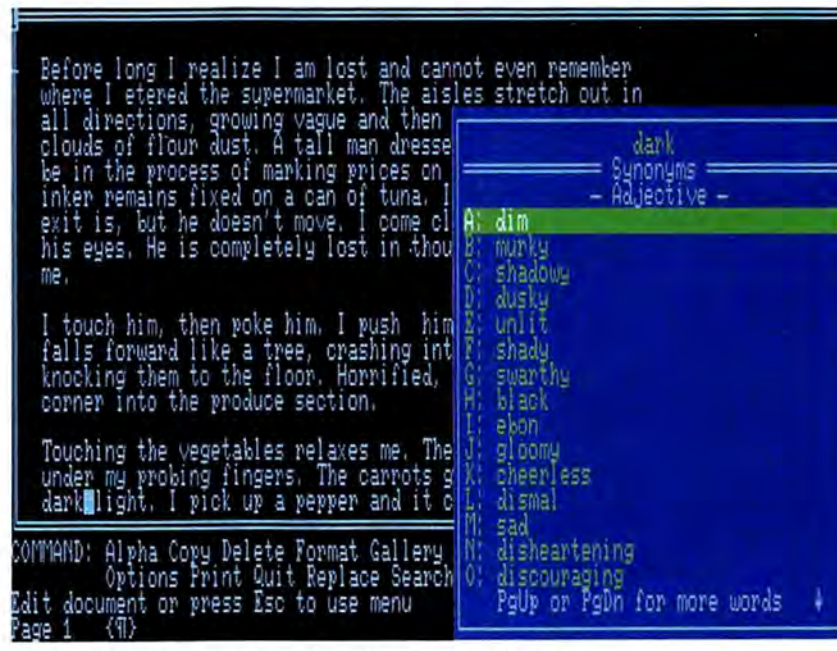
Despite their similarities, the differences between the programs are fairly clear-cut. *Reference Set* features an excellent stand-alone spelling checker, a macro program, and a cross-indexing feature in the thesaurus. It also occupies less memory and costs slightly less. *Turbo Lightning* includes an auto-checking mode, provides more sound-alike words when spell-checking, and enables you to create a library of auxiliary dictionaries.

These distinctions aside, *Lightning* wins by a neck. Its user interface seems slightly slicker and faster. Borland has established itself with a string of software hits: *Turbo Pascal, SideKick, SuperKey,* and *Reflex*. Users of these programs will feel at home with *Lightning*. More significantly, Borland's success gives it the best shot at developing new applications for its reference engine. ●

Ken Milburn is a freelance writer and microcomputer systems consultant based in Mill Valley, California.

Reference Set version 2.0
Reference Software, Inc.
330 Townsend St. #232
San Francisco, CA 94107
800/826-2222, 415/947-1000
List price: $89, thesaurus or dictionary alone $69
Requirements: 128K, two disk drives, DOS 2.00 or later version

Turbo Lightning version 1.0
Borland International
4585 Scotts Valley Dr.
Scotts Valley, CA 95066
408/438-8400
List price: $99.95
Requirements: 128K, two disk drives, DOS 2.00 or later version



Screen 7: Lightning's on-line thesaurus. Unlike in Reference Set, you can select a synonym by pressing its corresponding menu letter.

tas
MODEM TEST UNIT
tas
VOICEBAND CHANNEL SIMULATOR
Tone
SFI
White Noise
Impulse Noise
Gain Hits
Phase Hits
Amplitude Jitter
Phase Jitter
Frequency Shift
Intermod. Distortion
Gain Slope
Delay Slope
Line In T1
Line Out T2
VOLUME
POWER
tas
MODEM TEST POD
Hayes

Jeff Martin

Safe at Any Speed?

As the hare discovered all too late, speed is not everything. With a mob of 2400-bps modems hopping to market, a question begs to be answered: Is faster necessarily better? PC World puts four front-runners to the test.

Art Wilcox

In but an instant of the silicon epoch, the 300-bps modem passed from innovation to obsolescence. Performance-conscious users snapped up the Hayes Smartmodem 1200 (or one of its peers) and packed their 300-bps modems away with their double-breasted suits. The 1200-bps modem provided a quantum leap in performance—state-of-the-art technology that trimmed phone line charges while boosting productivity. But time and data don't stand still; 2400-bps modems have arrived in full force. Computer magazines proclaim their wonders while vendors offer units costing little more than their 1200-bps predecessors.

However, the latest technological advance doesn't always bring greater benefits. When 2400-bps modems were introduced in early 1985, the pros and cons were balanced. Although faster data transmission can mean smaller phone bills and more efficient use of on-line services and data bases, the reliability of high-speed communications over an aging telephone network designed for voice transmission was rightly questioned. More unsettling: the dearth of information services, on-line data bases, and value-added carriers supporting 2400-bps communications. The 2400-bps modem, it seemed, was all dressed up with no place to go.

But time makes all the difference in the Darwinian world of PC peripherals. Nearly 40 manufacturers have jumped on the 2400-bps bandwagon, among them Hayes, Cermetek, U.S. Robotics, Novation, Racal-Vadic, Microcom, and AT&T. Prices have shrunk accordingly: 2400-bps modems typically cost about

Table 1: 2400-bps services compared (rates in dollars/minute)

	300 bps		1200 bps		2400 bps		
	Prime time	Nonprime time	Prime time	Nonprime time	Prime time	Nonprime time	Connect charges
CompuServe	.21	.10	.25	.21	.38	.32	N/A
Dialog	1.20[1]	N/A	1.20	N/A	1.20	N/A	10/hour
Dow Jones News/Retrieval	.90	.20	1.98	.44	1.98	.44	N/A
EasyNet	N/A[2]	N/A	N/A	N/A	N/A	N/A	1
MCI Mail	N/A[3]	N/A	N/A	N/A	N/A	N/A	N/A
NewsNet	.40	.30	.80	.60	1.20	.93	N/A
Tymnet	4.25	1.50	4.25	1.50	4.25	1.50	N/A
The Source	.36	.14	.43	.18	.46	.20	.25
Uninet	3.25	1.50	3.25	1.50	3.25	1.50	N/A

[1] This figure represents an average cost; Dialog charges according to data base used.
[2] EasyNet charges $8/search.
[3] MCI Mail charges according to length of message.

$800; mail-order houses sell some units for less than $500. On-line vendors have also thrown skepticism to the winds—major providers such as CompuServe, Dow Jones News/Retrieval service, and Tymnet already support 2400-bps communications; others are planning to follow suit (see the sidebar "2400 On Line at Press Time"). Tim Riggins, a communications analyst at Future Computing, is positively bullish: "2400 bps will capture 30 percent of the modem market by 1990. It will definitely surpass 1200-bps sales in the next few years."

In an attempt to grab the rabbit by the ears, *PC World* scrutinized four external 2400-bps modems from four major players—the Hayes Smartmodem 2400, the Novation Professional 2400, the U.S. Robotics Courier 2400, and the Cermetek 2400 Modem. Aside from delineating each modem's key features and functions, *PC World* used another technological marvel—the telephone network simulator—to precisely gauge each modem's shortcomings and strengths. Our investigation underscores some conventional market wisdom and reaffirms the relationship between good design and superior value.

More Bits for the Buck?

Cost-conscious managers at large and small companies alike must weigh the cost of capital expenditures (equipment) against the productivity gained. When considering the move to 2400-bps communications, keep in mind that some tasks will directly benefit from higher speeds and others won't.

If you regularly transmit large files to distant clients or company divisions, you will quickly recoup your investment from a 2400-bps modem. However, if you occasionally send small files to a local office, the payback will not be substantial. Subscribers to Dialog, Nexis, CompuServe, and similar services will whittle their phone bills but not appreciably speed expensive on-line searches. Time spent entering search strategies, logging on and off, or waiting while a search is performed is time controlled by the host. The process is not hastened by a faster modem. Even more nettling: Savings may be offset by a surcharge for 2400-bps access (see Table 1). Some on-line companies maintain that this practice is not usurious, but rather, egalitarian. NewsNet, a full-text on-line data base service, claims its sliding scale is "designed to make the cost of on-line sessions roughly equal at all baud rates." If you use a modem pri-

Monthly fee	Initial fee
N/A	39.95
N/A	N/A
1	75
N/A	N/A
1.50	N/A
15	N/A
N/A	N/A
10	100
N/A	N/A

marily for certain on-line services, the move to 2400 bps may not be worth it.

Of course, strict computation of money spent on phone charges, on-line fees, and equipment outlays doesn't tell the whole story. The productivity gained when tasks are performed in half the time can't be easily measured but is nonetheless real. Using a 2400-bps modem, like using the PC AT, is at first a revelatory experience. File transmission time is neatly halved; communications sessions that once crawled seem to flash by on the screen. If raw speed is an important factor, the 2400-bps modem is indeed attractive.

Fit and Functionality

The 2400-bps modems examined here are not mere extensions of their 1200-bps predecessors. Along with startling speed come new standard features (see Table 2). In some cases, convoluted functions once handled via software (such as voice/data switching) have been relegated to simple front-panel push buttons; in others, hardware settings are accomplished with software commands. Some noteworthy improvements and disappointing revelations follow.

Hayes compatibility. For better or worse, the Hayes AT command set has become the communications industry's de facto standard. Most current communications programs use these modem-level commands to control everything from dialing a number to auto-answer functions. Given the success of the Smartmodem 1200, it's no surprise that all the 2400-bps modems reviewed here adhere to its command set. Contrary to rumor, Hayes has not substantially changed any existing commands but instead has added several new 2400-specific commands that control functions such as speaker volume and synchronous/asynchronous modes. *Smartcom II* users take note: Only 2.1 or later versions of the program work with the Smartmodem 2400. Earlier versions either cannot recognize the modem or insist on running it at 300 bps.

U.S. Robotics and Novation have likewise extended their command sets, providing convenient functions not offered by Hayes. For example, the U.S. Robotics Courier includes useful help commands that display current settings plus dial and S-register commands. Novation has added a nifty security feature that requires all incoming communications to be prefaced by a password—useful for unattended operations.

Configuration and control. Among the first challenges a modem user confronts are DIP switches, the tiny toggles that configure modems for specific tasks. Typically sequestered deep inside the modem, the DIP switches are more accessible on the 2400-bps offerings from Cermetek, U.S. Robotics, and Novation. Cermetek places them behind a sliding panel, while U.S. Robotics leaves them exposed on the belly of the modem. U.S. Robotics also keeps your nose out of the manual by printing DIP switch settings, dial commands, and RS-232C pin values on the unit's underside.

Novation wards off obsolescence by placing the switches and a ROM chip in a module that plugs into the back of the unit. As the company adds features—such as MNP (Microcom Network Protocol) error correction—the modem can be fitted with new modules. Novation has further simplified the user's life by assigning many major functions—speed, mode, voice/data switching, and diagnostics—to six front-panel buttons. Any selection is immediately noted in English on a sharp 3- by 1-inch liquid crystal display—a vast improvement over the blinking status lights found on every other modem.

Ever the market leader, Hayes has forged a different solution to system configuration by eliminating DIP switches altogether. For example, changing the carrier detect status for *Crosstalk* or restoring the manufacturer's default settings is a matter of entering 3- to 5-character commands from the keyboard. Once settings are specified, they can be saved to the modem's EEPROM, a special ROM chip that holds data securely even when the modem is turned off. If

2400 On Line at Press Time

Wes Nihei

Electronic information services are merging into the 2400-bps fast lane with varying degrees of haste. While some have been up and running at 2400 bps for over a year, others are waiting until high-speed modems find their way to corporate PCs in greater numbers. However, almost all on-line vendors agree that data transmission at 2400 bps is inevitable.

Tymnet, UniNet, and other packet-switching networks supported 2400-bps communications long before the stand-alone services did under their respective aegis. Electronic mail purveyors MCI Mail and EasyLink have to date refused to invest in 2400-bps equipment, offering subscribers a choice of 300-bps or 1200-bps hookups. But via Tymnet, speed-hungry users can access these same mail services at 2400 bps. Why the disparity? According to MCI's Bill Stern, "Most of our customers are comfortable with 1200 bps. When we move to 2400 bps depends on how quickly people adapt."

For many vendors, 2400-bps service has not been a money-maker. NewsNet, a full-text electronic news service, adopted 2400-bps service in June 1985, but the company's bottom line has not considerably fattened as a result. Marketing manager Bill Van Orden reports that only 1 percent of NewsNet's customers tap into the higher rate. Says Van Orden, "2400-bps usage is increasing, but in the last 18 months, there's been a tremendous flip-flop from 300 bps to 1200 bps." Other on-line vendors, such as Bibliographic Retrieval Service (BRS), state bluntly they have no plans to support 2400 bps, while Mead Data Central (provider of Lexis, Nexis, and Medis data bases) and Westlaw are content to wait and see.

At Tymnet, there are no mixed feelings about being on the cutting edge. "Systemwide connect hours at 2400 bps in September 1984 totaled 1701 hours," says Maurice Okawaki, Tymnet telemarketing manager. "By September 1985, the total jumped to over 10,000 hours—a growth rate of nearly 500 percent in one year." Tymnet is already investigating 4800-bps and 9600-bps transmission.

Growth rates and marketing projections aside, 2400 bps is a standard still waiting to catch on. The speed limit's been raised. So who's in the fast lane?

CompuServe offers a full range of on-line services including electronic mail, business and financial information, science forums, electronic banking, travel services, and special interest group forums. 2400-bps service is available in 30 U.S. cities. CompuServe, 5000 Arlington Centre, Box 20212, Columbus, OH 43220, 614/457-8600.

Dialog is a 2400-bps service, available since August 1985, that serves

up approximately 200 data bases focusing mostly on bibliographic, directory, and statistical information. Though subscription fees vary by data base, there is no surcharge for 2400-bps access. Dialog, 3460 Hillview Ave., Palo Alto, CA 94304, 415/858-3785, 800/227-1927.

Dow Jones News/ Retrieval service is the businessperson's prime source for electronic information, with 38 financial and news data bases. 2400-bps and 1200-bps access fees are identical. Dow Jones News/ Retrieval, P.O. Box 300, Princeton, NJ 08540, 800/257-5114.

EasyLink is Western Union's electronic mail arm, available at 2400 bps solely via Tymnet. EasyLink, Western Union Telegraph Corp., One Lake St., Upper Saddle River, NJ 07548, 201/825-5000.

EasyNet is an electronic gateway system that provides passage to on-line services and data bases from BRS, Dialog, and NewsNet. 2400-bps access is available through Tymnet. EasyNet, Telebase Systems, 134 N. Narberth Ave., Narberth, PA 19072, 215/664-6168.

MCI Mail is synonymous with electronic mail in many circles, even though its forte is delivering hard-copy output. MCI Mail also offers access to Dow Jones News/ Retrieval. As with EasyNet, 2400-bps service is available only through Tymnet. MCI Communications Corp., 1133 19th St. NW, Washington, DC 20036, 800/621-6245.

NewsNet is a full-text newsletter data base containing over 300 newsletters organized into 32 different categories. All data bases have been available at 2400 bps since October 1985. NewsNet, 945 Haverford Rd., Bryn Mawr, PA 19010, 800/345-1301.

The Source offers an omnibus of 2400-bps services: electronic mail, business and national news, investment information, weather, sports, and bulletin boards. Source Telecomputing Corp., 1616 Anderson Rd., McLean, VA 22102, 800/336-3300.

Tymnet is something of a pioneer, having featured 2400-bps communications since September 1984. Essentially an umbrella network, Tymnet offers 2400-bps access to MCI Mail, EasyNet, EasyLink, and a host of other services. Tymnet, 2710 Orchard Pkwy., San Jose, CA 95134, 408/942-5209.

Uninet started 2400-bps service in December 1984, following hot on Tymnet's heels. Besides its own electronic mail service, World Link, Uninet offers 2400-bps access to a variety of on-line services such as The Source, Dialog, and MCI Mail. Uninet, 10951 Lakeview Ave., Lenexa, KS 66219, 913/541-4400.

you unwittingly enter an incorrect value, be prepared to spend some time tracking it down—the Smartmodem 2400 can output only one setting at a time. Since this approach to modem configuration is new, Hayes wisely provides a chart that matches each 2400 command with its Smartmodem 1200 DIP-switch equivalent.

Call progress monitoring. Also known as tone detection, this capability discriminates between various frequencies, such as dial tones, busy signals, ringing, and the human voice, and enables the modem to respond appropriately. Early PC modems were tone-deaf—they waited a set time and dialed away. If no dial tone was present, they simply aborted the call. This crippling deficiency made unattended operations iffy at best. If you wanted to save on-line fees and phone charges by downloading files late at night, you brewed a pot of coffee and faithfully baby-sat your communications session.

Contemporary modems, including the 2400-bps units discussed here, go beyond these crude bit blasters and offer true tone detection, which enables a modem to detect a busy signal and redial until a connection is made, hang up if a human answers instead of another modem, and dial a call through a sequence of exchanges. Thus your modem can work over an office PBX, send files via a value-added carrier such as Sprint, or stay up late downloading files while you snooze.

The 2400-bps modems reviewed were run through such a gauntlet. Files were sent PC to PC over dial-up lines and a Siemens Saturn II EPBX, documents were downloaded from The Source and MCI Mail via Sprint, bulletin boards were accessed, on-line data bases were searched, and several human volunteers were subjected to modems trying to understand English and then abruptly hanging up. All the modems performed faultlessly with one unexpected exception: The Smartmodem 2400 failed to hang up when it encountered a voice at the other end of the line.

Voice/Data Switching. Not every communications user can afford separate lines for telephone and modem, but having both share the same line is risky; it's all too easy to break a connection when switching from voice to data and back again. All the reviewed modems make the switch safely, though some force the user to jump through hoops in the process. For example, to switch from data to voice, Hayes and U.S. Robotics users must issue modem-level commands and pick up their receivers at precisely the right time.

Cermetek and Novation offer less complicated alternatives: front panel controls. With the Cermetek modem, one communicator presses the ORG (originate) button, while the other presses the ANS (answer) button. Novation garners highest marks for eliminating even this guesswork. To shift, you merely tap the data or voice button on the front of the modem; the other modem automatically switches to that mode. Manufacturers should follow Novation's lead—users won't do backflips forever.

Documentation. Kudos here go to U.S. Robotics and Novation for providing succinct yet functional user manuals and pullout reference cards. Hayes, as usual, does a creditable job and includes information not only on traditional issues but on leased-line operations and the reconciling of dissimilar protocols and modem speeds. Unlike its competitors, Hayes continues to include technical specifications and circuit diagrams for more advanced users. While Hayes' intent is laudable, the bounty of technical minutiae tends to obscure basic operating instructions. Cermetek, on the other hand, should consider a thorough overhaul. Its slapdash typewritten manual lacks both index and reference card and is not particularly lucid about proper switch settings, synchronous operations, or other important details.

Real-World Lab

A telephone signal is like a dollar bill—it passes through many hands. For example, a single telephone call between San Francisco and Chicago may travel by copper wire and microwave, bounce off a satellite, and run down a fiber optic link; each medium contributes its own unique disturbance to the signal. Depending on the combination, a call may be crystal clear or inundated with hissing, crackling, echoes, and pops. Although the human ear can usually distinguish a voice in the midst of such aural clutter, these *impairments* wreak havoc on data traveling via modem. How much data is lost or corrupted depends on the number and intensity of the impairments along the way. A well-designed modem can work at or near peak speeds even over noisy

Table 2: 2400-bps modems feature by feature

	Novation Professional 2400	Hayes Smartmodem 2400	U.S. Robotics Courier 2400	Cermetek 2400 Modem
Hayes 1200 command set	●	●	●	●
Proprietary 2400 command set	●	●		
Call progress monitoring:				
Dial tone	●	●	●	●
2nd dial tone[1]	●	●	●	●
Busy	●	●	●	●
Ring	●	●	●	●
No dial tone	●	●	●	●
Voice	●		●	●
Voice/data switching	●	●	●	●
Auto-dial/auto-answer	●	●	●	●
Automatic speed detect	●	●	●	●
Transmission rate:				
2400 bps	●	●	●	●
1200 bps	●	●	●	●
300 bps	●	●	●	●
Full-duplex	●	●	●	●
Asynchronous communications support	●	●	●	●
Synchronous communications support	●	●		●
Built-in test modes:				
Self-test	●	●	●	●
Local analog loop-back	●	●	●	●
Local/remote digital	●	●		●
Dialing:				
Alphabetic characters	●	●[2]	●	
Pulse	●	●	●	●
Touch-tone	●	●	●	●
Adaptive	●		●	●
DIP switches	●	[3]	●	●
Indicator lights		●	●	●
LCD	●			
Speaker	●	●	●	●
Volume control	●	●	●	●

[1] Required by value-added carriers
[2] Only A, B, C, and D, plus # and *
[3] Equivalent system settings accomplished with software commands

lines by filtering out the chaff and detecting and counteracting signal distortions; however, even a slightly noisy line can reduce a poorly designed modem to plodding performance.

In the past, modem evaluations seldom focused on the effect of such impairments, and with good reason; the margin for error in 300- and 1200-bps communications is generous. At 2400 bps, however, the issue can't be ignored. Unfortunately, the telephone network's quirky nature doesn't make it an ideal modem test-bed because you cannot introduce, control, and measure the impairments that affect a modem's performance. Thus, "real-world" tests usually yield spurious results.

In an effort to quantify a 2400-bps modem's talent for dealing with the vicissitudes of day-to-day communications, *PC World* went into the laboratory and re-created the telephone network, using the TAS 1000 Modem Test System from Telecom Analysis Systems (TAS) of Little Silver, New Jersey. The TAS system consists of a system controller (a stock AT&T PC 6300) running TAS's menu-driven software package, which automates testing and collates results, and three hardware modules: the 1010 Channel Simulator, which recreates the impairments found on telephone lines; the Network Simulator, which mirrors the personality of public as well as leased telephone lines; and the 1020 Modem Test Unit, which funnels test data to the modems connected to the simulator and calculates the resulting data transmission errors.

We determined realistic impairments by consulting the 1982-1983 AT&T Bell Labs *End Office Connection Study*. Bell sampled the transmission impairments found on 6500 long-distance connections in the predivestiture Bell System. Bell Labs engineers then averaged the results and rated line quality on a percentile basis. In our tests, we put all the major impairments together on the line at the average (50th percentile) level, then increased the intensity of one impairment at a time to find each modem's breaking point.

The Modem Litmus Test

Evaluating each modem pair was a relatively straightforward process. Once attached to the Modem Test System, 1000-bit blocks of simulated data were transmitted in groups of 100 from one modem to the other as various impairments were added to the line.

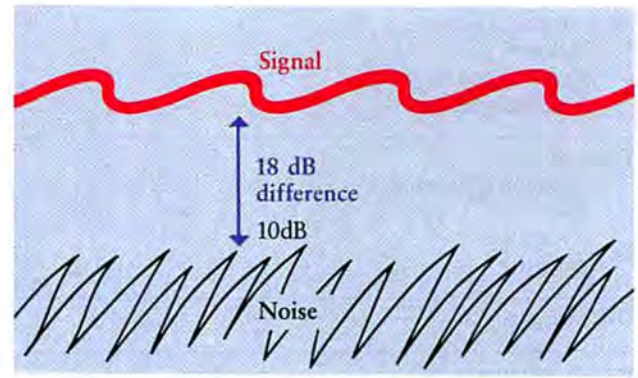


Figure 1: A signal-to-noise ratio indicates the difference between signal strength and the intensity of noise on a line as expressed in decibels. The smaller the ratio, the greater the likelihood that noise will corrupt data. Most of the modems tested for this review require at least an 18- to 20-decibel separation between signal and noise for acceptable operation.

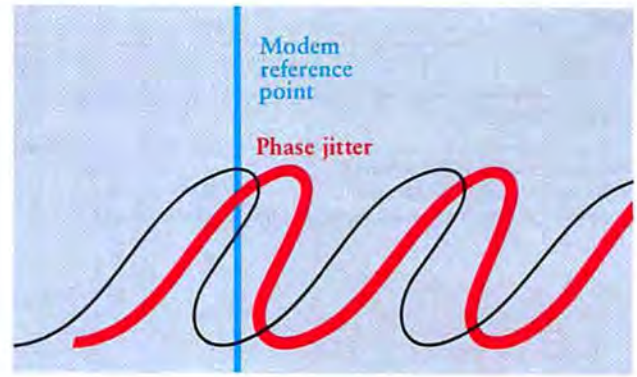


Figure 2: When a wave arrives out of sync—that is, when a peak representing data is not lined up properly with the modem's reference point—its phase is said to be jittered or shifted. Because so much data is packed into a 2400-bps signal, a slight shift can cause a modem to lose data.

After the data completed the circuit, the TAS 1020 Modem Test Unit calculated the block error rates. The test results measure block errors because popular error detection/correction schemes such as X.PC or MNP cannot retransmit individual bits or bytes, only affected blocks. The number of block errors also suggests a modem's effective transmission rate under fire. For example, a 2400-bps modem laboring at a 50 percent block error rate is always resending half its data—in effect, working as slowly as a 1200-bps modem.

Each pair of modems was stressed with three major impairments that frequently disrupt data communications: *white noise* (expressed as a signal-to-noise ratio), *phase jitter,* and *amplitude jitter.* Other impairments such as attenuation, second- and third-order nonlinear distortion, gain and delay distortion, and frequency offset were kept at a constant background level throughout testing.

Noise is caused by everything from lightning to the electronic components in the phone network that process signals. Since noise is present on a phone line across the entire frequency band, it's considered a significant cause of transmission errors. A signal-to-noise ratio indicates the difference between signal strength and the intensity of the noise on the line (see Figure 1). As the gap between signal strength and noise narrows—as the line gets noisier and the ratio shrinks—the number of errors escalates.

Amplitude jitter and phase jitter are typically introduced by the components in the telephone network. Since data is encoded in the amplitude and phase of a wave, any fluctuation in the signal can confuse the modem. If signal strength varies too greatly, amplitude jitter results—the height of the waves becomes erratic and the modem can't decode the data (see Figure 2). When a signal makes the leap from one medium (copper wire) to another (fiber optic cable) and encounters wildly different electrical properties, phase jitter can occur—waves arrive at uneven intervals (see Figure 3). Though noise, amplitude jitter, and phase jitter don't generally interact, their combined presence can turn your transmitted sales report into hieroglyphics.

Real-World Conclusions

As the tests clearly show, all 2400-bps modems are not created equal. A cursory glance at Figures 4-6 quickly demonstrates that the Hayes and Novation modems can weather the slings and arrows of outrageous communications far better than their counterparts from U.S. Robotics and Cermetek. Keep in mind, too, that some seemingly subtle performance variations are significant. Decibel differences are exponential; if signal-to-noise ratio drops by 1 decibel from 16:1 to 15:1, line noise increases tenfold. A 1 degree or 1 percent change in jitter is merely linear—but the effect can be similarly severe, since so much more data is packed into a 2400-bps signal.

The average impairments as determined by the Bell study were 34:1 signal-to-noise, 5.8 degrees of phase jitter, and 2.9 percent of amplitude jitter. As Figures 4-6 indicate, *PC World* subjected the modems to a far more vigorous test. Thus you might conclude that

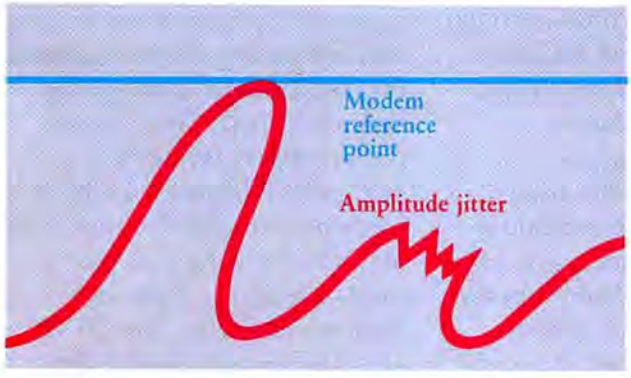


Figure 3: Transmitted data is encoded in electromagnetic waves. A modem expects data (1s and 0s) to be represented by waves peaking at set levels. If signal strength changes precipitously, amplitude jitter occurs: The wave drops out of sight. In this illustration, the first wave of data is unscathed and can be read; the second wave is distorted and is unintelligible to the receiving modem.

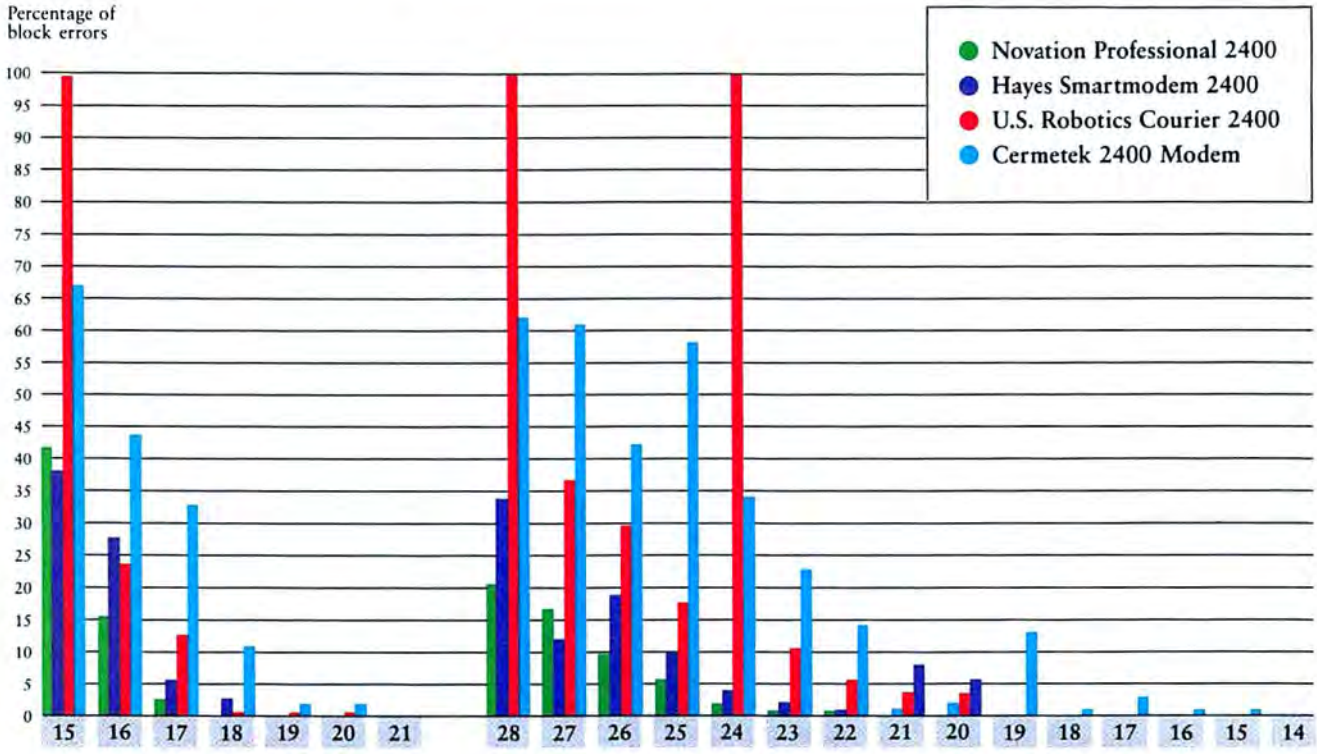


Figure 4: Signal-to-noise ratio in dB[1]

Figure 5: Phase jitter in degrees[2]

all the tested modems will run error-free most of the time.

However, consider that the Bell Study also notes that 5 out of 100 lines had phase jitter exceeding 15 degrees, while 1 out of 100 lines had amplitude jitter exceeding 15 percent. More important, the signal-to-noise number derived by Bell does not take into account the reduction in strength that a signal experiences traveling from your modem to the local telephone office. Depending on your distance from a local exchange—and the kind of equipment that may carry the signal along the way, such as a PBX—the drop in signal strength could be considerable. Thus, your transmitted data may frequently encounter the kinds of severe impairments simulated in our tests.

Of course, statistics mean little if your local line is usually noisy; in that event, your data can expect rough going most of the time. Thus it's particularly relevant to highlight the point at which a modem sends error-free blocks—in other words, when retransmission is unnecessary. The Novation and Hayes modems are neck and neck, transmitting data with the fewest errors under the worst circumstances and reaching no-error states earlier. The U.S. Robotics modem is a relatively close second, while the Cermetek trails a distant third. It's notable that the Novation racks up even better marks than market-leader Hayes.

Though competent, the U.S. Robotics modem didn't always fare well under battle conditions and would sometimes stop receiving data altogether. Unfortunately, the modem could not continue communications when line conditions improved; it had to be turned off and then switched on again. This could be a nuisance in real-life communications when the line "fades" momentarily, causing a burst of errors, and then improves.

The Cermetek modem, however, is the biggest question mark. An initial pair of tested Cermetek units could not operate even over an "ideal" line (before increasing the three major impairments), and as the test results on a second set pointedly illustrate, Cermetek has a long way to go. Although the Cermetek 2400 never lost its carrier, it was easily the most sensitive to noise and jitter and ran dead last in every test. The company plans to release the 2400EP, a $695 model that employs Microcom's powerful MNP error-checking and error-correcting protocol—which may lower the modem's error rate. Alas, MNP and other error-correcting pro-

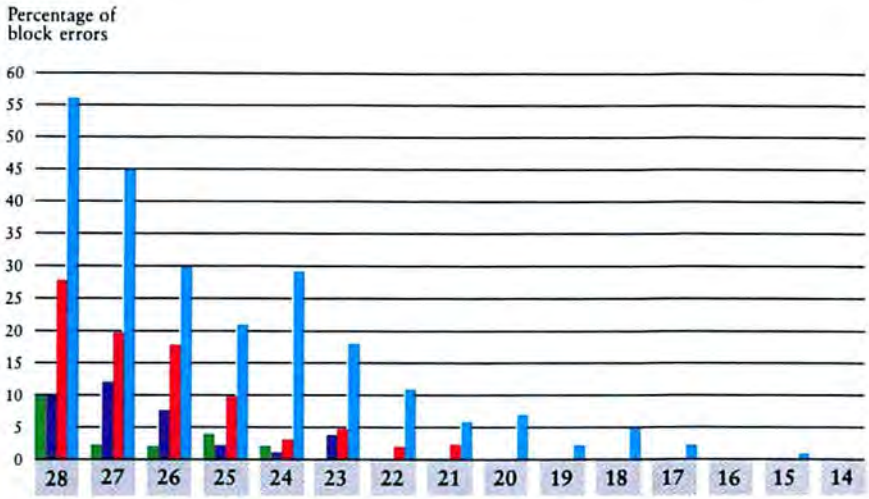


Figure 6: Amplitude jitter peak to peak in percent[3]

[1] Noise impairment is accurate to within ±0.25 decibels.

[2] Impairment is accurate to within ±0.5 degrees.

[3] Impairment is accurate to within ±0.5 percent.

tocols achieve error-free performance at the expense of throughput—it takes time to retransmit a block in which an error is detected.

The Checkered Flag

All four modems perform satisfactorily on average or good phone lines. Unfortunately, ours is not a state-of-the-art world. The same call may travel over aging copper lines and sleek spun-glass cables; components with varying tolerances lie in wait, ready to mangle your data. Worse still, deregulation has increased the likelihood that your data will travel through many "value-added" hands—and none too gently.

Even so, 2400-bps communications is no longer impractical over today's voice lines—and vendors from Digital Communications Associates to Electronic Vaults promise to push the standard to 9600 bps and beyond in the foreseeable future. In the meantime, you can't beat the price/performance ratio of 2400-bps modems. Product features and functions should naturally influence your purchase: Hayes has made some laudable enhancements to its dependable Smartmodem line; the Cermetek 2400 is a cheap way to step up; and the U.S. Robotics Courier 2400 is competent and reasonably priced, though it treads perhaps too closely in the Smartmodem 1200's footsteps. But the Novation Professional 2400, with its rock-steady performance, replaceable modules that welcome software updates, and handy front panel function buttons, tops the list. This is one modem that's safe at any speed. ●

Art Wilcox is a Contributing Editor to PC World.

Cermetek 2400 Modem
Cermetek Microelectronics
1308 Borregas Ave.
P.O. Box 3565
Sunnyvale, CA 94089-3565
408/752-5000
List price: $645
Requirements: RS-232C serial port

Courier 2400
U.S. Robotics, Inc.
8100 McCormick Blvd.
Skokie, IL 60076
312/982-5001
List price: $699
Requirements: RS-232C serial port

Novation Professional 2400
Novation, Inc.
20409 Prairie St.
Chatsworth, CA 91311
818/996-5060
List price: $795, with Mite communications software $895
Requirements: RS-232C serial port

Smartmodem 2400
Hayes Microcomputer Products, Inc.
705 Westech Dr.
Norcross, GA 30092
404/449-8791
List price: $899
Requirements: RS-232C serial port

TAS 1000 Modem Test System
Telecom Analysis Systems, Inc.
P.O. Box 635
86 Birch Ave.
Little Silver, NJ 07739
201/530-9242

Meet our P

Choosing a modem for your personal computer just got easier.

Modems are remarkable little gadgets. They can connect you and your PC to mountains of data and oceans of information. But up until now, deciding which modem to buy hasn't been easy. So to solve that little problem, IBM is offering two 1,200 bps PC modems. Modems that not only give you the best features currently available on PC modems, but also offer features usually found only on higher priced, higher speed modems.

First, a Brief Introduction to the IBM PC Modems:

The IBM 5841 is a stand-alone modem capable of operating at 0-300, 600 and 1,200 bps in asynchronous mode, and 600 and 1,200 bps synchronous.

Our other modem is the IBM Personal Computer Modem—an internal, half-card modem that operates at 0-300, 600 and 1,200 bps asynchronous.

The Non-Identical Twins

In some respects, these two modems are very similar. For example, they both have Automatic Adaptive Equalization—which means they will continuously fine-tune themselves to compensate for changes and noises on the telephone line. The result is, you can receive data over a wider range of phone line conditions. This is one of those features more often found on faster, more expensive modems.

In addition to automatic answering, both modems offer Adaptive Dialing—which means that if you don't specify either tone or pulse dialing, the modems try tone dialing for one digit, and if that doesn't work, they automatically switch to pulse dialing.

Both modems will automatically re-dial a number as many times as you tell them to. Or if you prefer, they can switch to an alternate number on a busy signal or a no answer. Once a connection is made, the modems automatically detect and adjust to the incoming transmission speed. They can also initiate an automatic log-on sequence including control characters, ID number and password.

And both modems have extensive "Help" menus, a complete complement of built-in diagnostics, a programmable speaker, and two phone jacks on the back so both your phone and the modem can be connected to the same line at the same time. You can even switch between voice and data without interrupting the phone call.

A Modem with a Memory of Its Own

The IBM 5841 stand-alone modem has some additional features you don't usually find on 1,200 bps modems. For example, the modem is switchable between asynchronous and synchronous modes and has a 20-entry Dialing Directory. Kept in non-volatile

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CModems

storage, the directory enables the modem to dial up and log on to systems automatically. This feature is most convenient when the 5841 is used with a fixed-function ASCII terminal such as the IBM 3161 or 3163.

The front panel of the 5841 has a complete array of eight LED Status Indicators to give you a quick visual check on what's happening.

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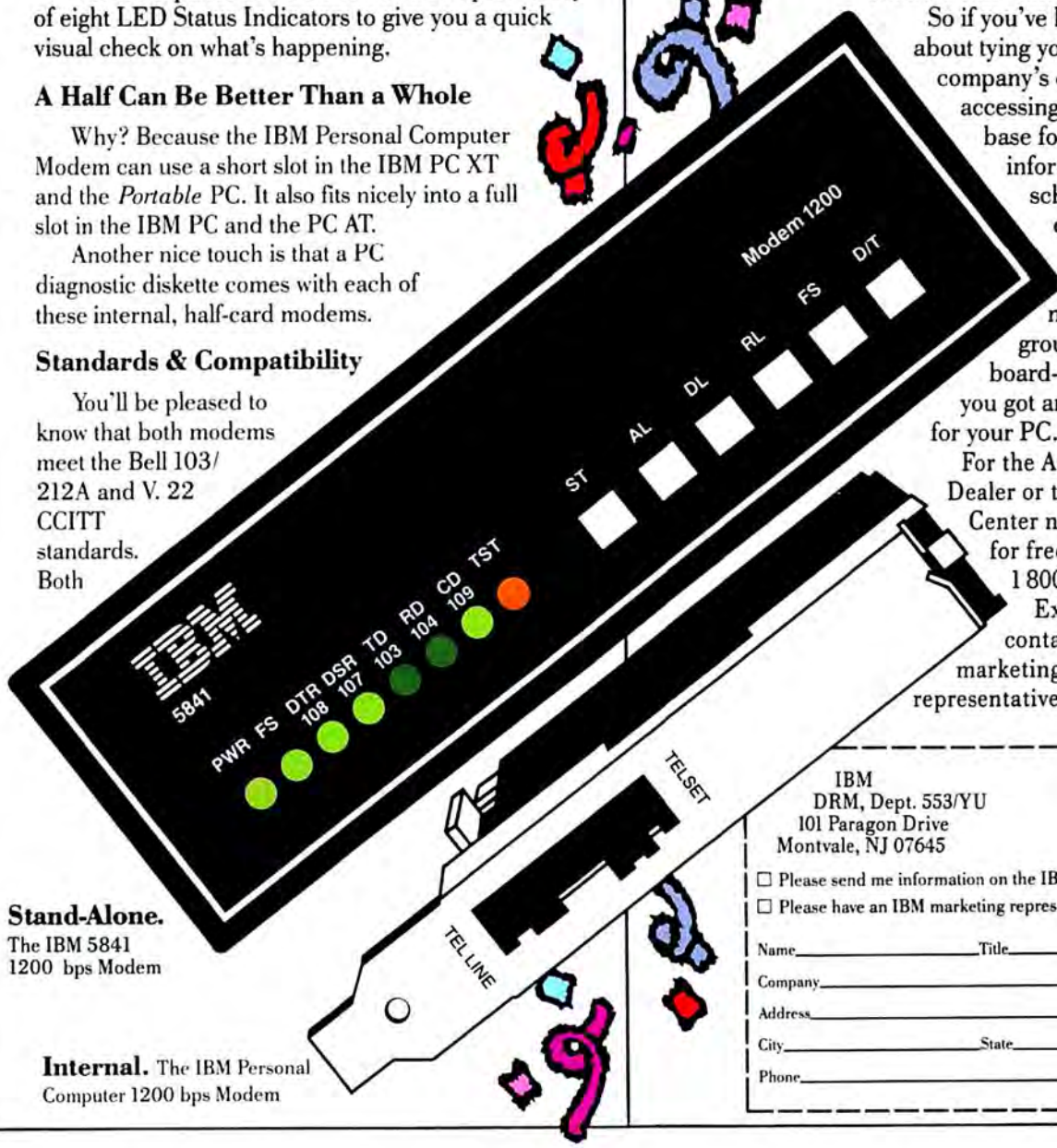

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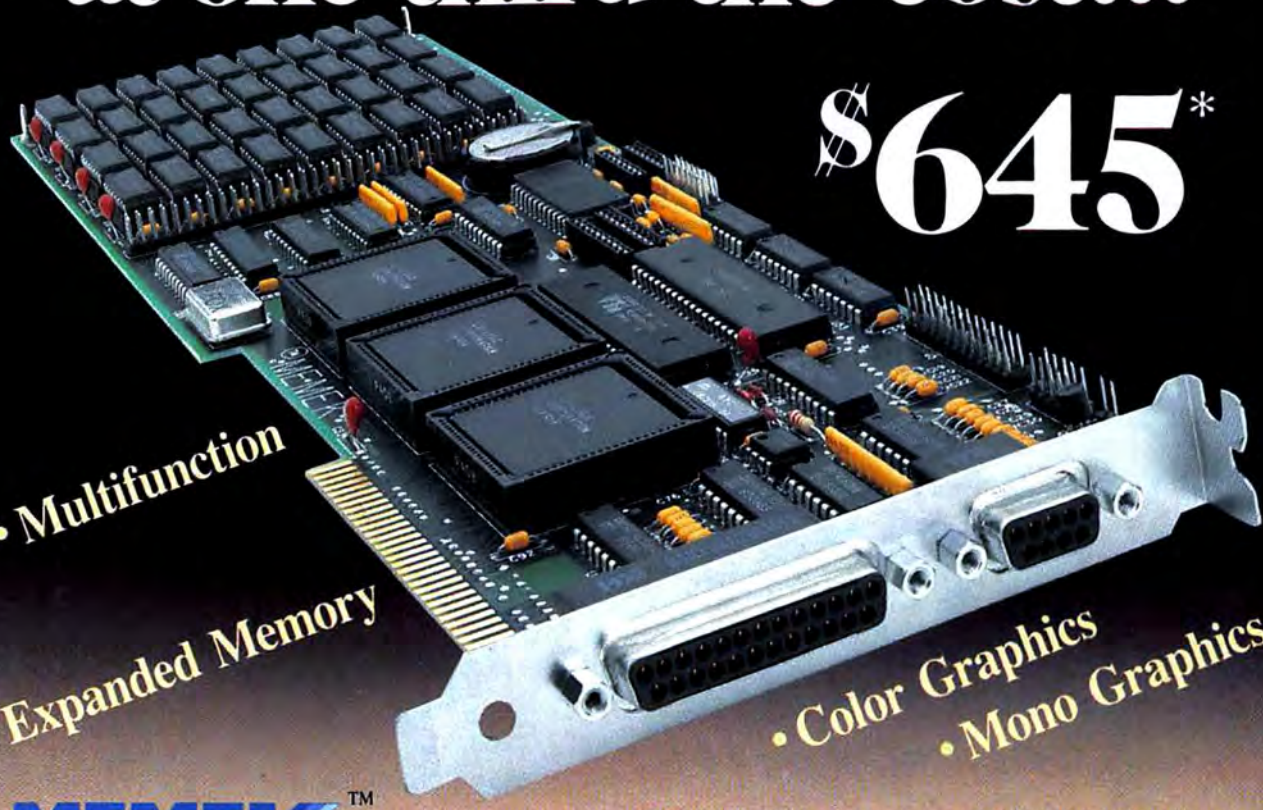

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Satellite Earth Stations

As long-distance rates climb, satellite earth stations become a cost-effective alternative for data communications. A 2-foot dish perched on a roof can open space-age satellite technology to PC users at down-to-earth prices.

Rain or shine, there's always a communications line. Standing beside his Equatorial receive-only earth station, the author awaits the first transmissions from the Westar IV satellite.

Mark Hamond

Richard Lewis

Almost a tenth of the way to the moon, over 20 domestic communications satellites transmit and receive voices, images, and data to and from the earth below. Satellites such as *Galaxy I, Westar IV,* and *Satcom III* make their home in the Clarke Belt, a narrow orbit 22,300 miles above the equator, whose distance from earth ensures that the satellites remain in a geostationary orbit.

These relay towers of the sky are carrying an increasing share of the world's data communications burden. Currently, the chief task of satellites is to receive and send video and voice for the television and telephone industries. The high-frequency signals are beamed up to the satellite (uplinked) by a master earth station and sent back down (downlinked) to

earth station dishes around the country. The data is then retransmitted to homes and businesses by a variety of methods, including telephone lines, microwave links, and radio and television signals.

What does this exotic space-age technology have to do with personal computers? Plenty. According to Link Resources Corporation of New York City, data transmission will grow from a current 19 percent of satellite usage to 40 percent by 1990. Many large corporations already take advantage of satellites for mainframe-to-mainframe links, but the major growth in satellite digital transmission will be driven by PCs.

Jumping beyond the limitations of earthbound telephone networks, small earth stations connected to PCs are starting to provide a fast alternative to ground-based telecommunications. Although the number of on-line services currently available through satellites is limited, and most stations are only equipped to receive data, interactive two-way earth stations have recently been introduced for the PC market, and in the not too distant future you should be able to use a satellite earth station to connect with just about anyone you can reach via modem today.

Why Satellites?

Frequent telecommunicators are finding that the price tag for telephone services is rapidly increasing. The rising costs of leased telephone lines and other hardware investments play into the hands of the emerging satellite data service suppliers, who claim a 30 to 50 percent cost reduction over conventional land communication.

"Users want the higher reliability and fixed long-term costs of the earth station communications approach," says Philip L. Arst, president of Communications Strategies Associates of Saratoga, California. "Companies like the idea of better control of their network costs in the face of projected telephone tariff increases."

While telephone transmission costs are directly related to distance, the cost for satellite transmission is the same for 100 miles or 1000 miles. Geostationary space antennas can relay data across the continent in a fraction of a second (270 milliseconds in either direction). This point-to-multipoint approach to data communications enables many locations to be reached economically and quickly.

Leased telephone line pricing is based on a fixed capacity in both directions for continuous or full service. Yet this runs counter to the fact that most data communications occurs in bursts, with transmission loads differing by direction. Satellite communications allows for the assignment of capacity where and when it is needed.

A satellite network has the advantage of flexibility. Installing a few portable earth stations puts the newcomer on line with minimum delay.

A satellite network also has the advantage of flexible configuration. Suppose a newly acquired subsidiary with several locations must be quickly tied into a corporate communications network. Presto! Installing a few portable earth stations puts the newcomer on line with minimum delay.

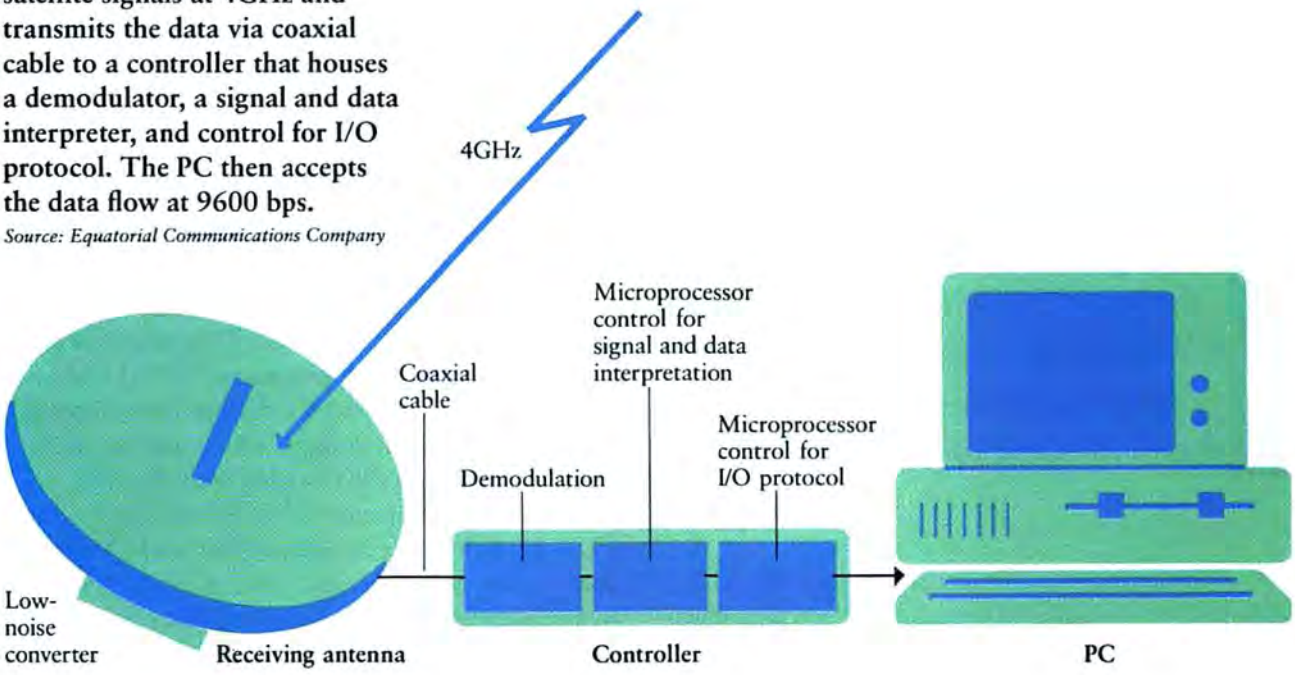
Satellite communications also boasts a low error rate. One bit error in 10 million is typical of satellite performance, compared to one in 100,000 for dial-up telephone circuits. Satellite systems reduce errors by using forward error correction (FEC), which sends redundant data for correction, thereby eliminating requests for retransmission of incorrect data. Although FEC adds a large burden of overhead, the enormous bandwidth capacity of satellite communications can easily handle the extra data.

A New PC Accessory

Until a few years ago, the big stumbling block to the wide use of satellite data transmission was the cost of hardware. Only mainframe users with heavy communications requirements could afford the large earth stations and associated equipment. But now the microprocessor technology that made the PC market explode is also making earth stations smaller and less expensive.

Figure 1: Equatorial's one-way earth station and related peripherals. The 2-foot dish receives satellite signals at 4GHz and transmits the data via coaxial cable to a controller that houses a demodulator, a signal and data interpreter, and control for I/O protocol. The PC then accepts the data flow at 9600 bps.

Source: Equatorial Communications Company



In 1979 Equatorial Communications Company incorporated its patented communications technology into a 20-pound earth station only 2 feet in diameter. The price for this receive-only dish is under $3000. So far, Equatorial has had the sole claim to point-to-multipoint satellite communications at data rates up to 19,200 bits per second (bps). Equatorial competes directly with thin-route telephone data transmission, in which widely dispersed remote locations must interact with a host computer.

Equatorial's receive-only earth station collects 4-gigahertz (GHz) signals from the satellite. A low-noise converter amplifies and converts the frequency of the incoming signals, and a coaxial cable transfers the modified signals to a small, indoor digital controller (see Figure 1). Somewhat like a modem, the controller contains circuits for signal demodulation, a microprocessor-based signal and data interpretation function, and input/output control facilities. An RS-232C or RS-422 interface handles data rates from 45 bps up to 9600 bps, and can serve up to four personal computers simultaneously. A wide variety of protocol conversion options are available, including asynchronous and synchronous interfaces and connections to data concentrators, terminals, and local area networks.

The Battle of the Bands

In providing either one-way or two-way satellite data transmission, satellite information vendors have a choice of two major frequency classifications: C-band and Ku-Band. Like most satellite communications systems, Equatorial operates in the C-band frequency, from 4GHz to 6GHz.

The C-band, which is also used by the many TVRO (television reception only) satellite dishes that dot the countryside, normally requires a much larger

earth station to gather an adequate signal. Its signal is also subject to interference from land-based microwave links, which operate in the same frequency range. However, Equatorial has overcome these problems with *spread spectrum*, a technology that was originally developed for military and radar astronomy to protect against interference.

Taking satellite/FM subcarrier technology beyond the realm of purely financial information, Bonneville Telecommunications offers point-to-multipoint private data networks.

The spread spectrum technique divides each data bit into a number of segments called chips. Each chip is transmitted as if it were a bit, spreading the data over a wide-frequency bandwidth. An intelligent filter in the earth station receiver performs a pattern recognition analysis, reconstructing the bits even if some chips are lost during transmission. The process is somewhat like mumbling a well-known song to someone who can fill in the missing words.

The most recent trend in satellite communications, however, is to transmit data on the Ku-band, which uses the higher-frequency 12GHz to 14GHz range. Xerox Computer Services, Tymnet, Scientific-Atlanta, and M/A-Com have recently introduced small Ku-Band earth stations for private two-way data networks.

The higher-powered Ku-band avoids microwave interference and can use a dish as small as 4 feet in diameter. Although Ku-band is sensitive to electromagnetic interference during rainstorms, the problem can be offset by a combination of increased power and a larger antenna. Due to the steeper price tag, the Ku-band is most cost effective at high data rates (56,000 bps and faster).

Christopher H. Greendale, director of Communications Services for Xerox Computer Services, reports that the Ku-band is clearly superior to the C-band. "The C-band is absolutely cluttered," says Greendale. "We didn't believe we could deliver a high enough level of quality data transmission to our customers. The Ku-band small earth station technology is just coming to the forefront and is most efficient in terms of the data rates it will support and the cost per dish."

To share the C-band or Ku-band capacity among many users, various forms of multiple access permit concurrent use of satellite channels. Time Division Multiple Access (TDMA) is the most common choice for satellite communications. With TDMA, the transponder bandwidth is divided into allocated time slots, so several messages can be sent at once and unscrambled at the receiving end. Another method, called Frequency Division Multiple Access (FDMA), divides the transponder bandwidth into frequency slices with message traffic allocation based on an assigned frequency channel. Satellite communications traffic may enlist different multiple-access methods. For example, Equatorial uses a form of TDMA on outbound traffic and a special form of multiple access called Code Division Multiple Access (CDMA) on inbound traffic. The latter method provides faster throughput and response time by eliminating queuing delays.

Of Ticker Tape and TVROs

So far, the major application for low-cost earth stations has been the point-to-multipoint broadcast transmission of time-sensitive information. Users of one-way services usually receive financial, commodity, news, and weather information. For example, Equatorial's one-way service broadcasts data from the American Stock Exchange, E.F. Hutton, United Press International, Dow Jones, Reuters, and other services. The services are connected to Equatorial's 36-foot master earth station in Mountain View, California, by telephone or satellite links. The master earth station transmits the financial data to subscribers via satellite.

The American Stock Exchange is in the process of replacing the telephone circuits used to deliver ticker data with receive-only Equatorial earth stations

installed at broker and subscriber locations. The user enters a set of stock symbols into the system in a market monitor mode. As the PC receives each issue from the data feed, it updates the selected stocks. In a quotation request, the user enters the symbol of an issue, and the current price and volume are displayed.

A unique twist to receive-only satellite communications is offered by Satellite Broadcast Network (SBN). SBN's Satellite Data Network provides access to the AgriData Resources business and agricultural data bases, taking advantage of the over 1 million TVRO satellite dishes currently installed worldwide, many of which are owned by farmers.

The annual retail price is $295 for each 24-hour service. For an additional $395, a current TVRO dish owner receives front-end software and a receiver/demodulator, which unscrambles the radio signal and relays it to a PC at 9600 bps.

Interactive Networks

So far, one-way earth stations have dominated the satellite market (an estimated 28,500 receive-only stations currently installed versus 2500 transmit/receive stations), but the trend will likely reverse itself in the next few years. Equatorial and the emerging competition have recently placed emphasis on two-way transmission for private interactive data networks.

In 1984, Equatorial introduced a two-way C-band earth station for private corporate networks. The offset parabolic earth station is a 4- by 6-foot rectangle and costs $6000. In the typical private arrangement, earth stations are set up at remote branch offices of a large corporation. Each earth station can serve a stand-alone PC, a dumb terminal, or a local area network, and communicate interactively with a host mainframe via satellite.

For interactive communications, Equatorial receives data from a corporation's host computer at its master earth station and then puts the data in packets and transmits one or more 153,600-bps data streams to the satellite. The variable-length packets of data are addressed to an individual station, a group of stations, or an entire network community. Each micro earth station retrieves up to 19,200 bps from the data stream. Return data from the earth station is transmitted at 1200 bps to the host computer via the satellite and the master earth station (see Figure 2).

The new Ku-band entrants, such as Xerox Computer Services, have also shifted toward the two-way market. Xerox's Hawthorne, California, master earth station sends a 56,000-bps data stream and receives a return signal from the 4-foot interactive earth stations at 2400 bps. Xerox uses a modified form of spread spectrum technology to provide data security. While there are some differences between Equatorial's version of spread spectrum and Xerox's, a legal conflict may arise between the two companies.

Equatorial and the emerging competition have recently placed emphasis on two-way transmission for private interactive data networks.

Both companies' two-way interactive services are targeted at transaction-oriented communications. Typical uses would be retail point-of-sale for credit verification and inventory control; banking transactions for teller inquiries and ATMs (automatic teller machines); process monitoring and control for utilities; and security services and branch office administration for manufacturing and service companies.

Beneficial Corporation is one company moving over to a private two-way data network. The Equatorial transmit/receive earth stations are replacing a portion of the telephone network used to transmit information between Beneficial's consumer finance branch offices and corporate headquarters in New Jersey. The private network links Beneficial's IBM mainframe to branch office personnel so they can process loan applications and payments and access statistics stored in Beneficial's central data base.

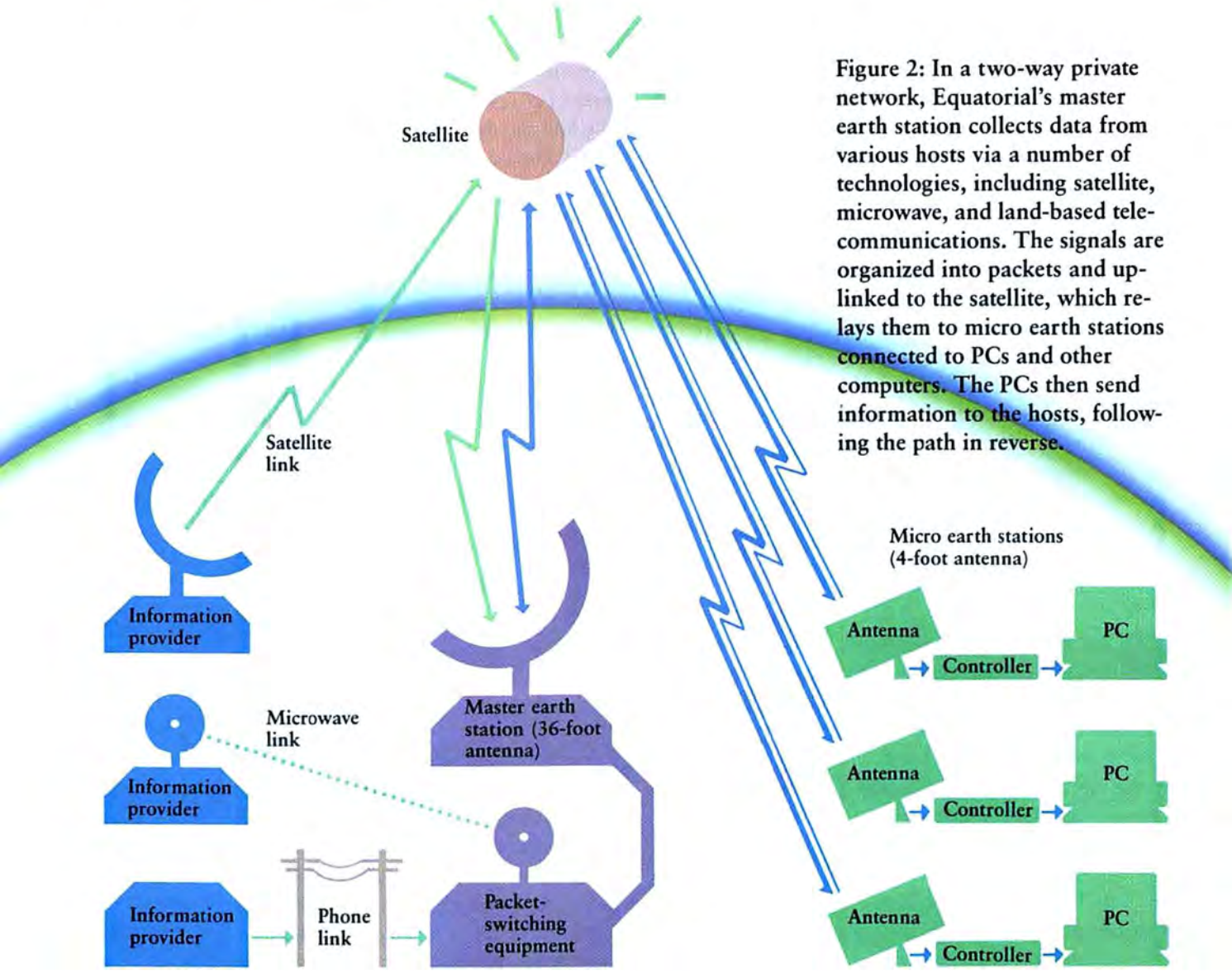


Figure 2: In a two-way private network, Equatorial's master earth station collects data from various hosts via a number of technologies, including satellite, microwave, and land-based telecommunications. The signals are organized into packets and uplinked to the satellite, which relays them to micro earth stations connected to PCs and other computers. The PCs then send information to the hosts, following the path in reverse.

The Hybrid Option

While satellite earth stations should show dramatic growth during the coming years, few analysts believe they will entirely supplant land-based telecommunications. The relatively high cost of earth stations and the difficulty in using them in interference-laden urban areas often make the pure satellite solution unfeasible. Meanwhile, other technologies, including cellular modems, FM sideband, and cable, are also poised to take advantage of the concurrent rise in phone rates and growth in PC data communications.

A number of hybrid solutions, combining satellites with other forms of communication, are already appearing in the PC marketplace for the delivery of one-way information.

One such solution, called Xpress, uses Equatorial earth stations to deliver one-way news and financial data to a satellite, which in turn transmits the data back down to participating cable television systems across the country. This information is then funneled along an unused bandwidth of the cable to PCs set up in homes and businesses (see "Password: Communicate" in this issue for more on the Xpress service).

A combination satellite/FM-sideband solution may hold even more promise. In the typical configuration, a satellite transmits data to a small earth station at a local FM radio station, which completes the local loop by broadcasting the data on an extra channel superimposed on the station's standard FM broadcast signal. At the receiving location, an FM antenna feeds the sideband signal into a radio modem, which decodes the silent radio wave for display on a computer monitor or printer.

Because the FM antenna and radio modem are less expensive than a satellite, subcarrier services offer low-cost solutions to delivering satellite data within a local area. However, FM signals are notoriously interference-prone and may not give pure reception throughout the station's signal coverage area.

The higher-powered Ku-band avoids microwave interference and can use a dish as small as 4 feet in diameter.

Lotus Information Network Corporation, a wholly owned subsidiary of Lotus Development, uses the FM sideband technology in a service called Signal, which transmits real-time stock market quotations to properly equipped PCs. (See "Data on Your Dial," *PCW*, February 1986, for more about Signal and other FM carrier services.)

Taking satellite/FM subcarrier technology beyond the realm of purely financial information, Bonneville Telecommunications offers point-to-multipoint private data networks. Users send data over telephone lines to a master earth station at Bonneville's Salt Lake City facility. The 19,200-bps data stream then travels via the *Westar IV* satellite to one-way Equatorial earth stations located at FM stations in 50 major metropolitan areas. The data is retransmitted over the FM subcarrier to FM-equipped PCs, which receive the data at rates from 300 bps to 2400 bps.

Messages can be addressed individually or to any combination of locations. As with Lotus's Signal service, users out of range of an FM signal can have an earth station installed for a direct transmission from satellite to PC (see the sidebar "The Office of the Future Is the Home").

The Bonneville system works well for delivering time-sensitive data, such as price changes, special orders, competitive activity, product recalls, and fraud and theft data. For example, a retail food chain uses the Bonneville delivery system to provide instant price updates, flag warehouse shorts, and flash fraud reports to stores.

Earth Station Applications

What applications loom in the future of satellite data communications? Abid Butt, director of Consulting Services for TeleStrategies of McLean, Virginia, says, "Over the next few years, the interfacing of PCs for data communications satellite networks in the corporate world will be the prime application for this technology. In the long run, voice, video, and data will be packaged together for the corporate market."

Currently, to set up a private interactive satellite network, the cost-effective minimum number of sites (earth stations) ranges from 100 to 200, making them practical only for large corporations. However, Butt predicts that satellite data communications will soon be feasible for smaller businesses: "A number of carriers will offer end-to-end solutions for the small business that may not have the ability to get economies of scale on their own. The minimum number of sites will drop to 10 or 15. Eventually, satellite communications will be offered on a per-site basis too."

Although satellite earth stations are on their way to becoming a common PC accessory in large corporations and medium-size businesses, most industry experts find the future of the home market unclear. Unless your communications load is high and you live in a remote area, the expense of an earth station and the lack of available services will probably put this technology out of reach for the time being. However, if you desire only to receive information

The Office of the Future Is the Home

On a bright, crisp Friday morning two technicians from Bonneville Telecommunications arrived at my suburban southern California home. Their mission: to install a one-way Equatorial earth station and an FM antenna, so I could have a personal introduction to satellite data communications.

You see, I'm a hands-on type of person. While it's thrilling to write about computer technology, I never feel comfortable unless my fingers walk the keyboard. I wanted to see how big of a gap exists between the slick sales brochures and a real working session.

I greeted Frank Belluomini and Bill Stoughton, the Bonneville technicians, as they unloaded the equipment. Once we decided the roof was the proper place for the earth station and FM antenna, things began to move. While Bill was on the roof installing the antenna, Frank produced a small carton and pulled out an Equatorial micro earth station only 2 feet in diameter. It was hard to believe that such a tiny dish could gather data from a satellite over 20,000 miles in the sky.

Frank bolted the 2-foot dish to my roof, adjusting it for proper elevation and direction so it would point southeast toward the *Westar IV* geostationary satellite. In the meantime, Bill used a field-strength meter to lock the FM antenna to the signal of Los Angeles FM station KBIG.

Next, we snaked the cable through a window and connected it to an Equatorial controller that was attached to a Bonneville Radio Writer, a device that presents the data in readable form to a dot matrix printer.

The satellite hookup in place, we moved to the FM lead, which we connected to an FM SCA receiver. For demonstration purposes, we plugged the receiver into a Bonneville Market Monitor, but I could also connect the signal directly into my PC via a serial port.

Once all the equipment was in place, my 17-year-old daughter chanced on the scene and asked, "What does it do, Dad?" Now that's a good question. It reminded me that our obsession with state-of-the-art technology can sometimes obscure its practical application.

Actually, a number of financial services are available through Bonneville, but for my own demonstration purposes, my PC served as the host. The receiving point was a dot matrix printer located in the same room. I began by invoking the Bonneville communications software, a friendly, menu-driven package called *PR-Send*. I entered the phone number of the Bonneville facility at Salt Lake City, prepared a message on the built-in editor, and sent it by entering the proper address code and pressing <F9>.

What happened next was truly amazing. My message was transmitted through a standard modem at 1200 bps over a dial-up line to Salt

Lake City. Next it was beamed up to the satellite, then relayed to my rooftop earth station. Suddenly the message appeared over the printer. The lapse time for the 45,000-mile trip: under 2 seconds.

My next hands-on experiment involved Bonneville's hybrid solution, using the FM sideband satellite network. The data was received from the satellite by a small earth station located at KBIG and retransmitted over the sideband to my rooftop FM antenna. The signal was then fed directly into my monitor. A digital keypad allowed me to select any number of financial services, such as Midwest Grains, NY Metals, and Chicago Livestock and Meats. Bonneville also markets a financial analysis program from Roberts-Slade called *Octool,* which is customized to work with the Bonneville data bases. Whether the data is transmitted via FM sideband or satellite, you can update *Octool*'s data bases without extra conversion steps.

The Bonneville setup is ideal for the home trader who wants to deal in the fast-action commodity markets. Now I can experience the frenzy of the trading floor from the comfort of my southern California home. Goodbye freeway commuting. Goodbye crowded buildings. Hello office of the future!

and not to interact with a remote host, hybrid solutions combining satellite communications and either FM sideband or cable services may give you a cost-effective window on the big birds of the Clarke Belt.

Richard Lewis is president of RLA Communications, a communications service organization in Van Nuys, California.

Bonneville Telecommunications
19 W. South Temple
Salt Lake City, UT 84101-1503
801/532-3400

Equatorial Communications Co.
189 N. Bernardo Ave.
Mountain View, CA 94043
415/969-9500

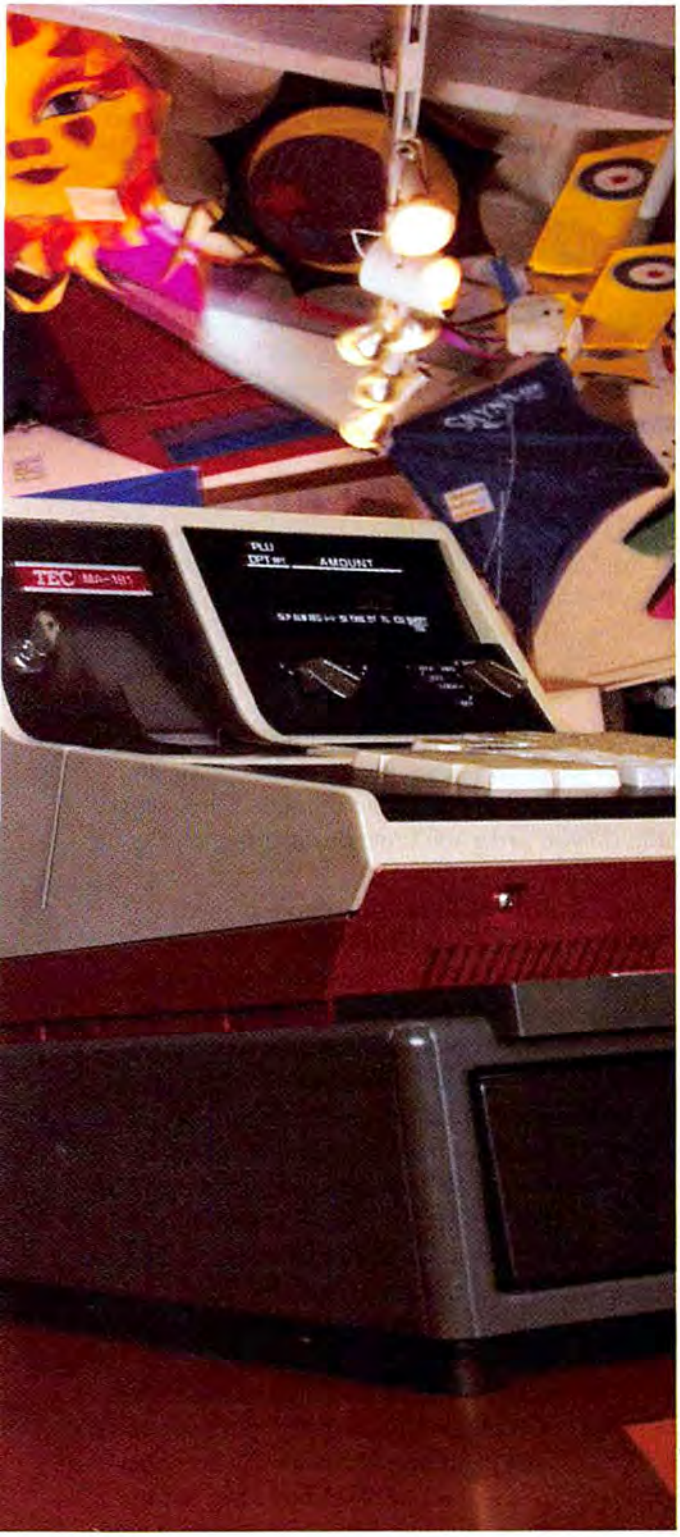
Lotus Information Network Corp.
1900 S. Norfolk St.
San Mateo, CA 94403
415/571-1800

Octool
Roberts-Slade, Inc.
1570 N. Main St.
Spanish Fork, UT 84660
801/798-8604
List price: $1195
Requirements: 384K, two disk drives, DOS 2.00 or later version

Satellite Broadcast Network, Inc.
212 W. Superior St.
Chicago, IL 60610
312/266-9844

Xerox Computer Services
5310 Beethoven St.
Los Angeles, CA 90066
213/306-4000

Mike McFadden depends on a point-of-sale system to track fluctuation of inventory at his three San Francisco kite shops.



George Steinmetz

Who's Minding the Store?

Is your small business venture taking off? Here's how to set up a point-of-sale system that tracks inventory, purchase orders, sales, and cash receipts—and hoists your bottom line.

Tom Moran and Christine McGeever

When Mike McFadden was stuck in a bittersweet jam. Sales at The Kitemakers, his three San Francisco kite shops, were brisk enough to turn his inventory over three times a month—and sometimes more. The heavy foot traffic, combined with similarly brisk activity in the stockroom, pleased him tremendously, but it also pained him a bit.

In response to the high turnover, McFadden was counting and reordering stock every Sunday night after closing; the cost of paying employees for inventory time was taking a sizable bite out of his budget. While your business may have nothing to do with selling, or flying, kites, following a process like McFadden's can serve as a model for establishing your own PC-based point-of-sale (POS) system.

Kite sales are strikingly seasonal—as seasonal as clothing or sporting goods, according to McFadden.

When the season is at its height in March, April, and May, the number of sales recorded each day can be staggering. The total of each sale, however, is usually about $10, resulting in an exceptionally labor-intensive tracking of each day's receipts.

McFadden's ordering and inventory habits were similarly affected by the seasonal nature of his business. He learned from experience that it was best to order kites in small quantities more frequently than other retailers, most of whom turn over inventory about 7 times each year. McFadden's inventory turns over a whopping 36 times annually.

He was coming to terms with the inevitable: To keep up with its customers' demands for state-of-the-art kites, The Kitemakers needed an alternative to manual, piece-by-piece inventory counting. "The manual system was working," he says, "but the cost was amazing." Left unchecked, McFadden knew, the burden would only increase. While The Kitemakers has 3 stores in San Francisco today, McFadden's business is on a growth path geared to put 20 stores around the nation by 1991. Hoping to avoid a corresponding increase in accounting and inventory troubles, McFadden decided to look into automating his inventory and POS transactions.

Considering POS

Minicomputer-based POS software has been used for years in the back offices of retailers who can afford the expense of maintaining the machine. Now, PC-based POS systems are hitting the marketplace in force. Such systems are attractive to the small business retailer because they combine cash-flow tracking, inventory, and accounting functions in a single process. Programs track and control all facets of sales transactions, from recording prices to balancing daily sales totals to tracing sales trends over time (see the sidebar "They Can Get It For You, Retail").

Rudy Hilderbrandt, director of operations for Corporate Micro Services, a San Francisco-based consulting firm specializing in POS, agrees that automated POS increases a shopkeeper's ability to sell goods by providing a more complete knowledge of how much stock is on hand, where it is, and what it costs. A shopkeeper who has a complicated inventory management system is a logical candidate for a PC-based POS system.

Hilderbrandt offers some sage advice about purchasing considerations. He suggests starting the process by listing how you want the computer to improve the way you do business. Maybe you're spending too much time counting gizmos, or your daily totals are out of whack. Most important, don't underestimate your prospects for growth. "The first purchase is always the most important," Hilderbrandt says.

He stresses that you shouldn't try to adjust your system to your computer, because you'll merely double your efforts for no additional gain in convenience. Find software that will do it your way.

Narrowing the Field

McFadden's first step was to talk with consultants and retailers who developed and sold POS software. They all gave him the same advice: There is no simple formula for putting such a system together. Few small retail businesses have PC-based POS systems, so there aren't many models to emulate. Ask yourself a lot of questions, he was told. Is your inventory seasonal? Is every item unique? When reordering, do you order the same product but vary color and size?

Recognizing such considerations helped McFadden narrow the field of POS alternatives. Pointedly aware of the specialized nature of his business, he found several packages that would handle retail inventory but would not allow him to do it his way. McFadden felt that these commercial programs would considerably limit his productivity. They used an inventory method known as *build-to,* which enables the retailer to establish a maximum quantity of a specific item to be kept in stock. For example, if McFadden wanted a stock of 20 rainbow-colored box kites, he would enter that amount as the build-to limit and indicate how long orders usually took to reach his stores.

As daily sales depleted the stock, the software would either remind him to generate a purchase order or would actually print one automatically at the appropriate time. If he sold 13 of 20 box kites in four weeks, at a rate of 3 to 4 a week, the program would generate a purchase order at the end of the fourth week, leaving exactly 7 box kites of the original 20 to last two weeks until the new shipment arrived.

In the Whimsy Business

But kite sales are subject to the whimsy of the weather. December, January, and February are slow months. The Kitemakers does well during the tourist months of June, July, and August, but the best times for kite flying are the blustery spring months. Sales of collectible, imported, and stunt kites are more stable throughout the year.

McFadden was familiar with the psychology of the kite flyer. Customers often don't plan to spend the day flying a kite until they get up that morning to see the sun shining and feel the fresh Pacific breeze. The fluctuating kite sales at McFadden's stores are compounded by such impulse buying, a pattern as random as the wind. Thus, McFadden never stocks the same amount of kites from month to month.

McFadden knew that drastic seasonal variance in his stock would make a build-to feature impractical. Entering new build-to limits for each item he carried and for each change of the weather would be far too laborious to warrant such a program. "Every [package] I looked at seemed to be written for someone else's needs," McFadden says. He assumed that his shopkeeping idiosyncrasies called for an entirely custom-built POS system.

A Different Animal

According to consultants specializing in POS systems, McFadden is not alone in making that assumption. If you were to ask ten retail store owners how they take inventory, you'd get ten different answers. The nature of the business often determines how a proprietor runs it. The owner of a shoe store must monitor stock closely to assure that all styles of shoes in every size are in stock. On the other hand, a hardware store owner doesn't need to count every nut and bolt in stock. If the container isn't as full as it was last week, it's simply a matter of ordering more.

Because there are as many styles of doing business as there are small business licenses, the personalized nature of each retail establishment has hindered development of PC-based POS software. General business consultants stay away from installing POS systems because the design depends so heavily on the store's specific methods of inventory. Says one general consultant, "Retail is a different animal."

According to Richard Crewdson, president of the POS development firm Cambria Corporation, commercial software packages offer trend reporting capabilities but can't match the excellent all-around fit that custom software provides. Crewdson maintains that you can find commercial packages that handle trend reporting, but the software may fall short of other marks, such as providing multistore or multiregister use or a variety of hardware configurations. Commercial software, Crewdson says, simply does not provide the flexibility that some retailers need.

Crewdson adds that two types of POS software have made strong debuts: packaged software for specific types of retail businesses (such as booksellers) and customized systems that are built from the ground up by a consultant, according to the client's needs.

Granted, that's not much of a selection, but Crewdson asserts that software publishers have found the lack of a standard method of doing business prohibitive. While some publishers have tailored their software to the more common types of retail business, Crewdson says, customized software may be the only acceptable route if you don't sell books or auto parts. Some retailers will decide that they can't afford a custom POS system, he adds, but others will undoubtedly feel that the PC will save them money and time formerly spent in tedious manual pursuit of efficiency (there are a few exceptions, of course; see the sidebar "Point of Consumption").

Taking the Leap

Because McFadden needed to accommodate fluctuating stock quantities, he decided that having a custom POS system designed and installed would be worth the expense and time. He immediately turned to a consultant specializing in POS to help with subsequent decisions and design the software.

One of custom software's greatest advantages is that it is not confined to a single hardware configuration. You can use a PC as a central controller in each shop location and connect by modem to electronic cash registers, or you can substitute additional PCs with cash drawers for registers.

McFadden already had a system in mind. He knew that he wanted to keep cash registers in the front of the store and delegate the PC to the back office. He based this decision on the simplest of requirements: His sales clerks already knew how to operate cash registers, and he could not justify the extra time

They Can Get It for You, Retail

Susan Gubernat

If you haven't already done so, add this sequence to your catalog of obsolete machine noises: the metallic *ching-ching* of a purchase being rung up, then the definitive *clunk* of the cash register drawer slamming shut. From the corner market to K-Mart, retailers are installing point-of-sale systems, many controlled by PCs and outfitted with "electronic cash drawers" that barely make a sound. Unobtrusively, single-user and multiuser POS systems at the checkout register consolidate a host of tasks beyond the typical exchange of legal tender for goods or services rendered.

POS systems track and control inventory, verify prices (farewell to the runner speeding to the produce section to find out the cost of coconuts), alert a salesclerk to a payout error, and even discourage employee theft. By determining at the point of sale what merchandise is on the shelves, what's back-ordered, and what could substitute for an out-of-stock item, the retailer can meet a customer's needs at the most critical moment—just as he or she is ready to make a purchase. And the tighter the retail economy, the theory goes, the more important it is for the retailer to ensure that, whenever possible, no customer leaves the store empty-handed.

What constitutes a typical POS system for the small retailer who is determined to merge the back room's long-term business strategies with the daily flurry of activity on the sales floor?

Single-user systems often consist of POS application software developed for specific vertical markets—apparel, sporting goods, liquor stores—running on a PC with two disk drives or, preferably, a hard disk, and linked to a PC-compatible cash register via an RS-232C serial cable. For the medium-size business, POS systems often assume the guise of a local area network (LAN), linking the host XT, AT, or compatible with numerous dumb terminals, printers, cash drawers, and optional peripherals such as scanners and bar-code readers.

Hardware options for multiuser systems aren't necessarily limited to local area network technology, however. Alloy Computer Products, for example, claims that "PC clustering" for POS applications provides a faster, cheaper alternative to LANs. Alloy's multiuser environment combines a PC or an AT running proprietary software with a storage subsystem and slave expansion/coprocessor board; clusters of up to 31 terminals can be configured.

Vendors of POS software stress the advantages of constantly updated inventory reports alerting the retailer to what's hot, what's not, what to promote, what to discount, and when. By keeping abreast of daily sales figures, retailers can maintain smaller inventories, which means they'll be less likely to find themselves in the position of selling overstock at

a loss. Besides generating customized sales slips and handling multiple forms of payment, POS software modules can integrate such accounting functions as accounts payable and receivable with sales records. With a POS system, a retailer can develop mailing lists from a customer data base and target special promotions at particular groups of buyers.

Besides helping a retailer keep a firmer hand on inventory, a POS system can help with payroll costs, identifying peak selling times when more sales personnel are needed and, conversely, slower periods when fewer salespeople are required on the floor.

Recently, IBM acknowledged the importance of POS to its strategy for the PC AT by introducing the 4680 Store System, aimed at mass merchandisers and department stores. Bundled with DRI's Concurrent DOS 286, a specially designed AT forms the backbone of the system, controlling sales and inventory functions within a store. The AT can further serve as the link to data bases on remote mainframes.

The 4680 Store System consists of modular IBM 4683 terminals (including keyboard, cash drawer, printer, and display) and an AT specifically designed to control up to 128 terminals. As a salesperson enters transactions, the terminal communicates with the AT to check prices and authorize customer credit, as well as to perform inventory and report tasks at day's end. When not controlling the Store System, the AT can function as a personal computer. IBM's general sales application software completes the system. A version of BASIC is available to retailers who want to customize applications for this system.

IBM also introduced two types of POS terminals to serve as cash registers in the Store System. The 4683 Model 1, an intelligent sales terminal, comes with 1MB of memory for storing daily sales data. Model 1 terminals can support the less expensive Model 2 terminals that permit data entry but lack RAM.

The AT used in the 4680 Store System is a revamped edition of a version previously modified for technical and vertical market applications. The system features a "store loop" capability enabling the AT to communicate with multiple terminals on the sales floor.

As with other POS systems, IBM's Store System hardware is configured so that you can add peripheral devices like optical character recognition wands, magnetic stripe readers for customer credit cards, and Universal Product Code readers.

Admittedly, IBM's new Store System is at the high end of this market. The neighborhood florist or VCR library isn't likely to benefit from, much less be able to afford, its features. But even the more modest POS systems on the market evolved from the same principle of automating and centralizing many retail functions through a PC. The point of sales, after all, is to stay close to the customer's immediate needs while safeguarding the long-term health of a retail business.

Point of Consumption

Christine Whyte

"May I recommend the house specialty?"

That mouth-watering solicitation is familiar in fine dining emporia nationwide, but what follows in 17 East Coast restaurants is special indeed. At these establishments, your waiter takes your order for food and drink, then enters the appropriate codes into a PC in the dining area; a minute later the cook and bartender scan the orders spewing forth from their respective printers. Behind the scenes, the manager and a trusty AT oversee this point-of-sale system that controls food and drink sales, stock inventory, and several major accounting tasks.

The secret to such culinary computerization is *Digital Dining*, a program developed by Menusoft Systems of Alexandria, Virginia. Because the program supports a variety of operating systems, value-added dealers offering PC-compatible and noncompatible computers alike can sculpt a POS system to suit a restaurant's budget and mode of operation. In Portsmouth, New Hampshire, Pier II Restaurant networks a PC-compatible TeleVideo Personal Mini PM4 and four TeleVideo PCs, and uses a bar-code reader for order entry. On a less ambitious scale, the cashier's station at the Fourways Inn Restaurant in Paget, Bermuda, sports an AT and a printer, both of which are linked to a PC in the manager's office.

Although a restaurant's initial investment may range from $15,000 to $25,000 (including $5000 for the program itself), many users expect the savings in time and money to defray the cost of most systems within 18 months. The program prevents errors in the tab (every item served is charged), and its sales analysis report enables a manager to promote high-profit fare and drop unpopular items. The stock inventory function minimizes waste and theft, and with the accounts receivable, accounts payable, and general ledger modules, a *Digital Dining*-equipped café can generate up-to-the-minute profit and loss statements.

Alas, all is not peaches and cream soaked in Grand Marnier. Graham Granger, Menusoft president, advises managers that like attempting to automate any manual procedure, getting the system to run flawlessly may take a good six months. Depending on the restaurant, having several PCs may not be cost-effective; when expansion is essential, the system is more likely to function without indigestion if a local area network is used rather than a multiuser system, although the latter usually costs less.

Whatever transpires away from the table, first-class restaurants must keep up appearances, especially on the finer points of service. As Stuart Thompson of the Fourways Inn points out, "A prime consideration is that *Digital Dining* produces a beautiful, easy-to-read dinner check." Such attention to detail is what gourmet dining is all about.

and expense to train the staff to use PCs. He also felt that the PC keyboard wasn't suited to fast numeric transactions. "Computers just aren't meant to do that sort of thing," he says. McFadden wanted his salespeople to be quick and efficient on the keyboard and attentive to the customer while ringing up a sale (see "Counter Intelligence at Esprit de Corp.," *PCW*, August 1985).

Responding to McFadden's aesthetic preferences, the consultant designed a system for The Kitemakers that kept the PC out of sight. The system hardware consisted of three TEC 191 cash registers, one in each store, with interface boards from CDM Systems connected to the PC by Hayes 1200-bps modems. When put to work, the boards would record each transaction, keystroke by keystroke; after hours, the software would gather the data by modem and store it in the PC. A data conversion program written in *dBASE II* would then sort the data by transaction, create a data base of the information, and generate a series of cash and inventory reports.

The computer-generated reports would replace both the Sunday-night inventory counts and the daily cash register reports generated by salesclerks to reconcile sales receipts against the cash in the till. Thus, McFadden planned to considerably reduce the time and expense of manual labor.

Honing the System

McFadden worked closely with the consultant to design and implement the system, which, all told, cost $20,000. Together they made lists of vendors of all the products carried and listed each product by its *stock-keeping unit* (SKU) number (a unique identification number assigned to products for inventory and ordering purposes). To accommodate growth, McFadden included possible future vendors as well as types of products The Kitemakers might order.

Once established, the lists were entered into the computer to serve as the master inventory data base. The software was honed to create daily sales reports that itemized transactions and balanced the receipt and cash totals, and to update the inventory data base according to the sales transactions. McFadden and the consultant also created purchase order forms and designed the system to automatically generate orders (see Figure 1).

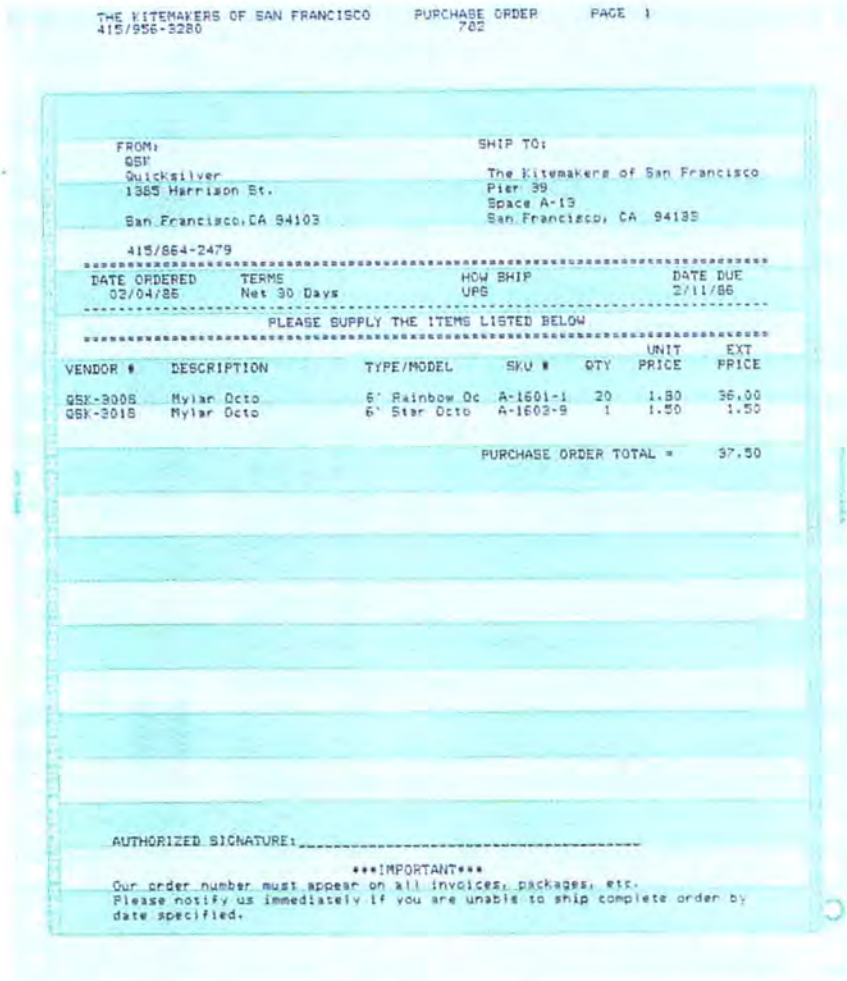
Finally, they established McFadden's alternative to the build-to system. The program would create a running sales history for each item in each store: quantities sold from the first of the year, and quantities sold per week a month ago, three weeks ago, two weeks ago, and last week. McFadden could now determine his sales trends and place his orders appropriately.

The trend-reporting feature alone makes the custom package worth the cost and effort, according to McFadden. He is now able to use the sales history to identify a buying trend in progress and order stock accordingly. For example, if the sales history shows that one shop sold 2 Chinese kites four weeks ago, 10 kites three weeks ago, 50 kites two weeks ago, 100 kites last week, and has 50 remaining in stock, then he'll need to order a large quantity—probably about 200—to keep pace with the trend.

Clearing Out the Bugs

Although content that he had made the right decision, McFadden soon learned that the system was not foolproof. A hardware glitch resulted in a malfunctioning clear key on his cash registers. Normally used to delete misrung transactions, the clear keys on the registers were instead recording both the misrung figure and the correct figure as one number and storing the jumble of digits as a legitimate transaction. Thus, if the sales clerk accidentally rang up an $89.95 item as $79.95, pressed the clear key, and corrected the mistake, the transaction would be recorded as a $89,957,995 sale. McFadden learned that unlike commercial software packages, custom systems often harbor bugs that surface only when the system is up and running; packaged software is relatively free of bugs because it is subjected to rigorous testing during the lengthy development process.

The use of cash registers in a POS system carries another sort of hazard, as Corporate Micro Services' Hilderbrandt points out: The cash register companies are a bit behind the times. A few vendors are just beginning to see the potential for connecting their machines to PCs; some of those companies have



THE KITEMAKERS OF SAN FRANCISCO
415/956-3280

PURCHASE ORDER
702

PAGE 1

FROM:
QSI
Quicksilver
1385 Harrison St.

San Francisco, CA 94103

415/864-2479

SHIP TO:
The Kitemakers of San Francisco
Pier 39
Space A-13
San Francisco, CA 94133

DATE ORDERED	TERMS	HOW SHIP	DATE DUE
02/04/86	Net 30 Days	UPS	2/11/86

PLEASE SUPPLY THE ITEMS LISTED BELOW

VENDOR #	DESCRIPTION	TYPE/MODEL	SKU #	QTY	UNIT PRICE	EXT PRICE
QSK-3006	Mylar Octo	6' Rainbow Oc	A-1601-1	20	1.80	36.00
QSK-3018	Mylar Octo	6' Star Octo	A-1603-9	1	1.50	1.50

PURCHASE ORDER TOTAL = 37.50

AUTHORIZED SIGNATURE:_____

IMPORTANT
Our order number must appear on all invoices, packages, etc.
Please notify us immediately if you are unable to ship complete order by date specified.

Figure 1: Many POS systems generate purchase orders and forms, but a custom point-of-sale system enables you to design output. Mike McFadden designed this purchase order for the custom POS system installed in his kite store.

acquired board manufacturers and are producing interface boards specifically for their cash registers. Other register manufacturers are designing their machines to accommodate interface boards. Regardless, Hilderbrandt advises, if you choose to use cash registers in your POS system, you may have to deal with both the board manufacturer and the cash register company—in addition to the POS consultant—if your system malfunctions.

McFadden confirms this. Initially, none of the parties involved was willing to correct the problem; months passed as they engaged in finger pointing. McFadden never lost faith, however, and highly recommends custom POS systems—but with a caveat: Look for hardware that has been thoroughly tested in a working environment. If you can't verify that the hardware is bug-free, ask about the testing procedure used. How does the manufacturer enforce quality control? How well does the company respond to problems, and is it willing to come back and make amends? If so, at whose expense? McFadden stresses that before you invest in a custom system, you should feel thoroughly confident that the consultant and the vendor will provide adequate support.

Hilderbrandt recommends that you find a consultant who will accept responsibility for the entire installation and any subsequent problems. "You should ask, 'Are you doing all the work?'" Hilderbrandt says, adding that the consultant should never say, "It's not my job."

Cambria's Crewdson stresses that commercial software will probably evolve into a more flexible alternative to the expense of a custom-designed POS system. For now, he maintains, McFadden's situation may exemplify what most retailers will experience when seeking a POS system. His advice: Don't balk at the price. If you foresee heavy growth or need extensive inventory maintenance, the expense will be worth it in the end.

Tom Moran is a San Francisco-based freelance writer specializing in microcomputers and related topics. Christine McGeever is an Assistant Editor for PC World.

ABS Point of Sale System
American Business Systems, Inc.
3 Litton Rd.
Westford, MA 01886
617/692-2600
List price: $1000
Requirements: 128K, 10MB hard disk, DOS 2.00 or later version, 80-column printer

Branch Store Retailing
Trac Line Software, Inc.
51 Alpha Plaza
Hicksville, NY 11801
516/935-7500
List price: $695, Integrated Accounting Package $1695
Requirements: 256K, 10MB hard disk, DOS 2.00 or later version, Integrated Accounting Package

Bravo Retail Management System
Armor Systems
324 N. Orlando Ave.
Maitland, FL 32751
305/629-0753
List price: $695
Requirements: 256K, 10MB hard disk, DOS 2.00 or later version, 40- or 80-column printer

Digital Dining
Menusoft Systems Corp.
4600 Duke St. #1520
Alexandria, VA 22304
703/751-0906
List price: single-user version $2999, multiuser version $4999, demo version $99
Requirements: vary according to hardware configuration

IBM 4680 Store System
IBM Information Systems Group
900 King St.
Ryebrook, NY 10573
914/934-4488
List price: 5170 PC AT store controller Model 899 $9120, Model 839 $9320; IBM 4683 point-of-sale terminal Model 1 $4399, Model 2 $2928; multiprotocol communications adapter $475; 4680 operating system $1250; 4680 general sales application software $900; 4680 BASIC $2500

Mainstreet Merchandisers
Armor Systems
List price: $4565
Requirements: 256K, 10MB hard disk, DOS 2.00 or later version

PC Cash Register
Data Consulting Group
12 Skylark Dr. #18
Larkspur, CA 94939
415/927-0990
List price: $595
Requirements: 128K, two disk drives, DOS 2.00 or later version

Point-of-Sale Communications System
Datachecker/DT
National Semiconductor Dr.
Santa Clara, CA 95051
408/749-7424
List price: $1995
Requirements: 256K, 10MB hard disk, DOS 2.00 or later version

Retailing
Trac Line Software, Inc.
List price: $695
Requirements: 256K, 10MB hard disk, DOS 2.00 or later version, Trac Line's Integrated Accounting Package

StoreMinder Series
XtraSoft
4701 Patrick Henry Dr.
Santa Clara, CA 95054
800/448-1400, 800/445-0500 California
List price: SalesMinder $995, StockMinder $995, MailMinder $395
Requirements: 256K, 10MB hard disk, DOS 2.00 or later version

Video Express
Alternative Software
1165 Barbara Dr.
Cherry Hill, NJ 08003
609/429-3838
List price: $995
Requirements: 128K, two disk drives, DOS 2.00 or later version

The Winner's Edge
Armor Systems
List price: $4565
Requirements: 256K, 10MB hard disk, DOS 2.00 or later version

Prospecting for Clients

Dun & Bradstreet has long been the nation's favored repository of financial data about businesses. Here are a few pointers on using a new D&B package that helps you make sense of prospect information.

Jeremy Joan Hewes

They're out there. Scores of them. Customers.

Tapping untapped markets is the tonic every small business needs to stay competitive and healthy. As new goods and services jam the marketplace, the contest for customer attention grows ever more intense. If you're offering a winning product or service but lack the means to trumpet it on billboards or between segments of the 6 o'clock news, you need a way to identify new markets and cultivate fresh clients.

Cottage entrepreneurs far and wide are discovering a cornucopia of potential new customers: other businesses. And they're communicating directly with these would-be clients by letter and by phone. This business-to-business marketing strategy promises big returns, and most firms can use existing client lists as the launching pad to higher profits.

The D&B Connection

Dun & Bradstreet, the financial colossus whose business is to keep abreast of businesses, recently began marketing software that small ventures can use to create, manage, and analyze lists of clients and to identify hot prospects. Called *Business Marketing System*, the package consists of two programs developed by Connection Software, a D&B subsidiary. *Business Information System (BIS)*, the primary program, stores and manipulates a client list much like any data management program. It can create disk files, print portions of a client data base, or generate labels in any of several

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formats. Another portion of the program analyzes the key data in a client list and churns out a statistical report.

Business Automatic Letter System (BALS), the second program in *Business Marketing System,* merges form letters with *BIS* data files. This program contains 15 boilerplate letters, which may be replaced by missives created with any word processor or editor. *BALS* does not include an editor for creating letters, but it easily imports ASCII text.

your client base. Moreover, you can export *BIS* data for use with most word processors, and if yours is equipped with a mail merge component, you can produce form letters on your own. Although there's an optional on-line component, this D&B offering does not require a modem, which is a departure for this pervasive information services company.

BIS is able to segue to D&B's master data base of more than 7 million businesses—a rich source of potential customers. With that

BIS strikes pay dirt in its ability to search, sort, and analyze data according to the 48 codes that you create.

Because of its varied data analysis and reporting capabilities, *Business Marketing System* can be an effective tool for small businesses committed to growth. The package is ideal for businesses that engage in regular customer mailings, depend on computer neophytes to key in client data, or want to free managers from struggling with arcane, high-powered data management programs—yet still obtain precise analyses of the firm's client list. D&B assumes no prior knowledge of computing and sculpted the product for those who seek instant (and practical) analysis.

The *BIS* and *BALS* programs are sold separately. *BIS* is by far the more potent of the two, and its analytical powers can reveal important relationships within

in mind, Connection Software furnishes prospect lists called D&B Leads, which are dispatched on disk in the *BIS* file format. These roundups of prospects aren't cheap, however; the minimum order is 1000 names, and the cost per name ranges from 20 cents to 80 cents, depending on the quantity ordered. You select D&B Leads according to type of business (noted by Standard Industry Code [SIC] numbers, which are available at most libraries), gross sales, number of employees, and geographic location. Your D&B order can be quite precise; you could, for example, specify ad agencies in Chicago that have more than 15 employees or florists in New England whose annual revenues exceed $1 million.

Data on each lead consists of company name, address, phone number, key contact, number of employees, annual sales (if reported to D&B), SIC number, and D&B's reference number. Using *BIS,* you can integrate these prospects into your current client list, analyze them according to your own criteria, or simply use them for a trial mailing. (As a cost-saving alternative to D&B Leads, you can use the on-line Dialog Information Service as a source of D&B data. Dialog offers its customers two D&B data bases, Dun's Financial Records and Dun's Market Identifiers.)

With *BIS,* you can access D&B's mainframe computers to retrieve a Business Information Report (BIR)—a comprehensive financial profile of a specific company. There are a couple of prerequisites, however; using this on-line service requires that you already have a D&B account and that you know the unique "Dun's number" assigned to the target company. (Dun's numbers are included on the D&B Leads disk.)

Although BIRs provide useful information, reports aren't available for every business. When I used the *BIS* link to D&B's data base, I obtained BIRs for only two of six businesses randomly selected from a list of more than 100. The system rejected the other four requests as "too old to print." D&B policy is not to provide a BIR if the information about a business is deemed outdated. There is no charge for unfulfilled requests.

List Logistics

While you can certainly buy D&B Leads, the cost of regularly procuring lists—up to $800 for the first thousand names—could be prohibitive for some small businesses. D&B Leads are perhaps best suited to businesses that offer

relatively high-priced products or services, or those needing to pinpoint potential clients.

For many firms, current files and free sources of information, such as the phone book or a private business directory, are more than adequate founts of basic client and prospect data. Even without the financial and employee information supplied in the D&B roster, *BIS* will help you create and manage a useful client list.

If you already have a PC-based client list—in *dBASE, WordStar,* or any program that can be converted to straight ASCII—Connection Software will translate it to the *BIS* format for 10 to 25 cents per name, depending on quantity. If you'd prefer to work with *BIS* from scratch, you'll need to key in basic information about each client or prospect, establish a coding system, and assign the appropriate values for each name in the file.

Screen 1: The completed code-entry screen for Timeless Travel

```
                    Business Information System
=================================== 01-20-86  09:22 ===================================

    Bus. type   Tvl Categy  Custom srv  Mailings    Prspect for (later)

 A  Prof.       Bus. tvl    Run conf.   Bus/combo   Bus/combo

 B  Corp.       Combo pkg   Study/tvl   Bargain     Family

 C  Service     Bargain     Seniors     Family      Sport/activ

 D  Retail/whls Family      Local tour  Sport/activ Working

 E  Institut.   Sport/activ Handicap    Seasonal    Custom

 F  Social org  Working     Insurance   Working

 G  Manufact.   Newsletter  Currency    Newsletter

 H  Other       Other       Other       Other       Other

    Left Tab = Previous field                  ↑/↓ = Move UP or DOWN
    Right Tab = NEXT field                     Esc = NO changes & return
                    F1 = SAVE changes & return
```

Creative Coding

Setting up a coding system is a fairly straightforward process. The codes in Screen 1 were devised for Timeless Travel, a travel agency that offers its clients both generic and customized services. *BIS* accommodates 48 such codes, arranged in a matrix of six columns by eight rows. Timeless Travel used only the first five columns, leaving the sixth free for future services.

Timeless's codes for its client list include the nature of the client's business (in the first column); the principal categories of the agency's travel services (second column); the agency's most popular custom services (third column); the mailings the agency prepares (fourth column); and the type of service for which the client would be a good prospect (fifth column).

BIS strikes pay dirt in its ability to search, sort, and analyze data according to the 48 codes that you create. To provide grist for this data analysis, you assign clients the letter of each type of service or business that applies to them, placing those designations in the appropriate code columns on each client's record. You can assign as many of the 8 letter codes as you like in each of the six categories. *BIS* returns an error message if you enter anything other than the letters A through H.

Screen 2 displays the full record for one Timeless Travel client. When the cursor is on the Codes line (midway down the screen), a summary of codes occupies the bottom half of the screen. The letter for each variable that applies to Timeless client Ellen Fisher is listed next to its column number on the Codes line.

One other set of codes may be assigned to each client as well, although *BIS* does not document them. These "key codes" consist of any set of letters, numbers, or symbols. A key code enables you to rate each client according to various objective and subjective measures. Timeless Travel, for example, assigned its clients numerical key codes, identifying high-, medium-, and low-volume clients (1 to 3), problem clients (4 to 6), and hot, lukewarm, or cold prospects (7 to 9). Whatever your system of key codes, document it and keep a copy with the *BMS* manual.

BIS can search a data file for all key codes and each of the 48 codes in the matrix, or for any combination of codes. Thus, you'll

want to consider the components of your business carefully and devise a coding system that provides relevant and timely information about each client.

To refine matters further, *BIS* lets you list up to 15 of your business's products and services. In Timeless Travel's case, the product list runs from plane tickets, hotel reservations, and foreign currency to ski excursions, photo safaris, and archaeological digs. Like the codes, each of these items can be specified as a variable when the program is searching a client list.

Filling the Files

Once you've assembled the codes and the product/service list, you can augment your client list by supplying complete information about new clients and prospects or by adding the relevant coding for clients already in the *BIS* data file. When working with the basic data entry screen (as shown in Screen 2), you can update codes with the <F1> key, add a company with <F3>, or update a product/service description with <Alt>-<F1>. When this data has been entered, *BIS* provides a separate screen that allows up to 420 characters for comments and a chance to note which of the 15 products or services the client uses.

Be advised, however, that if you add or change the codes you've designated for a client list, you cannot make a global change in the data. Instead, you must comb through the file manually, adjusting the data for each client as necessary.

This prodding for information is designed to give you greater control over your client base. You

Screen 2: One complete client record, showing the code summary on the bottom half of the screen

```
[Edit]                    Business Information System
                                  01-22-86  18:21
Company Name: Ellen Fisher, M.D.                          Phone #:(518) 555-2539
Address: 614 Birch Lane
Address:                                  City: Albany                State:NY
Zip: 12210        No. of Employees: 3      Annual Sales: 0              SIC: 8011
Reference #: 2222222222       Year Started: 1978        Fiscal Year End: 12/31
   Owner/Executive Name            Title              Salutation            Ext
1) Ellen Fisher, M.D.                                 Dr. Fisher
2) Paul Ware                                          Paul
3)
Contact: 2       Key Code: 3    Annual Review: 09/30   Follow up Date: 01/15/86
Advisor #1: D. Morales                  Advisor #2: M. Bennett
Codes:1) A       2) ABCDEFG  3) E       4) ABDEFG   5) E        6)

[ F5 = Return to Options ]
CODE  Bus. type   Tvl Categy  Custom srv  Mailings    Prspect for (later)
  A   Prof.       Bus. tvl    Run conf.   Bus/combo   Bus/combo
  B   Corp.       Combo pkg   Study/tvl   Bargain     Family
  C   Service     Bargain     Seniors     Family      Sport/activ
  D   Retail/whls Family      Local tour  Sport/activ Working
  E   Institut.   Sport/activ Handicap    Seasonal    Custom
  F   Social org  Working     Insurance   Working
  G   Manufact.   Newsletter  Currency    Newsletter
  H   Other       Other       Other       Other       Other
```

```
                          BIS Selection Options
                                01-28-86  16:31

 1.  Zip Code from:              to              2.  Product/Service:
 3.  Prod/Serv Review in the month/day of:       4.  Year Started prior to:
 5.  Follow up Dates in the month/day of:        6.  Key Code:
 7.  Fiscal Year End in the month/day of:        8.  Letter Sent:
 9.  Annual Review Dates in the month/day of:
10.  No. of Emp's from:          to
11.  Sales from:              to
12.  SIC code from:       to
13.  Codes: 1)F        2)        3)        4)        5)        6)

(S)=Select all  (C)=Clear & Select  (A)=Add to previous  (E)=End selection:  E

Select option:              F7=Process Selections          Esc=Cancel

(O)=Output formats     (C)=Create/append a BIS file:   C_

Total selected:  33          Total processed:  186

This selection:  6
```

Screen 3: The selection screen for searching a client list, indicating that at least two searches have been performed

can, for instance, assign all clients yearly review and follow-up dates; you can then use these dates to compile weekly or monthly lists of clients whose files should be reviewed or who your staff should write or call. Leaving a category blank will not trip up the program; *BIS* will work with whatever data you provide.

BIS is flexible enough to let you change the description of certain data without affecting the program's operation; annual sales figures are a case in point. Although you may not know a client's annual sales figures (and D&B may not be able to help), you could essentially reassign the annual sales category to monitor the amount that clients spend at your company. As long as you treat the category consistently (whatever its actual name), the program will provide useful results when searching a data file according to annual sales.

BIS provides space to note two advisors—members of your staff who work with the client—but you cannot search a client list by advisors. If tracking your staff's client load is important to your business, you could assign to staff members the variables in one or more of the columns in the code matrix, then compile client lists for any or all of your employees.

A Faithful Scout

Though *BIS* is versatile enough to search its files according to a number of variables, searching can be a several-step process. If you search by categories that permit a range of variables, such as zip code, number of employees, annual sales, or SIC code (see Screen 3), you're not likely to encounter a problem. If, however, you're dealing with categories that contain two or more discrete variables (such as product/service, the key code, or the elements in your code matrix), the program automatically assumes that all variables listed must be present. Thus, if you wanted to compile a list of all Timeless Travel clients by key codes 1, 2, or 3, the program would select only those clients with all three key code numbers present. Consequently, that search would turn up no records, because Timeless clients were assigned only one key code number.

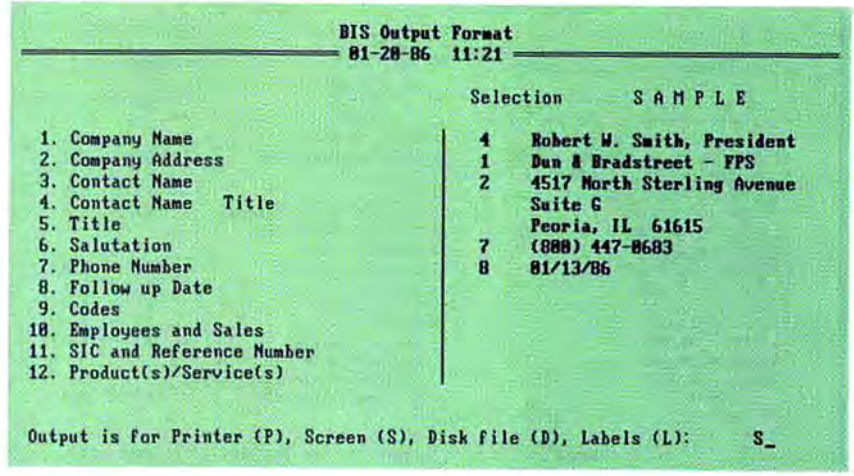
To obtain a list of all Timeless clients with a key code of 1, 2, or 3, you would have to conduct three separate searches—one for each number—while stipulating that the results of the second and third searches be appended to previous findings. Although this procedure is a bit unwieldy, *BIS* can get the job done.

Screen 3 also indicates selection options, any combination of which can be specified for reporting purposes. Search results are displayed at the lower left corner of the screen. This example shows consolidated results of three searches of Timeless Travel's client list by business type. The first search located 14 professionals, the second yielded 13 retail/wholesale businesses, and the third identified 6 social organizations—a total of 33 client records.

When all searches are complete, *BIS* creates a fresh client list consisting of the newly aggregated data; elements of this list can be displayed, printed, or sent to a separate file (in single-line, multiple-line, or *MultiMate* format). Data can also be printed in the program's default label format. For any of these files, you can specify the items to be included and the order in which they should appear (see Screen 4).

The program's label format is compatible with virtually all dot matrix and letter quality printers and supports the HP LaserJet and

Screen 4: The formatting options for exporting data identified in a BIS search



Business Information System
01-20-86
Statistical Profile Report

Total number of records in file DATA 107

Range of Gross Sales	Number of Companies	%
In Excess of $50,000,000		
10,000,000 to 50,000,000	2	1.9
1,000,000 to 10,000,000	17	15.9
750,000 to 1,000,000	4	3.7
500,000 to 750,000	9	8.4
300,000 to 500,000	10	9.3
200,000 to 300,000	7	6.5
125,000 to 200,000	6	5.6
75,000 to 125,000	7	6.5
50,000 to 75,000	1	0.9
35,000 to 50,000	1	0.9
20,000 to 35,000		
10,000 to 20,000		
5,000 to 10,000		
1 to 5,000		
NOT AVAILABLE	43	40.2

Product/ Service	Number of Companies	%
Plane tickets	6	5.6
Hotel reservations	6	5.6
Car rental	5	4.7
Package tour	1	0.9
Printed travel agenda	6	5.6
Cruise ship tickets		
Event tickets		
Insurance policy	3	2.8
Currency	1	0.9
Ski package	2	1.9
Golf package	2	1.9
Tennis package	2	1.9
Photo safari		
Conservation/ecology trip		
Archaeological dig	1	0.9

MONTH	ANNUAL REVIEW		FOLLOW UP		FISCAL YEAR END		PROD/SERV REVIEW	
JANUARY	33	30.8%	1	0.9%			6	5.6%
FEBRUARY	11	10.3%	1	0.9%				
MARCH	1	0.9%					2	1.9%
APRIL	2	1.9%	7	6.5%				
MAY	2	1.9%	37	34.6%				
JUNE			1	0.9%			1	0.9%
JULY	1	0.9%	2	1.9%				
AUGUST	1	0.9%	2	1.9%				
SEPTEMBER	1	0.9%			1	0.9%		
OCTOBER	1	0.9%	1	0.9%				
NOVEMBER			1	0.9%				
DECEMBER					3	2.8%		
NONE	54	50.5%	54	50.5%	103	96.3%	26	24.3%

Range of Employees	Number of Companies	%
Over 1,000		
500 to 999		
100 to 499	2	1.9
50 to 99		
20 to 49	12	11.2
10 to 19	39	36.4
5 to 9	51	47.7
1 to 4	2	1.9
NOT AVAILABLE	1	0.9

Age of Company	Number of Companies	%
Over 100	1	0.9
75 to 99		
50 to 74	2	1.9
25 to 49	8	7.5
15 to 24	19	17.8
8 to 14	23	21.5
4 to 7	13	12.1
1 to 3	12	11.2
NOT AVAILABLE	29	27.1

CATEGORY CODES

1 . Bus. type	NUMBER	%
A Prof.	14	13.1
B Corp.	2	1.9
C Service	14	13.1
D Retail/whls	13	12.1
E Institut.	2	1.9
F Social org	6	5.6
G Manufact.	5	4.7
H Other		

2 . Tvl Categy	NUMBER	%
A Bus. tvl	48	44.9
B Combo pkg	45	42.1
C Bargain	29	27.1
D Family	41	38.3
E Sport/activ	28	26.2
F Working	8	7.5
G Newsletter	11	10.3
H Other	1	0.9

ZIP	NUMBER	ZIP	NUMBER	ZIP	NUMBER	ZIP	NUMBER
12201	8	12204	6	12208	5	12214	1
12202	4	12205	30	12209	3	12224	1
12203	11	12206	11	12210	7	60606	1
		12207	13	12211	5		

Figure 1: A BISPRO report, consisting of a statistical analysis of a client list

Corona laser printers as well. *BIS* lets you run a test label before printing the selected data, enabling you to adjust the placement of labels in the printer.

BIS prints labels for any type of mailing, or you can use a disk file in conjunction with a word processing mail merge program. A file exported from *BIS* in the single-line format, which D&B recommends with *WordStar*'s *MailMerge* component, worked perfectly when combined with a *WordStar* form letter.

Astute Analysis

BIS sports one additional feature that might well win over small businesses in droves: the Business Information Statistical Profile (BISPRO). This component is simply a three-page summary of the client list, broken down according to major information categories, raw customer numbers, and percentage of client base (see Figure 1).

The BISPRO report is particularly useful for the owner or manager of a business like Timeless Travel, in which staff members independently handle a significant portion of client activity. With report in hand, managers can not only monitor employee workload but also spot patterns or trends in the way products and services are consumed.

Using BISPRO, for example, you can pinpoint those products and services that are most (and least) popular. Among Timeless's clients, business travel, business/vacation combination packages, and family vacation packages seem to be favored about equally (38 to 44

percent each). Working vacations, however, spark little interest, making up a lackluster 7.5 percent of the agency's business. Another section of the report indicates that 37.7 percent of the firm's clients are interested in customized services; Timeless Travel might consider expanding its offerings in this area.

The location of a company's clients can likewise provide useful guidance for product marketing. If Timeless felt the business climate merited the opening of a branch office, for instance, BISPRO could justify the expansion, and its zip code breakdown of the client list could identify the most suitable neighborhoods. In our example, one area stands out: The 12205 zip code contains more than twice the number of clients of the next runner-up.

The statistical report might also indicate a need for further analysis. Even though zip code 12205 predominates among Timeless Travel's clients, those clients may not account for the largest dollar volume of the agency's business. A combined search for key code 1 and zip code 12205 might resolve the matter; similarly, a new BISPRO client list limited to the agency's most affluent customers would reveal where the big travel spenders live.

In much the same way, a breakdown of your clients' SIC codes can suggest the types of businesses most likely to buy your products or services. Although you'll need to supply codes for all client names that weren't acquired via D&B Leads, doing so may prove worthwhile if your business—like Timeless Travel—boasts a diverse customer base.

On a Client Watch

Business Marketing System is cousin to a D&B offering called *The Client Information System (CIS).* Also a Connection Software product, *CIS* is a set of two programs. The principal program provides list management and analysis capabilities for compiling and sifting through names of individuals rather than businesses. A CISPRO module produces a statistical analysis of the client list. The optional *Client Automatic Letter System (CALS)* features the same mail merge operations as its business counterpart. Businesses that use *CIS* can also purchase the names of individual prospects on disk, but because of the nature of the data, the names cannot be run through *BIS.*

Although the D&B programs will run on a floppy-based system, a hard disk is almost essential for maintaining files of more than 300 names. If you stick to basic data, you can store about 500 names on a 360K floppy; if you toss in product/service information and comments, you reduce that number to 200.

Whatever the size and shape of the hardware, however, *Business Marketing System* is capable of delivering the kind of day-to-day intelligence that can only enhance communications with clients. The program won't run the show, but it's got a knack for knowing where you ought to look for customers—and what you'll be likely to sell them.

Jeremy Joan Hewes is a Contributing Editor for PC World *and coauthor of* Writing in the Computer Age *(Doubleday, New York, 1983).*

Business Marketing System
Dun & Bradstreet/Connection Software
P.O. Box 30098
Tampa, FL 33630
800/447-0683, 800/282-5949 Florida
List price: complete package $440, BIS $345, BALS $95, call for free demo disk
Requirements: 128K, two disk drives, DOS 1.10 or later version
Copy protected, limited number of installations for hard disk

Client Information System
Dun & Bradstreet/Connection Software
List price: complete package $440, CIS $345, CALS $95
Requirements: 128K, two disk drives, DOS 1.10 or later version
Copy protected, limited number of installations for hard disk

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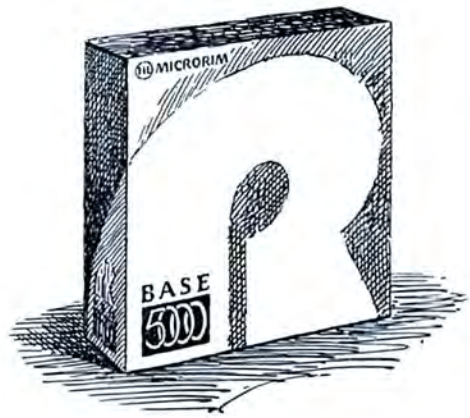

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• Custom Reports	Yes	No
• Reviseable Applications	Yes	No
Password Security		
• Pages of Documentation	1½	36
• Usable by Nontechnical User	Yes	No
Automatic Protection Against "Deadly Embrace"	Yes	No
List Price		
• Single-User	$ 700	$ 695
• Multi-User		
5 Users	$1,500	$2,385
10 Users	$1,500	$3,680
20 Users	$1,500	$7,360

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Circle 671 on reader service card

Password: Communicate

Information and insights on the PC communications marketplace

This month: Xpress communications by cable, CompuServe's real-time game show, and the ABA's on-line service for lawyers

Edited by Eric Brown

Trends

Xpress: The Cable Connection

Ever since the personal computer brought data communications into the home, cable television systems have been touted as a promising alternative to the phone network. Several cable-based data communications experiments have been tried, but only recently has the promise begun to be fulfilled. This year Xpress Information Services, a partnership of McGraw-Hill, Telecrafter, and TeleCommunications, has reopened the cable question with Xpress, a national information service that provides a wide range of news and financial services via cable 24 hours a day.

Unlike CompuServe and other on-line videotex services accessible by modem, Xpress is a teletext (one-way) service. You can't interactively retrieve information from a remote data base, but you can selectively capture data to create a small data base of your own and use the Xpress software to retrieve information.

Xpress uses a mix of satellite and cable technology to deliver its data. At the Xpress Processing Center in Golden, Colorado, a DEC VAX computer collects information from a variety of sources via satellite, microwave, and standard telephone circuits. Xpress formats the information into a unified data stream and beams it to the *Galaxy I* satellite, which then transmits the data to participating cable stations across the country (see "Satellite Earth Stations" in this issue). The cable stations then have the option of adding local services to the stream or piping the data directly to homes and businesses via cable (see Figure 1).

To put you on line with Xpress, a cable technician splits your cable and plugs one end to a data modulator, which acts as a cable modem that connects to your PC's serial port. Your existing television cable service is unaffected. To deliver its cable message, Xpress uses a radio signal that occupies one of 13 subcarrier frequencies otherwise unused by the cable operator.

"We use a variety of frequencies on different systems," explains Paul Maxwell, president of Xpress. "Cable systems aren't all alike. You have to configure them differently."

Maxwell points out that using these sideband frequencies is nothing revolutionary; it's simply more expensive than the vertical blanking interval (VBI) approach, used in previous teletext experiments. VBI is a rarely used interval of cable or broadcast television reception that runs vertically up and down the middle of your screen. Xpress's only competitor, Data Broadcasting Corporation of Vienna, Virginia, is currently using VBI for its Financial Data Broadcasting cable teletext service.

"The problem with the vertical blanking interval is that when it reaches a cable system that inserts advertising, you blow the signal," says Maxwell. A further problem is that even without interruptions, the high bit-error rate of VBI may be unacceptable for transmitting financial data. Explains Maxwell,

(continues)

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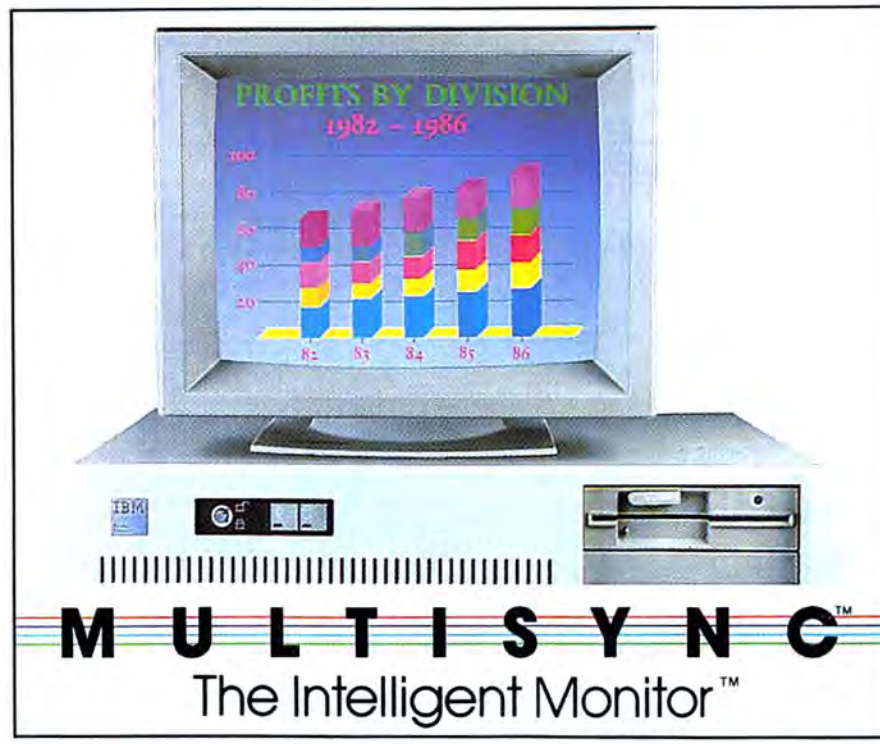

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For a flat $20 per month, Xpress customers receive access to the service along with the Xpress software, a front-end program that channels and organizes the steady flow of data coming in at 9600 bps. While the data collects in your PC's RAM, the software allows you to choose certain categories and services for capture and ignore others. This ability to select categories of interest, along with the program's full-text search feature, enables you to create a "personal newspaper."

Each day 10 million words in more than 3000 categories are available from 30 data sources. News services include the Associated Press, United Press International, and international services such as Notimex from Mexico and Tass from the Soviet Union (see Screen 1). The more notable financial services include Standard & Poor's, the New York Stock Exchange, the American Stock Exchange, NASDAQ, Business Week, and Business Wire (see Screen 2). One of the more appealing features is the Standard & Poor's Market Monitor, a stock market ticker tape service with a 15-minute delay. Incoming data automatically updates the tickers for the stock symbols you've entered.

The menu-driven software is easy to use. First, you choose the categories you want to collect in

(continues)

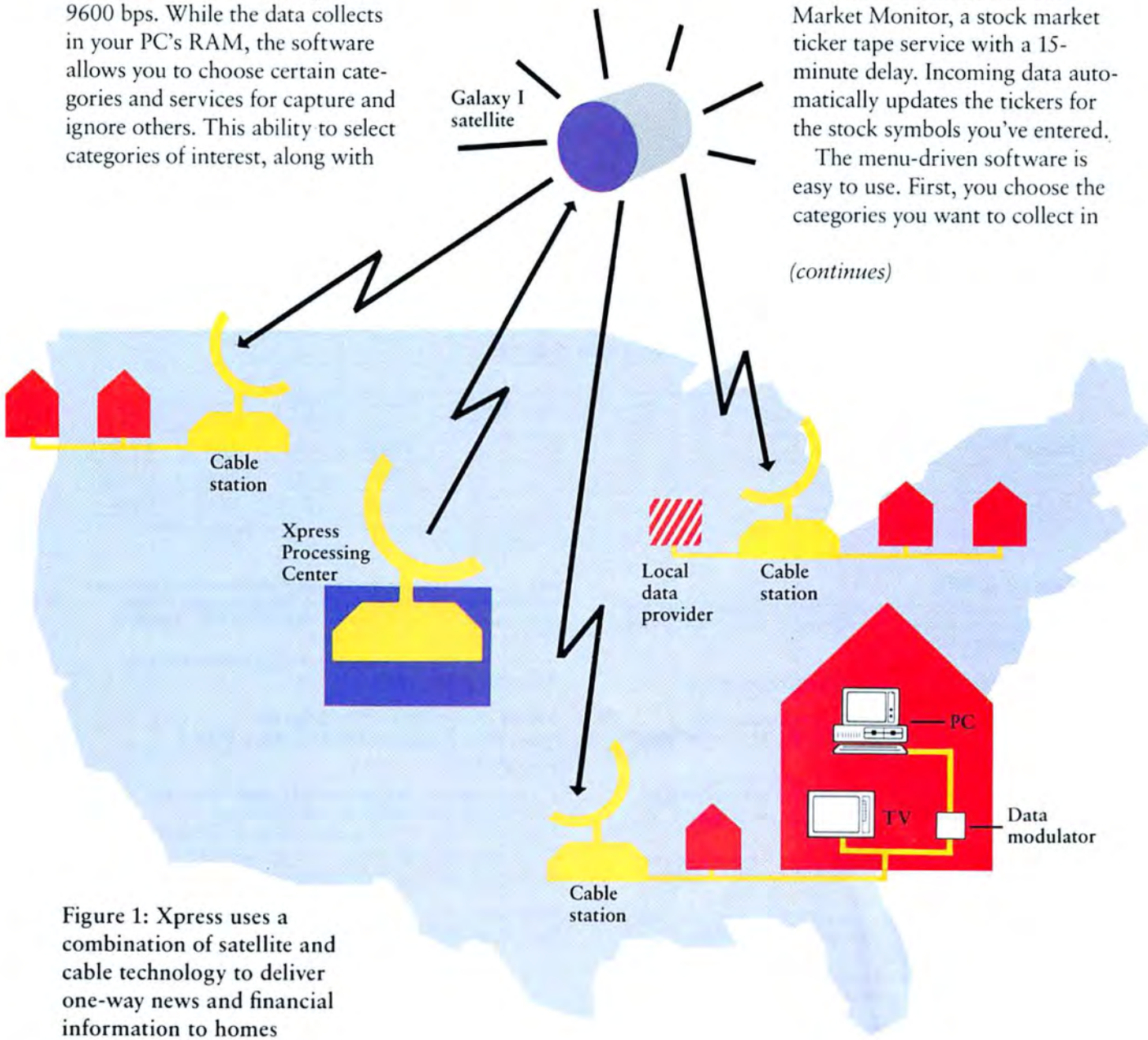

Figure 1: Xpress uses a combination of satellite and cable technology to deliver one-way news and financial information to homes and businesses.

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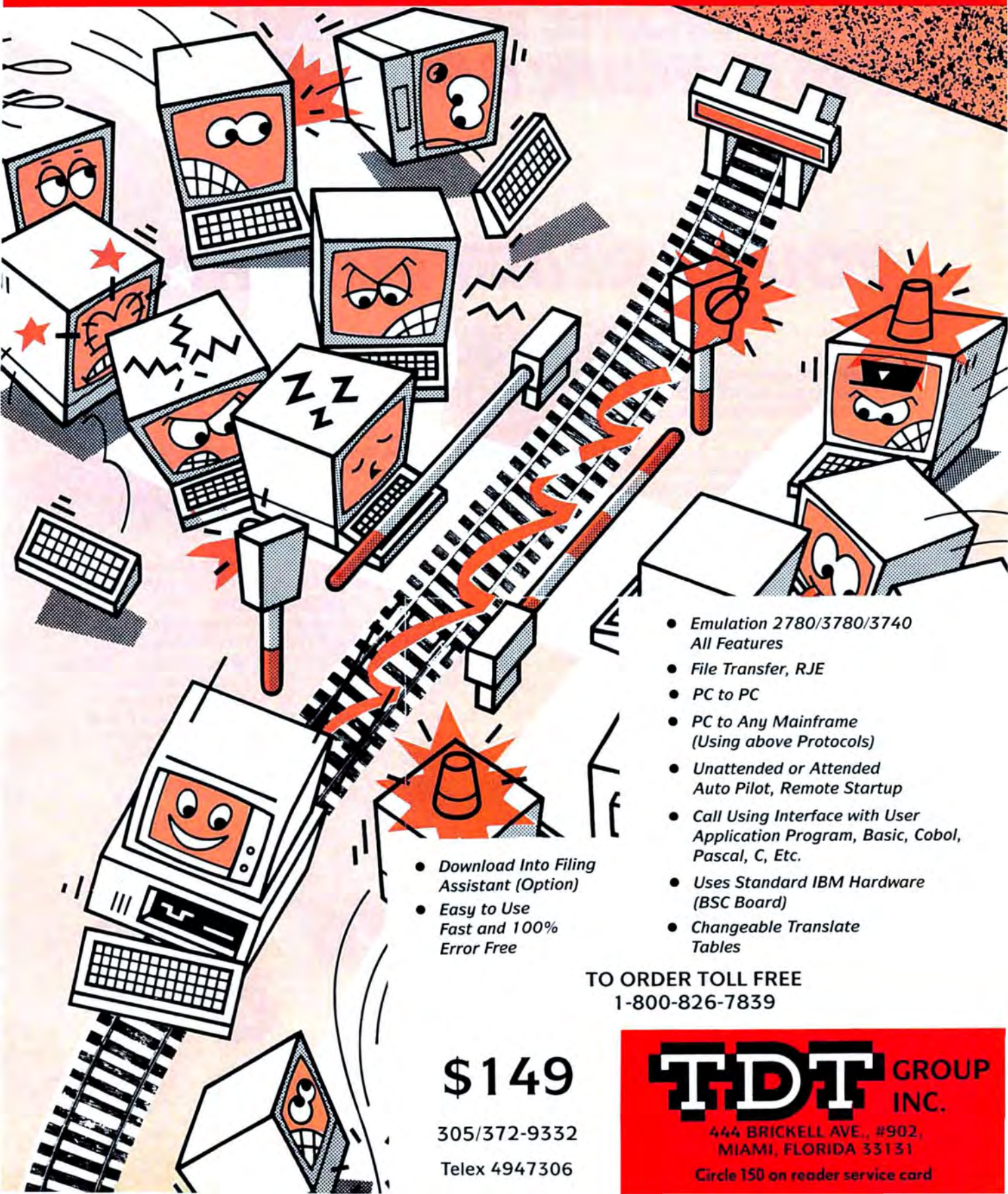

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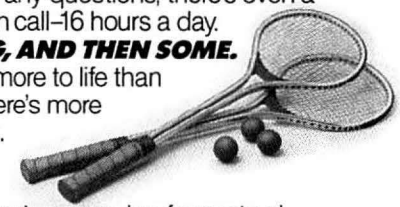

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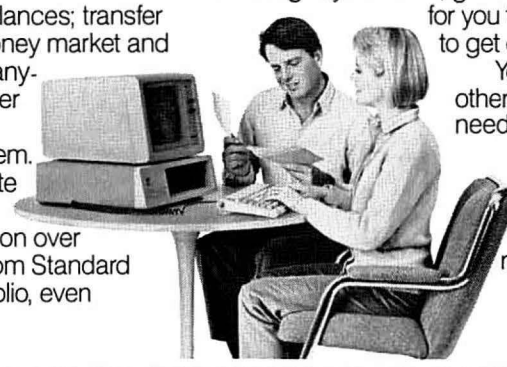

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Screen 1: Xpress's Category Selection menu for international news. The "X" next to each entry indicates that these items have been chosen for capture.

your PC's memory. It's important to be selective because once the PC's memory is full, the service stops, and you have to start deleting files. Even with an extended memory board giving you access to more than a megabyte of RAM, you can easily reach the limit every day.

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Like Lotus's Signal service, which combines satellite and FM sideband transmissions of videotex financial data, Xpress hopes to attract on-line-information users who are dissatisfied with rising long distance rates and don't really require interactive services. New PC users who also subscribe to cable may find Xpress an inexpensive solution for retrieving on-line data; aside from the lack of connect charges and the lower fixed cost, Xpress requires no separately sold communications software, modems, or dedicated phone lines. Furthermore, the information is direct and unedited, available to the user before the stories appear in dial-up services or newspapers. The question remains whether there are enough PC/cable users to enable the service to prosper. So

(continues)

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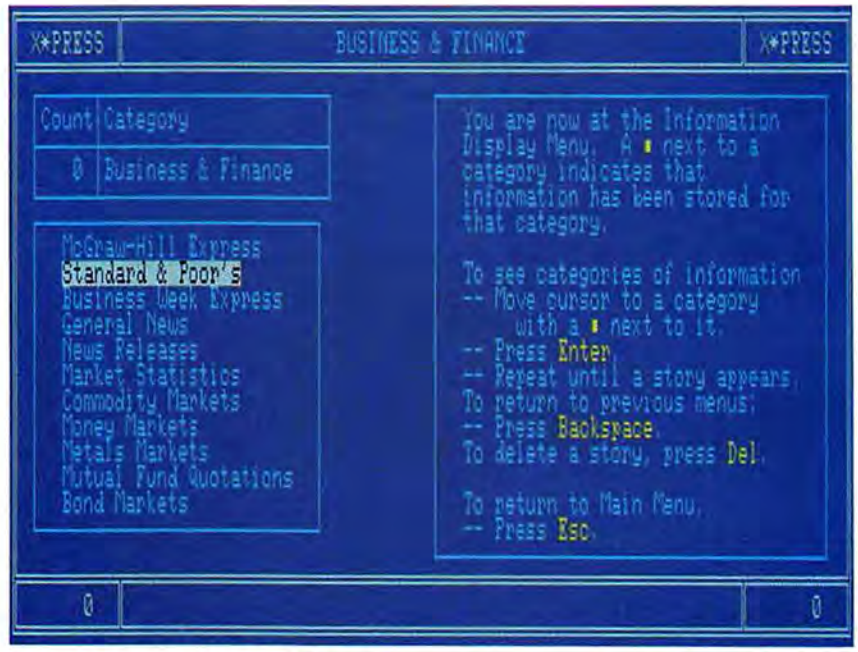

Screen 2: Xpress's Information Display menu for business and finance.

far, cable companies have responded enthusiastically, and Xpress expects to be available in all major American cities by year's end.

Xpress
Xpress Information Services
1536 Cole Blvd., Bldg. 4, #250
Golden, CO 80401
303/237-5665
Cost: $19.95 per month (includes software); installation costs vary depending on cable service
Requirements: 256K, two disk drives, DOS 2.00 or later version, serial port, cable access

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The audience waits restlessly while players chat behind the curtains, organizing themselves into teams of two to six players. Our host Bob Illuminati leaps on stage, cracks a few bad jokes, and starts another round of *You Guessed It.*

You Guessed It is CompuServe's real-time on-line game show. For half an hour Bob asks the audience and players trivia questions on topics ranging from 1960's television shows to obscure American history. (Does anybody know how much Thomas Jefferson paid for the Louisiana Purchase?)

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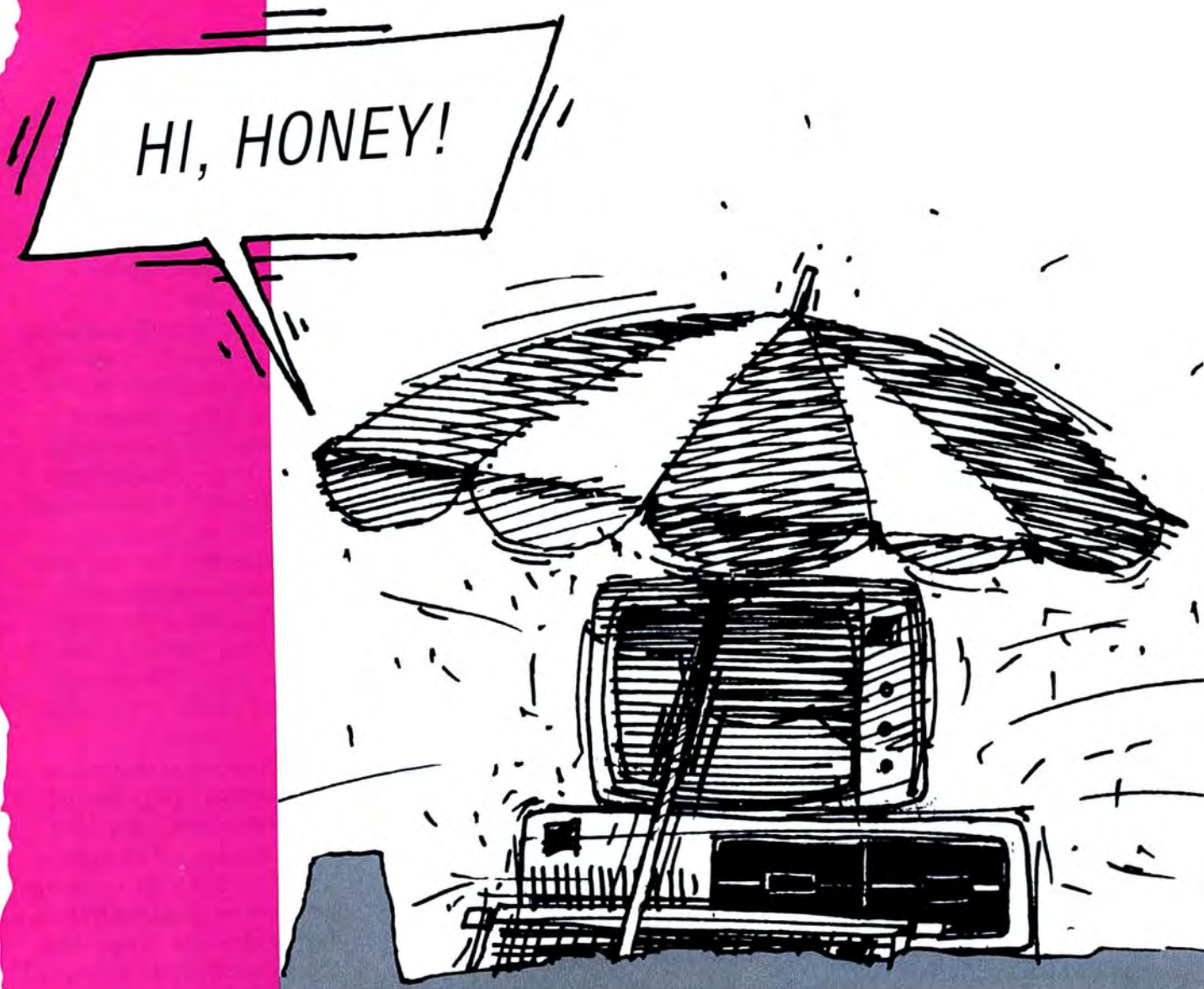

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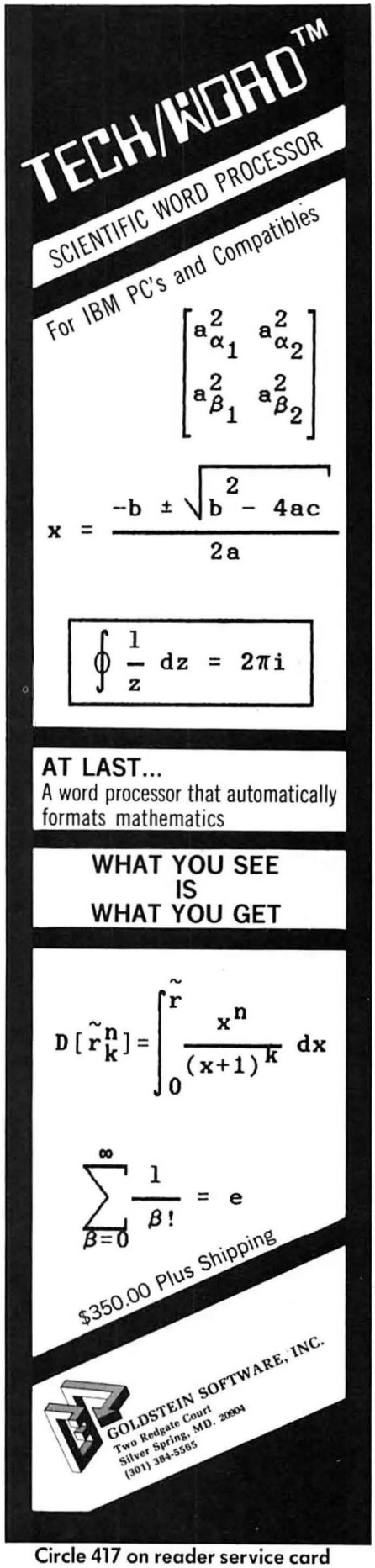

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Whether you're playing one-on-one or as part of a team, it's not whether you give the correct answer that counts but whether your answer matches that of the viewing audience. The correct answer to the same question could be different in a later game depending on the new audience's response.

Winners trade points for prizes ranging from CompuServe T-shirts to snorkeling gear. As in real television game shows, prizes are subject to taxes. Team games run about half an hour, and up to 40 games can be played simultaneously, with games starting at the quarter hour throughout the day.

Incidentally, the Louisiana Purchase cost 60 million francs, or 15 million dollars—a real bargain. Unfortunately, the studio audience guessed $3 million, so—you guessed it—you lose! —*May Sui*

You Guessed It
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Columbus, OH 43220
614/457-8600
Cost: $3 surcharge plus regular connect time charges

ABA/net: Putting the Bar On Line

The consensus is that the American Bar Association's year-old information and telecommunications computer network, ABA/net, is a good idea, whether or not it's successful.

"There's no doubt that this technology is where the legal profession is heading," says Tom Gonser, the ABA's executive director. "It will provide far more services to clients at lower costs. Lawyers who use it will have a competitive edge."

That seems to be the prevailing opinion, even among computing lawyers who are critical of ABA/net. Ernest Shaw, a patent attorney at the Chevron Research Company in San Francisco and head of the ABA's Microcomputer Users Group, predicts that certainly within ten years—and probably within five—motions and briefs will be filed electronically on the service. "Within a decade, if you don't have ABA/net you'll be left out," he says. "It'll be like not having a telephone."

The system works similarly to the two leading legal on-line services—Westlaw and Lexis. Attorneys can link into a wide range of services for a $20 to $50 subscription fee and an additional $10- to $14-per-hour access charge. ABA/net Services include the Associated Press and United Press International wires, the Bureau of National Affairs Advancelines, Dow Jones/News Retrieval, Bunker Ramo stock market service, Congressional Record and Federal Register summaries, and an electronic mail service.

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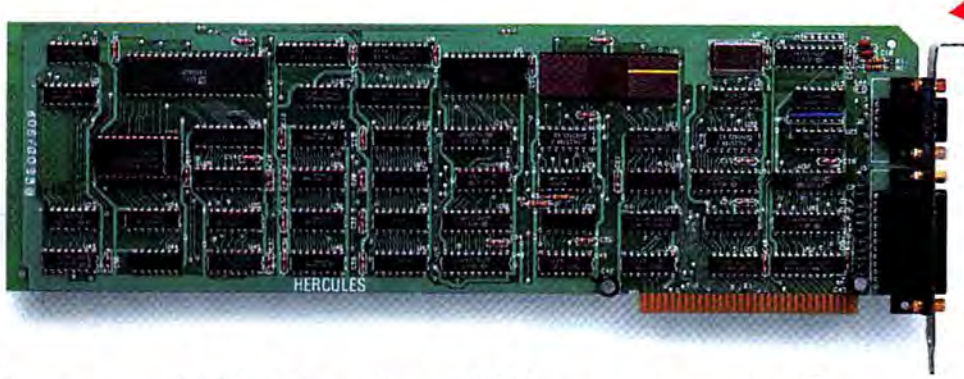

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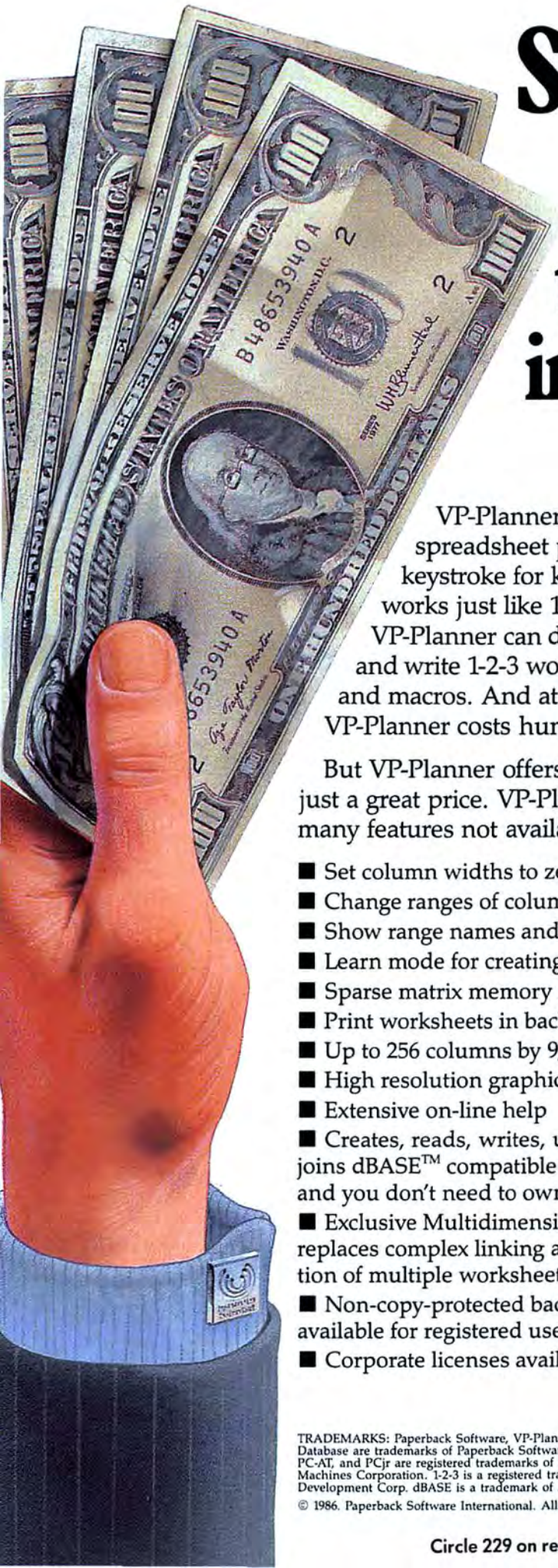
Ninety percent of all law firms have computers, Cary adds, and a full third of them have telecommunications capabilities. "We'll break even this year," Cary notes, "and [the service] will pay for itself by 1987, which is sooner than we anticipated." –*James Evans*

Art Wilcox is a Contributing Editor to PC World. *May Sui is* PC World's *Editorial Secretary, and James Evans is Associate Editor at the State Bar of California's* California Lawyer.



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The Help Screen

PC World offers answers and advice at every level

This month: Hurdling subdirectory boundaries in search of SuperCalc 3, finding a home for a mouse, the lowdown on high-density disk drives

Karl Koessel

A Mutual Subdirectory

Q. I recently converted from a floppy-based system to a PC with a 10MB hard disk. I've created subdirectories to separate several categories of SuperCalc 3 *spreadsheet files. I copied the program files into each subdirectory, which enabled me to access the spreadsheet files in each. Is there a way I can put* SuperCalc 3 *into its own subdirectory, remove it from the other subdirectories, and still be able to access spreadsheet files wherever they may be?*

Sal Guerrero
Walla Walla, Washington

A. Even though subdirectories are new to you, you seem to have a good grasp of the subject. The quick answer is yes—you can keep a single copy of *SuperCalc 3* on your hard disk, in its own subdirectory, and continue to access spreadsheet files stored in other subdirectories.

To change the default subdirectory for *SuperCalc 3*, type **/L** (for load) and press **< Enter >** to display the current subdirectory. Type **N** to move to a new subdirectory, then enter the drive and path of the subdirectory containing the spreadsheet files you need to access.

Tackling a Switch Back

Q. The November 1985 Help Screen *featured a program called SWAPLPTS.COM, which reverses the parallel port address values for LPT1 and LPT2. Once the program has been run, all output directed to LPT1 is sent to the printer attached to the second parallel port. My question doesn't really deal with SWAPLPTS.COM, which works fine, but with how I can switch back to the first printer short of going through a <Ctrl>-<Alt>-<Del> warm restart.*

Peter D. Gery
Willowdale, Ontario

A. Because SWAPLPTS.COM merely swaps the port address values for LPT1 and LPT2, you simply run the program again to return LPT1 output to the original printer. If you're among those readers who have two printers and two parallel ports but not the November 1985 issue, the directions for creating this popular and useful program are reprinted here.

Place a copy of DEBUG.COM (from the DOS Supplemental Programs disk) in drive B: and a disk for saving SWAPLPTS.COM in drive A:. At the A> prompt type the following bold characters, pressing <Enter> at the end of each line. (DEBUG displays the other characters; the *xxxx* will be a four-digit hexadecimal number that varies from machine to machine.)

```
A>B:DEBUG
-A
xxxx:0100 MOV AX,40
xxxx:0103 MOV DS,AX
xxxx:0105 MOV BX,[8]
xxxx:0109 MOV CX,[A]
xxxx:010D MOV [8],CX
xxxx:0111 MOV [A],BX
xxxx:0115 INT 20
xxxx:0117
-R CX
CX 0000
:17
-N A:SWAPLPTS.COM
-W
Writing 17 bytes
-Q
```

(continues)

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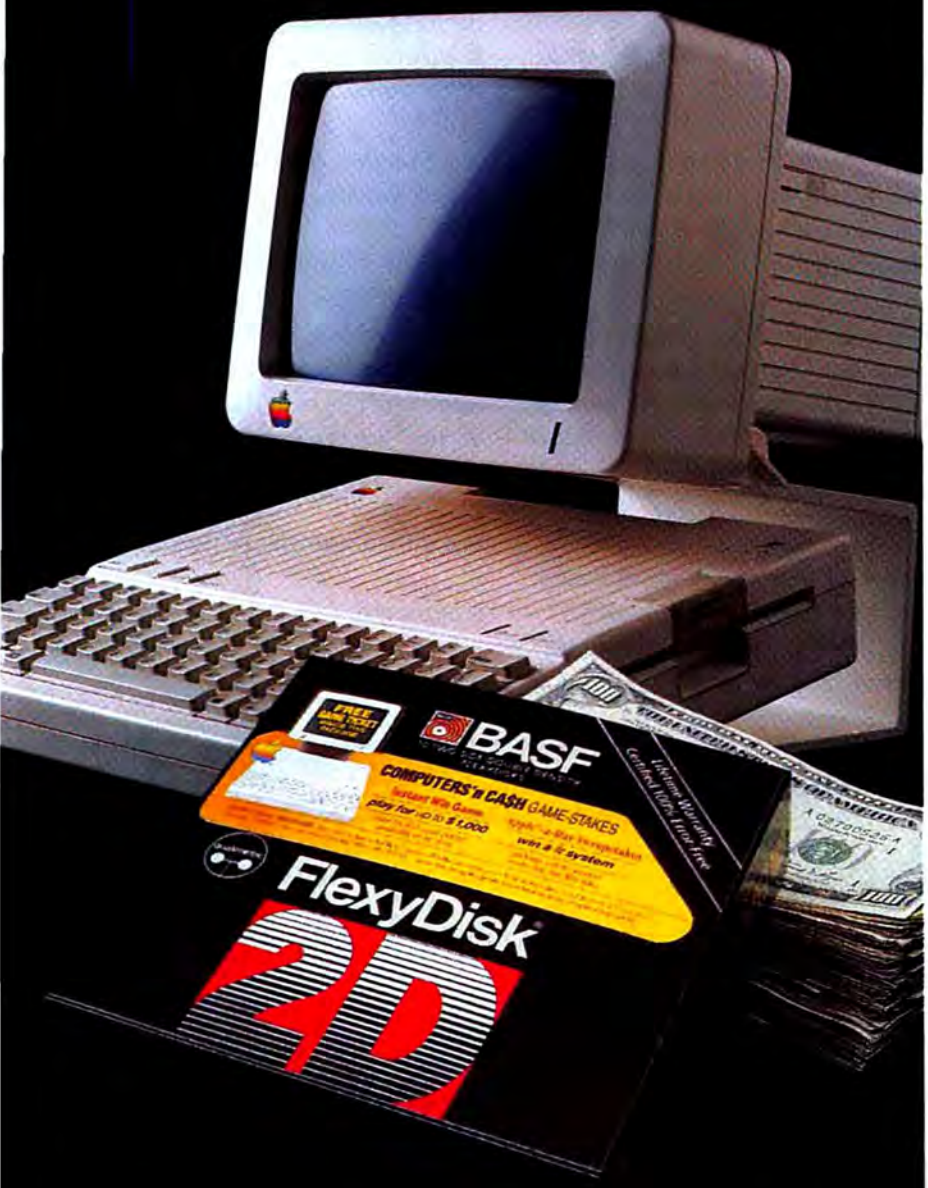

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That's it—SWAPLPTS.COM is now on the disk in drive A:. Whenever you want to switch between printers, just enter **A:SWAPLPTS** at the DOS prompt.

Any Port in a Swarm

Q. I've heard that a PC can have as many as eight RS-232C serial ports, but I've yet to see hardware or software that supports more than two. I'd like to plug a mouse into my XT, and I want to add a third serial port to do so. Do you know of any way I might accomplish this?

Jim McCaffery
Milpitas, California

A. It is true that more than two serial ports can be installed in a PC, an XT, an AT, or a compatible. However, their use requires special programs. Often, users who want more than two serial ports plan to connect dumb terminals or other PCs to their computers. That kind of system is the province of serial network manufacturers. One manufacturer, Server Technology, offers COMPort-2, a half-length expansion board that adds two serial ports with AT-style 9-pin D connectors to your machine. Although the accompanying software is intended to work with the company's EasyLAN product, it also makes using Hayes-compatible modems on those serial ports possible. So, if one of your current serial devices is an *external* Hayes-compatible modem, you could purchase the $220 COMPort-2 in addition to buying a serial mouse,

(continues)

move the modem to one of the new serial ports, and connect the mouse to the port the modem occupied.

In your situation, however, it would probably be more suitable to purchase Microsoft's "bus" mouse, which does not require a serial (or a parallel) port. The mouse is supported by almost every application that uses a mouse.

Incidentally, in the early days of the PC you could get your hands on a parallel mouse. Since then that peculiar creature has moved from the endangered species list right into extinction.

360K Format From an AT's 1.2MB Drive

Q. *I realize that I can't format a double-sided, double-density floppy disk in my AT's 1.2MB floppy disk drive and that in the manufacturing process the magnetic coating of the double-sided, double-density disk isn't deposited as finely as on double-sided, quad-density disks. Still, that shouldn't keep the AT from* trying *to format it. The AT seems to know immediately whether the disk in its 1.2MB drive is a double-density or quad-density disk. In the former case, the format program promptly displays the messages 'Invalid media or Track 0 bad - disk unusable' and 'Format failure', and asks if I want to format another disk. How does the AT recognize the kind of (unformatted) disk in its 1.2MB floppy drive, and why can't that drive format a double-density disk?*

Kenneth E. DeFord
Piscataway, New Jersey

A. The AT, using the FORMAT utility of DOS 3.00 or a later version, formats a 1.2MB disk at 15 sectors per track, packing far more bits per inch than the 8 or 9 sectors per track of a 320K or a 360K floppy (or a 160K/180K single-sided disk). Consequently, it's not difficult for the AT to discern

(continues)

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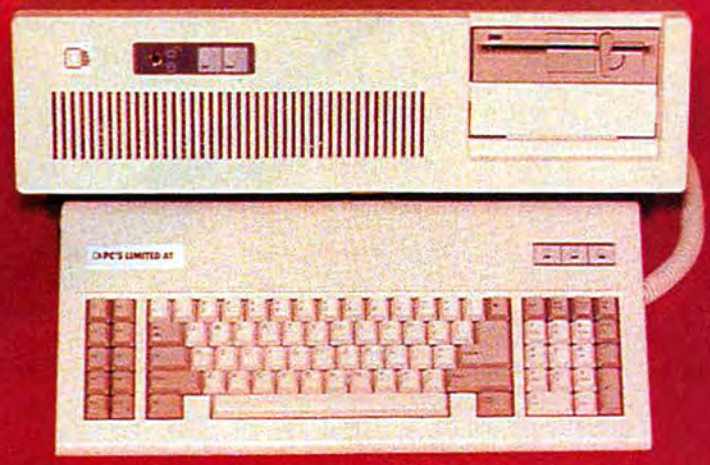

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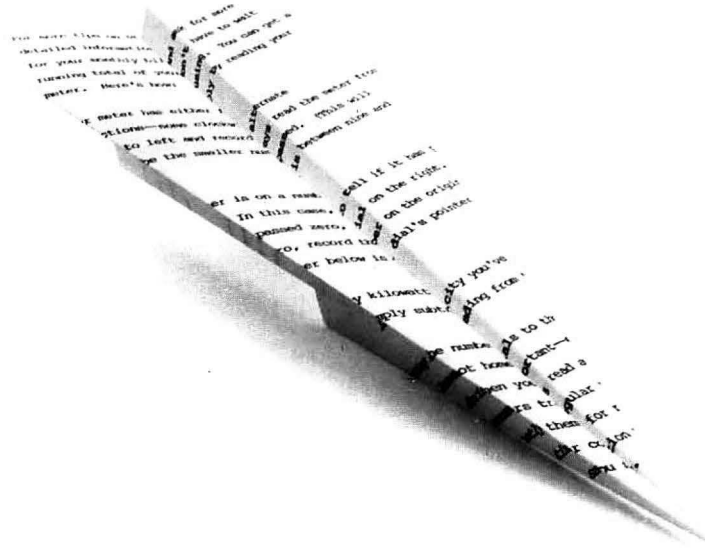

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that the disk in its 1.2MB drive lacks the "resolution" to record at the higher density.

You can, however, format and use double-sided, double-density disks in the AT's 1.2MB drive if you specify that the disk be formatted to hold 360K bytes. To format a double-sided disk in a high-capacity drive, type **FORMAT A:/4** and press **< Enter >**. Although I've rarely encountered a problem with this procedure, remember that IBM and all manufacturers of AT compatibles warn that such a disk may not be reliably read from or written to with a 360K drive. That aside, you may want to note that I regularly use *single-sided*, double-density disks formatted to 360K in my AT's high-capacity drive.

Sizing Up Batch Files

Q. I own a Compaq-Plus and rely on a menu system consisting of numerous small batch files that navigate among directories and invoke programs [see "Serving Up DOS," PCW, February 1986]. To experiment, I created a 1-byte batch file on a double-sided floppy disk and noted that it occupies a full 1024 bytes of disk space; this same batch file consumes 4096 bytes on my hard drive.

When I shared that observation with technicians at two computer stores, both recommended that I use DOS 3.10. I followed their advice and installed it, but the hard disk still devotes 4096 bytes to a 1-byte batch file. Both technicians reported that using 3.10 to store the identical batch file on their hard disk systems (a Compaq Deskpro and an XT clone, respectively) claimed only 2048 bytes.

The system manufacturers don't seem to have any answers. How can I reduce the amount of disk space used to store my batch files? Might there be another way to use my menu system without all these short batch files? I'm nearly ready to move them to a floppy disk.

(continues)

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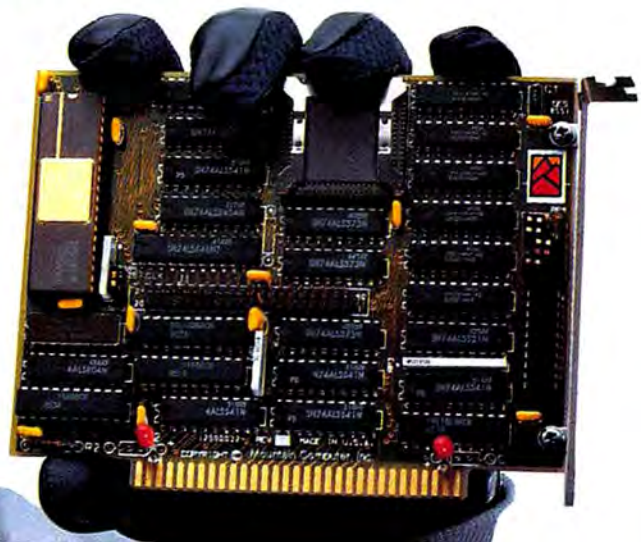

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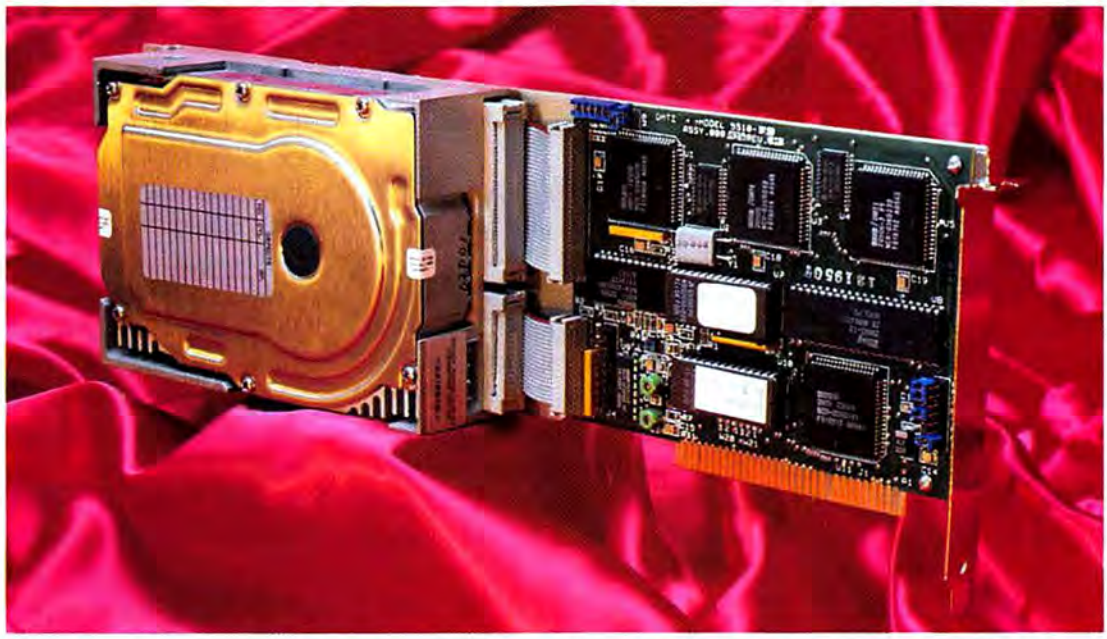

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My second question also concerns the batch file menu system. To access various programs, I'm now forced to type a letter (A, B, C, etc.) or a number (1, 2, 3, etc.), followed by <Enter>. That invokes a batch file that proceeds to another directory and starts the chosen program; when the program is finished, that batch file changes directories to the Root and calls the master batch file, which displays the main menu. I'd prefer not having to press <Enter> after I've keyed in the appropriate entry. Of course, it's possible to do this using a macro program like ProKey, *but I'm hoping there's an easier way. My other sources are fresh out of answers—can you help?*

Richard Chandler
Claremont, California

A. You needn't abandon your armada of small batch files, but you may want to Look at "Creating Batch Files With Echo" (*.*, *PCW*, November 1985) and the response to that item. Instructions therein detail how to use a single batch file containing a succession of ECHO commands to create your menu system's small batch files in a RAM disk (which usually uses less than 1024 bytes for each small file). This technique reclaims much hard disk space because the small batch files are created by a single batch file rather than stored on the hard disk as separate small files, each using up 4096 bytes of disk space.

Another technique, outlined in "Hard Disk Elbowroom" (*.*, *PCW*, April 1986), will make your Compaq-Plus assign its hard disk space, like the systems of the technicians you spoke to, in increments of 2048 bytes. As reader Bill Todd explained, DOS 3.00 and later versions allocate hard disk space a bit more sparingly than their predecessors—for hard disks of 20MB and up, that is.

(continues)

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Another *.* column also contains the seeds of the solution to your second dilemma. The item "Interactive Batch Files" (*PCW*, January 1986), with the correction to QUERY.DAT printed in the April issue, should spare you from entering superfluous keystrokes.

The following lines illustrate the structure of the batch commands you need to insert after the command that displays the main menu:

```
QUERY Your choice? @123ABC
if errorlevel 6 goto c
if errorlevel 5 goto b
if errorlevel 4 goto a
if errorlevel 3 goto 3
if errorlevel 2 goto 2
if errorlevel 1 goto 1
:c
c.bat
:b
b.bat
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(continues)

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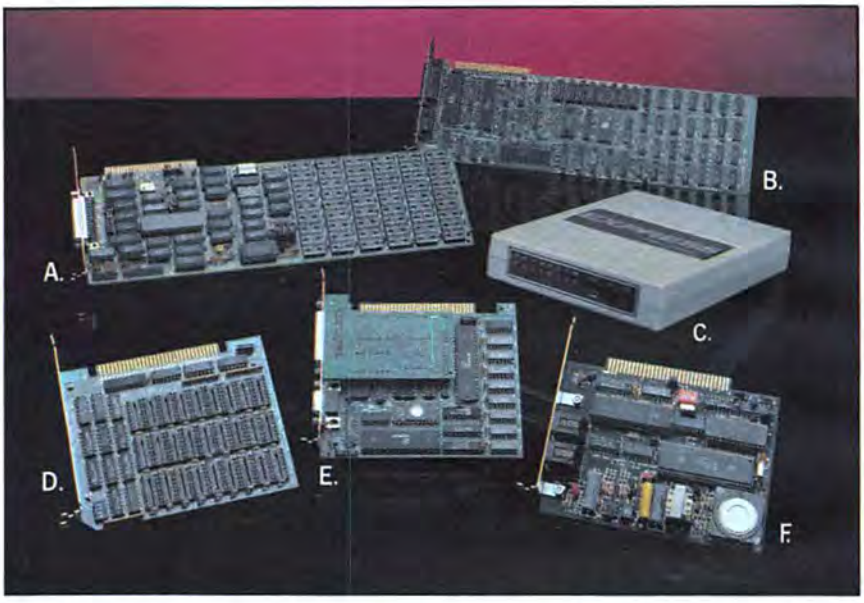

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```
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a.bat
:3
3.bat
:2
2.bat
:1
1.bat
:end
```

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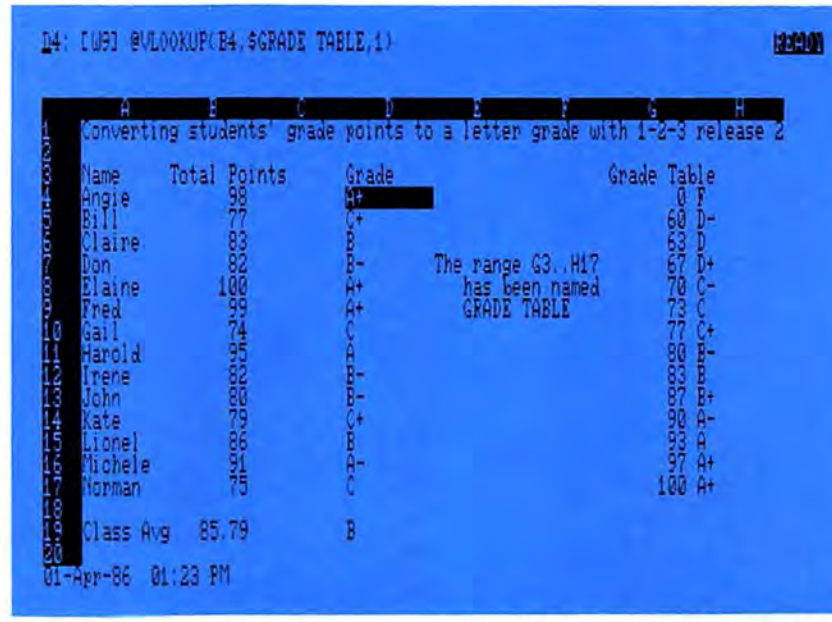
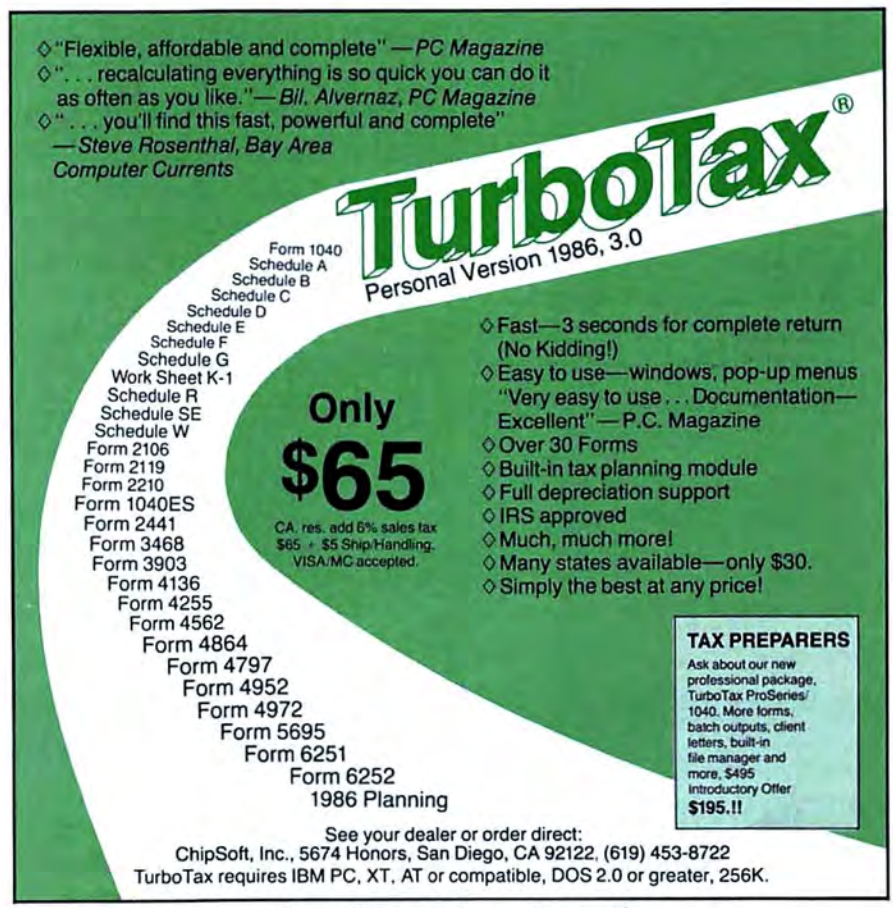


Correction: This screen of a 1-2-3 version 2 worksheet that calculates a letter grade from a numeric value was omitted from April's Help Screen. We regret any inconvenience this may have caused.



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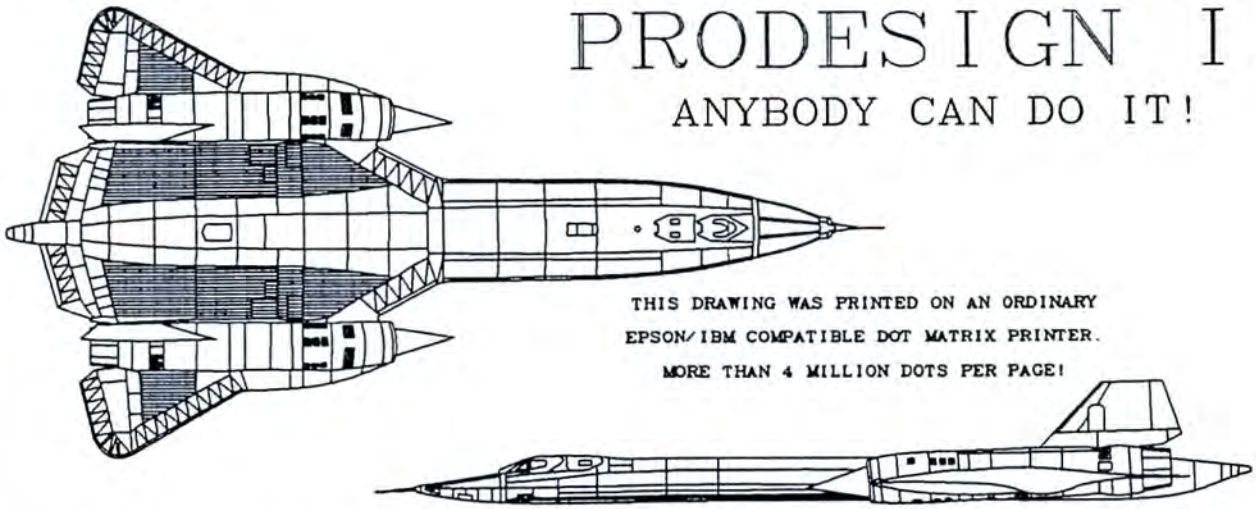

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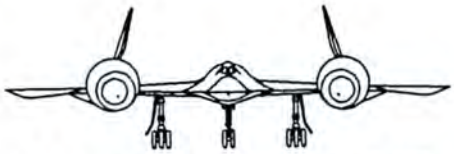

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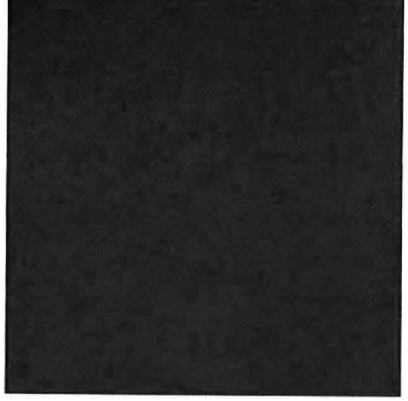

Star-Dot-Star

A global exchange of personal computer discoveries

Endowing the print screen function with automatic formfeed; embellishments for 1-2-3; notes on cursor control; and Turbo Pascal pointers

Edited by Steven Cook

Print Screen Perfected

If you frequently use the PC's print screen feature, you may find that the program PRTSCFF.COM will make your life a little easier. I wrote the program to eliminate a major inconvenience of the print screen operation: having to manually move the paper to the top of the next page after a screen has been printed. With the completion of every printout, I found myself taking the printer off line, pressing the formfeed button, then flicking the printer back on line. For a page or two it's no big deal, but for dozens of pages, the process can be a real burden.

You can force the printer to formfeed after a print screen in any number of ways, but none is simple, and I wanted to avoid running a special program to print the screen. I hit on my solution after reading about memory-resident programs. I decided to replace the built-in print screen routine with one of my own.

The program PRTSCFF.COM is a short and sweet method of sending a formfeed command to the printer after each print screen operation. The memory-resident program enables me to use the original keystroke combination (<Shift>-<PrtSc>) to initiate the routine.

PRTSCFF.COM occupies just 77 bytes of RAM and remains resident until you restart the PC. If you use it often you may want to amend your AUTOEXEC.BAT file so PRTSCFF.COM loads automatically when you start the computer.

The program itself does very little. Each time you press <Shift>-<PrtSc>, DOS will invoke PRTSCFF.COM instead of the PC's original ROM-based print screen routine. Rather than completely rewrite that routine, PRTSCFF.COM simply calls the original routine and then sends a formfeed character to the printer.

One final note: The program is ideal for Hewlett-Packard LaserJet users, because the LaserJet does not generate the usual print screen output until the page is full or you take the printer off line and press the formfeed button. With PRTSCFF.COM the page prints and ejects automatically.

Gary Khachadoorian
Weston, Connecticut

Editor's note: To create PRTSCFF.COM, load BASIC, type in the lines shown in X-MAKER.BAS, followed by the lines shown in PRTSCFF.DAT, then type **RUN** *and press* **< Enter >** *X-MAKER will check for errors, then create PRTSCFF.COM on your disk in drive A:.*

Make a Date

I use the *1-2-3* macro shown in 123DATE to permit dates to be entered as numbers without typing the @DATE function each time. The macro is particularly useful for creating data entry forms, especially when they'll be used by an inexperienced operator.

Don Druker
Rockville, Maryland

Cursor Control

Although Turbo Pascal provides a means of positioning the cursor on screen, it does not include a way to change the cursor's size. Variable cursor sizes are useful to

(continues)

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End users Circle 331 on reader service card

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```
10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 LOCATE 3,1:PRINT "X-Maker":READ F$
30 LOCATE 5,1,1:PRINT "Now testing for data errors...please wait";
40 SUM=0:READ LN:IF LN<0 THEN 80
50 READ H$:IF VAL(H$)<0 THEN 70
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 50
70 READ CKSUM$:IF SUM=FNHEX(CKSUM$) THEN 40 ELSE GOTO 170
80 RESTORE:CLS:LOCATE 3,1:PRINT "X-Maker":READ F$
90 LOCATE 5,1,1:PRINT "Press any key except ESC to create ";F$;": ";
100 A$=INPUT$(1):PRINT:IF A$=CHR$(27) THEN END
110 LOCATE 6,1:PRINT "Working...";
120 OPEN F$ AS #1 LEN=1 : FIELD #1,1 AS BX$
130 READ LN:IF LN<0 THEN 160
140 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)):PUT #1:GOTO 140
160 CLOSE:PRINT:PRINT F$;" has now been created.":END
170 PRINT:PRINT "Error in DATA line";STR$(LN);". ";
180 PRINT "Check your work.":BEEP:END
```

X-MAKER.BAS: Star-Dot-Star's program-creating program

```
1000 DATA "a:prtscff.com"
1010 DATA 1,EB,21,90,00,00,00,00,FB,1E,52,53,50,8C,CB,8E,DB,-1,D7
1020 DATA 2,9C,2E,FF,1E,03,01,BA,00,00,B8,0C,00,CD,17,58,5B,-1,A7
1030 DATA 3,5A,1F,CF,8C,CB,8E,DB,B0,05,B4,35,CD,21,2E,89,1E,-1,BD
1040 DATA 4,03,01,2E,8C,06,05,01,8C,CB,8E,DB,BA,07,01,B0,05,-1,EC
1050 DATA 5,B4,25,CD,21,8C,CB,8E,DB,BA,23,01,CD,27,-1,16,-1
```

PRTSCFF.DAT: Add these lines to X-MAKER.BAS to create PRTSCFF.COM.

```
/XLEnter YEAR, MONTH, DAY (with commas): ~~
{edit}{home}@DATE({del}~/rfd~~/wcs12~~
```

123DATE: Date entry macro for 1-2-3 worksheets

indicate when a special program mode is in effect or merely to make the cursor easier to locate.

The program CURSOR.PAS calls the PC's Basic Input/Output System (BIOS) from within Turbo Pascal to change cursor size. Function 0F (hexadecimal) of the PC's video interrupt routine returns the current mode of the screen. If it's mode number 7, a monochrome monitor is active; otherwise, a color graphics display is in use.

The maximum cursor size depends on the number of monitor scan lines that make up a character cell. A character cell on a monochrome display consists of 14 scan lines, numbered 0 to 13. The color graphics character cell is 8 lines tall. You change the cursor

(continues)

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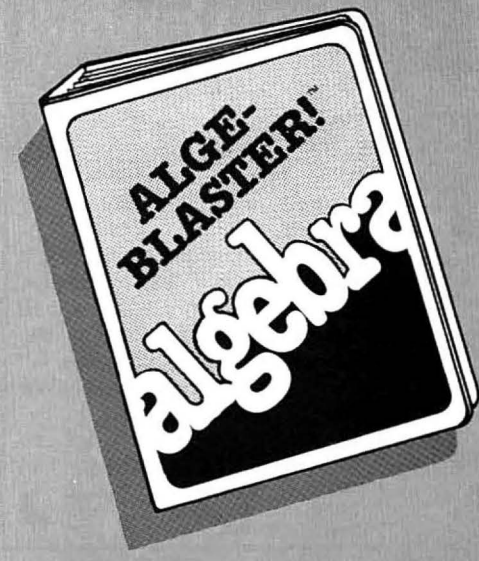

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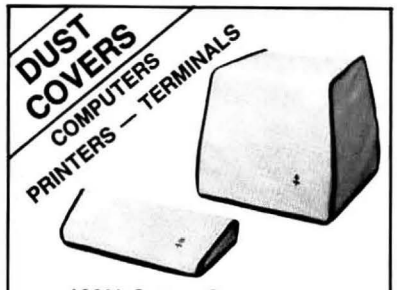

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```
Program cursor;

procedure cursor(resetcsr:boolean; startline,endline:byte);

type
  regpack = record
              ax,bx,cx,dx,bp,di,si,ds,es,flags: integer;
            end;

var
  recpack: regpack;                          {assign record}
  mode,maxend,cl: byte;

begin
  with recpack do ax := $0F shl 8;           {function 0F=get crt mode}
  intr($10,recpack);                         {call interrupt}
  with recpack do mode := ax and $00FF;      {determine current mode}
  if mode = 7
    then maxend := 13                        {monochrome cursor has 14}
    else maxend := 7;                        {color/graphics cursor has 8}
  if resetcsr then
    begin
      endline := maxend;                     {reset cursor= end-1 to end}
      startline := maxend -1;
    end;
  if endline > maxend                        {keep cursor size in range}
    then endline := maxend;
  with recpack do
    begin
      ax := $01 shl 8;                      {function 01=set cursor}
      cx := startline shl 8 + endline;      {assign start & end values}
    end;
    intr($10,recpack);                       {call interrupt}
end; {cursor}

{demonstration program begins here}

const
  setcsr: boolean = false;
  resetcsr: boolean = true;

begin
  clrscr;
  cursor(setcsr,0,13);                       {set cursor to largest size}
  write('This is the big cursor: ');
  while not keypressed do;                   {wait for keystroke}
  writeln;
  cursor(resetcsr,0,13);                     {reset cursor size}
  write('This is the regular cursor: ');
  while not keypressed do;                   {wait for keystroke}
end.
```

CURSOR.PAS: Turbo Pascal program that changes cursor size

size by indicating the line at which the cursor begins and the line at which it ends. For example, a cursor starting on scan line 0 and ending on line 7 is a full block on a color graphics monitor, but just a half-size cursor on a monochrome display; a full-size monochrome cursor begins at line 0 and ends at line 13. Note that if the starting line is greater than the ending line, the cursor "wraps around," appearing in two parts at the top and the bottom of the character cell.

Gordon Yarbrough
San Antonio, Texas

(continues)

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Editor's note: You can find more information about setting cursor sizes in the IBM BASIC manual's discussion of the LOCATE command. Once you start adding this cursor-changing routine to your programs you'll probably find the following item useful, too.

Cursor Correction

Many programs alter the size of the cursor or remove it entirely, but most restore it when you exit in the usual way. Abnormal exits from such programs can, however, leave you with an odd-size or nonexistent cursor, and some programs simply fail to restore the cursor, period.

Running the program FIXCURSR.COM will restore the cursor to its normal size; the routine works with both monochrome and color graphics display adapters. The program determines which adapter is currently in use, then sends the appropriate commands to that adapter.

Kenneth Whitney
Arlington, Texas

Editor's note: To create FIXCURSR.COM, load BASIC, type in the lines shown in X-MAKER.BAS followed by the lines shown in FIXCURSR.DAT, then type **RUN** *and press* **< Enter >**. *To use FIXCURSR.COM, simply type* **FIXCURSR** *at the DOS prompt and then press* **< Enter >**.

(continues)

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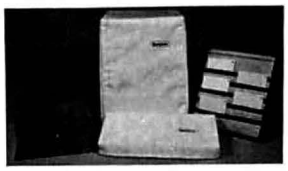

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•

```
1000 DATA "a:fixcursr.com"
1010 DATA 1,B4,0F,CD,10,3C,07,74,05,B9,07,06,EB,03,B9,0C,0B,-1,0A
1020 DATA 2,B4,01,CD,10,CD,20,-1,22,-1
```

FIXCURSR.DAT: Add these lines to X-MAKER.BAS to create FIXCURSR.COM.

```
Program circle;

var
 x, y, r, c :integer;

Procedure circle(xorigin,yorigin,radius,color :integer);

var
  incrmnt, xequat :real;

begin
  incrmnt := radius + 0.25;
  repeat
    incrmnt := incrmnt - 0.25;
    xequat := sqrt(sqr(radius) - sqr(incrmnt));
    plot (round(xorigin + xequat), round(yorigin + incrmnt), color);
    plot (round(xorigin - xequat), round(yorigin - incrmnt), color);
    plot (round(xorigin + xequat), round(yorigin - incrmnt), color);
    plot (round(xorigin - xequat), round(yorigin + incrmnt), color);
  until (incrmnt = 0);
  draw (xorigin - round(radius * 0.12), yorigin + radius,
        xorigin + round(radius * 0.15), yorigin + radius,
        color);
  draw (xorigin - round(radius * 0.12), yorigin - radius,
        xorigin + round(radius * 0.15), yorigin - radius,
        color);
end; {circle}

{demonstration program begins here}

begin
  x := 160;
  y := 100;
  r := 50;
  c := 6;
  GraphMode;
  circle (x,y,r,c);
  while not keypressed do;
end. {Circle}
```

CIRCLE.PAS: Turbo Pascal procedure to draw circles

Turbo Circles

I was disappointed to find that Turbo Pascal version 2.0 does not include a graphics command capable of drawing circles. To circumvent this omission, I found a formula for graphing circles and converted it to Pascal; the result is shown in CIRCLE.PAS. To use this procedure, include it in your program and call it with the statement CIRCLE(*x,y,r,c*) where *x* and *y* represent the coordinates for the center of the circle, *r* is the radius, and *c* is the desired color.

Dan Leska
Nichols, New York

(continues)

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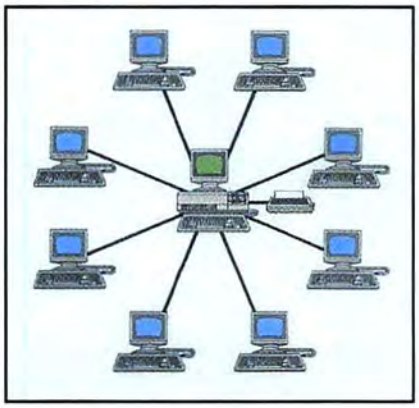

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Circle 103 on reader service card

```
{Include these TYPE and VAR declarations at the beginning of the
program using the routines listed below.}

type
    longstring=string[62];
    rtype=record
            ax,bx,cx,dx,bp,si,di,ds,es,flags:integer
          end;
var
   origdta,DTA:array[0..120] of byte;

procedure setdta;
   var
      i:integer;
      reg:rtype;
   begin
      reg.ax:=$1A00;
      reg.ds:=seg(dta[0]);
      reg.dx:=ofs(dta[0]);
      intr($21,reg);
      for i:=0 to 43 do
         origdta[i]:=0;
   end;

function findfirst(w:longstring):longstring;
var
   reg: rtype;
   i  : integer;

begin
  reg.ax:=$4E00;
  reg.ds:=Seg(w[1]);
  reg.dx:=Ofs(w[1]);
  reg.cx:=0;
  dta:=origdta;
  Intr($21,reg);
  if origdta[30]=0 then
     origdta:=dta;
  w:='';
  for i:=30 to 43 do
     w:=concat(w,chr(dta[i]));
  i:=1;
  while (i<13) and (w[i]<>#0) do
     i:=i+1;
  w[0]:=chr(i);
  findfirst:=w;
end;

function findnext:longstring;
var
   w  : longstring;
   reg: rtype;
   i  : integer;

begin
  reg.ax:=$4F00;
  Intr($21,reg);
  if reg.ax <>18 then
    begin
      w:='';
      for i:=30 to 43 do
        w:=concat(w,chr(dta[i]));
      i:=1;
      while (i<13) and (w[i]<>#0) do
        i:=i+1;
      w[0]:=chr(i);
      findnext:=w;
    end
  else
    findnext:='';
end;
```

DISKDIR.PAS: Turbo Pascal routines to read disk directories

(continues)

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They go to the Orient... taking either their designs or simply their ideas to one or more of the major electronics manufacturing concerns, getting bids for making these devices under contract to the creators. Multifunction Cards, Video Cards, Disk Controllers, Modems and I/O Boards all begin their life in this way.

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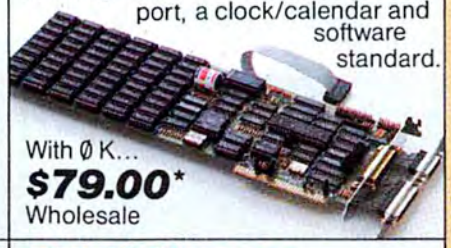

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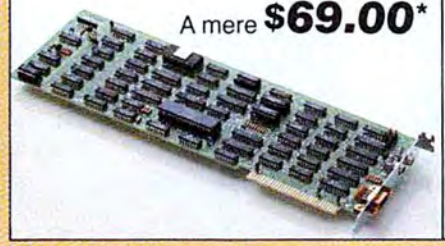

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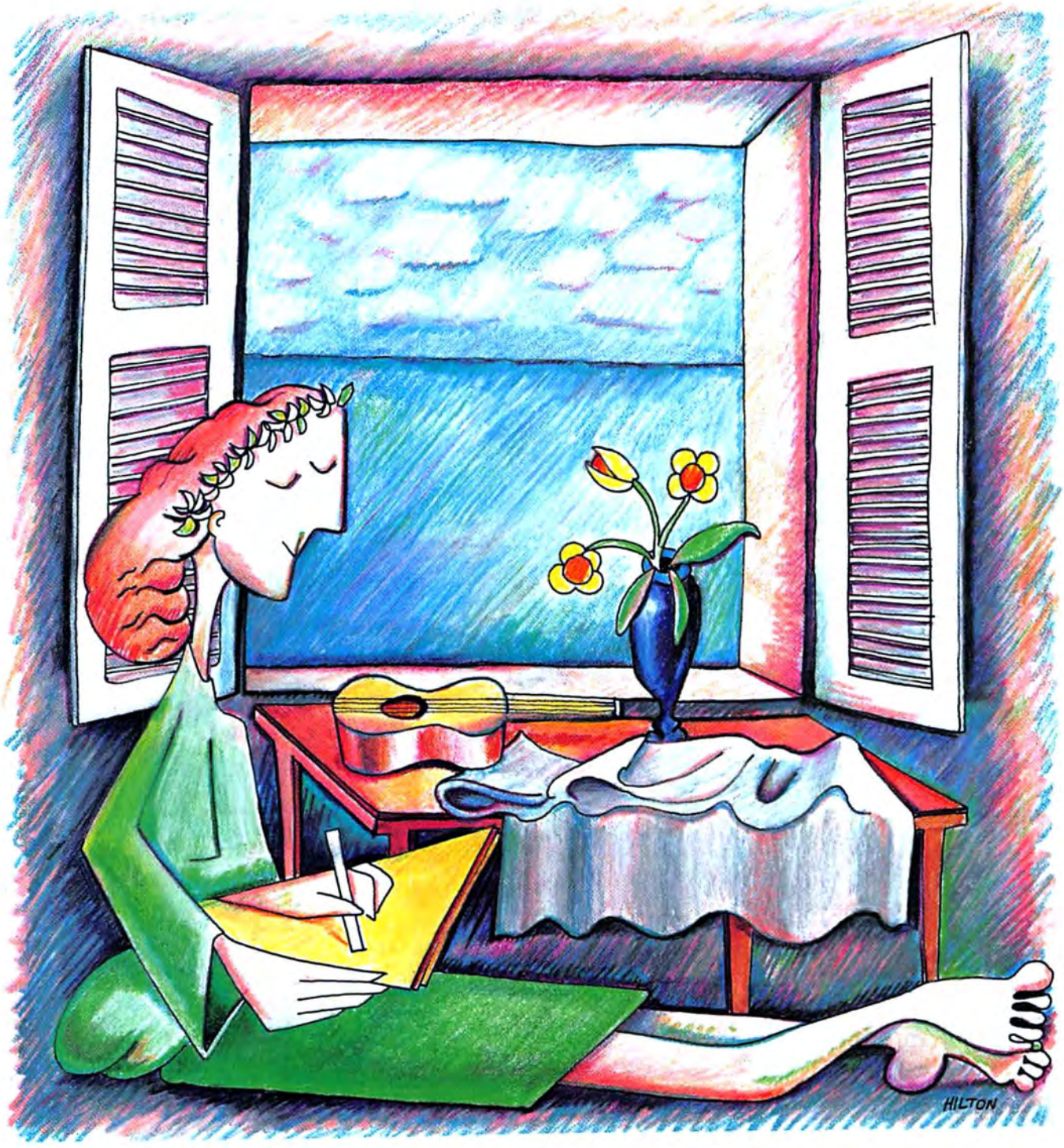

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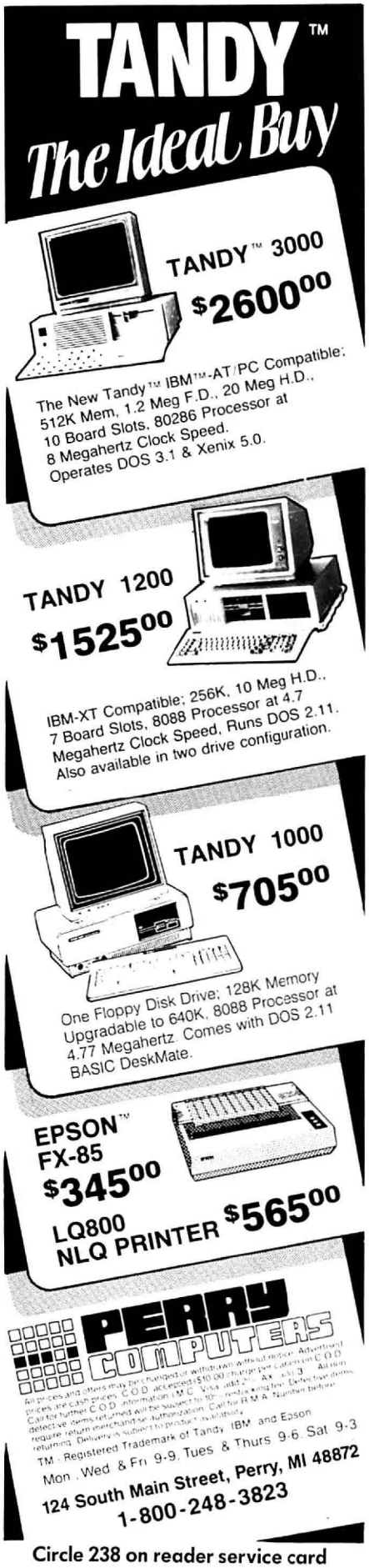
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Table 1: Speed comparison of three sorting algorithms

Number of Items	Interpreted			Compiled		
	JSORT21	JSORT31	SHELL	JSORT21	JSORT31	SHELL
50	11	9	4	2	1	<1
100	38	18	11	4	2	<1
250	186	47	33	26	6	1
500	–	99	81	95	13	2
1000	–	–	–	–	29	5
2500	–	–	–	–	81	11
5000	–	–	–	–	206	35

```
1000 CLEAR 32767
1010 DEFINT A-Z
1020 DIM A$(6000)
1030 CLS :INPUT "How many";K
1040 FOR I=1 TO K
1050 A$(I)=CHR$(RND*25+65)
1060 A$(I)=A$(I)+CHR$(RND*25+65)
1070 A$(I)=A$(I)+CHR$(RND*25+65)
1080 NEXT
1090 PRINT TIME$
1100 S0%=K :GOSUB 12000
1110 PRINT TIME$
1120 INPUT "Press ENTER to see the sorted items: ",Z$
1130 PRINT :PRINT :FOR I=1 TO K :PRINT A$(I);" "; :NEXT
1140 PRINT "Done!"
9999 END
12000 REM Shell Sort subroutine
12010 S1%=S0%
12020 S1%=S1%\2 'note backslash
12030 IF S1%=0 THEN RETURN
12040 S2%=S0%-S1%
12050 FOR S3%=1 TO S2%
12060 S4%=S3%
12070 S5%=S4%+S1%
12080 IF A$(S4%)<=A$(S5%) THEN 12120
12090 SWAP A$(S4%),A$(S5%) :S4%=S4%-S1%
12110 IF S4%>0 THEN 12070
12120 NEXT
12130 GOTO 12020
```

SHELL.BAS: Example of the speedy Shell-Metzger sort algorithm

A Faster Sort

The Shell-Metzger sorting algorithm used in SHELL.BAS is faster and more efficient than either of the routines (JSORT21 and JSORT31) presented by James Howell [*.*, *PCW*, January 1986]. This method was first presented by Donald Shell in *Communications of the ACM* (Association for Computing Machinery, New York, November 1971). I've used this particular routine for some time; its original source is lost in antiquity.

(continues)

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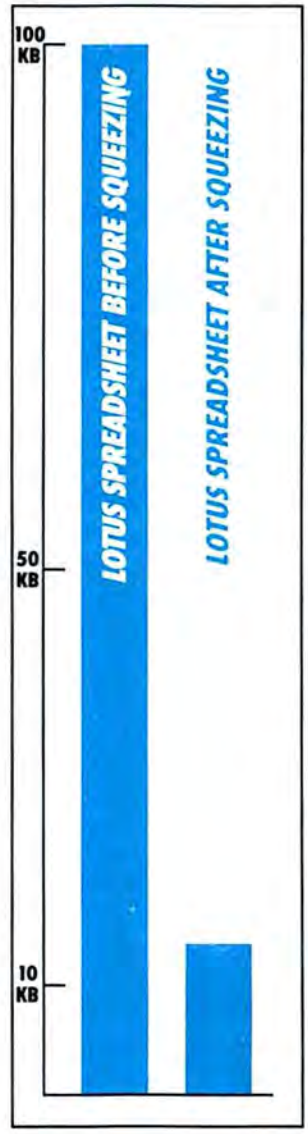

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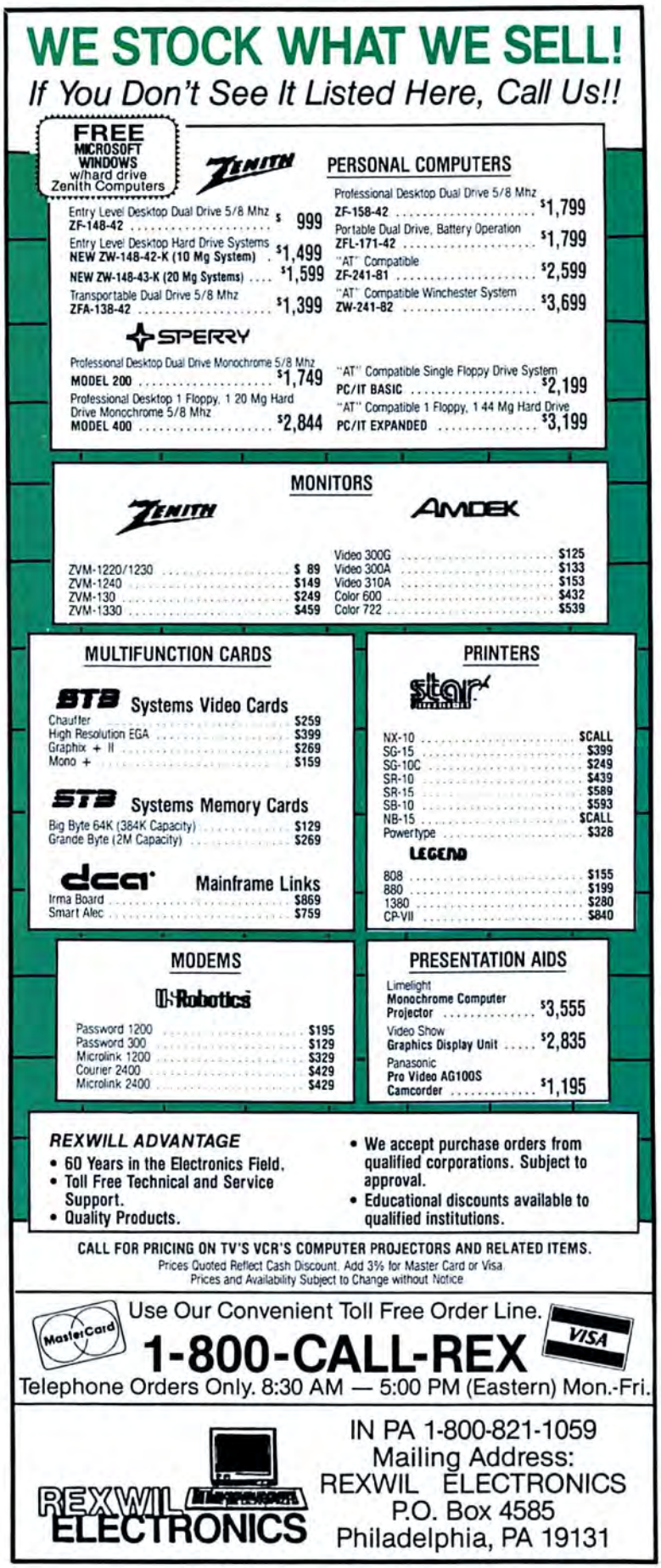

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Table 1 compares the speed of SHELL.BAS to the JSORT21 and JSORT31 routines. Under interpreted BASIC the Shell sort is slightly faster than JSORT31, but when compiled it performs about six times more rapidly.

Aside from the obvious speed improvement, the Shell sort is usually preferred over the Quicksort used in JSORT31 because it relies on very simple logic and doesn't require auxiliary arrays.

Martin Knebel
New Milford, New Jersey

Editor's note: Thanks also to reader Dallas Vordahl of Spokane, Washington, for providing similar insights about sort algorithms.

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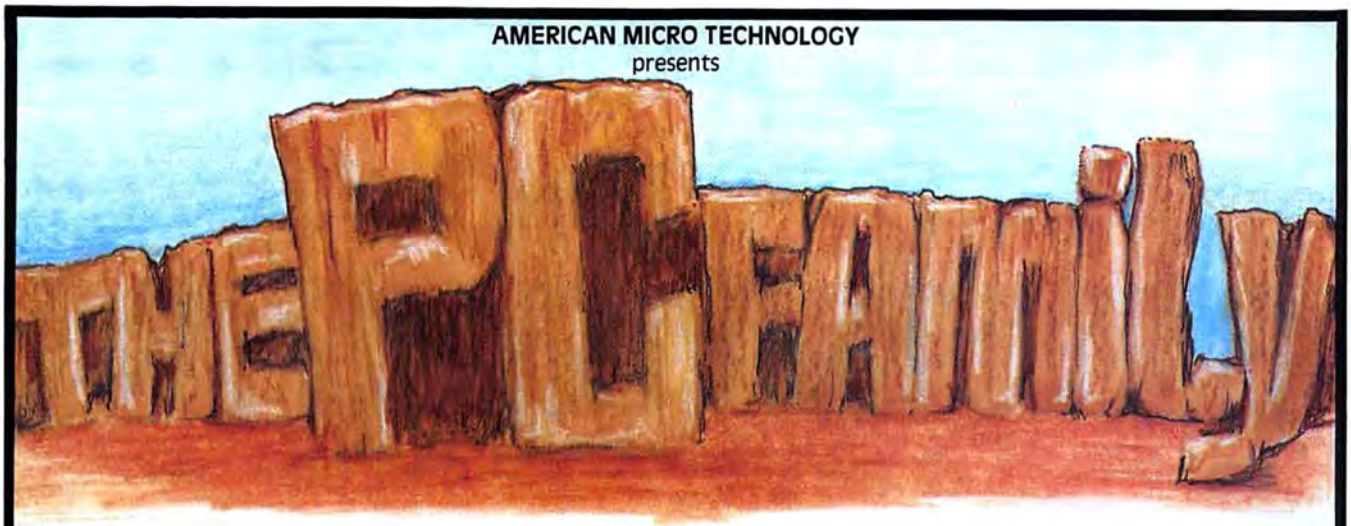

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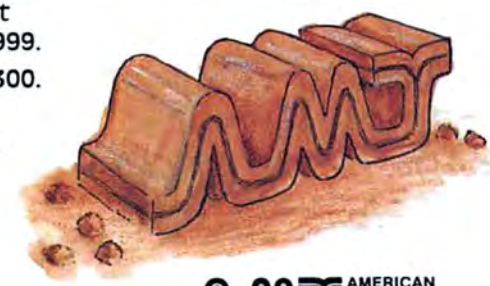

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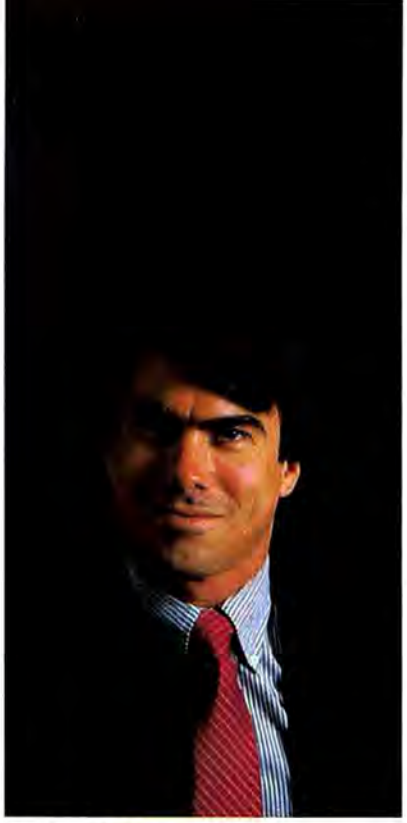

Kevin Strehlo

The Copy-Protection War

The adversaries in the costly battle over copy protection are fighting for the same elusive goal: a scheme that thwarts the pirate without disabling the honest user. But peace is nowhere in sight.

Michael Brown sits in his office in Portland, Oregon, as the latest version of *Copy II PC* comes in over the phone lines. About once a week Brown's wizard on PC copy protection, who works full time at home and prefers to remain anonymous, sends in an update. As Brown receives this week's file via modem, he chats about how he got into the business of cracking copy-protection schemes back in the early days of personal computing, when Apple IIs had just gotten disk drives and *VisiCalc* was the hot new program in the Eugene, Oregon, computer store where he worked.

"We'd sell customers an Apple and a copy of *VisiCalc,* and they'd take them back to their shops, happy as clams," says Brown. "But next thing you'd know, they'd be on the phone complaining their disk wouldn't boot any more."

VisiCorp, the publisher of *VisiCalc,* charged $40 for a replacement copy, and because it was a new company that was growing faster than anyone had dreamed possible, the replacements could take two weeks or more to arrive. "It caused a real problem in the store. Customers weren't mad at VisiCorp. They were mad at us." Brown would open a *VisiCalc* package, swap the defective disk for a new one, and return the opened package as defective goods. "We sure had to stock a lot of extra *VisiCalcs.*"

Brown, who had studied computer science and electrical engineering in college and was curious about how a disk could be copy protected in the first place, was pleased when the store manager asked him to solve the problem. He wrote a routine that let him look at the data pattern on a *VisiCalc* disk and compare it to a disk that wasn't copy protected. He labored for weeks before he understood the logic that lay behind the altered pattern, but the rest was easy. Soon, when a customer walked in with a copy of *VisiCalc* gone bad, store personnel were able to use a program Brown had written to make a copy of the store's disk and send the customer back to finish his or her spread-

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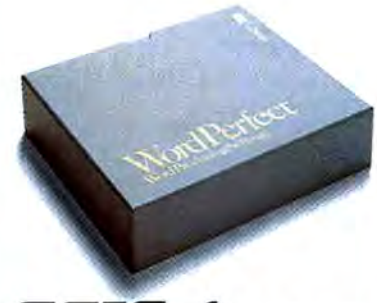

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sheet. When the first hard disks for the Apple appeared, the store could use Brown's program to copy *VisiCalc* to a customer's hard disk.

A locksmith ad in the local paper gave Brown the idea of selling his protection-busting program for extra pocket money. If a locksmith could make money picking locks for legitimate reasons, why shouldn't he make some by helping people defeat copy-protection schemes that locked them out of their own software?

Brown tracked down the nearest post office with an available P.O. box large enough to handle a healthy mail-order business and found it in Central Point, Oregon. He named his company after the tiny town on the rugged Oregon coast, but it wasn't long before the company had outgrown both the P.O. box and the town.

Cards and letters poured in, asking if he had a program that could defeat the copy-protection schemes of programs other than *VisiCalc*. Before long, Brown had untangled the protection schemes of the five next most popular copy-protected programs and released version 2 of his protection-busting program.

Central Point Software now grosses about a million a month, but Brown still finds time to do the nitty-gritty, low-level routines that crack new copy-protection schemes on the Apple II. Program updates for the PC he leaves to his anonymous employee. "Once you get a certain level of expertise, it's tough to pass it on," Brown says. "In order to be efficient, you need to have looked at hundreds and hundreds of schemes. It's a matter of pattern recognition, like getting good at chess. It takes me about 15 minutes per disk now." Most novices to protection busting would take up to a week to crack a single scheme, if they managed to do it at all.

Brown smiles when asked if the battle to defeat new schemes is never-ending. The version of *Copy II PC* that he is receiving over the phone, he says, can defeat the copy protection of about 150 programs. And Central Point's new $95 accessory board for the PC, PC Option, can copy virtually anything.

"The people who develop copy-protection schemes are telling the press we've escalated the battle by bringing in hardware," Brown says with a laugh, and then turns serious. "The sad thing is that Central Point Software and the companies that sell copy protection are the only ones who really win in this war. It's the user who loses."

Joe Diodati, vice president of marketing for Santa Clara, California-based Softguard, has a lot of respect for Michael Brown, his company's chief foe in the perpetually intensifying copy-protection wars. He likes Brown's inclusion of the "Thou Shalt Not Dupe" poster with *Copy II PC*, which discourages use of the program for software piracy. And he's acutely aware that without opponents as tough as Brown his company would feel less pressure to improve its product.

(continues)

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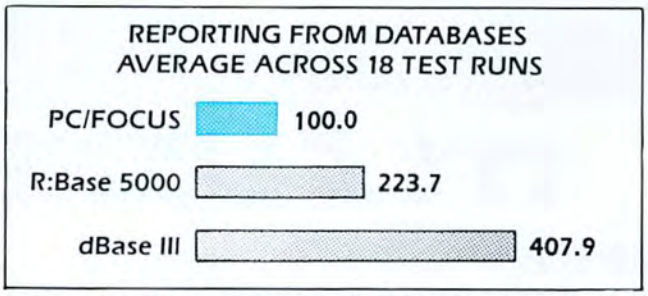

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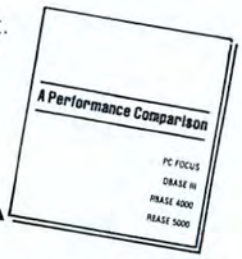

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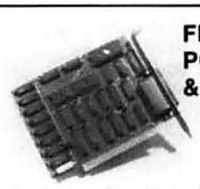

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Softguard's product, of course, is Superlok, the leading copy-protection program among developers. The company won the business of Lotus, Ashton-Tate, and Ansa, among others, by giving users a less troublesome copy-protection scheme.

While Superlok makes reorganizing a hard disk or changing computers a pain in the neck, the program is nonetheless deemed more tolerable by many than the key disk solution that preceded it. The key disk scheme required you to insert a floppy in drive A: whenever you started a protected program from your hard disk. Hard disk users resent having to handle floppies after paying all that money for a hard disk. And Softguard's process is more reliable; hardware that is slightly out of kilter only rarely has a problem installing, running, or uninstalling the copy-protected files.

Softguard's latest improvements are minor ones, says Diodati. Installation and uninstallation are marginally faster. More important, release 3.0 of Superlok allows people to back up and totally restore a hard disk—a process that consolidates the files that DOS has strewn across the disk—improving disk access time and freeing up wasted space, as long as that hard disk hasn't been reformatted.

But that still leaves people who suffer hard disk crashes out in the cold. Because crashed disks are almost always reformatted in the course of bringing them back to life, one of the two installations allowed on programs protected by Superlok will be lost—it's unavoidable. No program running under DOS can tell the difference between a reformatted disk and a completely different disk. If Superlok tolerated reformatting, it couldn't prevent copying programs to other machines.

Diodati says company staffers thought they were onto the big breakthrough several times—a copy-protection scheme that would not inconvenience the honest user and would thwart the pirate—only to discover some gaping hole in the protection, or an unforeseen inconvenience to the user, or prohibitive costs. He smiles at a recent story that quoted an unnamed Softguard executive as saying the company's forthcoming release would foil all attempts to make a copy.

"Anyone who says he has a foolproof copy-protection scheme is a fool himself," says Diodati. "There's always a bigger gun in town."

Softguard is continually testing new schemes against the dozen or more protection-busting programs. The final test is Central Point's PC Option board, and no scheme has yet passed.

What it comes down to is this: Diodati doesn't think it is possible to prevent all illegal copying without causing inconvenience to users, but that remains the ultimate goal. And if Softguard ever comes up with that perfect scheme, Michael Brown has sworn he will not attempt to

(continues)

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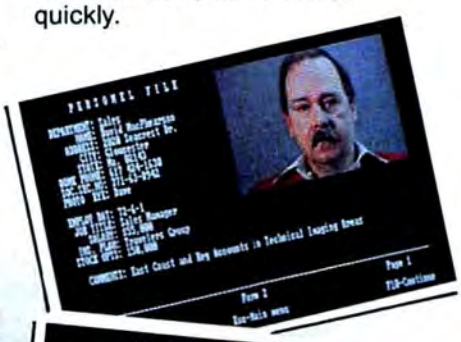

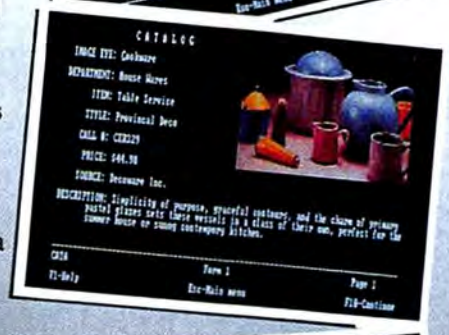

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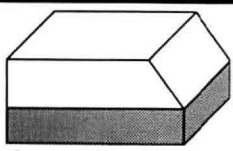

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break it. There would be no reason to do so, he says. Even Central Point has spent much effort chasing the elusive perfect scheme, to no avail.

And so the war goes on, with ever more elaborate schemes fired back and forth over the users' heads. Only an occasional unlucky soul is grazed, but all the rest spend time and money dodging the bullets.

Meanwhile, on another part of the battlefield, a new breed of software publisher is emerging, modeled on Borland International. Selling solid, useful software at low prices and saying you're on the user's side in the copy-protection war is part of the mold, and Dave Alderman of Cupertino, California-based Guaranteed Software fits it.

Alderman himself is a longtime user of *Copy II PC*. He has bought six upgrades of the program at $20 a crack and really gives the software a workout. A software junkie, he buys the latest software to see what the competition is up to—and to satisfy his own lust for play. The first thing he does after opening a new package is to make a copy of it using Central Point's most recent release.

Yet the first software Alderman designed and published for the PC, a program called *Bakup*, was copy protected; Alderman also got a bid from Joe Diodati to protect his latest, a hard disk utility called *Arkive*. "I thought about copy protecting it, but, to be honest, only so we could charge more for an unprotected version, the way Borland does," Alderman says.

Alderman thinks people would pay the extra money, since feelings run so high against copy protection in the user community. But he decided against protection because he couldn't afford the amount of time, money, and effort he would have to spend helping users cope with it.

Most of the calls that came in on Alderman's earlier program, *Bakup*, were about copy protection. Some of the calls were legit, some weren't, but the company had to field them all.

"One guy called and said he couldn't understand why he was having trouble," Alderman says. "He had installed the program on three of his hard disks, but now the program was telling him he didn't have any more installations, and he was mad."

When Alderman explained he was obligated to pay more money if he was using the software on more than one machine, the guy became really irate. "Copy protection is supposed to stop people who hand out copies to lots of other people," the man told Alderman. "It's not for me. I'm just a poor real estate broker."

Alderman still laughs at the thought of the poor real estate broker with five PC XTs in his office.

But the stories Alderman heard from many more users were on the up-and-up: PC AT hard disk crashes; installation errors caused by floppy drives that had drifted slightly out of alignment; and the sad story of a man who had lost all the allowed installations on a piece of IBM-branded software. He called IBM to see how much a replacement copy would cost, only to discover that IBM had no policy on selling disks to users whose program disk and backup had both gone bad. And running into an area where IBM has no policy is like running into a brick wall.

The documentation of *Arkive* touts the fact that Guaranteed Software trusts its users enough to sell its programs unprotected. "But that's just an attempt to turn what was essentially a financial decision into a virtue," Alderman admits.

It has been said that the root cause of war is money. The copy-protection war is no different, says Alderman. He just can't afford to wage it. No, he says, it won't end with the invasion of the new breed of software publishers. The war will go on as long as there is money to fight over. And there will be money to fight over as long as there are users willing to fork it over despite the bullets whizzing over their heads. ●

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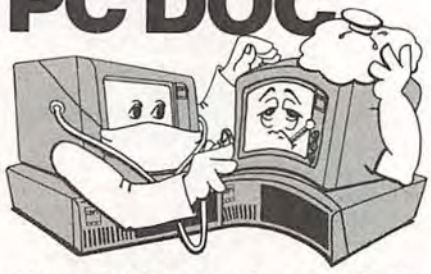

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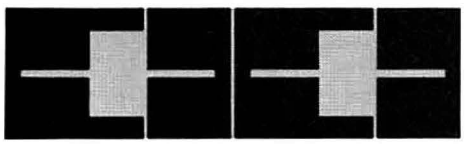

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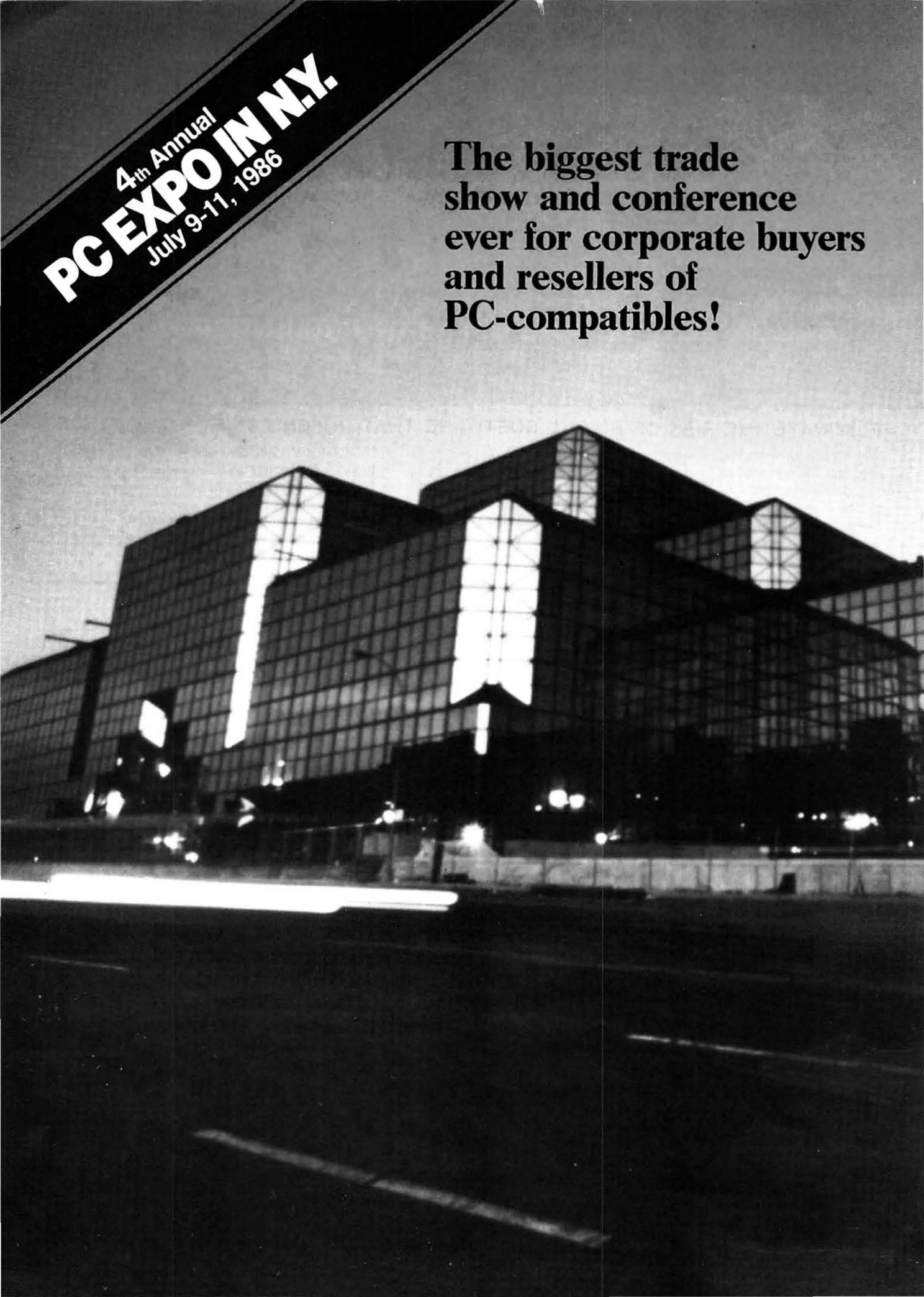
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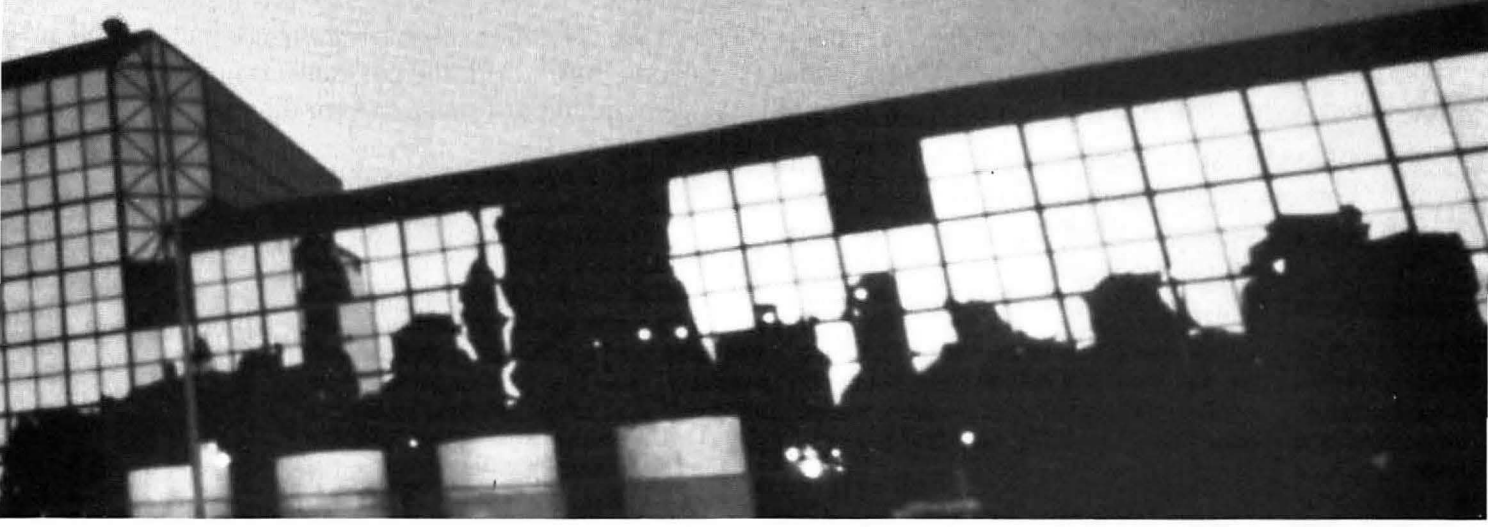

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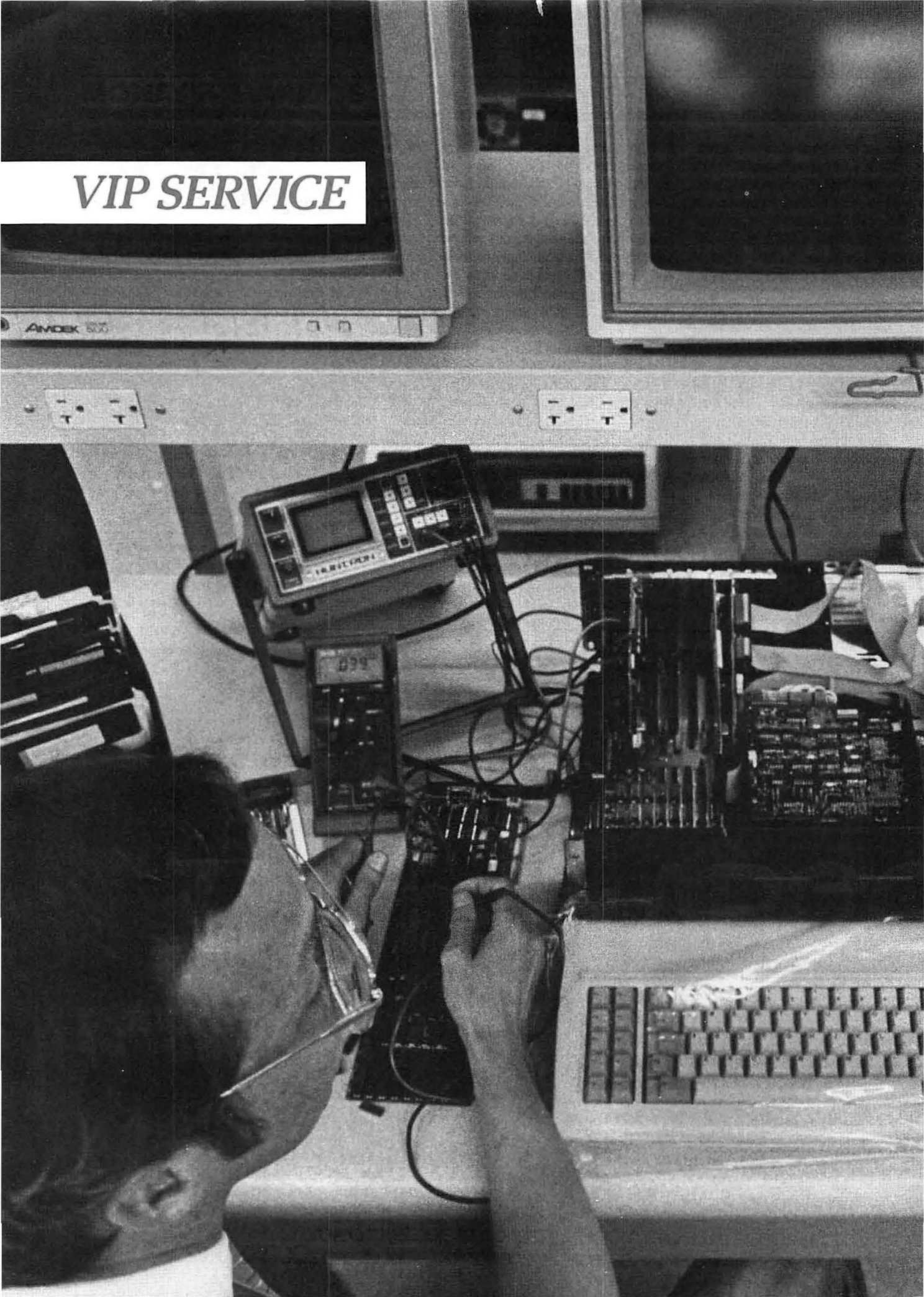
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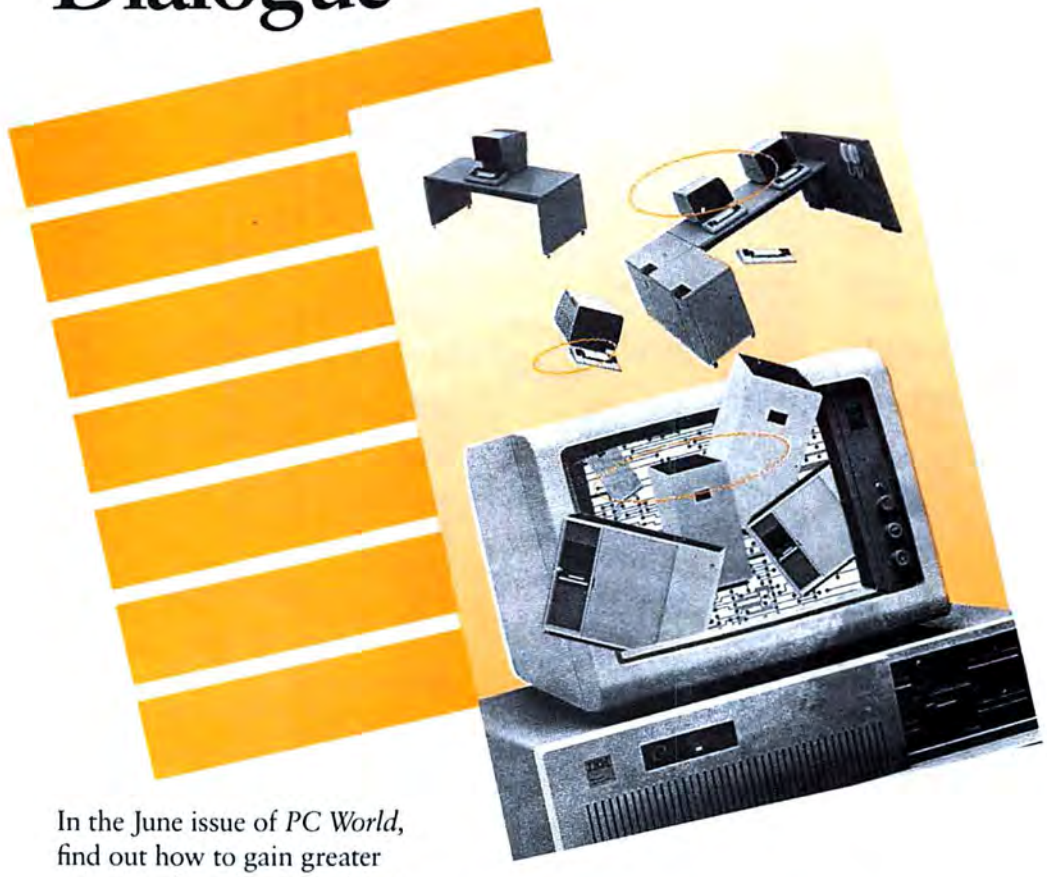

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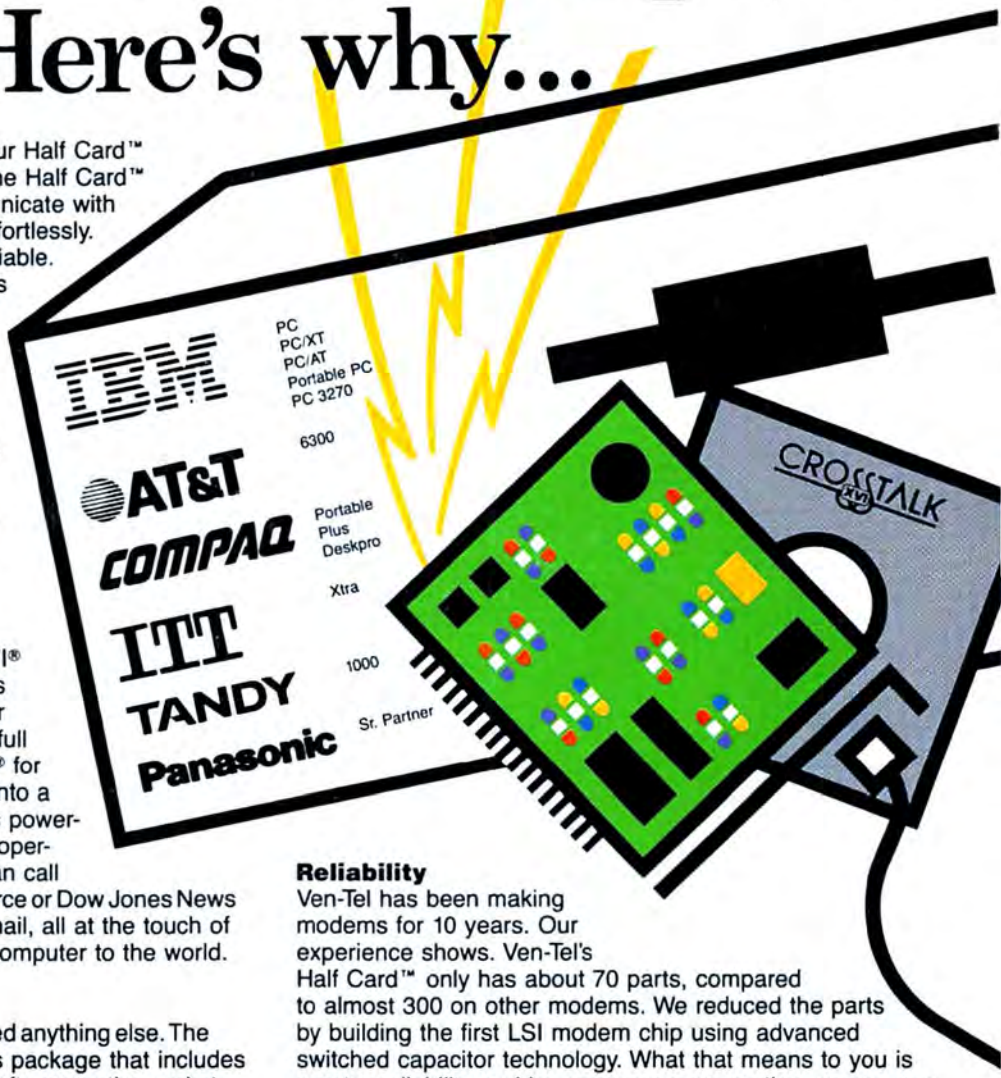

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