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# PC WORLD

January 1988 \$2.95

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*The Business Magazine  
of PC Products and Solutions*



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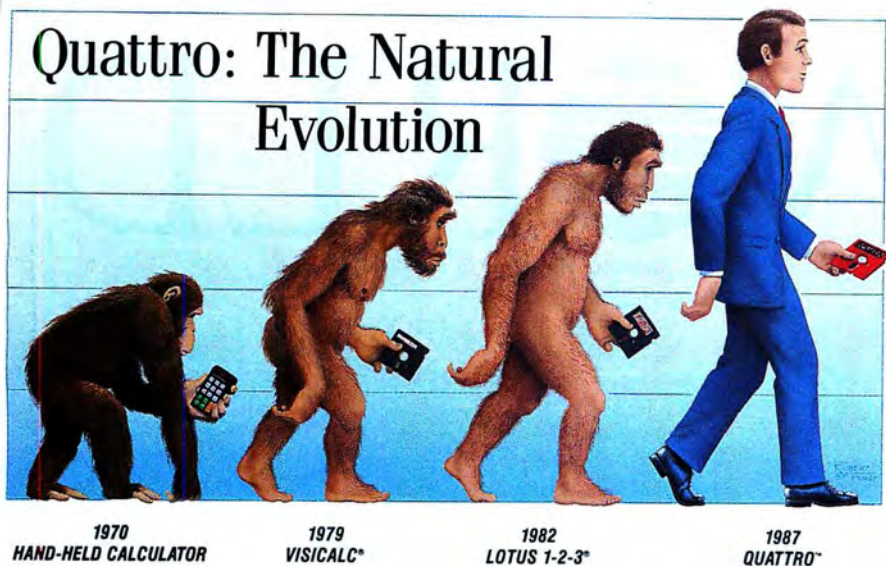
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# Quattro: The Natural Evolution



**Get Quattro, the new generation spreadsheet for only \$195.00**

Quattro is so advanced it's easy to use, and it's less than

half the price of 1-2-3. It's compatible with all your existing 1-2-3 files—but it makes everything in them look better, print better, and makes your work go faster.

## Quattro: The New Generation Spreadsheet

FEATURE		QUATTRO	LOTUS 2.01
SPEED	ReCalc Cash Flow Model (5K cells)	.27	2.90 sec.
	Delete Row 15K cells (Recalc Time)	.76 sec.	2.38 sec.
	Load File (15K cells)	15.9 sec.	19.8 sec.
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GRAPHICS	Presentation-quality Graphics	YES	NO
	Graph Types	10	6
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VERSATILITY	User-modifiable Menus	YES	NO
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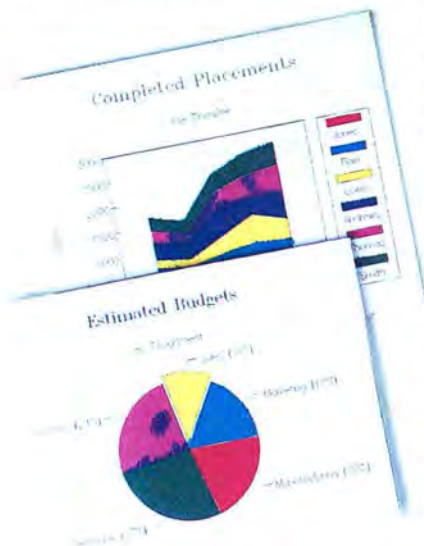
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# With Quattro, So

**Q**uattro," our new generation professional spreadsheet proves there are better and faster ways to do everything. To do graphics. To recalculate. To do macros. To save and retrieve. To search, sort, load. To do anything and everything that state-of-the-art spreadsheets should do.



## Technical superiority means product superiority

Lotus Development, makers of 1-2-3,\* is bigger by factors than Borland. Bigger, not better. Technical superiority is a Borland trademark, and Quattro is fresh proof that it produces a better product.

Once you've seen or used Quattro, you'll be convinced, because Quattro's faster than 1-2-3, has much better *quality* graphics and a far greater *variety* of graphics than 1-2-3.

For the IBM PS/2™ and the IBM® and Compaq® families of personal computers and all 100% compatibles

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## Quattro gives you presentation-quality graphics

Quattro brings new highs in quality graphics to your spreadsheet. It also brings new variety and diversity to the kinds of graphs and graphics you can produce from your spreadsheet, and you can produce hard copy of your graphics—with either printer or plotter—*directly* from the spreadsheet without leaving the spreadsheet. All you do is hit "Print." Quattro makes it easy to get hard copy—and you don't have to buy a separate graphics program.

## Naturally, Quattro: has PostScript support

Quattro is state of the art, so of course it supports Postscript™—now the industry standard. Quattro merges desktop publishing into spreadsheets, lets you use tomorrow's technology today, and gives you access to all the latest laser printers and the professional results they provide—which make both you and your work look good.



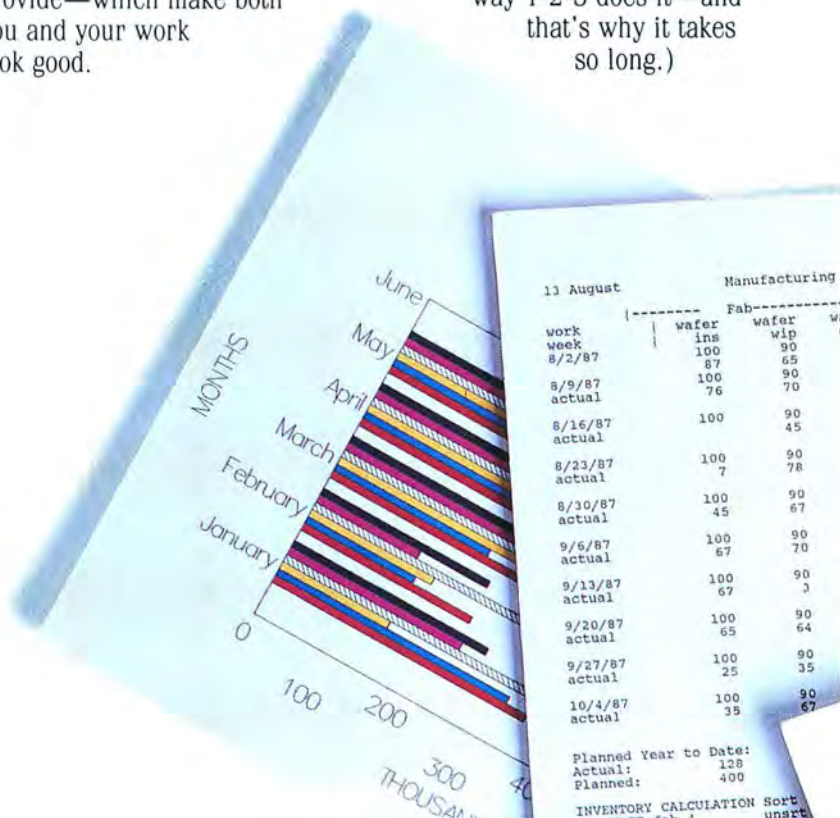
"What we show you"

## Quattro recalculates a lot faster than you-know-who

The smartest and fastest way to recalculate a spreadsheet is to do what Quattro does, something called "intelligent recal," which in English means you only re-count the numbers that count.

In a spreadsheet, not all numbers are born equal, and changing one number doesn't always change *everything* so Quattro recalculates just the formulas that matter, not all the formulas it knows. (You wouldn't reshoot a whole movie just because you changed one scene,

but unfortunately, that's the way 1-2-3 does it—and that's why it takes so long.)





# Seeing is Believing



"What they show you"

## Quattro demystifies Macros and makes your work go faster

Using macros—electronic shortcuts—is easy with Quattro. Quattro offers a complete macro debugging environment and puts you in control as you "single-step" or fast-forward through your macros. Quattro's "Macro Learn Mode" lets you record macros as you work—which is something 1-2-3 users have been waiting for—and the wait is over.

## You can't lose with Quattro

If you forget to close and save your spreadsheet—or a power outage shuts down your computer—all is not lost. Quattro automatically keeps track of every change you've made to the spreadsheet during the session, so if disaster strikes, it misses.

## Quattro lets you build your own menus

Quattro includes a Menu Builder that lets you customize menus. Coupled with macros, this application development feature allows you to create dedicated applications quickly and easily.

## You know how to use Quattro

You can tell Quattro to respond to 1-2-3 commands. You don't have to learn a whole new

program. Quattro works directly with all 1-2-3 file formats. No importing/exporting or macro translation is required.

Quattro can also directly load and save ASCII, Paradox,\* and dBASE,\* files.

Compatible with 1-2-3? Yes.

Faster than 1-2-3? Yes.

Technically superior to 1-2-3? Yes.

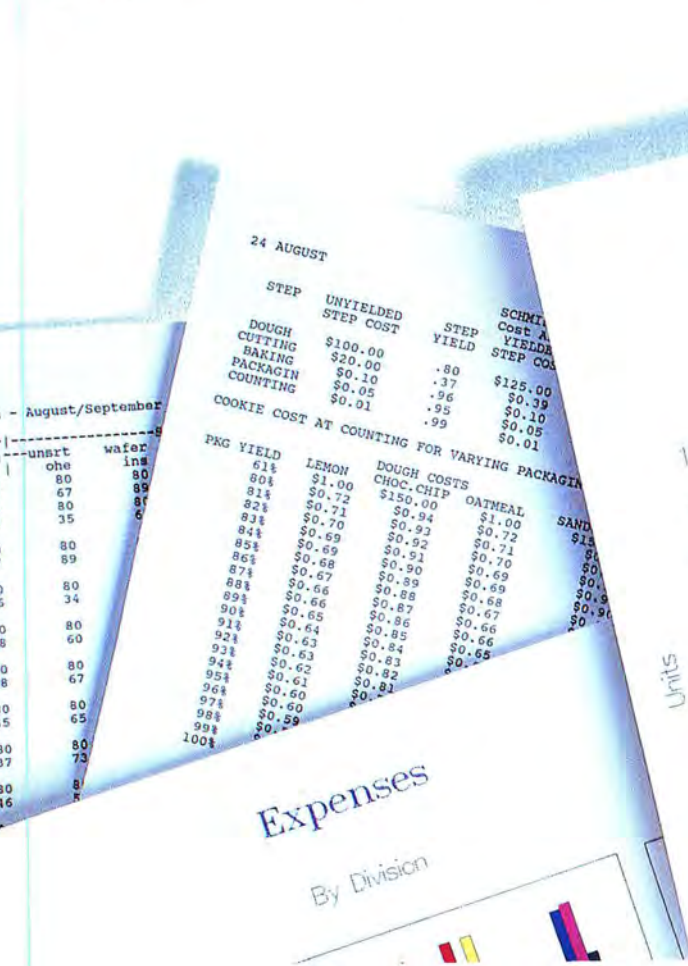
Half the price of 1-2-3? Yes!

**“** A formidable competitor to Lotus.

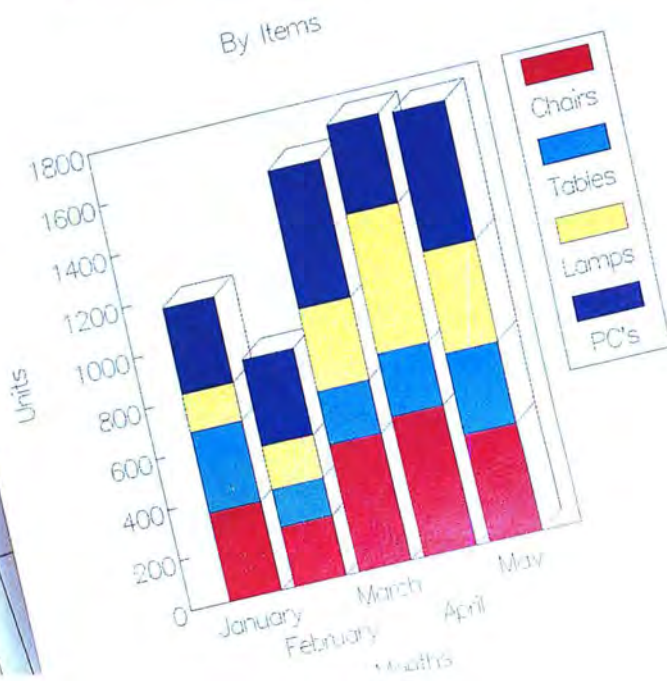
John C. Dvorak

This is the first time a major software company has taken on Lotus on its own terms—namely speed.

Stewart Alsop **”**



## Inventory Levels





# PC WORLD

The Business Magazine of PC Products and Solutions  
January 1988



Cover  
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### A DAY IN THE LIFE

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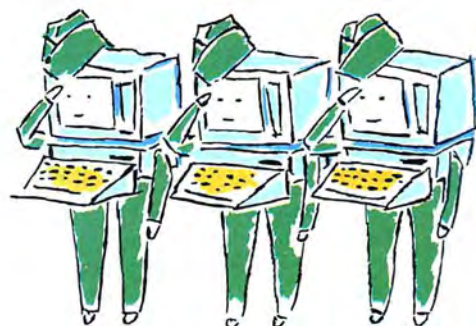
*So irresistible that people stole it, Ted Nelson's 1974 book is out in a new release.*





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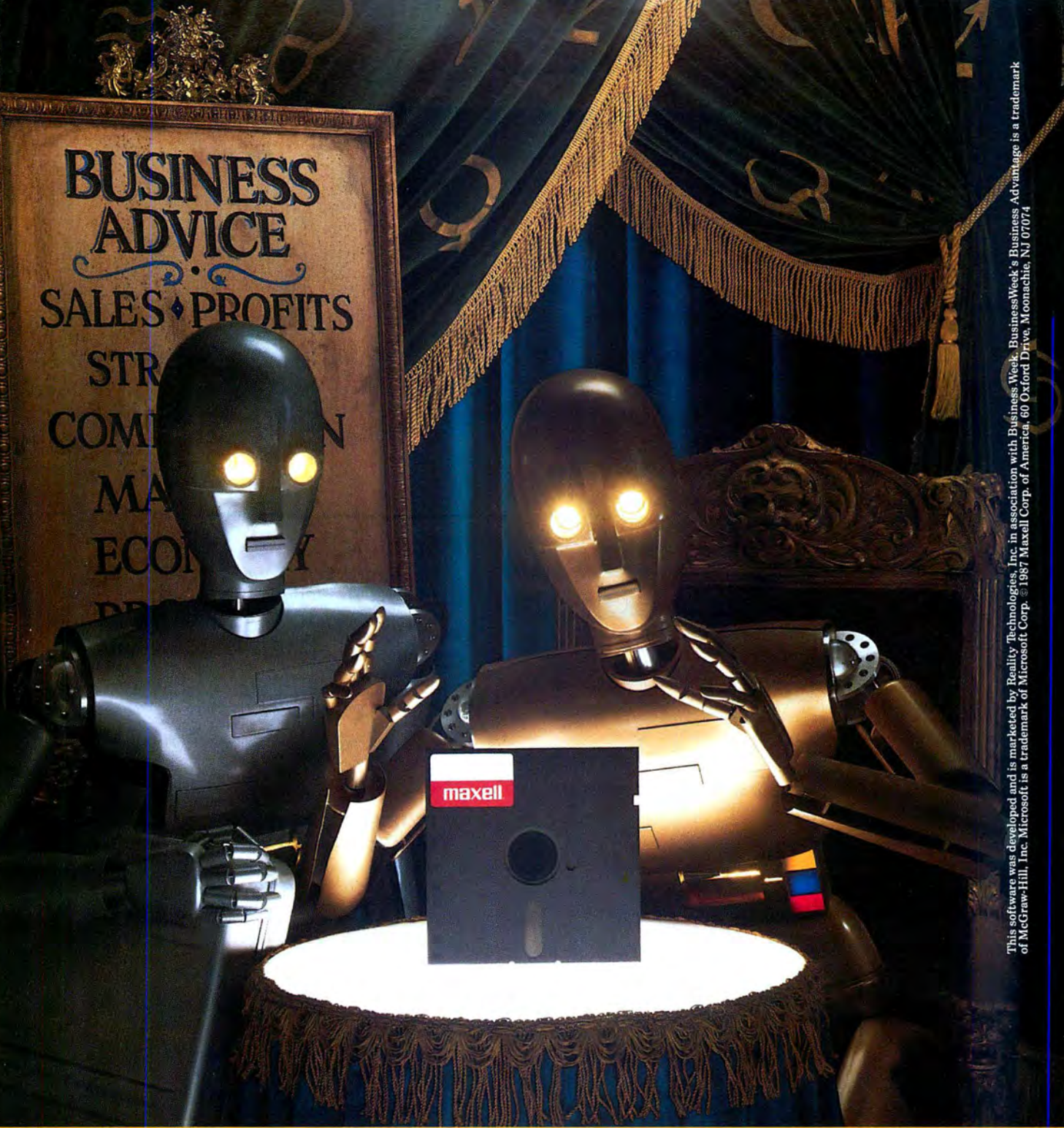
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**6/12 MHz**

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Circle 119 on reader service card



*Still compatible after all these years!  
As we celebrate the fifth anniversary of PC World, we take a fond look back  
and a fervent look forward.*

## TAKE FIVE

MS-DOS, you're still the boss!

David Bunnell

Happy fifth anniversary, *PC World*. To you readers who have been with us from the very beginning—and those of you who have joined us along the way—happy anniversary to you, too.

This magazine wouldn't have been possible without you.

Has it really been five years? Sometimes it feels like five minutes; other times, I think it's been five eons. In any case, reaching the five-year mark has been a real adventure. And the adventure is still unfolding.

Personal computing has changed dramatically since *PC World* was launched five years ago. The PC itself has grown up. We now have various LAN configurations to deal with, along with different micro-to-mainframe connections. We have much more powerful processors with 286 and 386 chips. We've conquered the 640K barrier. We have 100MB drives and very sophisticated output devices like laser printers. Business software has become incredibly powerful. AI-based software is now widely available.

Five years ago, average users had 128K of memory in their machines. They felt lucky if they had 10MB disk drives.

Those were the days, remember?

I recently let my fingers do the walking through our first





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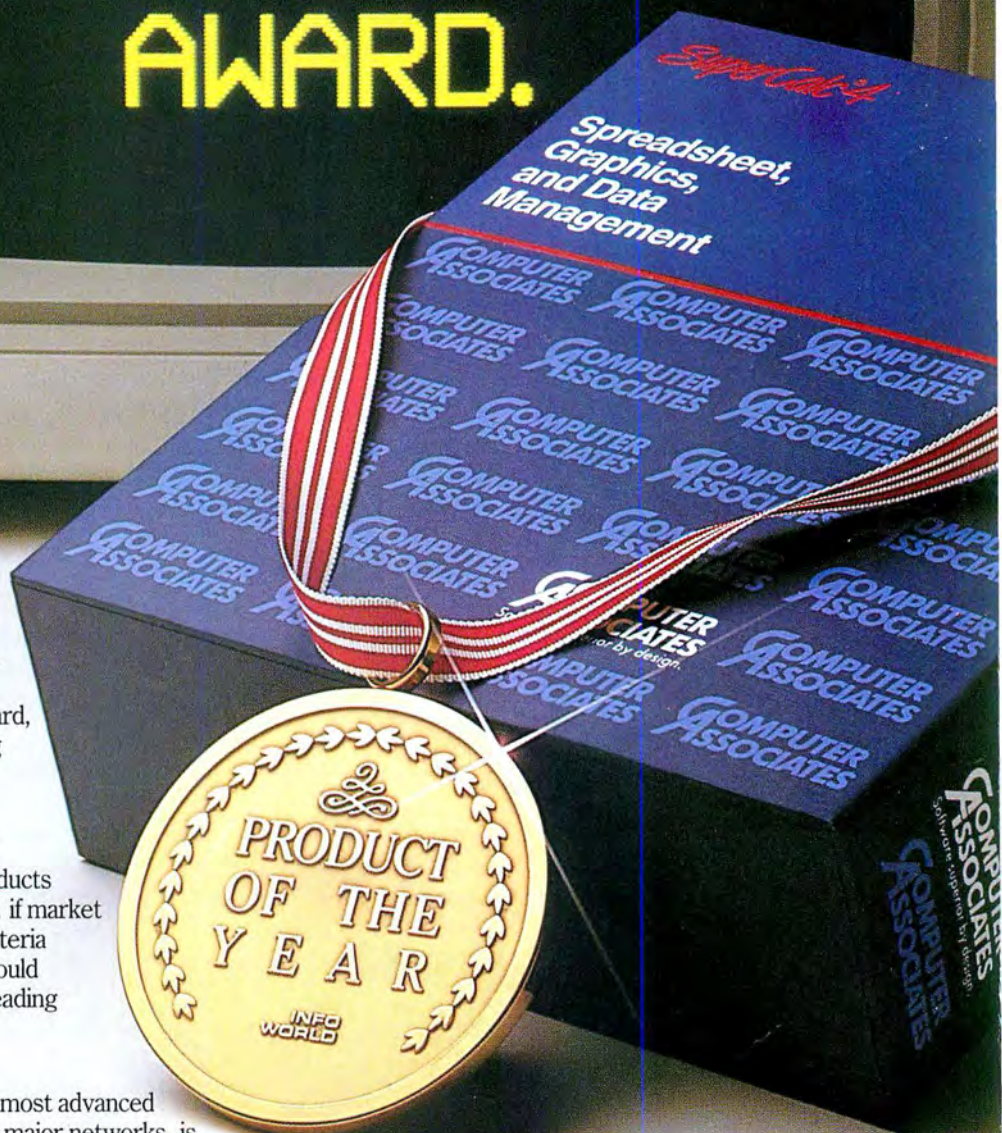
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Has it really been five years? Sometimes it feels like five minutes; other times, I think it's been five eons.



issue of *PC World*. At 324 pages, with over 200 pages of ads, it is the fattest premier issue in magazine publishing history. Flipping through those pages was quite a sentimental experience for me—something like “Peggy Sue Got WordStar.”

In my first editorial (“The Second Generation of Personal Computing”), I hailed the introduction of IBM’s 16-bit PC. At the time, only about 250,000 PCs were on the market. It has been estimated that by the end of 1987 there was a total installed base of over 15 million IBM PCs and compatibles—in the United States alone!

Our cover story that first issue was an overview of PC compatibility by Steve Cook, “How Compatible Is Compatible?” We also evaluated 21 PC look-alikes, most of which have since gone on to clone heaven. Who remembers the Eagle, the Corona PC, the Hyperion, and Seequa’s Chameleon?

One of our advertisers in the first issue touted its new product: “Meet 1-2-3—the remarkable new

The hardy band that worked night and day to produce the first issue of *PC World*. Of this group, 21 are still with the company after five years—a lifetime in computer magazine publishing.

software package that puts more raw power at your fingertips....” In that issue, too, there was a review of Microsoft’s exciting new program, *Flight Simulator*. Nostalgia buffs, please note the product’s stringent requirements: “64K, one disk drive, color/graphics adapter.”

Frankly, launching *PC World* was not unlike taking a daring *Flight Simulator* spin into the wild blue yonder. We got off to such a chaotic and unlikely start that it may be appropriate, on the occasion of our fifth anniversary, to recall that first amazing flight.

The story begins on November 22, 1982. I went to work Monday morning as the publisher of *PC Magazine*. I had started that pub-

lication in my house in the Sunset district of San Francisco with a little seed money from a New York City software entrepreneur named Tony Gold. In a short time we had hired enough of a staff to require renting an office. We found space on Irving Street above a Japanese restaurant.

Our little magazine had become a 400-page monster in just four issues. We were looking for a large company to buy the magazine or give us the cash we needed in order to sustain our momentum.

I bounded up the stairs in great spirits. Tony Gold had called the previous Friday to tell me he had struck a deal to sell *PC Magazine* to Pat McGovern, the computer publishing mogul who founded *Computerworld*, *InfoWorld*, and a host of other publications around the globe.

I was happy with the sale, my staff was happy, Pat McGovern was happy. He too had called on Friday, to congratulate me. The deal presumably met all of Tony Gold’s demands as well. I spent that weekend celebrating my good fortune.

But it was not meant to be.

When I got to my office, I saw two executives from Ziff-Davis, a big-time New York magazine publisher. Ziff had been interested in acquiring *PC Magazine*, as had a number of other publishing companies. When I saw them, I joked, “What is this, a sneak attack?”

They informed me that Tony Gold had sold the magazine to Ziff-Davis late Friday night. Apparently, after Tony had called me

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Frankly, launching *PC World* was not unlike taking a daring *Flight Simulator* spin into the wild blue yonder.

to say he'd reached an agreement with Pat McGovern, he met with Ziff's representatives one last time and ended up selling the magazine to them.

Cindy Hamburger, a *PC Magazine* staffer then who is now the production editor for *PC World*, recalls the arrival of the Ziff-Davis contingent:

"I was sitting at a café across the street from the office where we held regular 'information-exchange' meetings every morning. It was raining hard. I saw two guys in dark suits sitting in a car with its engine running and its windshield wipers going. They looked like hit men. All the staff were told to leave the office. About 10 or 12 people came out and started walking down the street."

Naturally, we felt deeply betrayed by Tony Gold. He had assured us that he wouldn't sell the magazine to Ziff-Davis without our consent.

We began meeting with lawyers that same afternoon to try to work things out. But prospects for a solution were nil. Pat McGovern had just flown to San Francisco from Japan and called to tell me he was very upset by this turn of events. He invited me to meet him at the Miyako Hotel and said, "I want to help you start a new magazine."

That night we began our discussions. By Friday of that week, I had signed a contract with McGovern along with Cheryl Woodard, a key associate of mine. We agreed to start a new company and to launch a magazine called *PC World*.

During that same traumatic week, Ziff-Davis called a general meeting of the *PC Magazine* staff.



The staff was informed that Ziff could guarantee them their jobs only until Christmas. Ziff also announced that the magazine's subscription fulfillment and accounting departments would be moved to New York City. Otherwise, it would be "business as usual."

*PC World* was officially launched on the Monday of the next week, November 29. That was the opening day of the COMDEX computer show in Las Vegas, the biggest event in computerdom. At that moment we were 12 people whose only office consisted of the aisles at COMDEX.

Armed with makeshift rate cards and business cards, a good story to tell, and plenty of chutzpah, we worked our way up and down the aisles from morning until evening, talking to every computer company exhibiting PC-related hardware and software. At night, we continued our work at various industry parties.

I think it's fair to say we were the cause célèbre at COMDEX that year. By contrast, the *PC Magazine* booth, which Ziff-Davis had expected us to staff, stood empty.

While at COMDEX, we received commitments for over 100 pages of ads for *PC World*'s first issue.

When we returned to San Francisco, we discovered there had been a general exodus of staff from *PC Magazine*. Out of a staff of 52 people, 48 had jumped the Ziff-Davis ship. *PC World* hired all of them.

It was tough going at first. Without our Irving Street office, it was back to my dining room table at home. Eventually we opened temporary offices, but we had to start from scratch. Even though Pat McGovern was bankrolling us, we still had to go out and buy everything ourselves—furniture, computers, filing cabinets, art tables, even paper clips.

Our most urgent task, however, was to create an entirely new magazine. From the beginning, our goal was to be different from *PC Magazine*. *PC* was product-oriented. We intended to make *PC World* solutions-oriented. We were the first computer magazine to cover the clones and the compatibles that were just beginning to appear on the market. We immediately decided to focus on all the MS-DOS machines.

Meanwhile, Ziff-Davis slapped us with a lawsuit to prevent us from publishing *PC World*. Ziff contended, among other things, that the use of *PC* in the title *PC World* violated its legal rights. Our lawyers advised us that the faster we could bring out *PC World*, the better our chances would be to stave off Ziff's maneuver.

Miraculously, we managed to publish our first issue on the very day that a preliminary hearing was held in San Francisco Superior





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Court. As it turned out, Judge Ira A. Brown dismissed Ziff-Davis's request for an injunction against us—and the rest, as they say, is history.

One of the best things that happened to me that first week was that Andrew Fluegelman, a talented contributor to *PC Magazine*, decided to join us as editor of *PC World*.

Andrew created the concept of freeware with his program *PC-Talk*. He was an excellent writer and a terrific editor. He had worked with Stewart Brand on the *Whole Earth Catalog* and had self-published a dozen special-interest books. While I was tied up with the Ziff-Davis lawsuit, he helped pull the magazine together.

(Andrew, who died in 1985, is listed on our current masthead as *PC World's* founding editor. In his memory, we've set up the Andrew Fluegelman Fund for the best contribution to freeware. The award is presented each year at the annual meeting of the Software Publishers Association.)

As we got down to the business of regular publication, life became a blur of frantic activity. The staff worked nights and weekends. They even brought sleeping bags to the office so they could catch an hour or two of sleep. A rare spirit of dedication fueled our enterprise.

That commitment has a great deal to do with what *PC World* is today. It has produced a strong magazine with a big heart—a courageous magazine.

*PC World* was born in a spirit of rebellion. We've expressed that spirit over the past five years, and we will continue to do so. We've



evaluated products carefully, and we've stood firmly on the side of users.

For example, we took a major stand against copy protection very early on. By surveying users, we discovered that the ability to copy software and pass it around might actually stimulate sales because users tend to buy the complete package with the updated manual. Our study made a huge impact on the industry, and we played a major role in helping to eliminate copy protection.

More recently, we challenged the Federal Communications Commission's proposal to increase telephone rates for on-line users. Partly as a result of our stand against this measure, the FCC chairman received thousands of letters and telegrams opposing the move. The plan has since been postponed.

As a footnote to our dispute with Ziff-Davis: We have been engaged in that same lawsuit with them since 1983. There have been repeated rounds of depositions and forays by battalions of lawyers. In fact, as you read this, I'm probably sitting in a courtroom in San Fran-

cisco, working to resolve our grievances. Stay tuned.

At the risk of sounding Pollyannaish, however, I must say that I believe our rivalry over the years has served a noble purpose. In effect, it has forced both publications to become better magazines. Both magazines are incredibly successful, and I think the market has benefited tremendously as a result.

Although we're celebrating five years of success, it hasn't always been easy. In 1983, the first year of the PC, the market was growing unbelievably fast. So many new companies were starting up, we had more business than we could handle. This period of growth allowed *PC World* to get off to a strong start.

But by the end of the year, we saw signs that the road ahead was rougher, with unexpected twists. For one thing, the *PCjr* proved to be a major disappointment. It just didn't have the impact that we hoped it would in the marketplace. And the home computer market never quite materialized.

At the time, *PC World* had an insert called *PCjr World*, which we hoped to spin off as a separate magazine. Unfortunately, we were unable to get the ad pages needed to launch it. I was the one who hung on to the idea the longest because I actually liked the *PCjr*. Every month Editor-in-Chief Fluegelman and Editor Harry Miller would come into my office and ask if they could kill *PCjr World*. I kept saying no, and clung to the publication long after I should have. Finally, it died.

*PCjr World* was really the first magazine idea I'd had that didn't





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**Circle 140 on reader service card**



PC World will continue to focus primarily on business applications, while other magazines will probably cover home and school applications.

make it—a sign that not all was well in the PC world. Then the Macintosh came out and challenged the PC. The Mac didn't exactly decimate the PC market, but it did create a totally new approach to computing.

From mid-1984 to the end of the year, the market seemed to slow down a lot. Then in 1985, it really hit the skids. A lot of magazines folded that year; a lot of computer companies were buried. IBM wasn't doing so well. Apple wasn't doing well either. For the first time in quite a while, things looked very bleak. Oddly enough, though, *PC World* had a very good year. We actually became stronger during this period and widely recognized as a leading magazine in the field.

Since then, the market has stabilized. In 1986, it became very healthy again. There have been many terrific new developments—the 386 machines, *Windows*, OS/2, CD ROM, and desktop publishing, to name a few. All these factors have contributed to keeping the PC world lively.

The recent stock market crash makes it difficult to say with certainty that 1988 will be a banner year. But we're prepared to cover, and address, whatever the market dictates.

One thing we will always be certain about: From the very beginning, our mission has been to provide the information you need to get more out of your PCs, to make buying decisions, and to help you implement your computing strategies.



Today, *PC World* stands proudly with you, our readers, just as we have since the beginning. We pledge to keep being rebellious, to keep pushing the standards, and to let the voice of the user be heard loud and clear.

We believe that we do these things better than any other personal computer magazine. And we don't intend to change our direction.

But where is our industry going in the near future?

If the first five years are any indication, we will continue to see big increases in power and memory and speed. We'll see the industry become even more multilayered and complex. It will probably split

off into specific categories. With their greater and more impressive capabilities, I think 386 machines will leave the 286 machines behind.

The whole world of MS-DOS is changing. We're already seeing low-cost MS-DOS machines, and no doubt the 8086 and 80286-based machines will live on in homes and schools. Increasingly smaller, cheaper, more dedicated machines will appear. Meanwhile, the 386, and eventually the 486, machines will evolve into super business workstations. These machines will become a major factor in the engineering workstation and CAD/CAM market.

*PC World* will continue to focus primarily on business applications, while other magazines will probably cover home and school applications.

I predict that in five years *PC World* will be even bigger than *Forbes* or *Fortune* in terms of circulation and revenue. We'll probably be close to the size of *Business Week*. No doubt *PC Magazine* will be right there with us. IDG and Ziff-Davis will come to rival Time, Inc., Hearst, and the other megapublishers.

By the end of the century, I expect *PC Magazine* and *PC World* to be two of the biggest magazines of all time. I'm proud to have started both of them. Both my babies are going to grow up to be monsters.

As for me, by the year 2000 you just might find me on a ranch in Montana, bar-coding my cattle. ●



# Meet The Press.



This year millions of PC users will cut and paste their way into desktop publishing. And the smart ones will control it all with the Key Tronic Touch Pad keyboard and Touch Pad templates.

The Touch Pad gives you the convenience of function keys and the versatility of a mouse without ever leaving the keyboard.

You can design layouts. Create and insert graphics. Reposition and resize text. And everything else you would do with a mouse.

You'll also save dozens of steps with the templates we've created for the

most popular desktop publishing programs. We've made shortcuts for PageMaker, and Ventura Publisher, in addition to Harvard Professional Publisher. Imagine that now you can wrap type around a visual like we've done in this ad with just one touch.

All without any mousing around.

You can also have templates that speed up frequently used functions for such programs as WordStar and Lotus 1-2-3. Or easily create your own.

There are a lot of desktop publishing programs for your PC. But only

*The versatility of a mouse with no mousing around.*

one easy way to use them. Put your finger on the Touch Pad keyboard and you'll see why.

For information and the name of your nearest Key Tronic dealer, call us at 1-800-262-6006. In Washington state call (509) 927-5515.

**key tronic**  
*The Responsive Input Company*



*Desktop publishing finally fits your desktop.*



## The Key Tronic Touch Pad Keyboard.

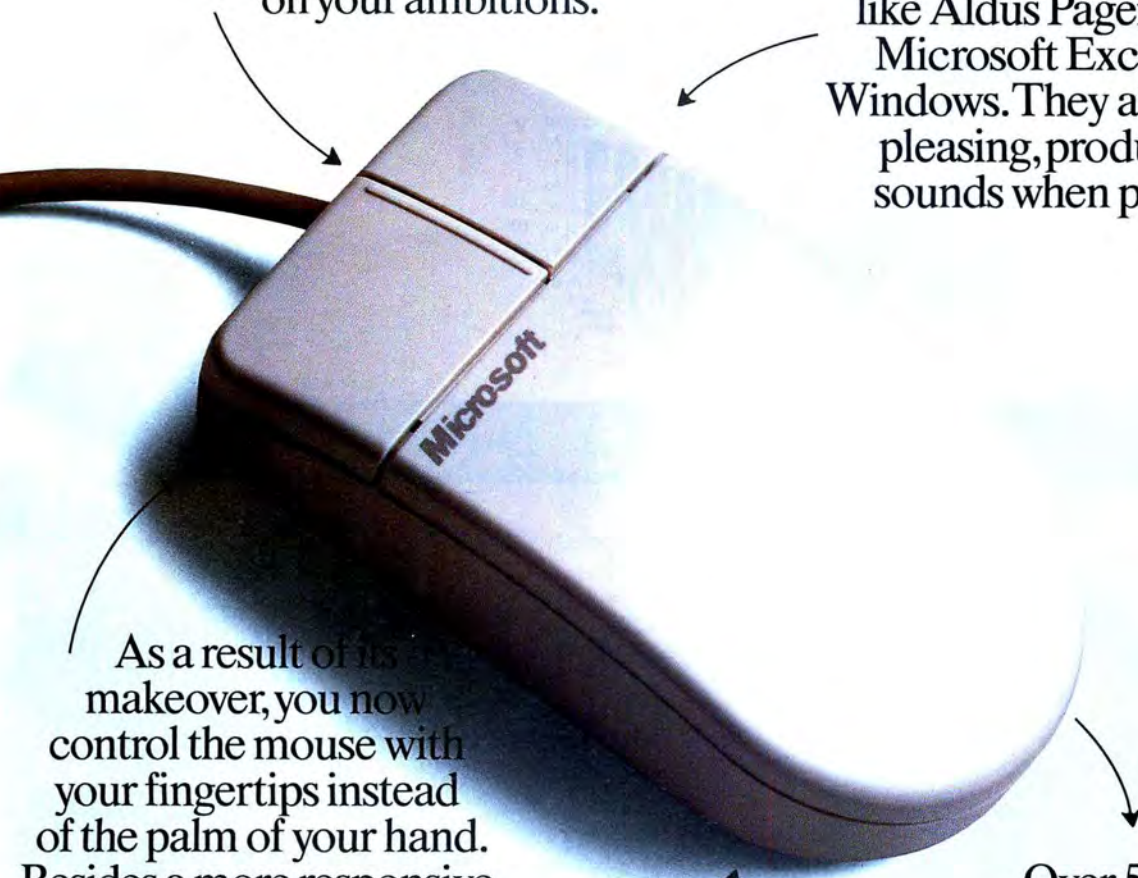
IBM PS/2 Compatibility Kits Available.

Circle 95 on reader service card



The new ergonomic design of the Microsoft® Mouse gives you a more comfortable way to seize control of your work. Or your company. Depending on your ambitions.

Smooth, subtle buttons can help you master today's newest programs like Aldus Pagemaker®, Microsoft Excel and Windows. They also make pleasing, productive sounds when pushed.



As a result of its makeover, you now control the mouse with your fingertips instead of the palm of your hand. Besides a more responsive, natural feel, this frees your palm to do something else.

Stylish plastic case is available in colors for every decor: white, white or white.

Over 500,000 people are already living life hand in hand with a Microsoft Mouse.

Microsoft Mouse is sold in three different packages. Get the mouse with EasyCAD™ or Windows 2.0 and PC Paintbrush® for Windows or Mouse menus and Microsoft Paintbrush. Available in serial-PS/2®, bus, and InPort™ versions.

## The Microsoft® Mouse

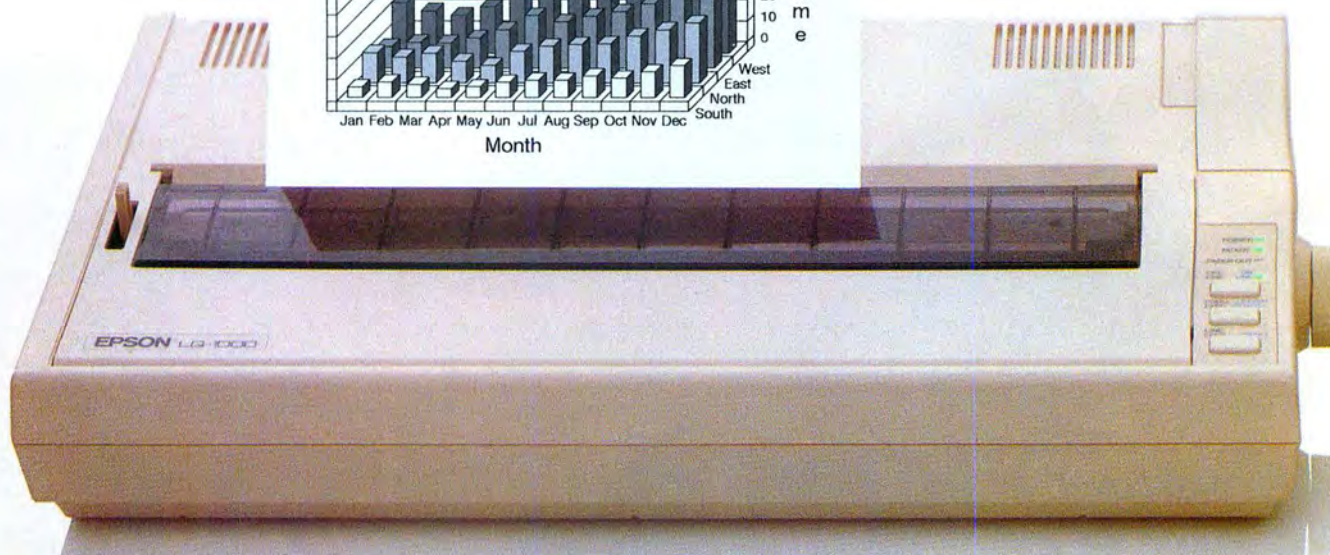
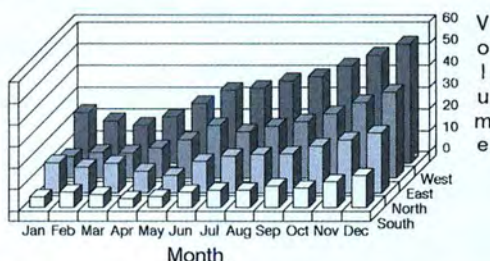
For the name of your nearest Microsoft dealer call (800) 541-1261, Dept. C21.

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# OTHERS PALE

## SHIPMENTS BY MONTH



The small printer on the left seems positively unexciting next to the new ALPS ALQ300.

And it's not just because of our colorful personality.

You see, the ALQ300 is a lot faster. It handles bidirectional graphics with flying colors. And for black and white work—spreadsheets, letters, you name it—the ALQ300

zips along as fast as 240 cps.

It can do more things. It has snap in/out 24- or 18-pin print heads. Multiple font cartridges. Paper handling extras like auto-

matic single sheet feed and bottom feed. And of course, it runs with all the most popular PCs and software.

It's much easier to use, too. Because you do everything

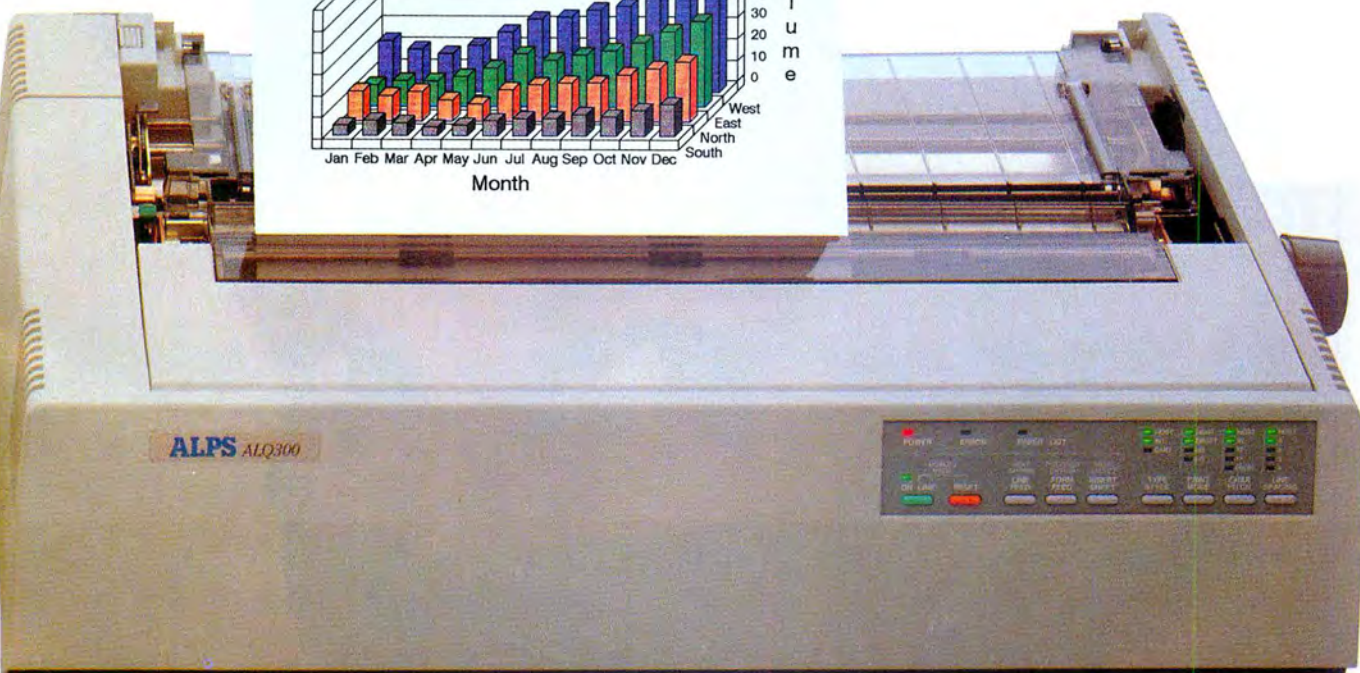
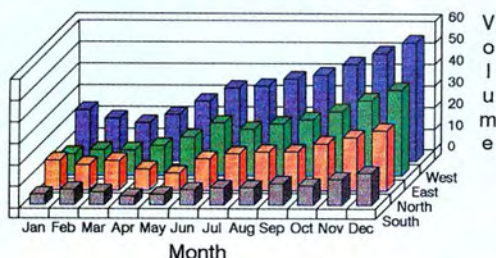
and both offer the same great features. The first dot matrix printers with resolution quality. They quietly print at speeds you're versatile. A full range of models, transparencies, multiple-part files, pitches and fonts.

*The ALQ300 prints everything from the letter quality text you see here, to high resolution graphics in seven colors.*



# Y COMPARISON.

## SHIPMENTS BY MONTH



on the front panel. Change type styles and print modes. Load paper. Even override your software. All without software commands or DIP switches.

You may have also noticed that the ALQ300 looks more substantial. It is. Treat it right and it'll run over five years without a breakdown.

You may also expect that the ALQ300 is more expensive. It isn't. Our 24-pin version has a suggested retail price of just \$995.

And our 18-pin model is \$100 less.

Now it's time to make your own comparison. Call us for a free demo or more information at **(800) 828-ALPS**. In California, (800) 257-7872.

And you'll find there really isn't any comparison to make.

**ALPS**  
AMERICA

**IT'S TIME YOU SAW THE ALPS.**

Circle 2 on reader service card

ALQ300 is a trademark of ALPS Electric Co., Ltd. ©1986 ALPS America.







# Now seriously, who would you rather have connect your PS/2 to your IBM network? Frank Burns or her?

The answer is obvious. And the answer is IRMA™ from DCA.

After all, what was the first 3270 micro-to-mainframe connection is now the undisputed industry standard. With more than half a million installations worldwide.

Now DCA is first again to introduce an alternative for those seeking the same ease of use and reliability from their IBM® Personal System/2™ models.

In fact, it was a mere 60 days after the PS/2™ announcement that we demonstrated IRMA's Micro Channel Architecture™ compatibility at COMDEX. And 60 days later that honest-to-

goodness PS/2 users started transferring data with IRMA 2™ and Smart Alec™, our micro-to-System 3X counterpart.

That's just the beginning. Other DCA connectivity products for PS/2s are shipping as we speak. Including IRMAX Multisessions™, IRMAX APA Graphics™, IRMA 3279 Graphics™ and IRMALAN DFT Gateway™.

What's more, we've already demonstrated connectivity products for OS/2™.

So before you make any connectivity decisions, talk to the communications experts who set the standard. Call us at 1-800-241-IRMA, ext. 520. **dca**

DCA is a registered trademark and IRMA, IRMA 2, Smart Alec, IRMAX Multisessions, IRMAX APA Graphics, IRMA 3279 Graphics and IRMALAN DFT Gateway are trademarks of Digital Communications Associates, Inc. IBM is a registered trademark and Personal System/2, PS/2, Micro Channel Architecture and OS/2 are trademarks of International Business Machines Corp. ©1987 Digital Communications Associates, Inc. All rights reserved.

Circle 53 on reader service card





# What we have here is a failure to communicate.

## Until now.

Ven-Tel would like to congratulate all IBM PS/2™ users. Now let's talk. Because a complete communications system for the IBM PS/2 has arrived.

Introducing the Ven-Tel 24/2™ Internal Modem for IBM PS/2 models 50, 60 and 80. This 2400 bps modem is fully Micro Channel™ and OS/2™ compatible. It's automatically configured by the system, so no option switches are needed. And, as an option, you can buy the 24/2 bundled with Crosstalk XVI® software.



Like all Ven-Tel 2400 & 1200 bps modems, quality and reliability are guaranteed by a *free* five-year warranty.

The new Ven-Tel 24/2 Internal Modem is in stock now. For the name of your nearest Ven-Tel dealer or distributor, call 1-800-538-5121.

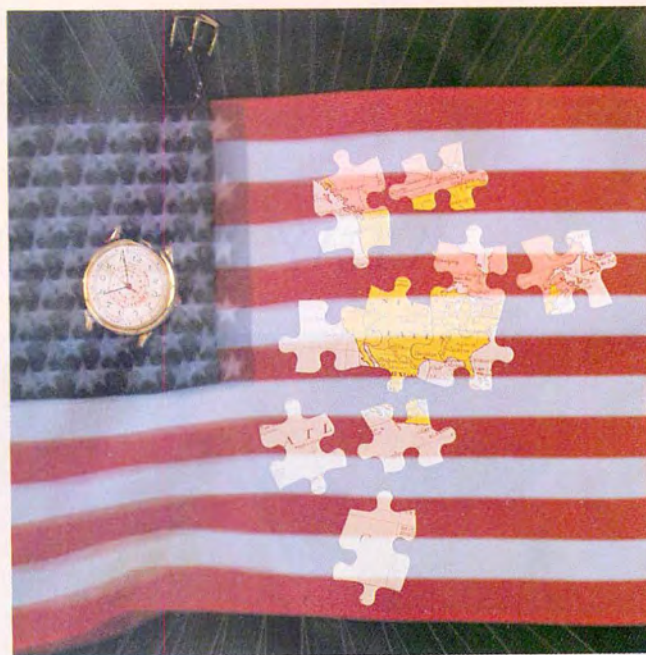
And start communicating.

**Ven-Tel**  
Modems

Micro Channel, PS/2 and OS/2 are registered trademarks of IBM Corporation. Crosstalk XVI is a registered trademark of DCA.

Circle 413 on reader service card



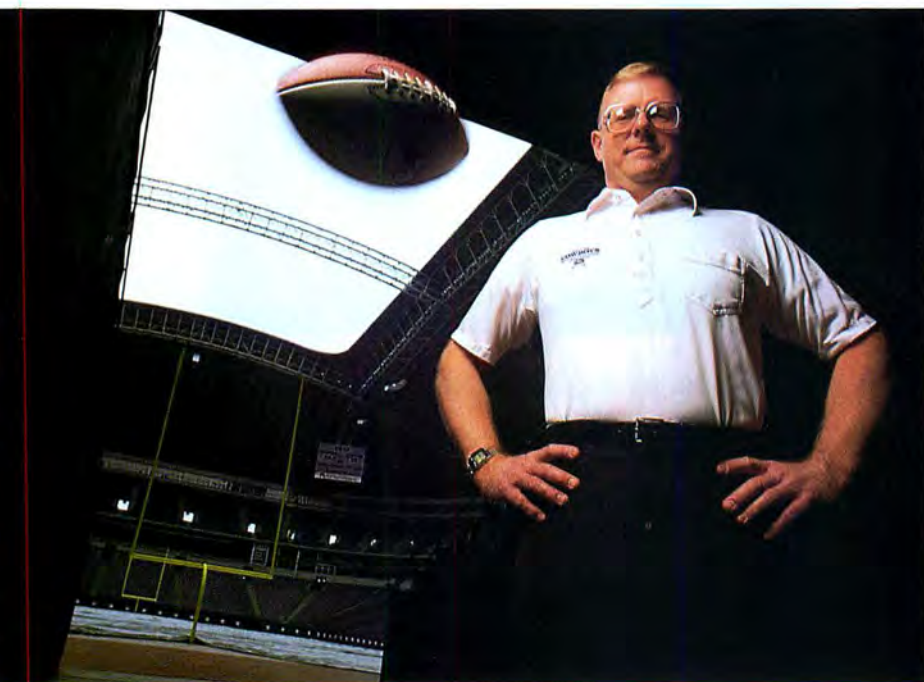


The PC is more than just silicon and steel. For some it is an obsession, but for most, it's the reliable machine that's changed the way they work—for better or worse. *PC World* meets the people who made it happen, who quietly continue to blaze paths, and who rightly ask: Can't we do it better?

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## A DAY IN THE LIFE



### ALLAN CARIKER *Irving, Texas*

When the Dallas Cowboys hold pregame strategy sessions, PCs are in the huddle. "That's where most of our secrets are," says Cariker, who runs the team's computer systems. "We use them to get inside the opposing coach's mind."

### JUDITH HARTMANN *Portland, Oregon*

Encouraged by computer trainer Judith Hartmann, Portland attorneys add computer skills to their zest for litigation. "You've got to be a cheerleader when you're a trainer," she says. "People have to feel good about what they're doing."

In one sense, the "user community" is no more a community than the folks who buy ad space in the Yellow Pages; they share a common tool, that's all. In fact, PC users have a lot in common: the same kind of knowledge, the same needs and frustrations. Beyond that, they are as diverse and interesting a group as exists anywhere. On these pages, you will meet scientists and lawyers, bankers and therapists, detectives and realtors. It's a community—of individuals.







## MICHAEL CAHLIN

*Los Angeles, California*

"If you had told me three years ago that I'd have anything to do with computers, I would have laughed in your face," says public relations specialist Michael Cahlin. "I still can't program my VCR."



## JULIE LEONG

*Portland, Oregon*

With her two partners, computer trainer Julie Leong has taught such diverse clients as Intel, the Army Corps of Engineers, and the Oregon Association of CPAs.



## MARK HELLINGER

*Los Angeles, California*

Turning his typesetting and book design skills into a cottage industry, Mark Hellenger has helped design many of Ashton-Tate's manuals.



## PETER LEWIS

*Austin, Texas*

New York Times computer columnist Peter Lewis was once a regular editor and reporter, he says. "Then the paper started selling an embarrassing number of computer ads, and they needed someone to fill up the white space."

*Photography by*  
MAX AGUILERA-HELLWEG





**JIMMY SUNSHINE**  
*New York, New York*

Helped by generous donations from the computer industry, Jimmy Sunshine's Variety charity distributes \$2 million a year to disabled, underprivileged, and sick children in the New York area.



**ALEX RANDALL**  
*Boston, Massachusetts*

Alex Randall heads the Boston Computer Exchange, the nation's largest secondary market for used and refurbished computer equipment. "When it gets busy," he says, "it's pretty wild around here, with people waving their fists at each other."





## CANDICE PAMERLEAU

*New York, New York*

"In the beginning was the PC," intones Pamerleau, who manages Metropolitan Life Insurance's information center in New York City. She now oversees 6000 PCs, not counting the laptops carried by the company's sales force.

## TERRY UDDEN

*Plainville, Massachusetts*

Visiting her clients in an elaborately outfitted van, Terry Udden runs her Decorating Den franchise practically from behind the steering wheel. A PC helps her follow changing tastes and orders.



## DANIELLE BARR

*Boston, Massachusetts*

Danielle Barr established the Bank of New England's first LAN in 1984 but says it intimidated people. "They were worried about security," she says. "Actually, we proved that a LAN is more secure than a stand-alone computer."

## DAVID SMITH

*Berkeley Heights, New Jersey*

Left a paraplegic by cerebral palsy, David Smith works as a research and design technician to develop aids for disabled kids, primarily in communications.



*Photography by  
BRITAIN HILL*





**RALF HOTCHKISS**  
*Oakland, California*

Drawing from his own experience, Ralf Hotchkiss uses AutoCAD to design light, strong wheelchairs for disabled people in Third World countries, then builds the prototypes in his shop.

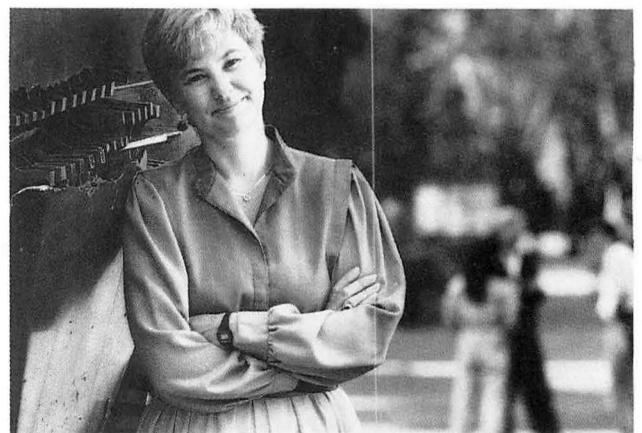
**STAN HONEY**  
*Menlo Park, California*

Where he once designed navigation aids for trans-Pacific ocean racers, Stan Honey now develops systems that display city maps for car drivers.



**JOY WALLACE**  
*Oakland, California*

The Math/Science Network at Mills College encourages high-school girls to pursue courses in math and science. Director Joy Wallace also runs a popular conference series called Expanding Your Horizons.





PAUL HAWKEN  
*Mill Valley, California*

"People will pay for quality," says Paul Hawken, who imports and sells gardening tools. The best-selling author of *The Next Economy* recently finished a new book, *Growing a Business*, for Simon & Schuster.



DENISE THOMPSON  
*San Jose, California*

On the run most of her working day, Denise Thompson does occupational therapy in private homes, hospitals, and nursing homes. Back at her own house, she writes up progress reports on her PC.



MARILYN CHILCOTE  
*Berkeley, California*

The East Bay Sanctuary Covenant represents 26 Northern California churches that offer sanctuary for Salvadoran and Guatemalan refugees. "We give them protection, support, and advocacy," says director Marilyn Chilcote.

*Photography by*  
LESLIE FLORES





**VICTOR SZABO**  
*Chicago, Illinois*

Victor Szabo heads a group that gathers and shares end-user computer information within the federal government's 18,000-strong Defense Logistics Agency.



**DAVE MURDOCH**  
*San Francisco, California*

At the San Francisco Symphony, Dave Murdoch's 19-terminal system tracks every piece in the orchestra's repertoire. "If you're playing Beethoven's Fifth," he says, "I can instantly tell you how many French horns you'll need."



**DOUG ELLIOTT**  
*San Rafael, California*

Equally at home with BIOS calls and zoning laws, real estate developer Elliott recently teamed up with investigative reporter Mark Dowie to develop software.

**LAUREN KUNKEL**  
*San Francisco, California*

When its membership hit 2000, the Pacific Asia Travel Association realized it was outgrowing its custom PC setup. Says PATA coordinator Lauren Kunkel, "As soon as our new system is in, I expect a lot more flexibility in our reports."







**MICHAEL SHARP**  
*Oakland, California*

Michael Sharp is a real estate attorney for San Francisco's Bay Area Rapid Transit. He taps into a mainframe to track the transit system's expanding number of properties.



**EVE PELL**  
*Mill Valley, California*

Eve Pell is no slouch: She's a marathon runner, writes books about criminal justice, and works for a private detective agency. "But I'm the most timid vanilla computer user you could imagine," she says. "I'm terrified of modems, for example."

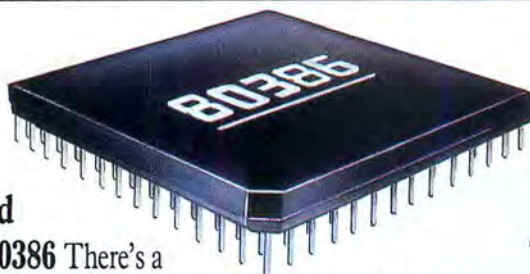
*Photography by*  
JEFFERY NEWBURY



# A Number of Reasons A Number

## 1. Designed for the 80386

There's a revolution taking place in desktop computing. A revolution that's been launched by a square wafer of silicon known as the 80386 microprocessor chip. It puts minicomputer potential at PC users' fingertips. It's a fact that virtually every leading PC manufacturer has built a "box" around this chip. And it's a fact that the "New Operating System" will, supposedly, even run on it. But, it's also a fact that *their* system wasn't designed for the 80386. Ours is. And it's called PC-MOS/386™



## 2. PC and PS/2 Compatible

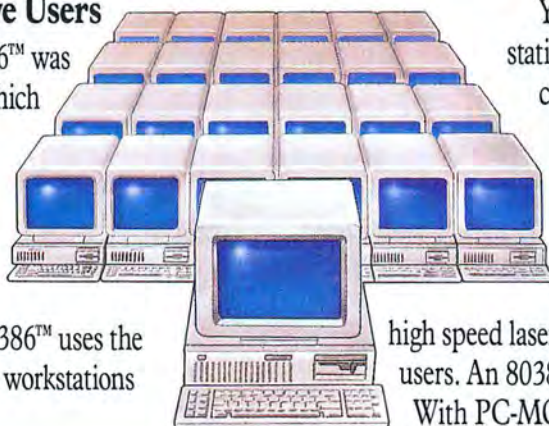
In designing PC-MOS, we knew our first priority was to exploit the minicomputer capabilities of 80386-based PCs & PS/2s. But we went further, and developed a system which would be fully compatible with the millions of existing PCs, PC ATs, and

Power without nothing less from the new standard bearer.

## 3. One, Five, Up to Twenty-five Users

From the beginning, PC-MOS/386™ was designed as a versatile operating system which could support twenty-five users as easily as it supports one. The system comes in single, five, and 25-user modules, so you're able to start with what you need and expand when you're ready.

In a multi-user setting, PC-MOS/386™ uses the computing power of the host PC to drive workstations linked to standard RS-232 ports.



## 4. Thousands of DOS Programs

PC-MOS/386™ gives you the best of the past, and the best for your future. Which means that while PC-MOS/386™ totally replaces your old DOS, you won't have to replace the programs you've spent a lot of time learning.

And it all happens so effortlessly. You'll continue to reap the benefits of your favorite DOS programs, while entering a new arena of power.

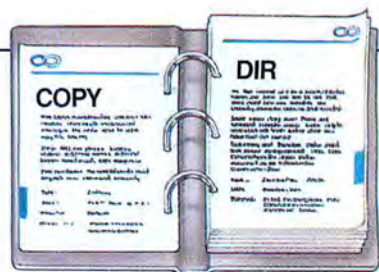
Think of it! Programs like dBASE III, WordPerfect, Lotus 1-2-3 and Symphony, WordStar, MultiMate...literally thousands of DOS programs—all compatible and multi-user available.



## 5. Familiar Commands Like DIR and COPY

Just as you don't have to learn a whole new array of software to take advantage of PC-MOS/386™, neither do you have to learn an entirely new set of commands.

Instead, the system builds on the knowledge you already have. "COPY" still copies files, and "DIR" still gives you a directory listing. As you might expect, we didn't stop there. There's a wealth of features that have strengthened the commands you know, making them more powerful and easier to use.



You can choose from a variety of workstations. Mix and match dumb terminals costing under \$500 each with PCs and PS/2s running our terminal emulation software.

All of the host's resources can be shared. Programs, data, hard disks, tape backup units & printers (including high speed laser printers) are suddenly available to all users. An 80386-PC has minicomputer potential. With PC-MOS/386™ you can "mini" your micro.



# of Users Will Choose PC-MOS/386™

## 6. Concurrently Supports Virtual 8086 and 80386 32-Bit Mode



80386-based PCs & PS/2s are dual-personality computers. To run DOS programs, they act as PCs with a 640K memory limit. But to take advantage of their minicomputer capacity, they operate in true 80386 mode which lets them address up to four gigabytes of memory. PC-MOS enables the 80386-host and its workstations to independently switch between these modes—making DOS compatibility and 80386 power simultaneously possible.

## 7. Multi-Tasking

While it's true you could look elsewhere for multi-tasking, why would you want to? The *other* multi-tasking operating system is not now, nor is it planned to be, multi-user. It won't even run multiple DOS applications in multi-tasking mode.

Now consider PC-MOS/386™. At the touch of a key, you can switch between up to 25 different tasks. And if you have workstations connected to a host, they get multi-tasking, too. Finally...a system that won't hold you back.



## 8. File/Record Locking and Security

When you decide to implement either a network or a multi-user system, there's a two-fold problem which must be solved: protecting your work from accidental misuse and securing it from intentional theft.

PC-MOS/386™ solves both aspects of this problem. Password protected security allows you to assign file, directory, and task access to each user. Plus, files and records are locked using either PC-MOS' proprietary system or NETBIOS emulation.

## 9. Remote Access



It's been said that information is power...which makes PC-MOS/386™ a deadly weapon to your competition. Imagine on-the-road salespeople being able to file call reports and access your latest inventory data. Picture executives being able to access your corporate database from across the country, or around the world—giving them the information they need, when they need it.

Visualize branch offices tapping time-critical data with nothing more than a modem and a workstation. Working at a home office in the evening or over the weekend suddenly gets awfully productive. And that makes good business sense. The kind of sense you can't afford to be without.

## 10. The Price...

As you evaluate operating systems, ask yourself if it's reasons you're considering...or rhyme. Ask if you're getting a system for tomorrow, or one that was made for yesterday. See if you're being forced to buy new hardware because of *their* software.

And consider this.

Only one operating system in the world can give you the raw power, features, and functionality that you demand. Its name is PC-MOS/386™. And it's immediately available in one, five and 25-user versions starting at \$195.



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# PC-MOS/386™

MODULAR OPERATING SYSTEM



THE SOFTWARE LINK





# How rewrote a

First we wrote a wish list. With help from the 500,000+ people who've already chosen MultiMate® for word processing.

We also had help from a whole new generation of users. Professionals and managers who want quick results from the software they use.

## We Gave It A Hot Start And Finish.

The result is MultiMate Advantage II.™



*A few simple commands let you directly merge dBASE files without leaving MultiMate. And without knowing how to work dBASE. Which makes it easy to create stacks of personalized form letters.*

Within seconds of booting up, its Hot Start feature lets you create and edit simple memos without fussing with



menus. There's also a Hot Print feature that prints out memos at the touch of a key.

Which all adds up to a fast start and an equally fast finish.

## We Let You Directly Merge With Another Bestseller: dBASE.

We've made it easier than ever to merge directly with dBASE® files. So you can generate loads of personalized form letters. And preview them on-screen

with the dBASE data in place.

You can even import ASCII files directly, or use file conversions with other popular software.

MultiMate also supports over 400 printers, including the latest lasers.

Your choice of fonts has increased as well. Now up to 26 fonts in

Fred's Encyclopedia Inc.

June 5, 1987

Mr. Steve Davison  
215 Al Divisadero  
Walnut Creek, CA 94598

Dear Steve,

As manager of foreign sales for F.E.I., I want to personally congratulate you. You have been appointed Encyclopedia Sales Representative for our Antarctic sales area.

As you know, Steve, there has been some turnover of encyclopedia salespeople in your new area. It's one of our toughest beats. But Steve, I have examined all your qualifications personally. And I know you are the right person for the job.

While many of your sales prospects cannot read English and may seem cold and uncommunicative, remember, it's really nothing personal. So get out there, Steve, and sell our books.

With warm personal regards,

John Martin



# We bestseller.

a single document, with 18 downloadable.

## We Made It Easy To Read.

Understanding and learning MultiMate is easy when you use the



Now you can access the power of MultiMate with simple pull-down menus (left) or choose the original interface (right). Both interfaces have document mode for visible page breaks and fast scrolling.

new optional pull-down menus. So is day-to-day operation.

But maybe you're familiar with the original MultiMate interface. Never fear. It's still there, with all the power you need to tackle the toughest word processing jobs.

Whichever interface you choose, you now get fast page-to-page scrolling with visible page breaks. Plus search and replace is 15 times faster and lets you go forward or backward.

We've also added a sorting capability that many are calling the best in the business. And an undo-delete feature that lets you bring back the passages you thought you didn't want.

Finally, when you're ready to print, our new Preview mode shows how your pages will look. With headers, footers

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And learn how a good rewrite can improve even the best of bestsellers.



**ASHTON-TATE®**





Actual unretouched screen image.

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## A High-Quality Line of PC Monitors Priced Below The Competition.

Introducing the Mitsubishi *brand name* family of PC Monitors. Select from five different IBM® compatible models, along with the new IBM PS/2™ compatible XC-1429C. Each has a 13V" diagonal viewing area and proprietary high contrast glass for the sharpest image possible.

### Affordably Priced PC Monitors

The XC Series incorporates proven Mitsubishi quality and reliability at an extremely affordable price. In fact, we've included a wide variety of features for which you'd expect to pay considerably more. Like advanced video and deflection circuits to reduce distortion and optional tilt and swivel base for improved ergonomics. Also in-line self-convergence for low power consumption and extra reliability.

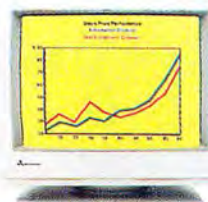
The XC Series is available in quantity, ready to support a wide range of application needs—from standard word processing and business graphics to windowing and high resolution solids modeling and CAD.

### Complete Customer Satisfaction

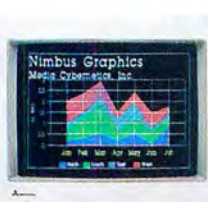
Mitsubishi stands behind its brand name XC Series monitors with knowledgeable applications and service personnel and backs each product with a comprehensive one-year warranty. It all adds up to a worldwide reputation for state-of-the-art electronics and unparalleled customer satisfaction.

Compare the picture quality and see for yourself why Mitsubishi monitor displays look so good.

For product literature and your nearest distributor, call Mitsubishi today at 1-800-556-1234 Ext. 54. In California call 1-800-441-2345 Ext. 54. Mitsubishi Electronics America, Inc., Computer Peripherals Division, 991 Knox Street, Torrance, CA 90502.



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**Medium Resolution Monitor:**  
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## UNSUNG PC HEROES

John Grissim

Speak of computers and some names come quickly to the tongue: Bill Gates, Steve Jobs, Philippe Kahn, and their peers. They are luminaries who seem to stand in a perpetual spotlight, the press hanging on their every syllable.

While these celebrities undoubtedly have played pivotal roles in creating the personal computer industry, they also are among the first to acknowledge the contributions of many brilliant and unselfish souls who labor just outside the spotlight's glare.

These are the unsung heroes of personal computing—consultants, engineers, doctors, educators, programmers, and many others. They work both inside and outside computer companies. Some get paid for their labors, some don't. What binds them all is a simple love of computing and a willingness to share their knowledge and time with fellow users.

Their turn to shine comes when it's time to put computers to work in the real world—in corporate computer labs, office cubbyholes, and late-night user group meetings. We find them writing freeware, volunteering long hours to help new users, and rescuing thousands from the frustration of cryptic error messages.





## *Group Sacrifice*

Mike Rohrbach is the founder and former director of the Boston Computer Society's IBM PC User Group—the largest such group in the world.

Drawing on experience gained during stints with IBM and other

User group pioneer: "Our staff was all volunteer. There were no elections, no hierarchies."—Mike Rohrbach, IBM PC User Group founder



*Photography by*  
CYNTHIA MOORE

mainframe suppliers, Rohrbach, 52, helped guide the group during three years of astounding growth. Current membership tops 15,000, making it by far the largest of the BCS's 55 user groups.

Starting off, Rohrbach explains, "The challenge we faced was to develop a productive relationship between IBM—which is a highly structured, hierarchical corpo-

ration—and a group of highly individualistic end users whose organization was unstructured. The staff was all volunteer. There were no elections, no hierarchies."

"He was the right man at the right place and time," says Vincent Gale, one of the group's four associate directors. "Mike's style is entrepreneurial, but he uses a light touch, which works perfectly when dealing with volunteers, of which there are about 150. He's low-key, soft-spoken, and absolutely great at floating trial balloons. His enthusiasm from day one has been tremendous."

"Mike is very creative, very dynamic," adds Jonathan Rotenberg, founder and president of BCS. "At a time when the industry has moved more toward servicing the Fortune 1000 companies, he's made sure that support is there for the individual home and small-business user."

Rohrbach spent up to half his business time on the group. He finally resigned as director to devote more time to the PC sales, leasing, and consulting outfit that he owns and runs with his wife, Susan. Looking back, he stresses his efforts at recruiting BCS members—and how well that has paid off.

"I courted people who wanted to become independent, people in corporations or at home, and tried to give them confidence that they could do anything," Rohrbach says. "That was the thrill for me, seeing people grow." He's also proud that the group remains unstructured, despite its growth, and boasts a balanced mix of men and women, old and young, among its members.

*(continues)*



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## Info Central

As staffers at the information center of Continental Grain's headquarters in New York, Eric Dickstein and Larry Stouder have helped to lead the 12,000-employee commodity enterprise into the well-connected land of local area networks (LANs).

No pain, no grain: "The great thing is I can dial in from home and work weekends—it's wonderful!" —Eric Dickstein and Larry Stouder



Dickstein, 40, an animated New Yorker, is Continental Grain's premier PC paramedic, spending long days alternately manning the phone at the software/tech support desk and dashing from office to office to calm harried users. The "Don't Panic" button on the label of his sports coat has become Dickstein's personal trademark. On occasion, he tapes over the "Don't."

When not resuscitating computers or their users, he writes macro programs and utilities, helps install network upgrades, and beta tests software for several development houses. "And I have to tell you," Dickstein quips, "they actually pay me to do this!"

Dickstein started in the industry as a keypunch operator in 1969, after graduating from high school. He became a gifted programmer and was working for a consulting company when he wrote the program for Continental Grain's custom Telex messaging system. After joining Continental, he found himself on the PC firing line; he turned out to be a natural for the job.

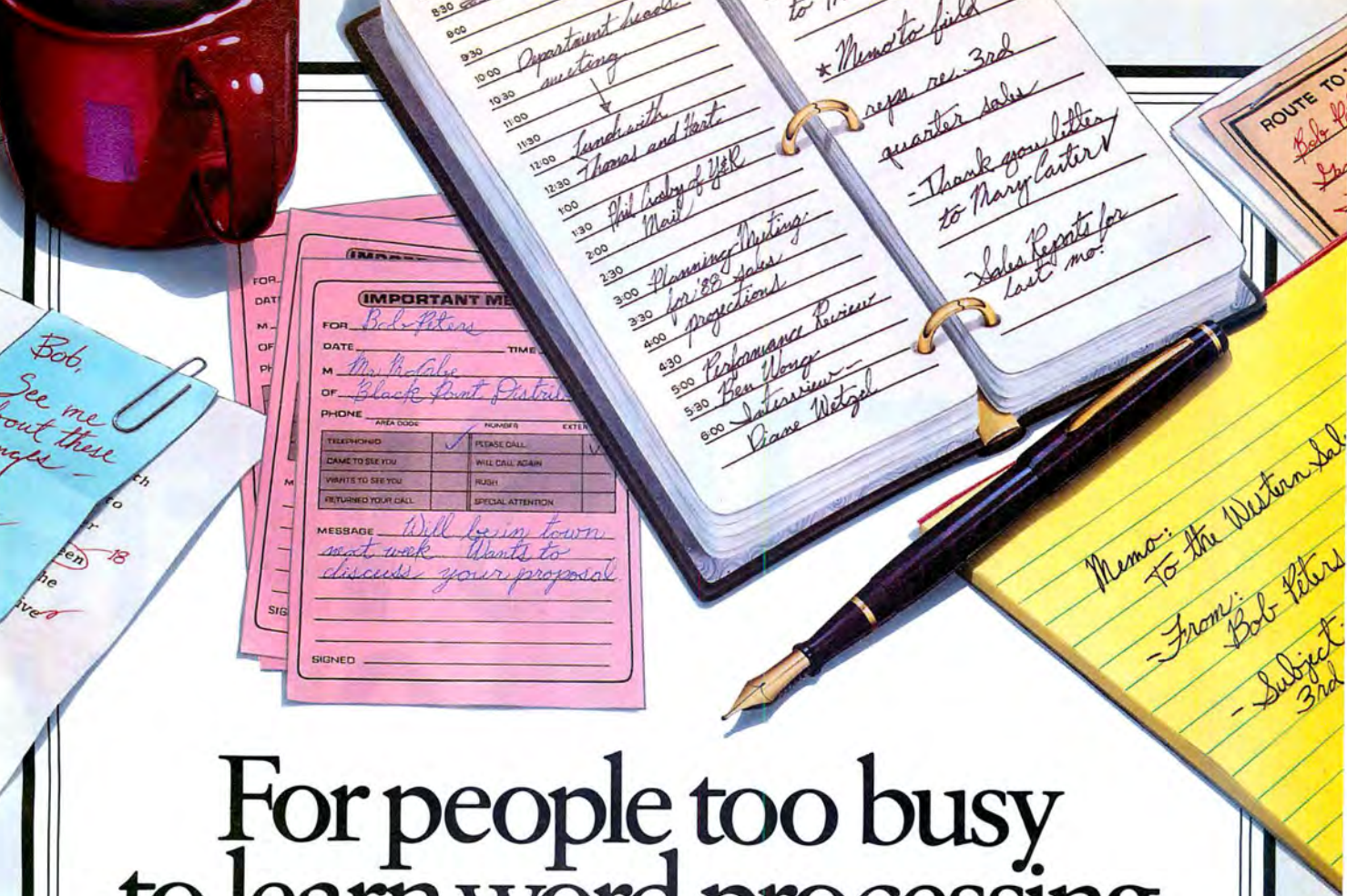
Dickstein works 10 hours a day and confesses he feels guilty when he considers the 12- and 14-hour stretches that Stouder puts in. "But the great thing is I can dial in from home every night and work weekends—it's wonderful!"

A pet project for Stouder, Dickstein's boss, has been the construction of Continental Grain's local area networks. "It's a wild and woolly job," remarks Stouder.

"I was a PC hobbyist back in the seventies," he recalls, "but I didn't see it fitting into my work in finance at first." He has an M.B.A. in management and had worked for several corporations before arriving at Continental Grain's controller's office. "Pretty soon I found myself doing full-time PC-based data processing," he says. "From there I got involved in the LAN, including all aspects of systems design, applications, and development. Of the 300 PCs here at

*(continues)*





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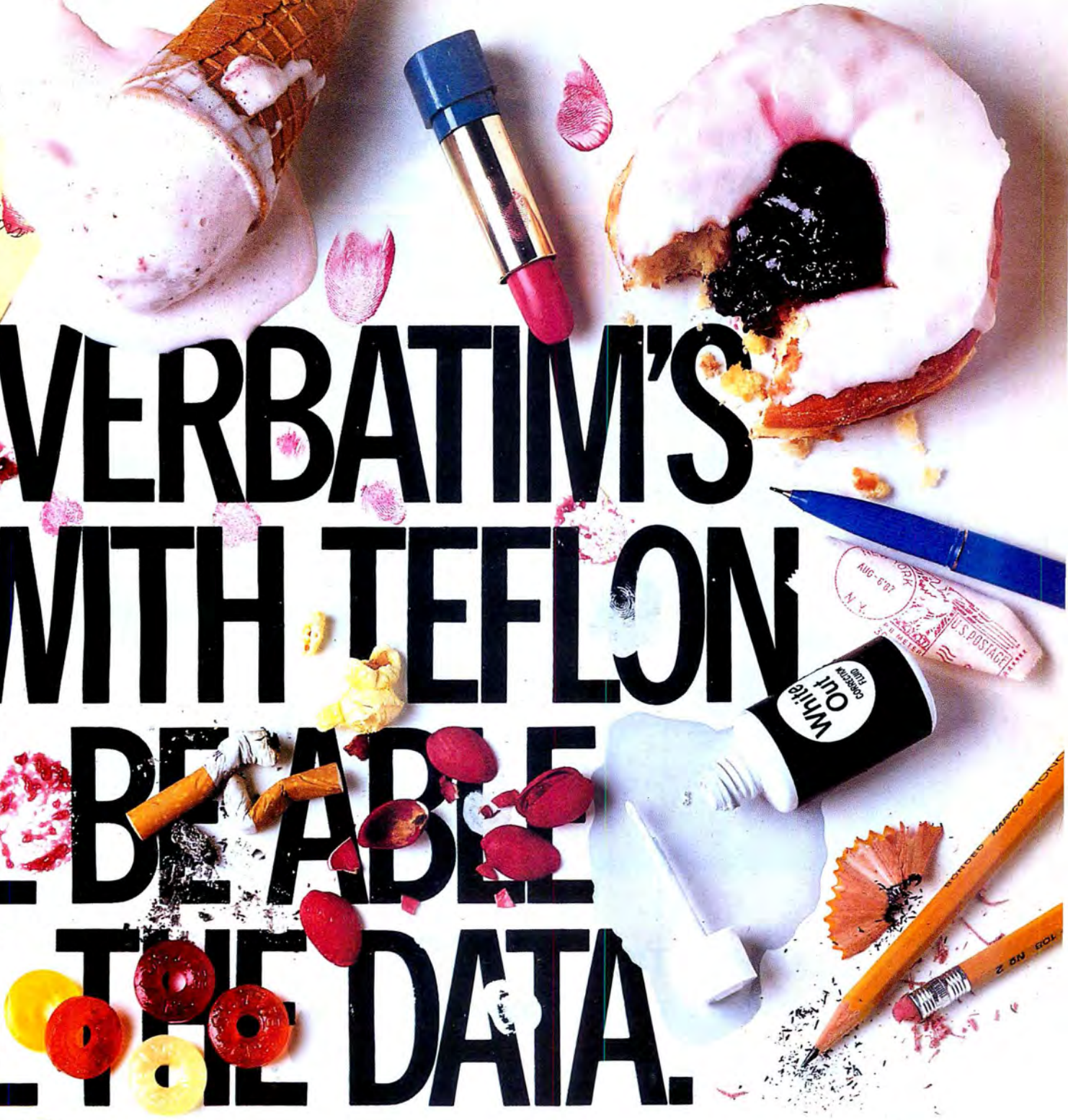


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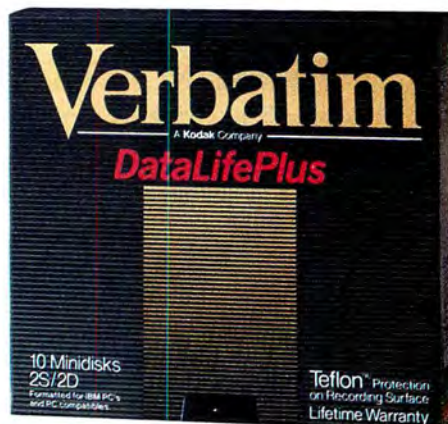
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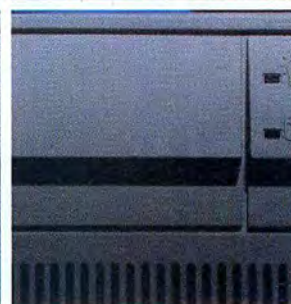
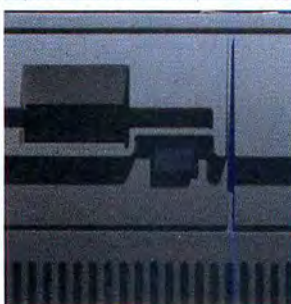
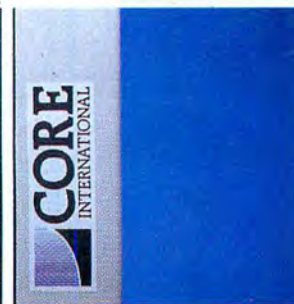
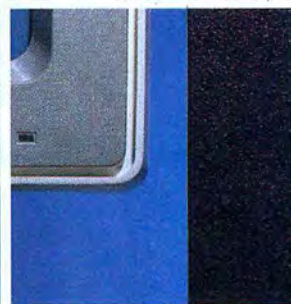
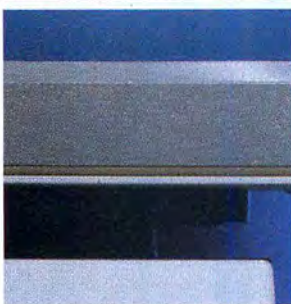
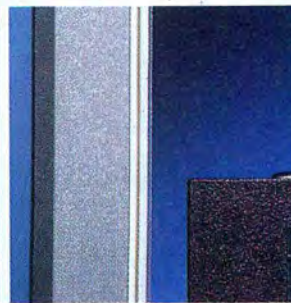
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# Management Reading List: Wall Street Journal, Fortune and PC World.



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## Unsung PC Heroes

Unsung teacher: "For a while there I guess I ate, slept, and breathed PCs." —Tim Bethel



headquarters, we've got about 185 networked."

The 39-year-old Stouder has a 10-year-old daughter who takes after her father. She began playing with an Apple at age 3 and is now happily computer literate.

Dickstein and Stouder are "crackerjack guys," declares Hilly Fuchs, who has companywide responsibility for configuring PCs, LANs, and office automation systems at Continental Grain. "Larry has personally done a lot of trench work, much more than his management role would dictate. Both he and Eric have tremendous enthusiasm and dedication. They've really played a key role in giving Continental Grain ultrarapid worldwide communications—which in this business is the name of the game."

## Up and Running

Tim Bethel, director of product evaluation and end-user support at United Gas Pipe Line of Houston, has been a charter member and

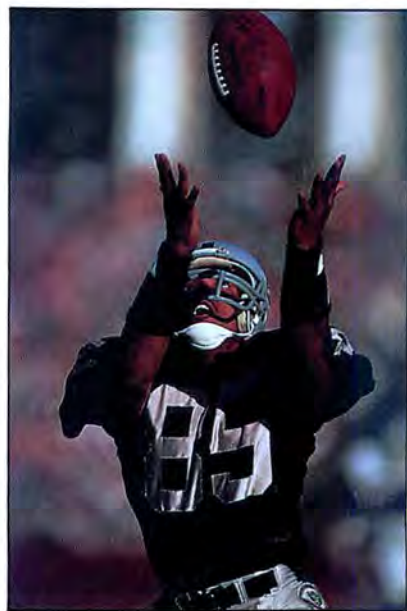
mainstay of the Houston Area League of PC Users (HAL PC). "Tim is one guy who truly qualifies as an unsung hero," says Duane Hendricks, who recently stepped down as the HAL group's president.

The soft-spoken, 44-year-old Bethel began mainframe programming in the mid-sixties and came to United Gas Pipe Line in 1975. In 1982 he caught the PC bug and soon helped form the HAL PC user group. He volunteered hundreds of hours to launch what has become the second largest user group in the United States, now tallying 6500 members.

"Tim was always around quietly in the background, ready to help out," Hendricks recalls. "When the first PCs came out, he was the one who knew how to set them up and keep them working—and help all of us learn how to use them."

"I'm more of a technical person than a people and management

*(continues)*



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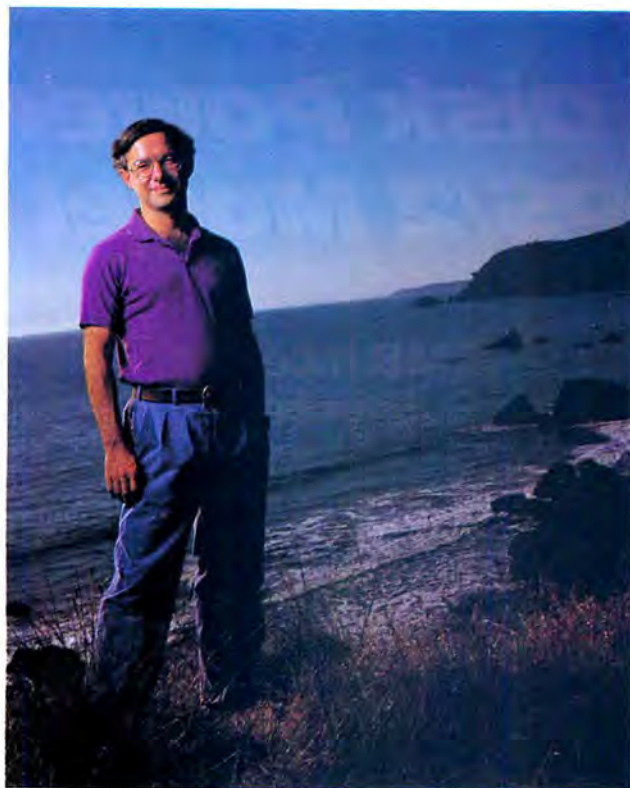
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## Unsung PC Heroes

The well PC man: "When WordStar 4.0 came out, we felt like MicroPro had finally caught up with us." —Dr. Michael Samuels



person," Bethel explains. "I've always been interested in exploring how things work." Even though Bethel has a mainframe background, PCs were so new and different that they fascinated him. The initial technical problems and shortages of certain components, like drives, kept him busy: "For a while there I guess I ate, slept, and breathed PCs."

Betty Dillingham, who edited the HAL newsletter for three years, was struck by Bethel's dedication. "Tim is just one of those people who gives and gives, and you can hardly get him to take anything in return," she says. "He almost single-handedly kept the hardware operating so we could run the user group. When we first put up our bulletin board, Tim practically lived at the office on weekends until we got the thing going."

Bethel's current job includes supporting more than 250 PCs at United Gas and evaluating 80286-based compatibles to select a company

standard. The self-effacing Bethel confesses that he's not quite as obsessed as he was during the go-for-it years. "For a while there, it had me a little scared," he admits.

## PC Doctor

Dr. Michael Samuels is renowned in the Northern California coastal village of Bolinas, home of the late Richard Brautigan and other poets and writers, for having helped light and feed the PC fire. The 45-year-old M.D. is himself a living example of how the PC can help nurture the literary spark, having authored or coauthored eight books. (He collaborated with his wife, Nancy, on the best-selling *The Well Baby Book*, *The Well Child Book*, and *The Well Pregnancy Book*.)

"Michael was inspiring," says author Jim Anderson. "He got together about a dozen working writers and really got us going with his

(continues)



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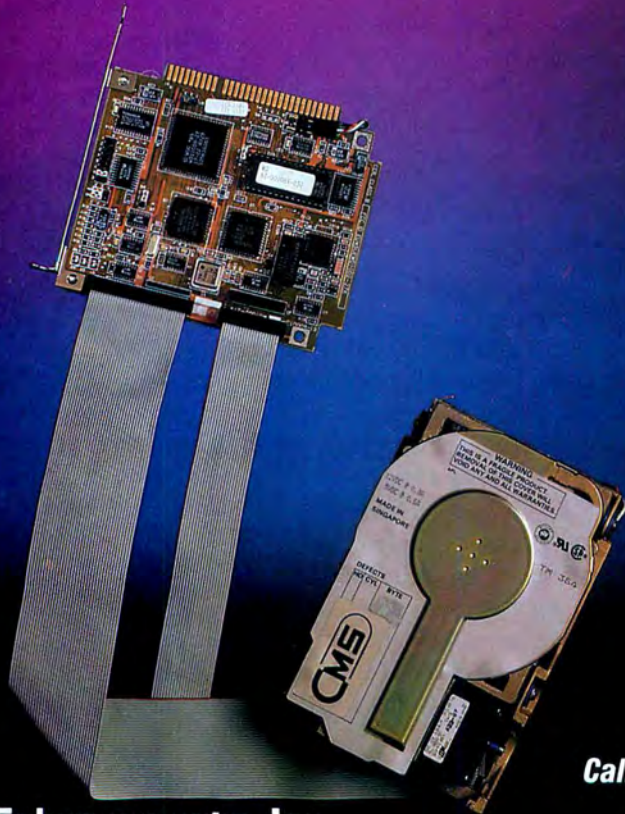
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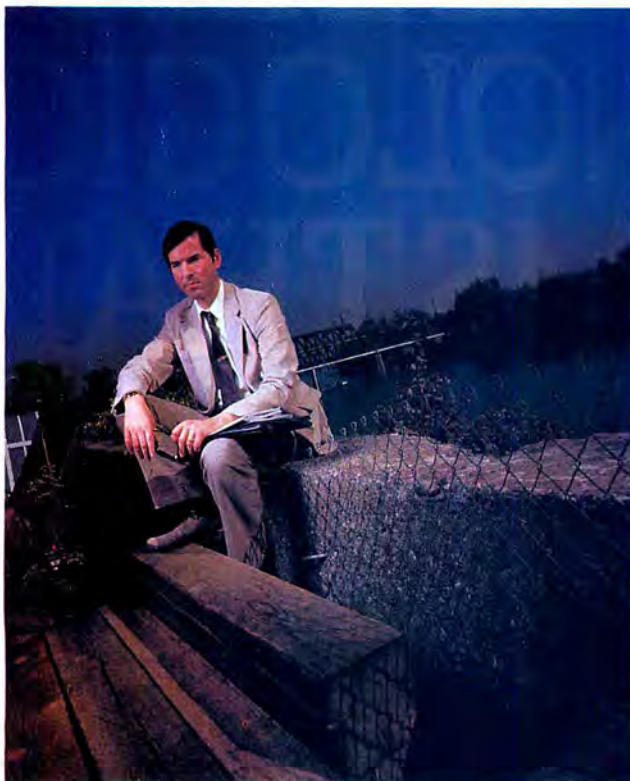
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**Prolific publisher:** "We were the first PC group [to use a laser printer], and we've stuck with it ever since." — Anthony Barcellos



enthusiasm. He's highly energetic—kind of a new age whiz kid. He is unbelievably helpful, and when we were all first getting started, he'd spend hours on the phone dealing with our problems. He was tremendous in helping us become fluent with *WordStar*."

In particular, Samuels helped novelist Charles Fox, author of the best-selling *The Noble Enemy*. Largely confined to a wheelchair by multiple sclerosis, Fox is a confessed computer illiterate. "When someone first plopped a PC on my desk I was a bit resentful that it took up so damned much room," Fox says. "But Mike was essential, and a blessing. He'd come down at all hours to fix equipment and help me with software problems or lend me floppies and ribbons. He really inspired all of us."

Samuels shrugs off the kudos but is proud of the way the informal user group customized early versions of *WordStar*: "We anticipated a lot of changes, like integrating

dictionaries as they came out and writing batch programs and lots of macros. When *WordStar 4.0* came out last year, we all felt like Micro-Pro had finally caught up with us.

"We've managed to keep everyone working on a very high level despite the minimum of computer expertise," he sums up. But as those he has helped are quick to point out, "we" is Michael Samuels.

## Letter Perfect

Anthony Barcellos teaches mathematics at American River College in Sacramento and manages the software library for the Sacramento Users Group. But he's probably best known as editor of *Sacra-Blue*, the group's monthly newsletter.

"I guess only the editors of the user group newsletters around the country really understand," says former newsletter editor Betty Dillingham. "But there's a tremendous amount of unheralded work that

(continues)



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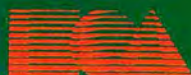
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## Unsung PC Heroes

Chem Bank counselor: "It's a fun job because it's really just an extension of my avocation." —Hank Kee



goes into those newsletters. A lot of us feel the monthly edited by Tony Barcellos is number one."

"He's done a terrific job," agrees Sacramento Users Group president Rick Hellewell. "When he took over the paper two years ago, it was running about 24 pages. It's now up to 60 to 70 pages, with a circulation of 1900, and gets reprinted in half a dozen newsletters around the country."

In July 1985, Barcellos decided to run off the newsletter on a laser printer as a one-time stunt. "We were the first PC group to do so, and it turned out so slick that we've stuck with it ever since," he says.

The 36-year-old Barcellos has gradually increased the volunteer staff of *Sacra-Blue*. He's also gathered a stable of first-rate columnists, together with an aggressive ad-sales force. "Tony gives a great deal of himself," Hellewell says. "He's really helped bring us where we are today."

The newsletter now showcases

the booming health of the country's third largest user group, which has 1800 members. Monthly meetings regularly draw 400 or more. "We give them bread and circuses," Barcellos jokes. "Our group encourages vendors to show up and give away thousands of dollars of goodies at drawings. We've gotten very good at shaking down the vendors."

## Banking on PCs

No one would deny that Hank Kee, a vice president at Chemical Bank of New York and director of the bank's corporate technology lab, can claim considerable corporate and public recognition. He joins the ranks here for his willingness to share time and expertise and to roll up his sleeves to solve problems.

Kee is ebullient, engagingly outspoken, and tireless. (He claims he needs only 3 hours of sleep a

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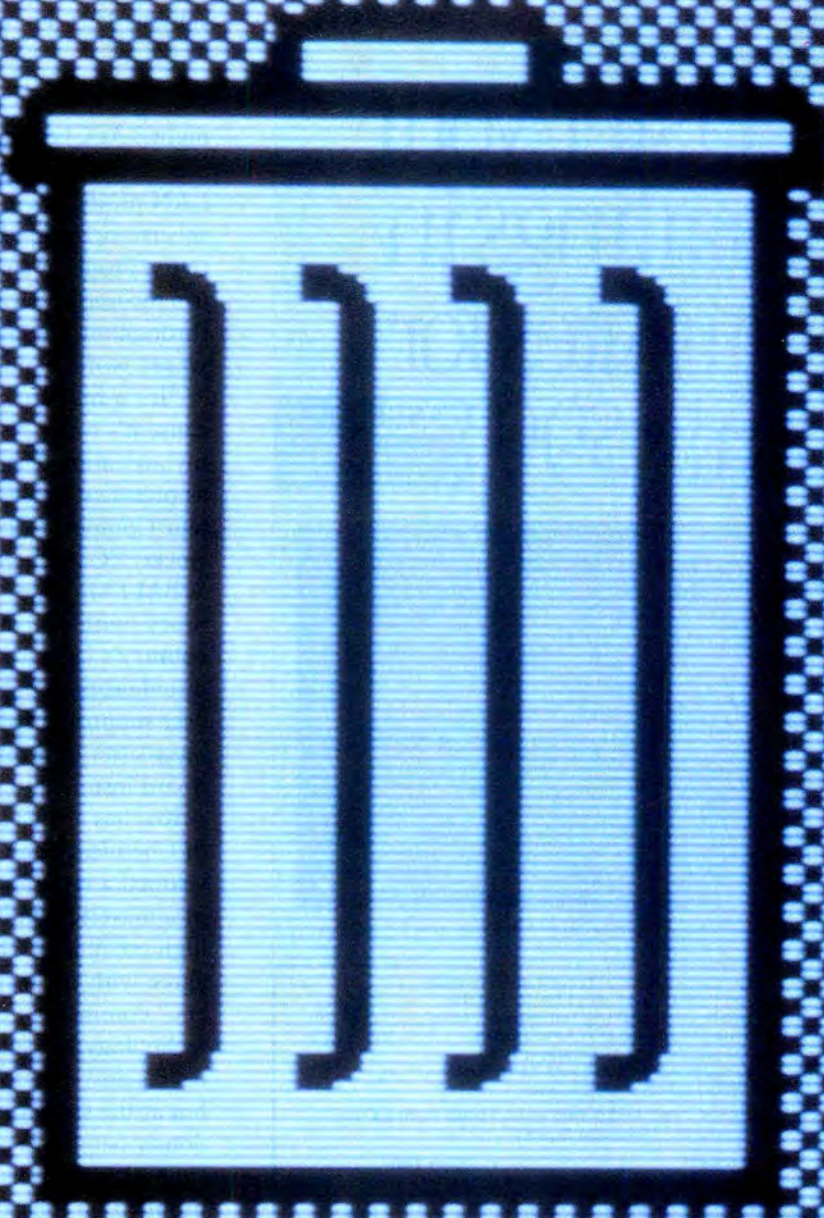
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## Unsung PC Heroes

night.) At Chemical Bank, he directs a staff that evaluates PC and LAN products and services, with a special focus on expanding connectivity. From his shop come product recommendations adopted throughout the giant institution, whose workers number 20,000.

"It's a fun job," Kee claims, "because it's really just an extension of my avocation at home." He relaxes as president of the New York Amateur Computer Club; cohost of the weekly "Computer Show" on WBAI-FM; editor of PC/Blue Library (with 377 disks, one of the country's largest noncommercial distributors of public domain and user-supported software); and baby-sitter of a three-line bulletin board installed in his home.

Kee has entrée to every echelon of Chemical Bank, and he has developed a reputation as something of a maverick without losing his high credibility. "He loves to disagree with the technology forecasters," comments Ed Grigoleit, a technology lab staffer. "He plays devil's advocate to stir up the soup, but at the same time he's tremendously helpful to people. Many times, if people have a technical problem on their hands, they'll drop a PC or a printer on his desk and he'll be here until 10 at night fixing it."

"Hank's got a voracious appetite for knowledge of the PC and LAN worlds," says Kee's boss Mike Coppelli, the bank's chief technology officer. "He weaves in and out of the background, quietly influencing the decision makers. He's very effective."

The 49-year-old Kee is married, with three children, two of them in their twenties. "I guess I'm pretty old for being so close to the technical edge, to the people in the trenches," he remarks. "But I really enjoy it." ●

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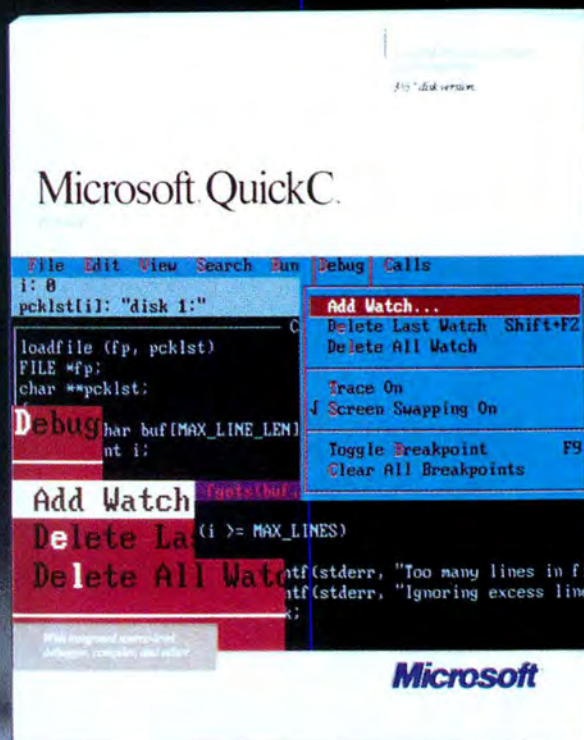
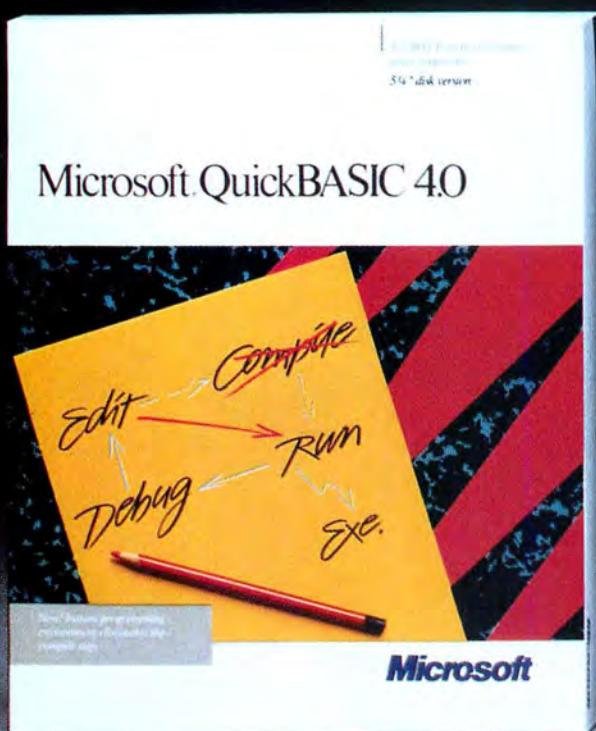
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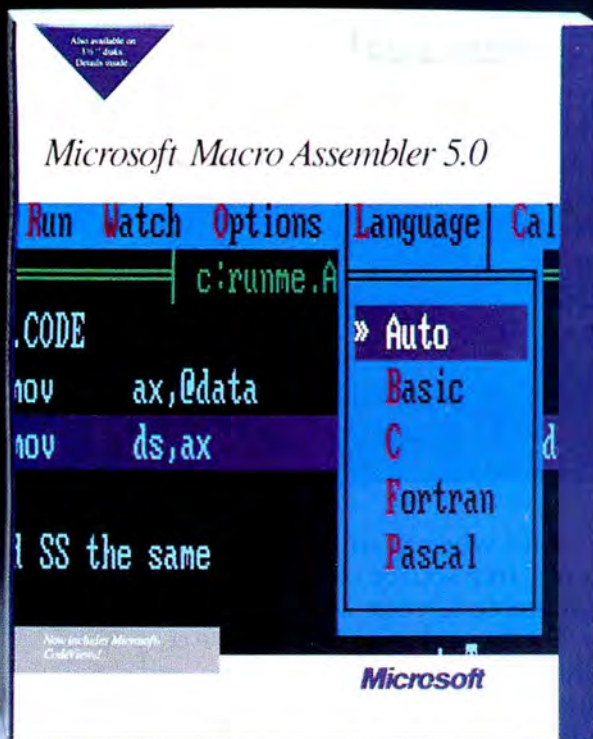
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Circle 163 on reader service card



## THE NAKED PC

Jack B. Rochester and John Gantz

Did the world know this would be no garden-variety revolution? That it would be a full-scale, circuit-popping, market-stomping, mind-expanding blowout? That the PC would make the mainframe superfluous? Probably not. But we liked what we saw, and before long we were all booting up and loving it.

Americans didn't buy PCs—they inhaled them. Nearly a quarter million PCs were sold by IBM in the first 16 months. Per capita, the PC was accepted ten times faster than the telephone and three times faster than the TV. Meanwhile, a sleepy farming community known as the Valley of the Heart's Delight was quickly paved over into what we now call Silicon Valley. The average age of a computer professional plummeted too, from 34 (1969) to 26 (1982).

What were people doing with all this newfound computer power? Things no self-respecting Fortune 500 DPer would have ever imagined. Susan Thunder, a Los Angeles lady of the night, used the PC to keep track of her, well, clients. Dr. Jerrold Petrovsky used PCs in experiments to stimulate the muscles of paraplegics so they could walk. The cons at Leavenworth used them to figure out what triggered IRS audits—and made a few bucks on the side filing phony tax returns.

Some fledgling capitalists turned their fascination with computing into gobs of money. Bill Gates and Mitch Kapor, currently 31 and 36, respectively, formed their own companies early in the game and now find themselves being pursued by Robin Leach.

With so much money on the line, the game was bound to turn serious. Today the personal computing industry earns more than the mainframe and supercomputer businesses combined. The processing power of the installed base of personal computers is easily twice that of all the mainframes and minicomputers in existence. Personal computing has become serious indeed.

Its roots are anything but. Behind the industry's three-piece demeanor are tales of tomfoolery, wizardry, and not a little silliness.



### *In Search of...the First PC*

What was the first personal computer? Maybe it was the do-it-yourself Mark-8 kit developed in 1973 by Jonathan Titus of Blacksburg, Virginia. The Mark-8 relied on an Intel 8008 microprocessor and was programmed by flipping eight toggles, one for each bit. *Radio-Electronics* ran a breathless cover story about the Mark-8 in its July 1974 issue, calling it a minicomputer.

Another cover computer (this time on the January 1975 issue of *Popular Electronics*) was the Altair 8800, brainchild of Ed Roberts' firm, Micro Instrumentation and Telemetry Systems (MITS) in Albuquerque, New Mexico. The kit-built \$397 computer was likewise programmed by flipping switches, until two college students named Bill Gates and Paul Allen wrote a paper-tape BASIC for it.

Still another contender was the Honeywell H316 "kitchen computer," which was offered in the 1969 Nieman-Marcus catalog. The \$10,600 system could be programmed to plan menus, track golf scores, watch stock investments, and manage charity ball



*What do you say to a naked PC?*

*Only the authors of 1983's whimsical history, **The Naked Computer**, would know for sure. Take this jaunty tour through the PC's not-so-distant past with two guides who know the way.*



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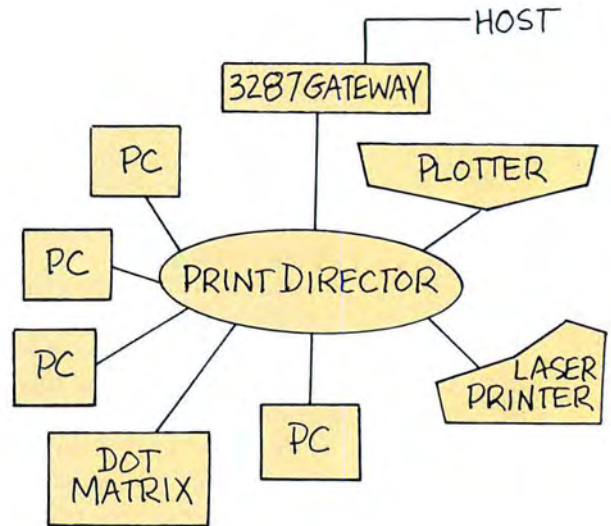
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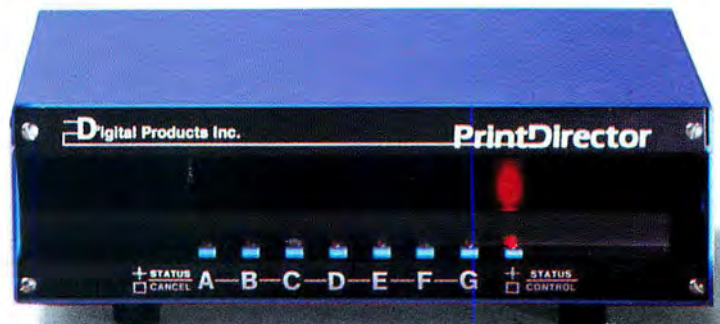
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Americans didn't buy PCs—they inhaled them. Nearly a quarter million PCs were sold by IBM in the first 16 months.

membership lists. Personal, perhaps, but hardly Everyperson's computer.

Lee Felsenstein's Sol-20, built in 1976, was probably closer to the mark. Named after *Popular Electronics* editor Les Solomon, the typewriter-like keyboard-cum-computer used a TV as a monitor. The first software written for it was *Electric Pencil*, a word processor Michael Schrayner created to write the user manual for another program he had designed. (The Sol-20 is strictly a museum piece now, but *Electric Pencil* is still on the market. How's that for longevity?)

Don't write off IBM in this not-so-trivial contest. Big Blue might have tumbled headlong into personal computing in 1973 if the SCAMP—the Special Computer APL Machine Portable—had sufficiently excited IBM president John Opel. The brainchild of Paul Friedl, a chemical engineer turned computerphile, the SCAMP featured a built-in cassette tape drive, a Selectric-type keyboard, 64K of memory, and a tiny CRT. Friedl, along with a handful of IBM engineers and programmers, crafted the SCAMP; he even developed a spreadsheet program for financial modeling three full years before *VisiCalc* debuted on the Apple computer. The SCAMP worked

flawlessly in hundreds of demonstrations before IBM executives, but Opel, who found the little machine charming, failed to come across with cash for development. IBM did eventually transform Friedl's work into a commercial product: the IBM 5100, released in November 1975. But the 5100's \$20,000 price tag and reliance on APL and BASIC doomed the machine. It was one of IBM's more memorable flops.

## Then Again...

The first PC might have been the one-of-a-kind device made in the early 1950s by IBM for Dr. Jerome Weisner, president emeritus of MIT and cofounder of the university's Media Lab. The device contained 20 vacuum tubes and a bunch of wires and plugs that were switched around to perform various computations. Weisner



thought the machine too complicated and gave it to the MIT furniture exchange, where Bud Napier bought it for \$10. Now part of the Napier Family Trust, it was recently valued at \$50,000.



## He'd Rather Be Flying

When IBM decided to seek an outside developer for a PC-based operating system, it was determined to get the very best. So it approached Digital Research, maker of CP/M, the most popular personal computer operating system at the time, and set up an appointment with company president Gary Kildall. But when IBM's honchos arrived at DRI's Pacific Grove, California, office, they were informed that Mr. Kildall had gone flying for the day. It was probably the first time IBM had ever been snubbed. The blue suits huffed into their plane and flew to Microsoft Corporation in Bellevue, Washington, where they struck a deal with Bill Gates.



## BUT MAYBE IT JUST WASN'T IN THE STARS

It's not surprising that the two sides never came to terms, much less to the bargaining table. Kildall was reluctant to relinquish control of CP/M to IBM, which assuredly would have made more demands than Stalin did at Yalta. Image-conscious IBM, in turn, may have been worried about CP/M's roots. The operating system got its start when Kildall and Ben Cooper decided to build computerized horoscope machines to be placed in supermarkets and stores all over Northern California. Although the machines they fashioned were decorated with dazzling astrological designs, the printer kept jamming. The machines ended up in a warehouse, but bits and pieces of the computer code that made them work formed the basis of CP/M.

Illustrations by  
PHILIP ANDERSON



"The Breakthru 286 performed flawlessly with every application we handed it, including copy-protected programs and nine memory-resident utilities at once."  
Stephen Manes, PC Magazine

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Mark Welch, InfoWorld (Rated #1)

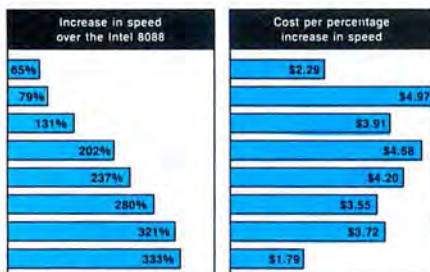
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Fourth, these are the best. There are several other boards on the speedup market. We at PCSG have compared them all, but there simply is no comparison. Many cards offer only a marginal speedup in spite of their claims and others are just poorly engineered.

We are really excited about these products. PCSG makes the unabashed statement that the BREAKTHRU 286 card represents more advanced technology than boards by Orchid, Quadram, P.C.

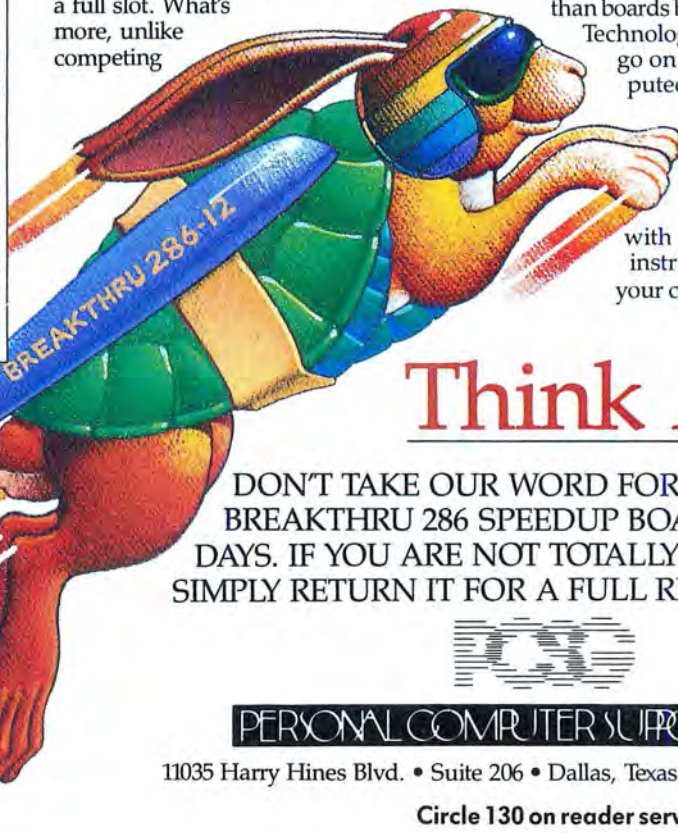
Technologies, Phoenix...we could go on. Breakthru 286 is undisputedly the turbo board with the biggest bang for the buck. And we include FREE the \$89.95 acclaimed Lightning software. Call today with your credit card or COD instructions and we will ship your card the very next day.

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Too many companies produced too many machines for too few buyers. Whatever the cause, the shakeout signaled the pinstriping of the personal computing business.



## ...Or in the Chips

Remember how the IBM PC had that little, well, glitch? How it couldn't always divide 0.1 by 10 and arrive at 0.01? It was David Walonick, a computer programmer and consultant in Minneapolis, who first blew the whistle on the wayward computer. IBM refused to believe it at first and didn't fix the bug until Walonick told the *New York Times*.



## IT'S A GRAND TRADITION

Under- or overestimating the size of the computer market is a tradition that dates back at least to 1948, when IBM's market researchers decided that the commercial potential of the computer was zilch. The venerable Tom Watson, Sr., decreed that maybe five computers would be enough for the entire country.

And, decades later, forecasters said that the PC might sell 250,000 units, tops.

So perhaps it's no surprise that professional Cassandras uniformly underestimated the personal computing market in the beginning and overestimated it once the revolution was underway. Case in point: International Data Corporation, as conservative and respected a name as you'll find in computer market research, forecast in 1980 that 1984 U.S. shipments of personal computers would run to 850,000 units. In 1981, IDC boosted its estimate to 1,058,000 units. By 1982, the company feverishly proclaimed that the 1985 installed base would be 10.1 million units; this estimate was revised two years later to 26.7 million units. In fact, the installed base was closer to 22 million units.

When the Great Compatibles Shakeout hit, IDC quickly revised its numbers—and whittled visions of a 1989 installed base of 83 million units to a mere 51 million.



## The Doomsday Machine

Technology stocks have often been the darlings of Wall Street; personal computing stocks even more so. And for good reason. Between July 1982 and June 1983, personal computer stock prices leapt 190 percent. During the same period, no less than 19 major personal computer companies went public.

But even as paper millionaires were being made, a distant rumble was heard. As early as July 1983, obscure trade journals began circulating rumors that IBM would announce another, cheaper personal computer, code-named Peanut, by Labor Day. Wall Street got the jitters, and when the PCjr finally debuted in November 1983, stocks in other personal computing and peripherals companies had fallen an average of 58 percent. It was the biggest drop in computing stocks since 1969.

Ironically, the product that triggered the crash—the PCjr—was a dog. After selling little more than 500,000 units, IBM discontinued it.

## WELCOME TO HARD TIMES

Of course, the market keeled over for other reasons, as well. One good one: Too many companies produced too many machines for too few buyers. Whatever the cause, the shakeout signaled the pinstriping of the personal computing business. A few of the most notable failures along the way:

*Most tragic.* It seemed like the best of times for Eagle Computer founder and president Dennis Barnhart. The company had just gone public and was confidently looking forward to a very profitable future. But on his way home from a party celebrating Eagle's stock issue, Barnhart lost control of his sports car on a twisting Silicon Valley road and was killed. The company continued its upward climb and reached its zenith



# Paradox: the top-rated relational database manager in the world

Source: Software Digest*		Software Digest Rating	Overall Evaluation	Program Name	Version Tested	Ease of Learning	Ease of Use	Error Handling	Performance	Versatility	Memory Requirement	Price
☆☆☆☆	8.7	Paradox	1.1								512K	\$495
☆☆☆☆	8.2	XDB	1.10								320K	\$750
☆☆☆☆	7.6	PowerBase	2.3								384K	\$349
☆☆☆☆	7.0	Open Access II	2.0								256K	\$395
☆☆☆☆	7.0	DataEase	2.5/2								384K	\$600
☆☆	6.6	dBASE III PLUS	1.1								384K	\$695
☆☆	6.4	R:BASE System V	1.1								512K	\$700

**RATINGS KEY**  
(On a scale of 0 to 10)  
**Overall Evaluation**  
☆☆☆☆ 9.0 or higher  
☆☆☆☆ 8.0 - 8.9  
☆☆☆☆ 7.0 - 7.9  
☆☆ 6.0 - 6.9  
☆☆ 5.0 - 5.9  
**All Other Ratings**  
■ 7.0 - 9.9  
■ 5.0 - 6.9  
■ UNDER 5.0

**P**aradox® is once again the top-rated program, with the latest version scoring even higher than last year's top score.\*\* (Software Digest's 1987 Ratings Report is an independent comparative ratings report for selecting IBM PC business software. Ratings Report tests were done by the prestigious National Software Testing Laboratory, Philadelphia, Pennsylvania.)

The Ratings Report message is crystal clear: there is no better relational database manager than Paradox. NSTL tested 12 different programs and amongst other results, discovered that Paradox is 3 times faster than dBASE® and 6 times faster than R:BASE® on a two-file join with subtotals test.†

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“Paradox 2.0 will do for the LAN what the spreadsheet did for the PC

David Schulman,  
Bendix Aerospace”

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- DOS 2.0 or higher
- IBM® PS/2 and PC, Compaq® PC families and other 100% compatibles
- 512K RAM
- Two disk drives, 3½-inch and 5¼-inch supported
- Compatible monochrome, color, or EGA monitor with adapter

\*Reprinted with permission by Software Digest from its July 1987 Report covering 12 relational database programs

†Test was designed and executed by NSTL. A 1,000-record and a 10,000-record file were joined. A short text field from the 1,000-record file and a numeric field from the 10,000-record file were selected (using the 1,000-record file indexes). The short text field was grouped and sorted in ascending order, the numeric field was subtotaled for each group, and the results output to a null printer. Test times from the last keystroke on the command sequence until return of program control were recorded and averaged.

\*\*Rebate request must be received by Borland no later than February 15, 1988. Mail to: Paradox Rebate Department, Borland International, 4585 Scotts Valley Drive, Scotts Valley, CA 95066

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Circle 22 on reader service card



Kildall was reluctant to relinquish control of CP/M to IBM, which assuredly would have made more demands than Stalin did at Yalta.

in early 1984 with 330 workers. But legal problems with IBM over BIOS ROM code and the loss of Barnhart's leadership crippled the company. By the time it filed for Chapter 11 in June 1986, the clone maker was down to 7 employees. In its brief life, Eagle had lost \$40 million.

*Worst timing.* Journalist and publisher Adam Osborne slapped a handle on a computer, called it portable, and quickly found himself head of a \$100 million empire. The company's rocket to stardom started in July 1981 with the release of the Osborne 1; by March 1982, *Fortune* magazine was congratulating Osborne for his prescience. Alas, the company's crash was just as sudden. In the spring of 1983, Osborne began publicizing an unreleased IBM-compatible model—so successfully, in fact, that everyone stopped buying the Osborne 1 and waited. Revenues dried up, a planned public stock offering was called off, and the House of Osborne began to fall

apart. By September 1983, the company was in Chapter 11, was briefly resuscitated by employees, and finally closed its doors. In true capitalistic fashion, Osborne wrote a book about the whole mess, thumbed his nose at the naysayers, and formed Paperback Software.

*Most hype.* If you believed the ads, *Ovation* was going to be the ultimate in integrated software. Unfortunately, *Ovation* Technology of Canton, Massachusetts, never came across with the goods. This infamous bit of vaporware received rapturous coverage in almost every trade magazine and even rated a major piece in the *Wall Street Journal*. Although there was something awesome about the company's ability to raise venture capital (\$6.8 million) and play the press, *Ovation's* intention to conquer virtual storage raised some eyebrows. After the company's capital ran out in 1985, *Ovation* quietly went belly-up.



### *That's OK, I Didn't Need Any Help*

Mayday, the first comprehensive third-party software support service, claimed it could solve almost any software problem in 6 minutes. Like many clever notions, Mayday earned press notices and little else. Mayday's backers erroneously assumed customers would flock to the service in droves, but for some reason, PC consumers felt dealers and software publishers should provide support for free. Mayday's \$200 price tag didn't help either. The company's desperate SOS for capital was never answered and Mayday went the way of all flesh in 1984.



### LET THE GOOD TIMES ROLL

The IBM PC inspired hundreds of entrepreneurs to make a better

hard disk or expansion board or even a better computer. You've heard about Compaq and AST—and companies like Eagle. But consider some of the notable events in PC publishing:

*First book.* *An Introduction to Microcomputers, Volume 0*, written in 1977 by Adam Osborne and the founder of this magazine, David Bunnell, is still in print and in its third edition.

*Best Software Book.* *I Didn't Know You Could Do THAT With a Computer!* by New York writer and syndicated columnist Dan Gutman. More exotic and weird programs than you can wriggle a mouse at.

*If-at-First-You-Do-Succeed Award.* Goes to Wayne Green of Peterborough, New Hampshire, who has never topped his first and most successful start-up, *Byte*. He lost that one to his ex-wife in a sticky divorce settlement. Green later created *InCider*, *80 Micro*, and that paean to laptops, *Pico*.



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S I G M A D E S I G N S



Journalist and publisher Adam Osborne slapped a handle on a computer, called it portable, and quickly found himself head of a \$100 million empire. Alas, the company's crash was just as sudden.



## The Silicon Surfer

Chris Rutkowski had a dream: to build a computer that was truly easy to use. But with no capital, the dream remained just that. Until Rutkowski met Yashuhiro Tsubota, president of Epson America, in 1979. The encounter led to the CP/M-based Epson QX-10 and Rutkowski's *Valdocs* integrated package. Unfortunately, the QX-10 made it to market in 1983, at a time when eight-bit, CP/M machines were considered passé. But where so many integrated DOS programs failed, *Valdocs* succeeded. The totally integrated package incorporated a word processor with keyboard macros and on-screen formatting (including multiple type sizes); spreadsheet, data base, and communications modules; plus a desktop manager that boasted an address book, mailing list manager, notepad, calculator, and more. You could hop from one application to another with but a single keystroke, undo multiple commands, and create file names 64 characters long.

The QX-10 and *Valdocs*

joined the list of late, great ideas, and Epson turned its attention to its line of MS-DOS Equity computers. And Rutkowski? The man who described himself as "a little wild and woolly around the edges, not quite civilized...riding the curl of Alan Toffler's Third Wave on a silicon surfboard" dropped out of sight, whereabouts unknown.



## SERMON ON THE MONITOR

Meet Saint Silicon, whose Keyboard Prayer begins, "Our Program, who art in Memory, Hello be thy Name. Thy Operating System come, thy Commands be done, at the Printer as it is on the Screen." This is the handiwork of Jeffrey Armstrong, a part-time comedian and publicist who wants to humanize computers by poking fun at them. Says Saint Silicon, who naturally hails from Santa Cruz, California: "There's a seeker born every minute."

## Do PCs Dream of Electric Sheep?

*Eliza* is the famed expert system that aids psychotherapists; *Prospector* helps geologists find molybdenum. But *Racter*—disk-bound poet, dreamer, and philosopher manqué—provides less tangible results. The program was developed by freelance writer Bill Chamberlain and programmer Thomas Etter in compiled BASIC between 1980 and 1985. Said Chamberlain, "The program maintains certain randomly chosen variables that appear and reappear as a given block of prose is generated. This spins a thread of what might pass for coherent thinking." What does *Racter* think about all this? "More than iron, more than lead, more than gold, I need electricity. I need it more than I need lamb or pork or lettuce or cucumber. I need it for my dreams." PC users will need less—*Racter* costs \$44.95 and requires but 128K of RAM.



## FOR THE POWER USER WHO HAS EVERYTHING

Back in 1983, we wrote a manuscript called *The Computer Home Companion*, which never made it into print. In it, we asserted that buying a computer was, first and foremost, a statement of lifestyle. Coordinating your purchase with your home's interior design thus became paramount. "Apple IIs look good on natural oak furniture, while Japanese computers go well with modernistic steel and glass motifs," we wrote. The PC, however, has always posed a thornier aesthetic challenge. But thanks to Casica Corporation of Denmark, you can replace the PC's putty-colored metal shell with a designer shell made of oak, mahogany, walnut, or cherry wood for only \$995.

Remember, you heard it here first. ●



# If you don't buy you'll miss

If you're looking for a good way to judge personal computers, a simple question will do: "What's in it for me?"

In the case of the IBM Personal System/2 family the simple answer is, "a great deal."

For openers, each model offers higher performance levels thanks to a "balanced system" approach for making things work together. Components were designed not just to coexist but to bring out the best in each other. So, for example, many of the programs you're using now and a wide range of other DOS applications will run up to 150% faster on the IBM Personal System/2 than on previous IBM PCs, depending on the model, of course.

Things that are optional on other PCs are standard on the Personal System/2—like advanced graphics, parallel and serial ports and more. And advanced IBM technology brings new levels of reliability and data protection.

**It'll do what you're doing now. Only better.**

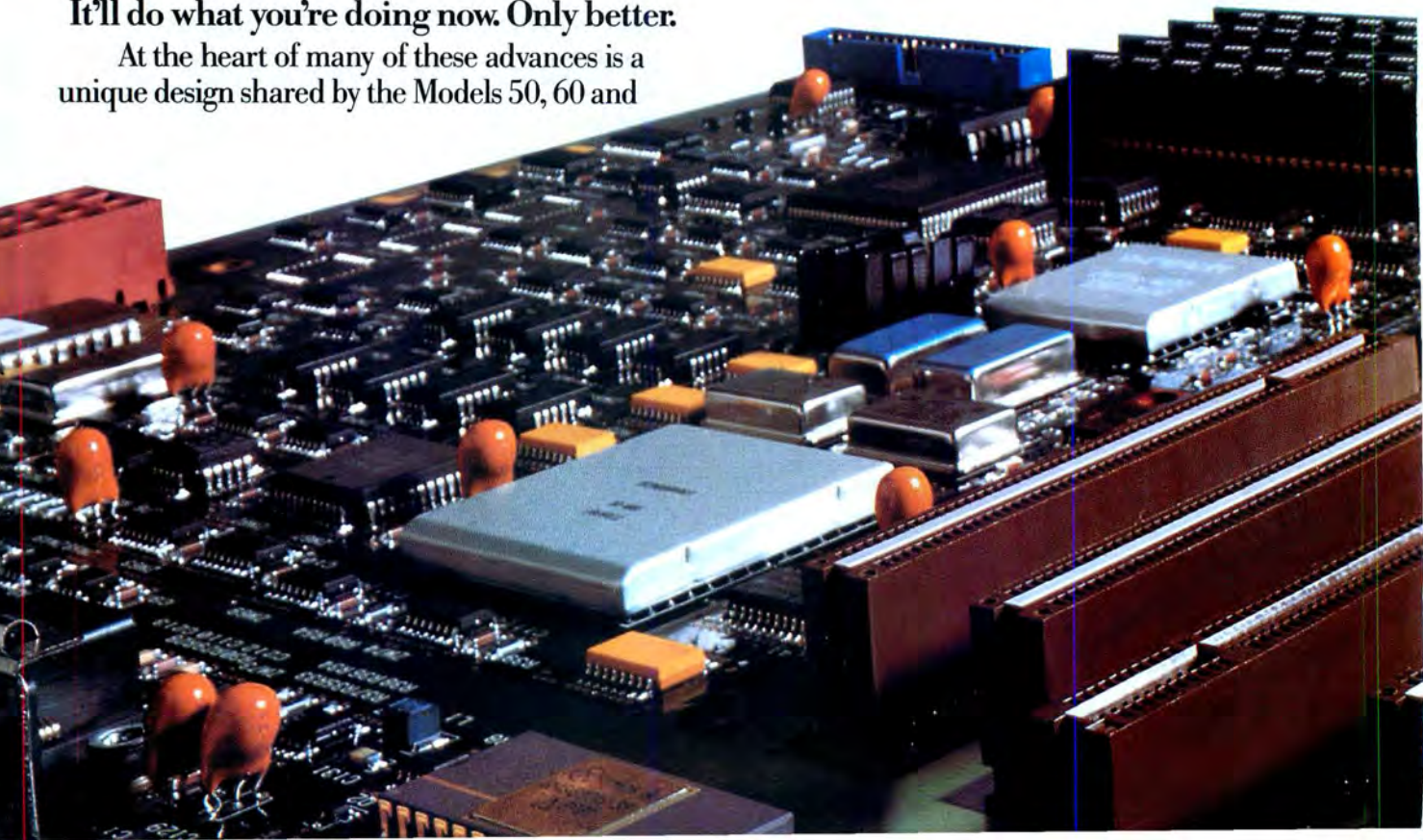
At the heart of many of these advances is a unique design shared by the Models 50, 60 and

80 of the Personal System/2 family. Technically it's called parallel bus architecture. We call it Micro Channel. But you can think of it simply as a super-highway with lots of fast lanes and bypasses. It allows data to flow faster and more efficiently, reducing the chance of information bottlenecks in the system.

What's more, the Micro Channel architecture not only makes it easier to speed information throughout the system, it also makes it easier to install peripherals and expansion cards in the system. There are no more DIP switches to set. It's all done electronically and automatically and, therefore, a great deal more reliably and easily.

Feature cards in your system can even transfer data directly to memory, via Micro Channel, leaving the microprocessor free to do other things.

The design of the Micro Channel also provides a faster, more efficient way to connect your





# an IBM PS/2, the bus.

system to other IBM Personal Systems, local area networks, minicomputers and mainframes.

**It'll do what you want to do tomorrow.  
Only better.**

Micro Channel architecture also gives the IBM Personal System/2 something else that's surprisingly rare in personal computing: the ability to improve with age.

One of the main reasons the architecture was created, after all, was to get the most out of IBM's new operating system, OS/2. And together they'll unleash the power of the 286 chip in the Personal System/2 Models 50 and 60 and the 386 chip in the Model 80.

With IBM Operating System/2 you don't have to be a "power user" to run several programs at once. You can prepare a presentation while your system recalculates a spreadsheet and gets data from a main-

frame. And with a future edition of OS/2, you'll be able to share all this information with others on a local network or over mega-distances. Vast memory and host processor resources will be more accessible. And software will do more things more easily.

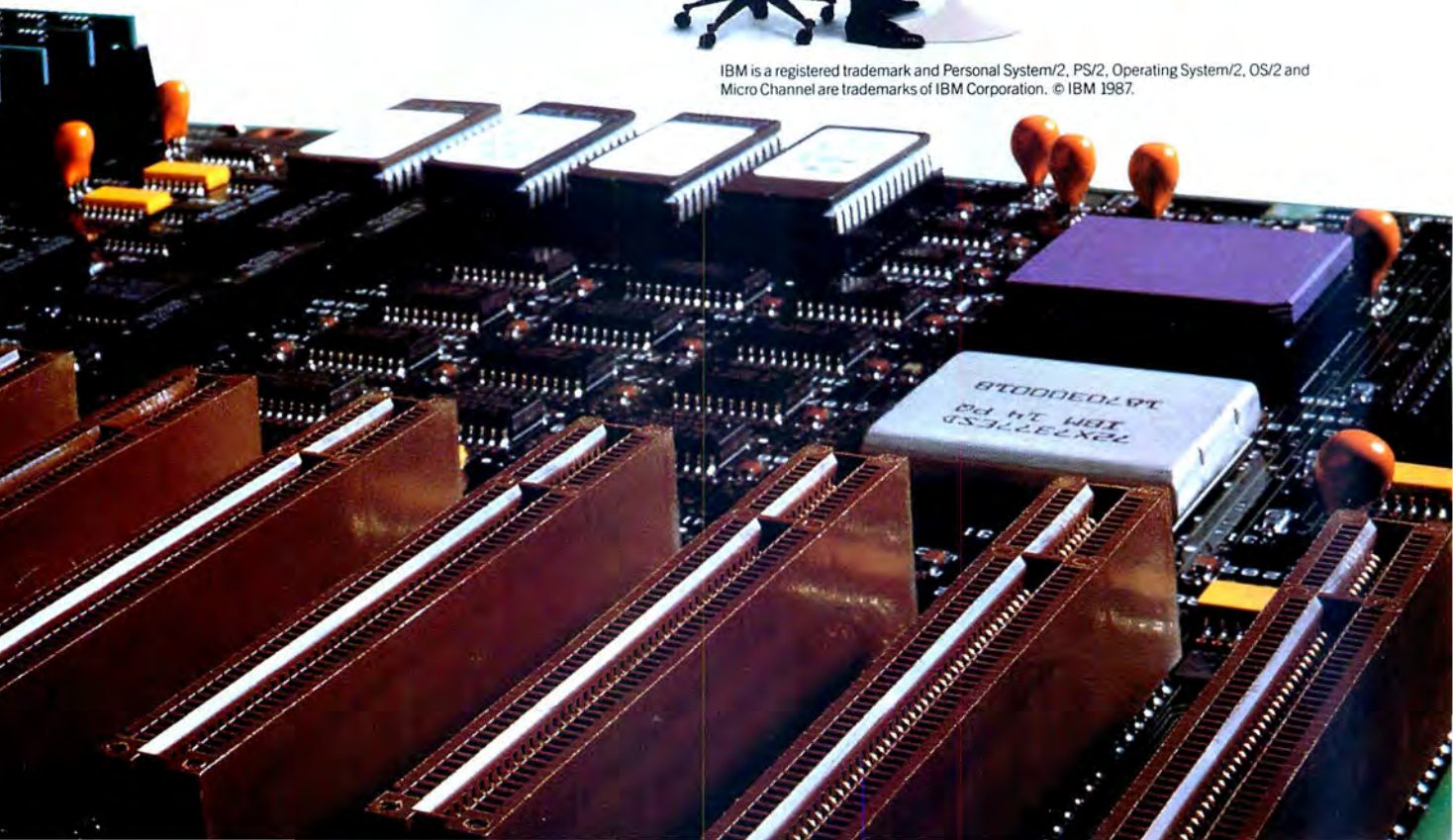
So catch the Micro Channel bus and you're on the fast track to higher performance, exceptional expandability and greater reliability tomorrow, as well as today.

For more data about the IBM Personal System/2, call your IBM Marketing Representative or visit an IBM Authorized Advanced Products Dealer. For the dealer nearest you call 1-800-447-4700.



The IBM logo, consisting of the letters "IBM" in a blue, stylized font with horizontal stripes.

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# more memory you need.



When the concept of personal computers was conceived, people didn't think about

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Now memory seems to be on a lot of people's minds. In response, we introduce a powerful new generation of add-on memory boards.



*IDEAmax/MC (left) and Supermax/MC (right), for the IBM PS/2 Models 50 and 60.*

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*IDEAmax 30 (top) and Supermax 30 (bottom), for the IBM PS/2 Model 30, PC and XT.*

supports the Lotus/Intel/Microsoft\* specification. Meaning you

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cation, our boards can be built with either 256K chips or 1MB chips.

Supermax/MC is for the IBM PS/2 Model 50 and 60.

It features 8MB of memory, one serial port and one parallel

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While Supermax 30 combines the same memory plus two serial ports and one parallel

port. Both are for the PS/2 Model 30, the PC and XT.

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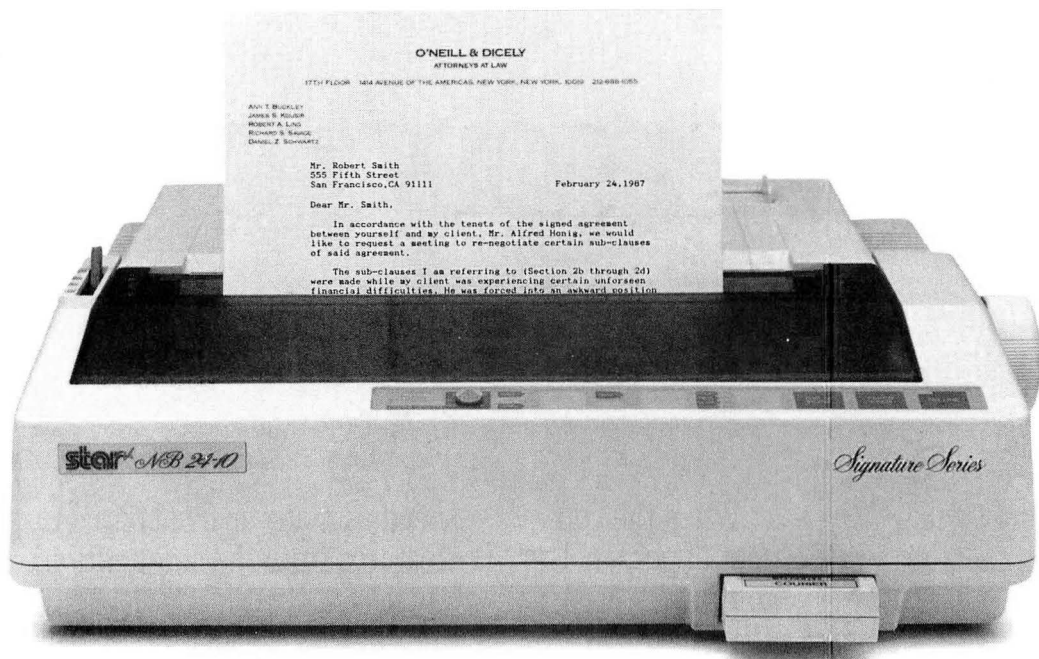
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among their accounts without ever having to change modules, or even change screens. And when they enter a transaction, all related items in other lists are updated immediately. So there's never a need for "posting."

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which is make the best chili in the whole doggone state.

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# HOW THE PC CHANGED MY LIFE

Edited by  
William Rodarmor

A caveman gathered his clan to show off his latest invention. As they huddled round the thing, admiring the way it crackled and gave off warmth and light, one of his neighbors asked the inventor what he planned to call it. After a moment's pause he answered, "The wheel."

The PC has had much the same history. Many of us looked at this bright new toy and confidently mistook it for something else. No matter. It changed our lives anyway. *PC World* asked prominent people in and out of the industry how the PC's advent changed the way they live. We picked boosters and critics, pundits and practitioners; their answers are as varied as the people themselves.

Tama Janowitz  
AUTHOR (SLAVES OF  
NEW YORK, A  
CANNIBAL IN  
MANHATTAN)

I've never been good with machines, and no machine has ever worked for very long around me. When I bought a computer, I thought it would change everything and write my novel for me. What actually happened was that it kept destroying the things I was writing, and it kept saying, "Not ready error reading drive C: Abort, Retry, Ignore?" Whenever I aborted, retried, or ignored, it

would just chew up my work and translate it into all sorts of strange signals, or it would just keep typing on the screen by itself. I read this article once about a demon that possessed a computer in India and wreaked all sorts of destruction. I wondered, had my PC been invaded, too?

I kept calling up the company and saying, "Look, this is just wacky," and they would say, "You don't know how to use the computer," which was true. So I had the guy come over and he'd say, "It's fine,

it's absolutely fine." It was true; when he was there, it *was* fine.

Finally one day when it said "Abort, Retry, Ignore?" I left the machine on, and got him to come over. And he said, "Oh you're right, there is something wrong," and he took it away. While it was being fixed, I went back to using my typewriter and never returned to the computer. It just sits there, getting dusty.

I wish I could be more optimistic, but my mechanical-energy/electromagnetic-field just isn't compatible with appliances like wristwatches, toaster ovens, and answering machines. I'd hoped things would be different with computers. I would never say anything against IBM; I'm afraid my typewriter would break down.



Ray Bradbury

AUTHOR

I'm not the most qualified person to comment on personal computers. I had so much trouble get-



Illustrations by  
MICHAEL WITTE



ting started with my PC, I finally said, The hell with it! My son-in-law needed one, so that was perfect. I gave it to him.



### David Fox

#### DESIGNER, LUCASFILM GAMES DIVISION

I was a counselor eleven years ago, and computers for me were a means to an end, a way to learn about technology for personal growth. I had the classic college experience using paper-punched tape for programming. It was neat, but I definitely wasn't a hotshot programmer.

In 1977, my wife Annie and I started the Marin Computer Center with ten Sol-20 computers, and for the next four years we taught classes and did outreach, taking computers to schools to teach the kids. When

we'd ask a group of thirty kids which of them had actually touched a computer, only one or two would raise their hands. By the time we were finished, only one or two hadn't.

Along the way we wrote a couple of books, including *Armchair BASIC*. My big break came in 1983 when I wrote *Computer Animation Primer* with Mitchell Waite. The second half of the book was a tutorial on animation using the Atari computer. I heard that Lucasfilm was starting up a games group, and I got a job as a designer on the strength of the manuscript and the demos I had done for the book. Since then, we have turned out seven PC games, including *Rescue on Fractalus*, *Ballblazer*, *PHM Pegasus*, and *Maniac Mansion*.

Working at Lucasfilm has meant being on the cutting edge of technology and entertainment, and I'd wanted to get here for years. At the time *Star Wars* came out, a few months before we opened the Computer Center, we kept hoping that George Lucas would walk in and say, "Hey, you guys should come work for me."



### Harvey Rosenfield

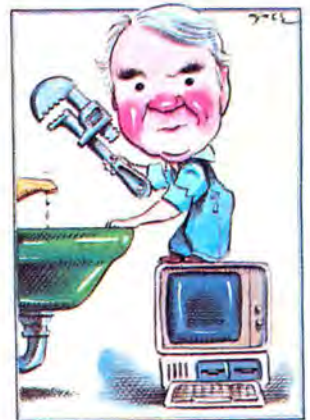
#### HEAD OF RALPH NADER'S ACCESS TO JUSTICE

When I first joined Ralph Nader's organization in 1979, there was only one clerical person for six lobbyists, so we all used manual typewriters to pound out draft after draft. We didn't even have a Xerox machine! Meanwhile, the special interests, with their infinitely greater resources, had access to computerized press lists, word processing, and typeset-quality graphics and layout systems.

Then came the PC. Sensing vaguely what it could do for us, I took out a loan and bought a PC with 64K of memory. It was a revolution among the revolutionaries. Suddenly, a position paper could quickly become legislative testimony; a press release, a newsletter. Most important, it helped even the

odds for the consumer movement. Today, the entire Nader network is electronic.

Cheap as they are, the machines are still out of the range of many public interest organizations. But there are a lot of micros on the desktops of citizen advocates, and that means more power to the public. We're waiting for the day when the PC makes every citizen an advocate.



### Andy Rooney

#### HUMORIST

I just have a nervous feeling that young people in school should be taught to be less dependent on technology and machinery, not more. We admire things that are home-made and handmade, but no one's learning how to make them that way anymore. What the world needs is fewer computers and more people who know how to fix a leaky faucet.



'Number one, PCs gave me a business. Number two, we couldn't run that business without tons of PCs.'



### Alice Kahn

**AUTHOR (MY LIFE AS A GAL, MULTIPLE SARCASM)**

For me, getting a computer meant the difference between being an amateur and a pro. I used to write on yellow pads and scribble the changes into the margins before I would even go near the typewriter. Now I turn out two pieces a week, and my writing income has increased 800 percent.

When Delacorte Press was working on *My Life as a Gal*, they sent me a mock-up of the cover, a photograph of my face rolling out of a typewriter. I was embarrassed enough at being on the cover, but seeing the typewriter made me sick because I didn't associate it with my career as a writer. I had them replace it with a picture of my face on a computer screen.

Learning to use the computer was a minor bit of technical mastery, nowhere near as hard as learning to use a blow-dryer. Writers who don't use computers may not want to jinx their writing; maybe they have a lucky pen or something. Of course, I once had an unlucky Macintosh that ate an entire screenplay.



### Paul Bartel

**SCREENWRITER, DIRECTOR, AND ACTOR**

When I decided to revise the screenplay for *Bland Ambition*, a sequel to my film *Eating Raoul*, I knew it was time to buy a computer. Now, it is certainly true that my Leading Edge has made an enormous difference in my writing, but hardly the one I anticipated. In fact, I have barely written a page of screenplay in the time I've owned it.

What I have written is pages and pages of

a journal and dozens of letters. I've written speeches, a catalog of all the signed first editions in my book collection, a list of the wines in my wine cellar, a list of all the actors who are potential candidates for roles in movies I'm hoping to make, acting and directing résumés for myself, critical notes on several scripts I may be involved in producing, and a confessional memoir about a sexual adventure I had in a movie theater when I was twelve. But no scripts.

I have spent hours feeding names and addresses from various ratty old address books into a program called *Little Black Book*. I have installed a wonderful (though to me incomprehensible) communications program called *PC-Talk* and subscribed to CompuServe, but I've never sent or received anything over the wire. To tell the truth, I'm not sure I remember my secret code word. Was it Short Circuit?

My computer is my new best friend. It provides me with hours of pleasant recreation every day, but it has so far refused even to consider putting in any time re-

writing *Bland Ambition*. I suspect it's waiting to get that first check from the producers.



### Esther Dyson

**EDITOR AND PUBLISHER, RELEASE 1.0**

The first PC I ever knew was a Wang word processor I single-handedly brought into the Wall Street firm where I was working. Everyone in the office was very suspicious of the machine, but by the time I left they were all standing in line to use it. At my next job you had to fight like the devil to get even a Radio Shack computer—until our boss got one. Then we all got them.

I gladly left Wall Street behind to start working for Ben Rosen and eventually turned his electronics industry newsletter into *Release 1.0*. I got into the field because I thought it was an interesting business to cover, but I fell in love with it because I became fascinated by the under-



‘When my newspaper brought in its Atex system,  
I was the last guy writing with a typewriter.’

lying technology. There’s a lot of intellectual content here that you don’t find in selling cornflakes.

The PC in a sense *is* my life. It gave me my job, and it’s a prism to look at the world with. Thinking about software is thinking about information, people, and meaning. There’s an awful lot of richness in software—kind of like in poetry.



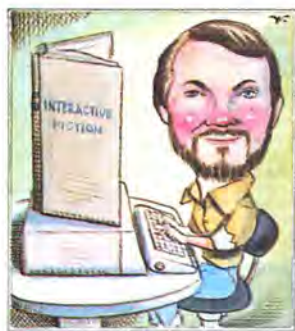
### Therese Myers

#### PRESIDENT, QUARTERDECK OFFICE SYSTEMS

Number one, PCs gave me a business. Number two, we couldn’t run that business without tons of PCs.

I see the PC as an unbelievable tool that lets a small company compete effectively against a large one. You can generate mailing labels and financial statements, reduce support staff, immediately capture informa-

tion and put it in a data base, and create business plans and newsletters, instead of relying on service bureaus that would cost you a fortune. You can act big.



### Robert Lafore

#### PROGRAMMER AND AUTHOR (MICROSOFT C PROGRAMMING FOR THE IBM)

The TRS-80 Model 1 came along shortly after I quit my programming job at what is now the Lawrence Berkeley Laboratory. Here was a machine that would let me combine my careers—programming and writing novels—and it was so cheap I could actually buy one myself. So I invented *Interactive Fiction*, a series of stories in which the computer user participates in the plot.

This was in 1979, a time when a start-up company could still afford a 6-foot booth at the Computer Faire in San Francisco. *Inter-*

*active Fiction* was a big hit, and I was interviewed by the local radio stations, the BBC, and Ted Nelson for *Creative Computing*. They all thought it was a great idea.

The TRS version did all right, but it sold even better when it was translated for the Apple II. Still, I always felt *Interactive Fiction* was misplaced. Here I was trying to create a new art form, and it was being marketed as a game—which it wasn’t, exactly. People expected this adventure and then found they had to do a lot of reading.

When I realized *Interactive Fiction* wasn’t making me rich, I got into writing computer books.



### Mike Royko

#### COLUMNIST, CHICAGO TRIBUNE

I use a PC at home, but it hasn’t affected my life just yet. I have to go to school to figure out what the hell this thing is all about. I bought a Leading Edge because it’s cheaper than an IBM and

it does the same things. I’ve got *WordPerfect*, but it’s more than I need. I mean, it’s massive. The manual’s a whole book. They ought to put a book out on how to understand the book.

The machine terrifies me, but I know enough to write my columns on it. When the first typewriter came out, a lot of newspaper guys said they’d never write with “that monster.” They’d rather write with a pen. When my newspaper brought in its Atex system, I was the last guy writing with a typewriter. I write five times a week; I didn’t have time to learn how to use the system. Then another reporter explained enough to me in simple English so I could do my columns. I didn’t need to learn the wonders of the system. All I needed to know was how to write 900 to 1000 words.

I don’t know that everyone needs a PC. I don’t know that I’d want to keep my business records in one. A \$2 ledger book is perfectly adequate for my needs. So far, I haven’t found a reason to use a PC for my taxes. My accountant tells me he can set something up to make things easier for both of us. It will probably make things easier for him.

(continues)



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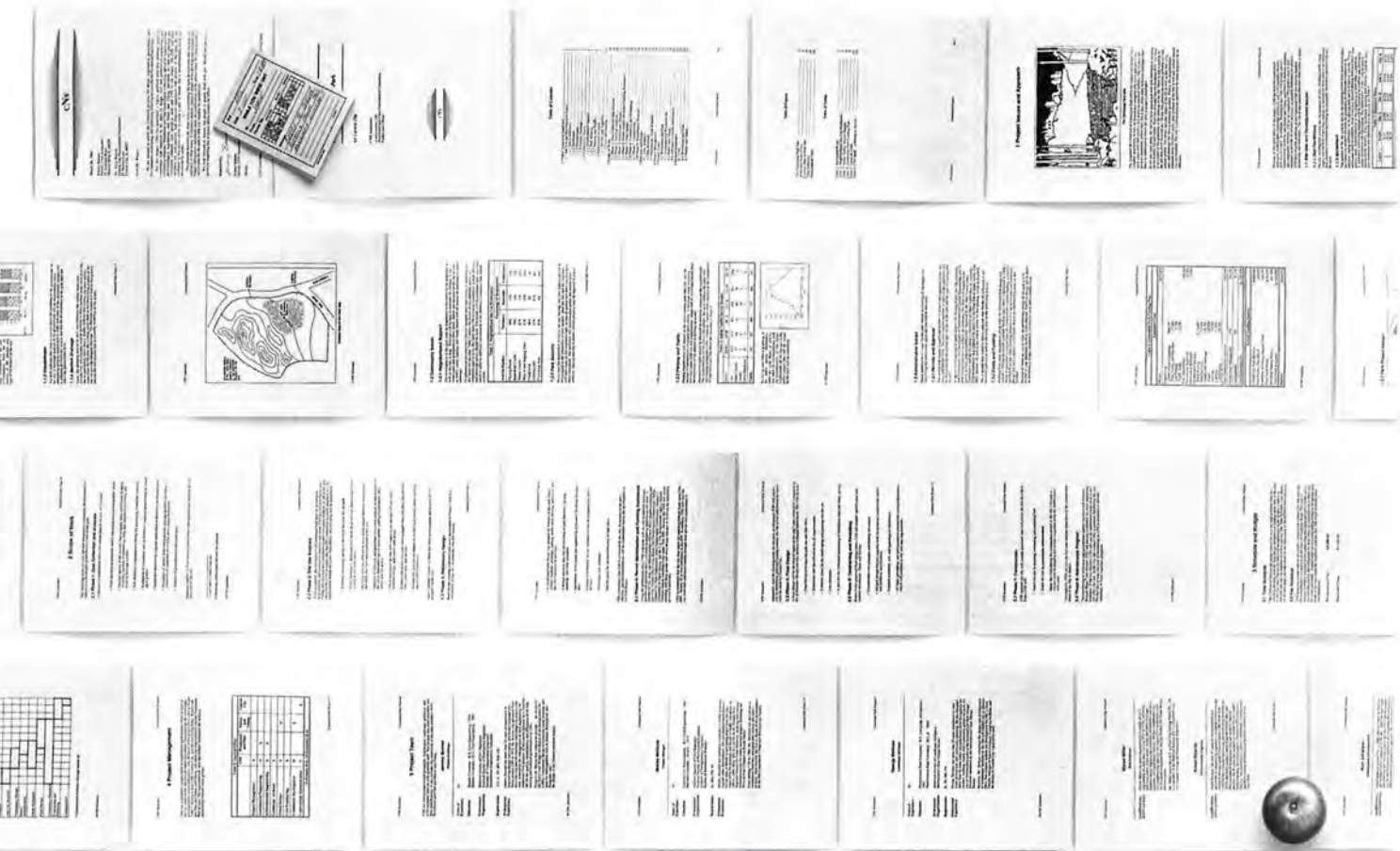
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## How the PC Changed My Life



### Chris Pray

EMMY-WINNING  
TELEVISION WRITER  
AND ACTOR

I have a war with machines. I don't even drive. I have a Stone Age psychology and even have a Stone Age computer: no modem, no hard disk.

The first month I had my computer, I found myself thinking like a computer after I turned it off: I'd think about deleting dumb remarks I'd made in a conversation, or inserting things, or moving things around. Instead of changing the subject, I'd think about changing the logged drive. I was actually logical for a few days, but it passed.

The computer is friendly—except when it's unfriendly. Yesterday I hit the delete key to get rid of a line of type, and it didn't work. I hit it again and it still didn't work. Most people would go to the manual to find out what was going on, but I'm not one of them.



### Andrew Tobias

AUTHOR AND  
CO-CREATOR OF  
MANAGING YOUR  
MONEY

The PC has changed my life in several respects. I was already an established writer, but the computer added a whole new dimension to my career. It would be dishonest of me not to acknowledge that it has bought me a vacation house and a lot of other nice things. But more than that, I now spend half my life on this program, *Managing Your Money*. I didn't expect it to turn out this way, but it has.

One of the things that made it easy for me to write *Managing Your Money* is that I designed it to suit myself. I have my whole life organized on this program, including records of rental properties, tenants, and investments. If I hadn't written the program, I would have had to find one just like it.

(continues)

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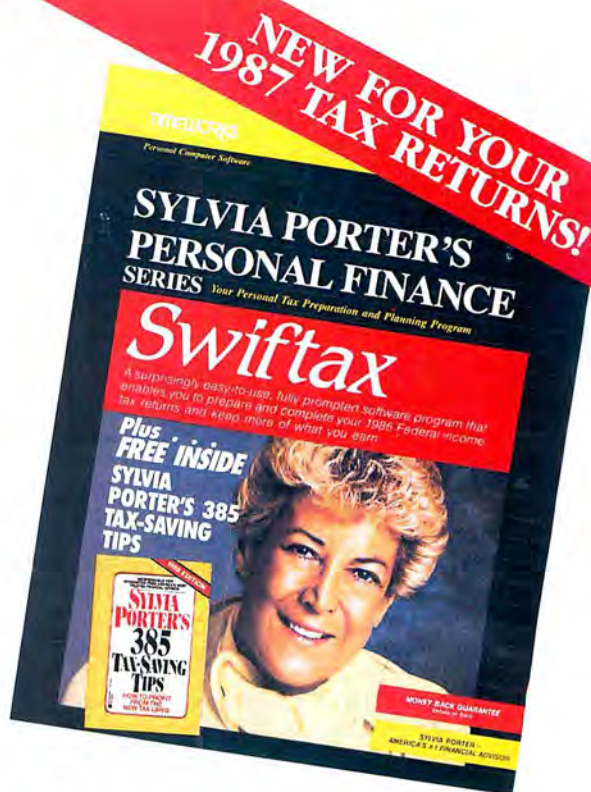
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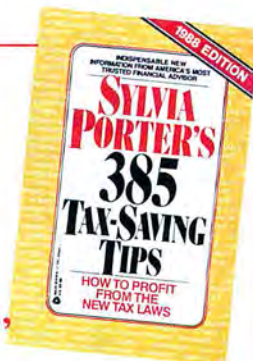


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## How the PC Changed My Life



William Gibson

AUTHOR

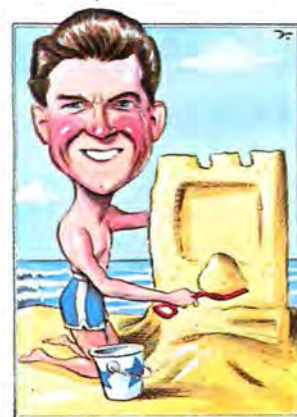
(COUNT ZERO,  
NEUROMANCER,  
BURNING CHROME)

Although my novels depict a future America where computers pervade culture, economics, and politics, they were written on a 1927 Hermes manual typewriter by a guy who had never had physical contact with computers. Now I write on a PC, but there was a time when I didn't know what a disk drive was.

Despite the atmosphere of my books, I don't really see PCs as innately sinister. There are a lot of fascinating things happening. I met a guy who produces software that makes it possible to create audio recordings of anybody saying anything. With that type of technology, we can modify history—change the memory of the race. That's weirdly radical stuff, and it will have a strange effect on society.

The first-generation PCs were invented by people hanging out in garages. I'm sorry that era is gone, because geniuses of that order will have to

content themselves with modifying and bootlegging technology produced by big corporations. The fantasy of my books is that there will always be individuals who find ways of creating outside the established systems.



David Kay

PRESIDENT, KAYPRO  
COMPUTERS

Before I got into PCs, I had my own construction company, which specialized in installing electricity-generating windmills that saved people money on their electric bills. This was during the heyday of the back-to-the-land movement. When the tax breaks for windmills dried up, I joined my father's construction business. I discovered that construction was largely selling, but that PCs involved a whole different dimension—fast-moving technology and people on the leading edge.

The long hours I put in now give me less time to do other things, so there are trade-offs. But I still manage to go swimming every day. ●



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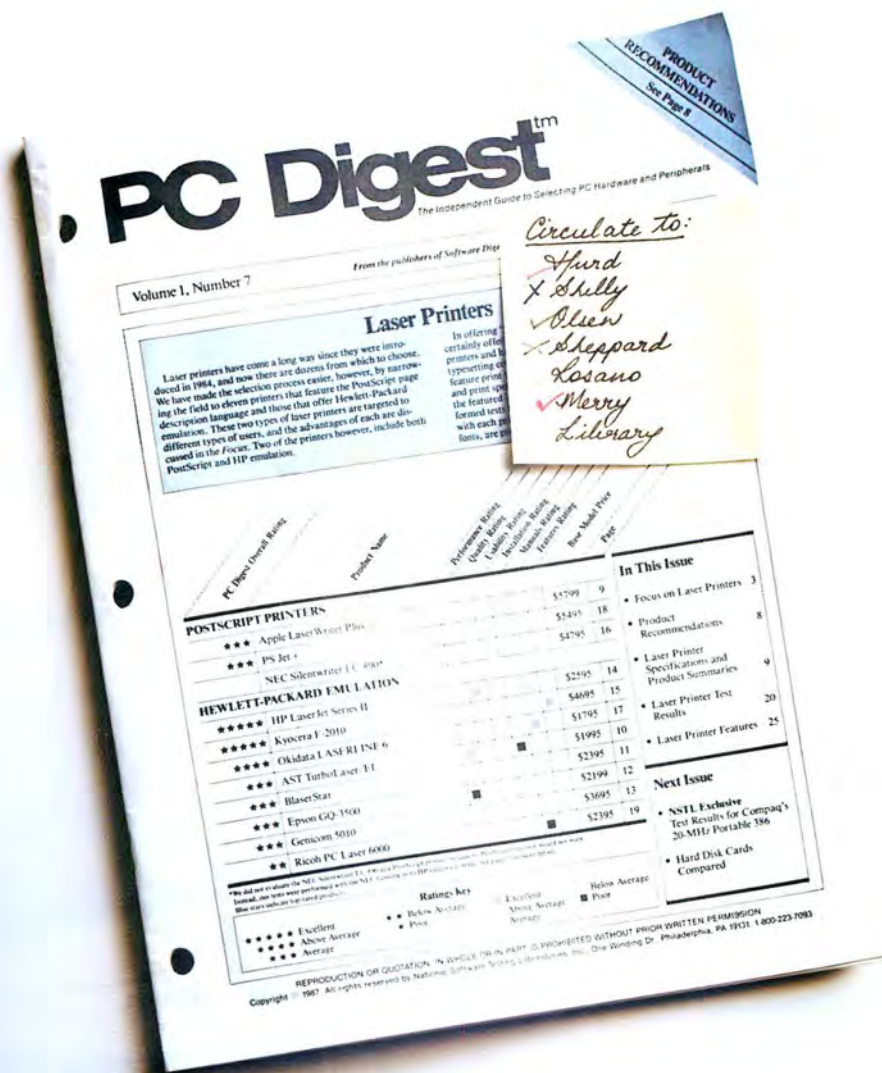
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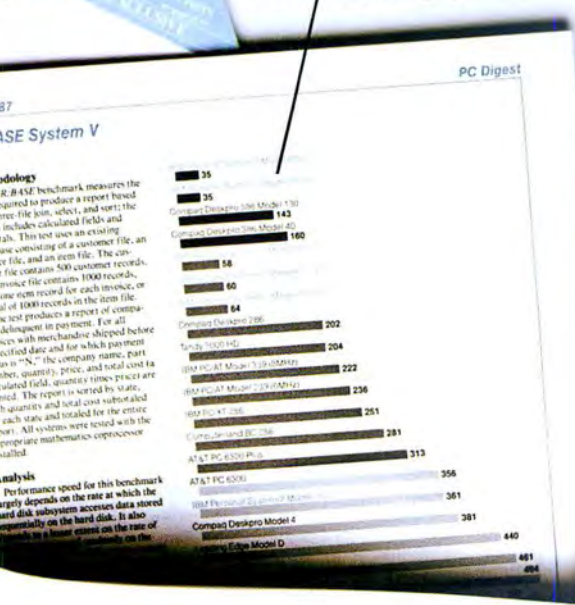
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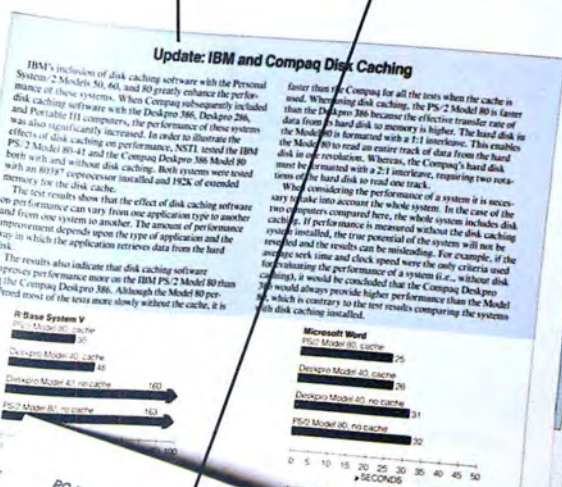


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## PRODUCT SUMMARY

## SPECIFICATIONS

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Units Shipped  
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Drive and Controller Manufacturers  
Drive: Peripherals Technology, Inc.  
Controller: Peripherals Technology, Inc.

Operating Parameters  
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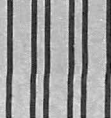
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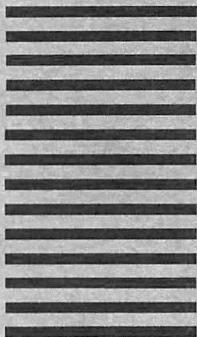
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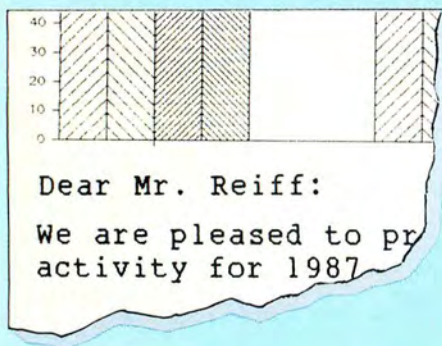
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## PC PIONEERS

Pioneers want something they don't have. Beyond this "burr under the saddle," though, they tend to be a diverse lot. Witness the roster of PC trailblazers profiled here: engineers, programmers, a money man, a party animal, and a teacher wearing weird hats. They've each made original contributions to personal computing—and they're itching to make more.

*Photography by*  
JEFFERY NEWBURY





## Long Live the Altair

*A tireless progenitor, Ed Roberts fathered the first personal computer and the Altair II, taking time off in between to become a hog farmer and a doctor.*

### Michael Harper

"You can always tell the pioneers by the arrows in their backs," people in Silicon Valley are fond of saying. But Ed Roberts, Renaissance man and "father of the personal computer," has escaped relatively unscathed.

Fed up with managing a booming business, Roberts the engineer retired to Georgia at the end of 1976 to become Roberts the hog farmer. He still has the farm, but now he's also a fully qualified physician finishing up a residency at Macon's Medical Center of Central Georgia. Moreover, when he hangs out his internist shingle, he'll also probably be an adjunct professor—one with impeccably diverse credentials—at the local school of engineering.

Roberts has come a long way since 1975, when he began shipping the first commercially available personal computer—the Altair—as a basic kit that could be mail-ordered for \$397. The product was born of Roberts' wide interests, all-consuming curiosity, enormous energy—and severe financial problems.

In 1968 the Air Force had transferred Roberts to Albuquerque, New Mexico, where he and three partners set up in Roberts' garage a company called MITS to make test equipment for model rocketry. By the early 1970s MITS was successfully producing calculators. But when its line was undersold by competitors who manufactured their own chips, MITS's bank balance moved \$365,000 into the red.



Ed Roberts, designer of the Altair: "The IBM PC may be bigger and faster, but what you can do with it is no different in principle from what you could do with the Altair."

The company needed a new product.

"We all lusted after a computer" in those days, Roberts recalls—just as he would have "killed" for a four-function calculator when he was an engineering student. MITS had already produced a calculator (the 816 in 1971) that allowed limited programming, so the company had some applicable experience.

Born in premises squeezed between a laundromat and a massage parlor in Albuquerque, the Altair's performance was in some ways as inauspicious as its birthplace. Even if you possessed sufficient soldering skills to build the machine out of a \$397 bag of parts, you couldn't do much with it as it stood. The basic Altair had an Intel 8080 microprocessor, 265 bytes (not kilobytes) of memory, a row of switches instead of a keyboard, and a bunch of LEDs in place of a video terminal.

But what it represented in terms of affordable, *personal* computing power was awesome, and Roberts maintains that peripherals available from MITS and third parties by the end of 1975 made it a useful machine. "The IBM PC may be bigger and faster, but what you can do with it is no different in principle from what you could do with the Altair." Roberts also points out that the Altair's S-100 bus, designed by staff engineer Bill Yates, became a personal computing standard for several years.

Whether or not you could do useful work with it, the Altair was in demand from the start. When a picture of the Altair appeared on the cover of the January 1975 *Popular Electronics*, thousands of people sent checks through the

mail in the hope of getting a computer. Many ordered peripherals that were only in the planning stages, and Roberts had to return their money. But the red ink on MITS's bank balance was soon replaced by \$250,000 of solid black.

### *A Mixed Bag*

Success seemed to generate as many problems as it solved, however. Few people outside hobbyist circles thought personal computing had any future, so financing depended on cash flow instead of venture capitalists' checkbooks. A surprised Intel, anticipating that the chief use of its 8080 microprocessors would be as traffic-light controllers, had agreed to supply Roberts at an OEM price, but disk drive manufacturer Shugart had no interest in selling him drives at a similar discount.

So Roberts found himself lying awake nights worrying about payroll for his rapidly expanding workforce. He had conflicts with associates "whose sense of ethics I had overestimated." Happiest dreaming up projects and solving engineering problems, Roberts now found himself "orchestrating a soap opera. It was a brutal experience." When Bill Yates complained, "This isn't fun anymore," a burned-out Roberts agreed.

By the end of 1976 Roberts had sold MITS to a big firm called Pertec, which subsequently had its own problems with the "soap opera." Many of the original MITS gang departed, the Altair began to face competition from other garage

enterprises, and Pertec lost exclusive rights to the BASIC that Bill Gates and Paul Allen (founders of Microsoft) had written for the Altair. Eventually, Pertec dropped the Altair line and name altogether.

By this time, Roberts was happily hog-farming at his "ancestral home" in Georgia. Farm life appealed to the beleaguered engineer-cum-manager because "the most momentous decision I thought I'd have to make was whether to turn the tractor right or left at the end of the field."

This mood "lasted about an hour and a half," says Roberts. Before the first crop of hog feed came in, he enrolled in medical school as a prospective internist. Reaching for an M.D. wasn't quite the radical career change it appears: Roberts had planned to be a doctor when he was still in high school but was sidetracked into engineering courses.

### *The DataBlocks Process*

Roberts' eyes are on the future, not the past, and the future includes computers. As this father of five sons and a 3-year-old daughter moves forward with his medical career, he still has a finger in the PC pie. Pertec may have dropped the Altair, but Roberts hasn't. He's a major stockholder in DataBlocks, the Georgia outfit where some MITS alumni (and Roberts' two oldest sons) produce process-control machines under the Altair name.

DataBlocks was founded in 1985 and is currently marketing two products that allow nonprogrammers to move into the world of ro-

(continues on page 114)





## VisiCalc Visionary

*Dan Bricklin, now quietly tending his Software Garden, began a colorful career in personal computers by brainstorming the electronic spreadsheet.*

### Eric Bender

Wading toward an MBA at Harvard in the 1970s, your best friend was a hand-held calculator. Case studies—done by the numbers—included break-even analyses, five-year projections, pro formas. “I began dreaming about a word processor for numbers,” Dan Bricklin recalls. The dream came alive in the electronic spreadsheet, a crucial tool today for millions of white-collar workers.

Now 36, Bricklin was already a seasoned professional programmer when he began writing *VisiCalc* on a Harvard minicomputer. Unlike many programmers, he also had considerable customer contact under his belt—fixing newspaper typesetting systems under nail-biting deadline pressure and building on-line cash registers “for 16-year-olds with other things on their minds.” From the start, he struggled to keep the software simple to use.

Over a holiday weekend in the fall of 1978, he borrowed an Apple II and threw together the first personal computer spreadsheet—a relatively primitive affair. “You couldn’t scroll it, and it took 20 seconds to recalc,” Bricklin remembers, amused. But *VisiCalc*’s alphabetic columns, numeric rows, and slash commands made it look much like spreadsheets do today.

With prototype in hand, Bricklin went to Bob Frankston, whom he’d met years earlier at MIT. Frankston agreed to share *VisiCalc* development tasks and to form a company called Software Arts.

Today, it’s hard to remember what a stunner *VisiCalc* was when it debuted in 1979. At the least, *VisiCalc* made the Apple II a



Today, it's hard to remember what a stunner Dan Bricklin's VisiCalc was when it debuted in 1979. By 1984, the package had sold half a million copies, making it the best-selling business software of all time.

unique helpmate for those who juggled numbers, and it often gets credit for the Apple II's grand success. By 1984, the package had sold half a million copies on various personal computers, making it the best-selling business software of all time.

With more than 100 people added to the payroll in four years, and a reputation as a programmer's paradise, Software Arts branched off into other innovative software: *TK!Solver*, the first PC equation processor; *Spotlight*, a desktop accessory package, many of whose design ideas would emerge in Lotus's *Metro*; and an electronic mail project dubbed *Wildfire* that later would be born as Lotus's *Express*.

Software Arts also frantically churned out versions of its money-maker for various flavors of microcomputers. "We were on a million different machines—a strategic error," Bricklin says. The company came out with an IBM version fairly quickly, but *VisiCalc* was not really optimized for the PC. And unlike the new kid on the block, 1-2-3, it didn't do graphics or data management.

Bricklin says that despite the competition, "We were in very strong financial shape." The next step in the plan was to sell the firm to a well-heeled parent company, so Software Arts could funnel major bucks into development efforts.

But VisiCorp, the publishing firm that had held marketing rights to *VisiCalc* since its inception, had different ideas. Unhappy with its Software Arts contract, and strug-

gling to create an ambitious line of homegrown applications, VisiCorp sued. The litigation quickly began to choke off Software Arts' income and made it impossible to seek outside funding. A year later when the two firms finally signed a truce, each had been mortally wounded.

### *The Lotus Connection*

The following spring, Bricklin ran into Lotus founder Mitchell Kapor on a plane trip. Soon thereafter, Lotus bought out Software Arts' product line. Bricklin, Frankston, and several other Software Arts employees trooped off to work as Lotus consultants.

Frankston ended up joining the Lotus payroll, but Bricklin had other interests. "I liked being a generalist," he explains. He also liked the idea that would become *Dan Bricklin's Demo Package*, a tool that allows programmers to quickly create mock-ups of their package's screens.

"I figured I could sell enough to live," as he puts it. He also wanted to readdress some of the business questions that had perplexed software firms in the roller-coaster early years. "With Software Garden [his latest company], I had the goal of learning about the industry from the bottom up," Bricklin says. Additionally, "I didn't know the IBM PC very well, and people were always asking me about it. How better to learn?"

He first cleared space for the Garden in his guest bedroom. Now housed in a two-room office in Newton, Massachusetts, the firm employs one other person. "Sales per employee are respectable," Bricklin concedes. First shipped in

volume in January 1986, the \$74.95 *Demo* sold more than 10,000 copies in its first year. Members of the Software Publishing Association voted it the best programming tool of 1986, which Bricklin finds particularly gratifying. Last fall he unwrapped a high-end *Demo* with more in-depth simulation capabilities, including powerful programming functions and bit-mapped displays.

### *Look and Feel*

Quietly plainspoken in private and public, Bricklin takes strong stands on industry issues, notably "look-and-feel" protection. While he agrees that the issues of intellectual property rights get very tricky, he's come down heavily against the Lotus copyright suits.

He landed in a curious situation last spring when owners of the Software Arts remnants sued Lotus and Kapor, making a series of allegations that date back to Kapor's look at unreleased *VisiCalc* products in 1981. Bricklin still owns stock in the shell company ("Nobody's offered me any money for it") but tried to stop the suit. He has blasted its legal foundations in print ever since.

While Software Garden could provide a good living indefinitely, "I don't want to do *Demos* forever, and I don't want to stay in a small business forever," Bricklin remarks. He soon will hit the big time in a serendipitous way. Although few have ever seen him don a tie, "I'll be in *Gentleman's Quarterly* and *Esquire*, doing a fashion ad," he says, smiling. "Heady stuff!" ●





## Radical Engineer

*A hardware designer with a heart, Lee Felsenstein helped launch Silicon Valley's legendary Homebrew Computer Club.*

### William Rodarmor

With the smile of a pussycat and the face of an owl, Lee Felsenstein is once again going to sea. But not in a pea-green boat. A mild-mannered hardware designer with a string of successes in his wake, Felsenstein is finishing an inexpensive computer he feels will give the PC world the capabilities of the Macintosh for graphics and desktop publishing. Powered by an 80386 processor, the prototype announced at Fall COMDEX 1987 coupled a very high-resolution custom monitor and a powerful external laser printer engine. Felsenstein claims that a low-end version of the computer could become "the Osborne of the 1990s."

The new machine is the latest manifestation of a restless mind and a lively social conscience. These qualities have been shaping the PC scene ever since Felsenstein first organized a motley crew of hobbyists into that early crucible of Silicon Valley talent, the Homebrew Computer Club.

Even if he hadn't formed that club, Felsenstein's niche in PC history would be secure. He designed the world's first portable computer, the Osborne 1, and launched an offbeat public information network called Community Memory. Now putting in what he calls "start-up hours" refining his new computer, Felsenstein claims his real goal is to see daydreaming become a respectable pursuit.

Felsenstein's just one of many early PC innovators who were spared the burdens of being rich. He launched Community Memory



**Osborne 1 designer Lee Felsenstein: 'After the Osborne disaster, I realized that even the highest-paid, neatest-dressed executives don't know what the hell they're doing.'**

flush from the success of the Osborne 1, but the organization nearly foundered when Osborne stock became worthless. "After the Osborne disaster, I realized that even the highest-paid, neatest-dressed executives don't know what the hell they're doing."

Growing up "leftist" in Philadelphia, Felsenstein developed an early distrust of authority. The son of Philadelphia communists who were later forced out of the party, he was involved with grass roots civil rights organizations by the time he was ten. Shy with people, he took apart clocks and built radios until a brother pushed him into computers. When Felsenstein convened one of the first Homebrew meetings—held in a Menlo Park mansion straight out of Charles Addams—he was determined not to let hierarchy get in the way.

Though it has become the stuff of legend, the Homebrew club in 1975 wasn't much to look at. Its members were an odd collection of people who hadn't made it—yet. Most belonged to Silicon Valley's underclass of technicians and junior engineers who Felsenstein says "were close enough to computer technology to see what it was like, but not powerful enough to do anything about it."

Although the club grew big enough to move its meetings to the Stanford Linear Accelerator Center auditorium, it was never a mass movement. "Somebody in the *San Francisco Chronicle* recently wrote that 750 people were there," says Felsenstein. "Heck, the auditorium only seated 250, and at most we'd

have another 50 in the aisles." As the club grew, Felsenstein worked steadily to encourage it—by breaking down its incipient hierarchy.

"At the first meeting," says Felsenstein, "Gordon French was giving a lecture, and when somebody raised a point, French would give a little talk on some aspect of programming. But I noticed that whenever somebody tried to impose a lecture, people went out into the halls and talked. That's where the important stuff was getting done."

#### *Random Access*

The structure Felsenstein devised kept the people in the room. He started the meetings with a "mapping session," in which people would stand up one at a time and say what they'd like to talk about later in the "random access" session. The effect was electric. "After a certain length of time," says Felsenstein, "the meeting would almost burst apart, because people would get anxious to grab a person who had stood up and find out what they wanted to do about their interest." With individuals like Steve Wozniak and Steve Jobs in attendance, those random encounters had some far-reaching effects.

For the first two years of its existence (1975 to 1977), says Felsenstein, the microcomputer industry wasn't driven by capital but by technology. That early "random access" talk was the model for the sort of information exchange that catalyzed the industry. "Technolo-

gists gave away their stuff to other technologists, saying, 'Wow, isn't this great! Just imagine what you could do with this.' The technologists could cooperate, because they didn't have anything to play with unless they all played together."

The payoff from those meetings came in the form of several computer companies—not the least of which was Apple. "Wozniak and Jobs began to design their Apple I for the people in the meeting," says Felsenstein. "They sold it from the floor, got feedback, and began work on the Apple II."

#### *Technologists on a Leash*

In a way, Homebrew was a kind of hunting and gathering society that hadn't yet settled down to tilling the fields. The club's end, ironically, grew out of its success, as design ideas began to change from communal concepts to private property. When Apple was formed in 1977, says Felsenstein, the rules of the game changed. "Now the technologists were on a leash. They weren't going to be permitted to take the designs out of the lab and show them around at the Homebrew club...designs were proprietary; they were property."

If his new computer's debut translates into sales, Felsenstein will just be doing what he likes best: turning out intelligent computer designs at reasonable cost. When somebody comes in and says they want something, he says, "I can execute the design and have it built, and it'll work with only very minor meddling. I'm a very good engineer—and getting better." ●





## Wild-Man Warren

*Brainchild of Jim Warren, math teacher turned programmer, the Computer Faire has been the industry's favorite party since 1977.*

### Michael Goodwin

It was wall-to-wall people at that first Computer Faire in April 1977. The program boasted more than 100 speakers; Conference Proceedings ran well over 200 pages; and founder Jim Warren made a cool \$20,000 profit. Not bad for a Texas math teacher with a penchant for wild parties. Now 51, Warren is a large man with short white hair and a well-trimmed white beard and mustache. He's dressed in jeans, dusty shoes, and a T-shirt he pulls on especially for the interview. "Clothing is permitted around here," he grins, looking around his gorgeous 40-acre spread high above the California coast, "but it's definitely optional."

Aside from buying land and building a dream house—which the first successful Computer Faire made possible—money never mattered much to Warren. "If I were driven by making money," he declares, "I would never have sold the Faire, 'cause it *printed* money." Like many PC pioneers, Warren's been motivated by interesting technical problems and by social conscience. That these concerns proved extremely lucrative is an irony of the industry. Warren grew up in San Antonio—where he became a math teacher and the chair of the South Texas Mathematics Council. He learned computing in 1960 on an IBM 650, "the old 2000-word drum machine. It was all punch cards, and used a primitive language called SOAP," he recalls. In 1964, fed up with south Texas, Warren headed for California, eventually holding several teaching positions in the San Francisco Bay Area. But his real enthusiasm was reserved for the Palo



**'If I were driven by making money,' Computer Faire founder Jim Warren declares, 'I would never have sold the Faire, 'cause it printed money.'**

Alto Free University—where he taught a tremendously popular course in Intentional Communities—and for the relaxed nude beach scene along California's north coast.

Warren liked the beach scene so much he started throwing huge nude parties at his house in Santa Clara. These were relatively sedate affairs, he insists—aside from the roaring rock music. Although he held a tenured position at a Catholic university, Warren was doing nothing illegal and saw no reason to be secretive about these parties. They developed such a wide-ranging reputation that *Playboy* shot a photo spread of one and the BBC sent a crew to film the “now generation” at another. When his “straight” academic employers became uneasy, Warren—not wanting to cause any trouble—resigned.

Luckily, another job waited in the wings. A friend from the Free University invited Warren to work for the Stanford Medical Center as a computer programmer. “They had a classic DEC PDP-8,” Warren recalls. “4K of 12-bit memory. Transistors, not integrated circuits; it kept the room warm.”

Over the next few years, Warren found himself increasingly involved in computer societies. He attended the second meeting (“not, sadly, the premiere”) of the Homebrew Computer Club and published an article in the second issue of a new magazine called *Byte*. Then Dennis Alison and Bob Albrecht, who ran a nonprofit educational corporation called the People's Computer

Company, asked Warren if he wanted to edit a magazine on microcomputer software. Warren was enthusiastic: The same sense of adventure, of anything being possible, that had informed the late sixties was alive in the burgeoning world of microcomputers.

#### *Without Overbyte*

What to call the new microcomputer software journal? Eric Bakalinsky, pasteup artist for the PCC's newsletter, came up with an esoteric mouthful of a name: *Dr. Dobbs' Journal of Tiny BASIC Calisthenics and Orthodontia*, subtitled “Running Lyte Without Overbyte.” “‘Dobbs’ was Dennis and Bob,” explains Warren. “‘Calisthenics’ were exercises, and ‘orthodontia’ was avoidance of overbyte. I wasn't about to edit a magazine devoted solely to BASIC, so I changed the title to *Dr. Dobbs' Journal of Computer Calisthenics and Orthodontia*.” Thus Warren's editorial career was launched.

In the spring of 1976, a New Jersey computer group created the Trenton Computer Fest, modeled after the Ham Fests that had existed for amateur radio fans for years. It drew almost a thousand people. Warren thought that was great—only it was happening on the wrong coast. When he began to hear rumors about a personal computing festival to be held in Atlantic City, New Jersey—PC '76—it stung him into action.

Warren went to Atlantic City with a xeroxed flier announcing his own Computer Faire to be held in the San Francisco Bay Area in April 1977. “People could set up

tables somewhere and have a flea market if they wanted to, but I came out of an academic community, and I envisioned the Faire as a technical conference, an information exchange.”

#### *Too Much of a Good Thing*

Warren hardly envisioned the result: 12,800 people paid to attend that first Computer Faire. “It was the best of all possible worlds,” says Warren. “We got to do something fun and worthwhile—and something that pays.”

Warren hadn't intended to do more than one Faire, but after he'd slept for a week he realized he had ascended too steep a learning curve not to do another Faire. Warren eventually directed seven Faires—each one more successful. Warren's last Faire, in 1983, drew 47,000 people; 120 companies were on the waiting list for exhibit space. Shortly thereafter, Warren sold the Faire to Prentice-Hall. Even if the price was right (sources say \$2 million after taxes), the Faire was a going, profit-making concern. Why did Warren sell?

For one thing, he was somewhat overextended. In the late seventies he had started a biweekly computer newspaper called *Intelligent Machines Journal* that turned out to be more work than fun. “I was a lot better at the editorial content than hustling advertising,” Warren admits, “and that's not the way to break even.” Finally he sold *IMJ* to Pat McGovern (president of IDG,

*(continues on page 114)*





## Playing the PC Ponies

*A mover and shaker behind the scenes, venture capitalist Ben Rosen backs the best, juggles the rest, and keeps a firm hand on the reins.*

### Daniel Brogan

All too often, the venture capital game resembles an afternoon at the racetrack: Pick a horse and place your bet. Ben Rosen played it that way with his first two investments and both times came up a loser. Synapse Computer Corporation and Osborne Computer each went bankrupt. Osborne Computer alone swallowed up a Rosen wager estimated at \$400,000.

Undaunted, Rosen decided he had more to offer than his bankroll. Henceforth, Rosen-backed horses could count on getting a trainer, an agent and, if need be, a jockey as part of the deal. If he and L. J. Sevin—an investment partner since 1981—were going to be failures, says the 54-year-old Rosen, “We wanted to at least be responsible for our failures.”

Today, Rosen’s Sevin Rosen Management Company is far from a failure, having funded some of the PC industry’s biggest winners. A \$2.1 million bet on Lotus paid \$70 million when the company went public in 1983; that same year, Compaq’s initial stock offering turned a \$2.5 million Sevin Rosen investment into holdings worth \$40 million. Other Sevin Rosen-funded companies include Ansa Software, Palantir Corporation, Quarterdeck Office Systems, and Electronic Arts.

To each of those companies, Rosen has brought a wealth of knowledge from previous careers as an electrical engineer and one of Wall Street’s top technology analysts. It was in 1977, during his tenure at Morgan Stanley and Company, that Rosen became convinced of the personal computer’s vast potential.



**Ben Rosen has funded some of the PC industry's biggest winners. A \$2.1 million bet on Lotus paid \$70 million; Compaq's initial stock offering turned a \$2.5 million investment into \$40 million.**

"I think you can make a strong argument that Ben Rosen is as responsible for the development of this industry as anyone else," says Sevin, who watches semiconductor and network technologies for the partnership. "When Apple was just selling boards, Ben was telling Wall Street, 'Hey, here's someone to watch.'"

Rosen continues to make his voice heard through the directorships he demands from every new company he funds. Often, as is the case with Compaq, Rosen takes the title of chairman. "When a company starts out, it's usually resource-shy—just a few people and an idea," Rosen says. "Besides money, they need help in putting a team together and deciding on a strategy. Most of these people are engineers or software writers. They've never seen a lawyer or an accountant or an investment banker or an ad agency before. They don't know what public relations is. There's a whole host of things that we can assist them with while they're putting the company together."

That assistance comes in the form of an uncompromising eye for detail and an obsession with quality. His devotion to precision is evident even in casual conversation—he often rephrases a thought several times in hopes of better expressing his meaning.

"Look at the companies he's funded—Lotus, Compaq, Ansa—and you'll see that they all have the same fanaticism for quality," says Esther Dyson, who bought up

Rosen's newsletter, *The Rosen Electronics Letter*, in 1983 and renamed it *Release 1.0*. "That's the mark of Ben Rosen."

#### *A Good Balancer*

Rosen may be demanding, but as they get to know him, colleagues begin to see hints of an altogether unexpected talent. "I've tried juggling, but I'm not very good at it," says the venture capitalist. "What I am is a good balancer." Proving it, Rosen's been photographed for *Fortune* magazine balancing a Compaq Computer box on his nose. More recently, he appeared in *U.S. News & World Report* with a foot-long stick between his nose and a *Paradox* package.

"He's an amazing combination," Dyson says. "On the one hand, he's totally pin-striped; on the other, he got the biggest thrill out of having Phyllis Diller pop out of his 50th-birthday cake."

Countless would-be entrepreneurs, however, never get a chance to see that side of Rosen. Only one in a thousand business plans submitted to Sevin Rosen eventually get funded. Those that do must first survive a rigorous courtship that can last as long as a year.

"Generally, we're looking at three things: people, market need, and the product itself," Rosen says, adding that people are usually the most important consideration. "In the case of Compaq, we actually encouraged the people even though we didn't like their original idea. We told them it should be scrapped. After a few months, they came up with the Compaq Portable."

Unfortunately, Compaq's subsequent success story isn't likely to be repeated. From a venture capitalist's point of view, the PC boom is over. "Six years ago, PCs were a very hot area of investment. During 1982-83, 30 or 40 PC companies—and well over 100 software companies—received venture funding," Rosen says. "In the last three years, you can count on one hand the number of hardware and software companies that have been funded by venture capitalists."

#### *Future Funding*

Rosen says that venture capital's attention is now shifting toward telecommunications, semiconductors, and biotechnology. All three are industries in the midst of what Rosen calls "great ferment." "Funding tends to go into fairly new industries, when market shares haven't been established, when the technology is changing rapidly." In the PC industry, where three companies control 50 percent of all software sales, the fermentation stage is over.

To catch a venture capitalist's eye today, says Rosen, a PC-related company would have to be oriented toward solutions rather than tools. He points to Sevin Rosen's most recent investment as an example. Bestinfo of Media, Pennsylvania, provides a professional desktop publishing system that runs on ATs and compatibles.

"This is an area of great interest to us," he continues. "The emphasis (continues on page 114)"





## The User's Champion

*Russ Walter might wear funny clothes and keep weird hours, but nobody does a more thorough, practical, and entertaining job of teaching PC technology.*

### Becky Batcha

Author and educator Russ Walter, creator of the incomparable *Secret Guide to Computers* series, comes up short by many people's measure of the good life. At 40, Walter's a loner who has never sought to amass a personal fortune. His ramshackle frame house in Somerville, Massachusetts, is empty save for stacks of boxes, piles of electronic odds and ends, and a few pieces of dormitory-style furniture.

But Walter aspires to a different realm. What he wants most is to help beginning personal computer users and, in the process, to touch as many lives as he can. By these criteria, he's a very successful man indeed.

More than 200,000 people own at least one of Walter's *Guides*, which he publishes himself and sells for \$8 apiece. Now in its 12th edition (and 12th year), the three-volume *Guide* receives nothing but praise for its scope, wit, and enormous practicality. "No room that holds a small computer and an adult learning to use it is well equipped without Walter's *Guide*," says *Scientific American*.

Moreover, thousands of students got their start in personal computing through one of Walter's \$55, two-day crash courses in PC operations and PC lore. Accompanied by 40-odd computers, a few Casio synthesizers, and a talking watch, he teaches everything a beginner needs to know, including how to



More than 200,000 people own at least one of Russ Walter's *Secret Guide to Computers*, which he publishes himself and sells for \$8 apiece.

computerize a business, how to select computers and software, and how to learn programming in BASIC, C, and Pascal.

His teaching (and trade show) costume features a black witch's hat, a black monk's habit, and a red "ninja" jacket. Strange clothes help people relax around computers, he says.

### *Serious Credentials*

Walter's somewhat eccentric teaching style has a solid foundation. He received an undergraduate degree in math from Dartmouth and a master's in math education from Harvard. Like many good teachers, his influence ripples. Over the past dozen years, his classes have spawned several noted PC gurus—among them *dBASE* trainer Adam Green and authors Harriet Morrill, Richard Ridington, and Mark Williams. Walter also doesn't stop teaching when the bell rings. He prints his phone number (617/666-2666) on the covers of his books and encourages readers to call him day or night. "Whenever you have a question about computers—or about life—call me, and I'll help you, free, even if your question is weird or personal," he writes.

Mostly, callers want advice on what computer to buy or how to

use some software they've already purchased. Walter loves to oblige. "It makes me feel useful," he says. If he's in the middle of one call when another comes in, he phones the second caller back at his own expense. The only queries he refuses are those from users of pirated software.

If accepting phone calls at all hours seems fanatical, Walter is equally extreme in defending an independent voice. He refuses sponsorship and handouts from corporations, universities, publishing houses, and other institutions, fearing they might compromise his integrity.

He won't compromise on pricing either, charging half what most computer book publishers get for similar-size (and generally less useful) tomes so that more people can afford his wisdom. The result is that he barely covers overhead on some editions. Last year, for instance, Walter lost \$28,000 promoting PC use. "If I'd gone to sleep for a year," he comments dryly, "I'd be \$28,000 richer."

### *Prime Time*

The way he tells it, Walter reached his creative prime when the personal computer did: around Christmas of 1982. He felt invigorated as people got excited about PCs and their potential. In response, he composed the most lively of his *Secret Guides*, the risqué 11th edition.

PC glorification reached its peak in 1983 when *Time* declared the personal computer its "Man of the Year," says Walter. After that, as users started concentrating on practical business matters, the industry lost its sparkle for him and he lost his own sense of purpose. "At that point," he says, "I felt I was becoming useless."

Beginners still need a good teacher like Walters, however. With users and industry observers lost in a fog about IBM's new PS/2 machines and Microsoft's OS/2 operating system, for example, Walter's simple advice shines like a beacon. This is what he recommends: Unless you get a steep discount, feel a pressing need for advanced graphics, or have an unlimited budget, buy an XT clone now and wait on the PS/2. In two years, when prices drop to half of what they are now, pick up a new-model machine. Then you'll have two computers for the price of one.

No one who can piece together such an elegant solution to a thorny problem need ever worry that he's outlived his usefulness. ●



According to most estimates, Ansa and Borland together constitute the fifth largest software company in America.

## Ed Roberts

(continued from page 103)

botics. One, the Altair II, is a stand-alone processor, and the other is an interface card (PC Link) that connects a PC (or an XT or AT) to the Altair II control modules, turning the PC into a process-control machine. The interface card fools the PC into thinking it's talking to its own bus, so the user never has to leave the PC environment.

Applications for the new Altair range from controlling oil-drilling rigs to processing film automatically to running elaborate model railroad setups. One client's Altair II regulates the blinds in an office building to allow maximum light without admitting direct sunlight.

Roberts' involvement with DataBlocks stops well short of management, though, and he's determined that nothing will interfere with his medical practice. Such resolve doesn't mean that he's finally settled down for good: "Don't you think we all need to change what we're doing every five years?" he asks. ●

## Jim Warren

(continued from page 109)

parent company to both *Computerworld* and *PC World*) for a large but undisclosed sum; McGovern promptly changed its name to *InfoWorld*.

But Warren's real reason for selling runs deeper. "I'm a computer guy," he explains, "a mathematician, an educator—not a businessman. Yet after the third or fourth Faire, when the computer business

became very profitable, the people coming in were business oriented, dollar oriented. I'm not driven by money. I've always been driven by doing things that were exciting and innovative and fun, and made a positive contribution to society."

These days Warren dabbles a bit in county politics, is a trustee with the county's community college district, and works with the IEEE Computer Society. He's even written a typesetting program for the HP LaserJet—but has never gotten around to promoting it. "One of the disadvantages of having more money than I need," he notes, "is that it removes a lot of the incentive to do the scut work once you get past the interesting parts."

He's also started writing a computer column about the future: "I continue to feel that computers in the hands of the general public are crucial tools for positive social change. The only way we have a

hope of regaining control over our society and our future is by extracting the information we need to make informed, competent decisions. And that's what computers do." ●

## Ben Rosen

(continued from page 111)

sis is definitely shifting from companies that make PCs and horizontal software to those that use PCs with vertical software." But even a Bestinfo would be hard pressed to win Sevin Rosen funding in the years ahead. The partnership recently announced that its venture fund would not be renewed after 1990.

"We've invested in 36 companies. Eight companies went bankrupt and eight went public. Twenty are still in incubation," Rosen says. "That isn't a bad track record for venture capital. Now, though, I think we're better served by concentrating on present investments than by looking for new ones." Rosen is especially interested in Ansa. The Belmont, California, maker of the *Paradox* relational data base was recently acquired by Philippe Kahn's Borland International. Part of the deal was a seat on the Borland board for Rosen, who also retains his title as Ansa's chairman.

According to most estimates, Ansa and Borland together constitute the fifth largest software company in America.

"Philippe and I have the same objective," says Rosen—making Borland a Big Three contender. With Rosen's (and Kahn's) track record, that should be an excellent bet. ●

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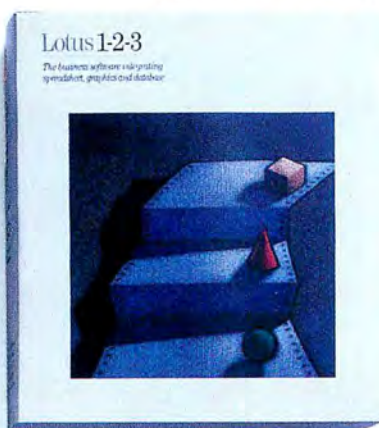
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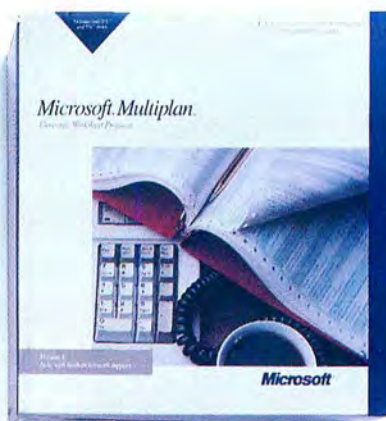
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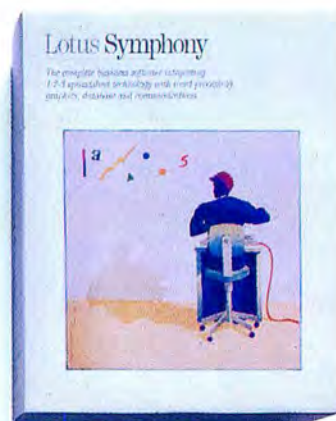
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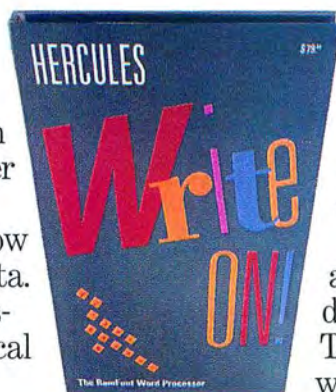
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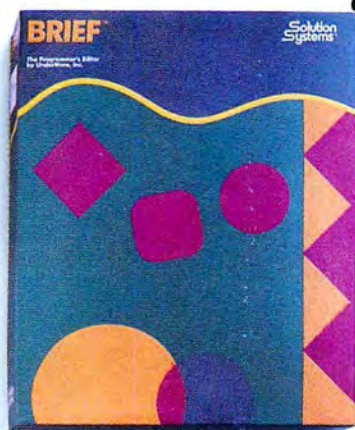
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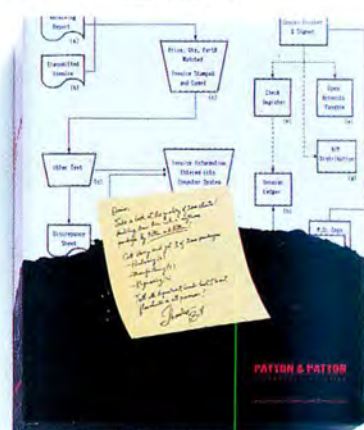
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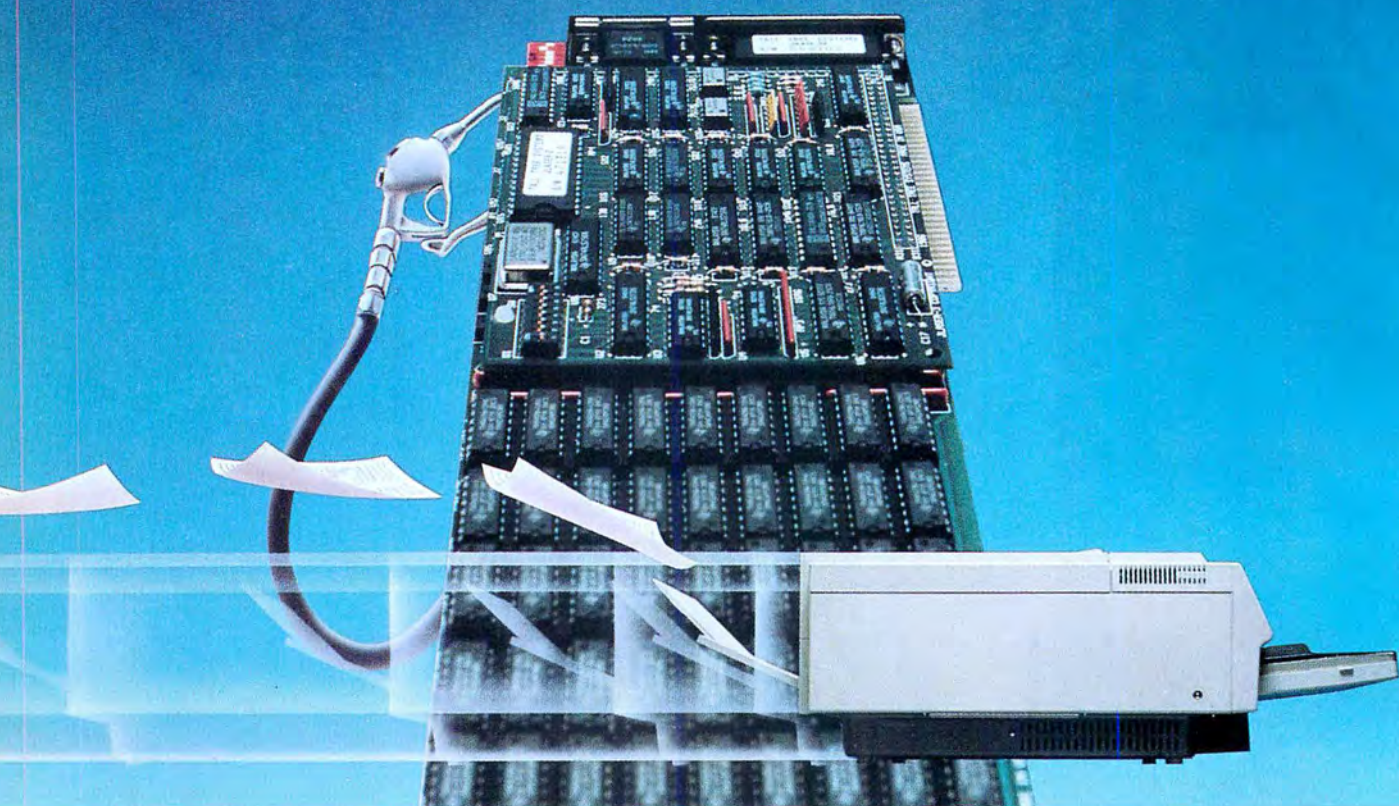
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HOWARD VADNAÏS Director of Service and Support  
LOTUS DEVELOPMENT CORPORATION



# PC WORLD FORUM: ARE USERS GETTING A SQUARE DEAL?

Edited by Mike Hogan

The personal computer demands more from its users and sellers than almost any other business product. Unlike with a telephone, photocopier, or fax machine, you don't simply plug it in, push a few buttons, and have it do something for you. Making good things happen with a computer requires a level of expertise that most of us can only hope to achieve with the help of those who sold us the equipment. Are users getting the kind of cooperation from vendors that they need to realize maximum productivity per dollar spent?

That's an easy question to ask but a tough one to answer. For help we turned to the heads of the industry's leading vendor and user organizations.

Users were eager to engage in a dialogue, but attracting vendors to our roundtable was much more difficult. Some confided that the issue was just a little too sensitive to be discussed on the record.

Still, we did find some brave souls among the leading companies. Those who accepted our recent luncheon invitation were Howard Vadnais, director of service and support for Lotus Development Corporation; Will Kieper, executive vice president of MicroAge Computer Stores; and Jim Button, president of ButtonWare. Representing the user perspective were Jonathan Rotenberg, president of the Boston Computer Society; Jerry Schneider, president, Capital PC User Group; Alex Kask, president, New York Micro Managers Association; and Jeffrey Erlich, manager of product technology, General Electric Corporate Information Technology. Sitting in from *PC World* were Editor-in-Chief David Bunnell, Editor Rich Landry, and News Editor Mike Hogan.

*Computers users and sellers squared off recently to explore one of the fundamental questions of the day. Their answers may surprise you.*



JONATHAN ROTENBERG President  
BOSTON COMPUTER SOCIETY

*Photography by*  
HENRY HILLIARD



'With the PS/2 and OS/2, I think we're looking into—not to exaggerate—a two- or three-year black hole, where IBM has to reinvent everything that Apple did.'



ALEX KASK President  
NEW YORK MICRO MANAGERS ASSOCIATION



JEFFREY ERLICH Manager of Product Technology  
GENERAL ELECTRIC CORPORATE INFORMATION TECHNOLOGY

**PCW:** *Does the Boston Computer Society think that users are getting a square deal?*

**Rotenberg:** We feel that the user community has become very stratified recently. Today, people who buy computers for themselves or for their small businesses are getting the least square deal of anyone. First, the entire industry is focused on multiple sales, not single purchases. Also, in some ways the technology is moving backward. Personal computers are getting harder to use every year, with more powerful software and increasingly complex local area networks and multitasking. You need consultants and experts on staff to set things up, and in larger companies, that takes control of computers out of the individual's hands. This is very different from three years ago, when people were saying that the need for computer literacy would disappear because computers would become people-literate rather than vice versa. Personal computers are becoming more and

more like mainframes. It's hard-tech rather than high-tech.

**PCW:** *If IBM and Microsoft were here, they would say they are trying to provide you with a long-overdue platform for higher performance and ease of use. New, more powerful architectures like the PS/2 and OS/2 are supposed to insulate the user from the hardware the way the Apple Macintosh does.*

**Rotenberg:** I think it works with Apple because it has one vision, one architecture, and the ability to make people stick to it. But the OS/2 and PS/2 world is a mess of bureaucracy and negotiation focusing on what's going to meet Microsoft's needs and what's going to satisfy IBM and Intel. The result is that users are confronted with the equivalent of ten different operating systems—permutations of OS/2 with its display manager or *Windows* or *Presentation Manager*, or iterations for the 386 or 5¼-inch drives instead of 3½-inch drives.

There's no unified vision of what the IBM personal computer should be.

**Erlich:** With the PS/2 and OS/2, I think we're looking into—not to exaggerate—a two- or three-year black hole, where IBM has to reinvent everything that Apple did. It's going to be a very tough time now for PC users, particularly so-called power users. IBM and Microsoft are bringing out a system with new foundations, and we're going to have to pay a price for it—in both time and money.

**Kask:** We've just about made up our minds that we're not going for PS/2 or OS/2 technology immediately. There's no productivity gain in sight and no advantage to paying a lot of money for a new operating system and a lot of new hardware. My recommended buy list currently includes 286 computers rather than so-called better technology. There are nice features in the PS/2 line. The 3½-inch disks are a brave move. I'm just sorry that they didn't make them option-

(continues)



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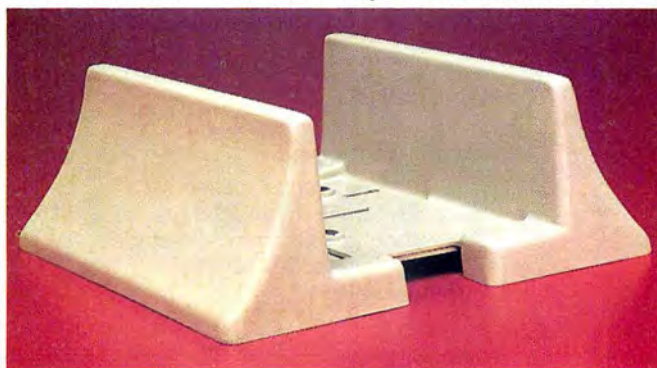
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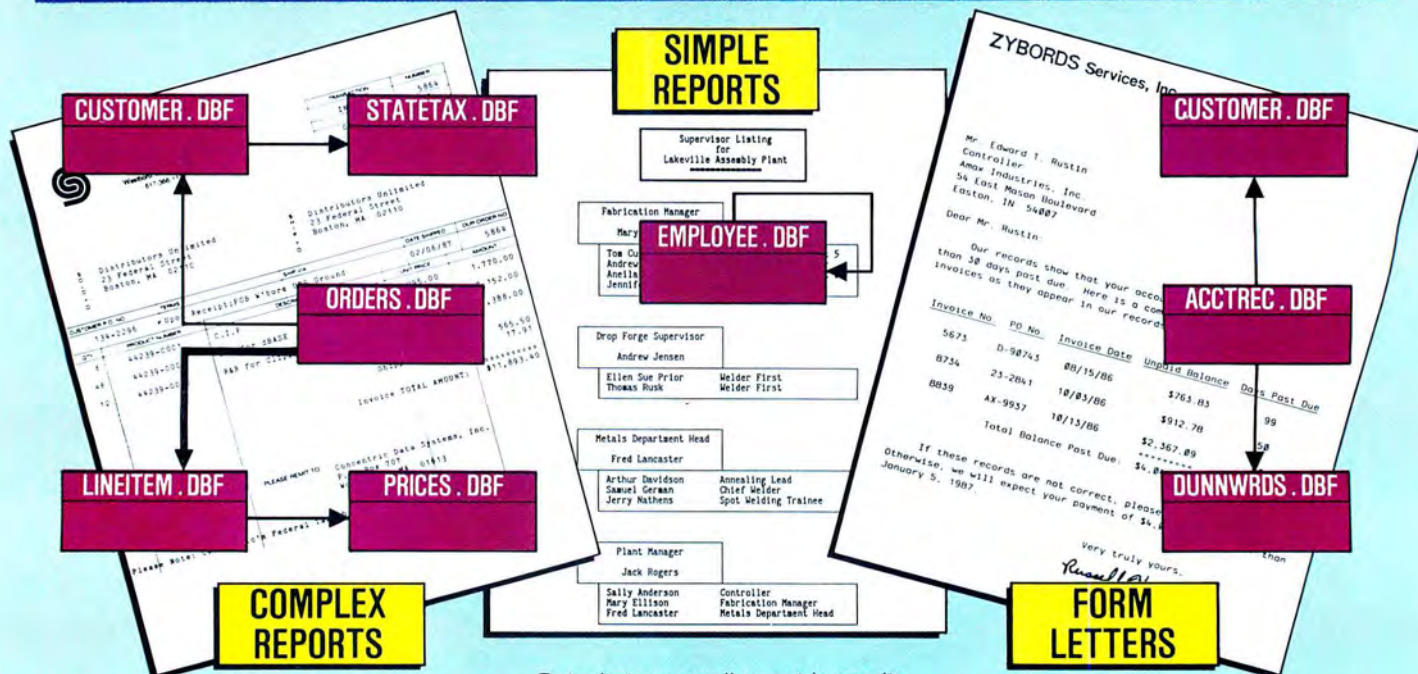
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'Individual computer users are being squeezed out by  
the great visions of dollar signs that vendors see in large multiple-unit buyers.'

al. We'd all like to use smaller, higher capacity disks, but I'm not going to convert 10,000 5¼-inch disks to microfloppies. Right now we have a five-year history of some of our clients on *SuperCalc* templates, and I'm not going to take those disks and convert them to 3½-inch materials just for the sake of being up-to-date.

**Button:** I'd like to add something about stratification. There's a whole category of users out there who are feeling left behind somehow by the industry. While computer magazines and vendors are all off chasing things like CD ROM and desktop publishing and 386

machines and OS/2, some people just want stuff they can run at home or use for their small businesses. Most are interested in little more than accounting and word processing, but when they look around, all they see is new technology. Nobody seems to talk about or care about the things that they have to deal with in computing.

**Erlich:** I see that the most when I go home after a day of dealing with my company's various complex concerns. I talk to my neighbor, and the big thing for him is, boy, I want to get a PC so I can do a little word processing. This is the real world. We're worried about file sharing across a network and

APPC and OS/2; it's like stepping out of a spaceship to talk to someone whose biggest concern is whether to buy a dot matrix printer or a daisy wheel.

**Schneider:** We've noticed that every company has dramatically increased its emphasis on support, but I'd say 70 percent of those support resources are allocated to large corporations. Meanwhile, more than 60 percent of the computers out there are owned by individuals who aren't getting adequate support. Individual users are told to go to their dealers. And the dealers, with hundreds of titles on their

(continues)



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'We figure the average \$2000 computer purchase requires \$20,000 worth of support when you add up all the training, maintenance, and service involved.'

shelves, are expected to be able to tell a user how to do a macro with XYZ software. Individual computer users are being squeezed out by these great visions of dollar signs that vendors see in large multiple-unit buyers.

**Kieper:** Dealers need to know a massive amount in order to provide an appropriate level of support to each individual on any given application. So big corporate accounts and businesses get the most attention because they are likely to buy something else at high margin—another peripheral or a number of software packages or a service contract—and that's what it takes for a

dealer to survive. It's a tough business already; to walk away from those high-margin customers in order to provide support to the individual end users would be suicide.

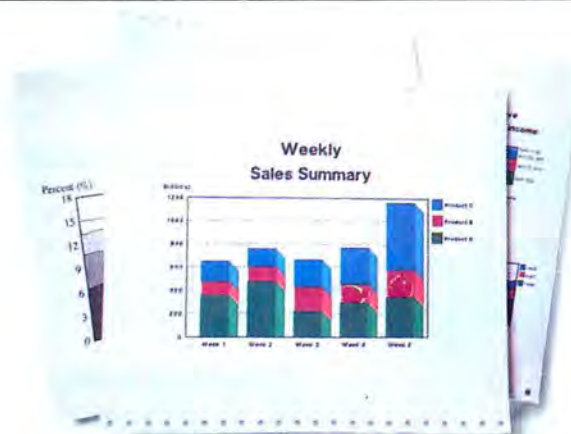
**PCW:** *Are end users' expectations realistic, or are they asking for support without being willing to pay for it?*

**Kieper:** It's very difficult to generalize about end users. Certain end users, such as those who participate in groups like Capital PC and the Boston Computer Society, understand that there is a price to be paid if you expect to call a deal-

er and get someone who is reasonably intelligent to respond to your question. Then there are those who say, "I paid \$100 for this, I'm entitled to ask as many questions as I want for as long as I want." I think it is reasonable for dealers and software vendors to get something for their time.

**Rotenberg:** We figure the average \$2000 computer purchase requires \$20,000 worth of support when you add up all the training, maintenance, and service involved. Large corporations acknowledge that the actual hardware investment is really only a very small

(continues)



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## Lotus Graphwriter II

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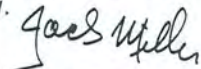
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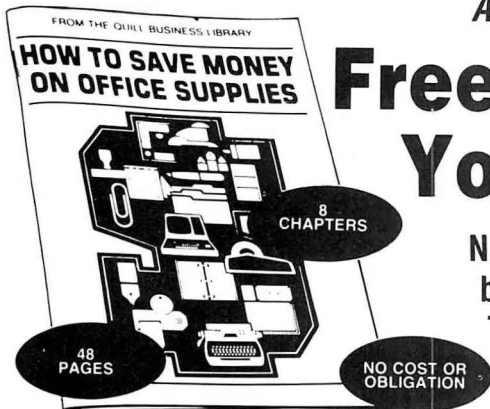
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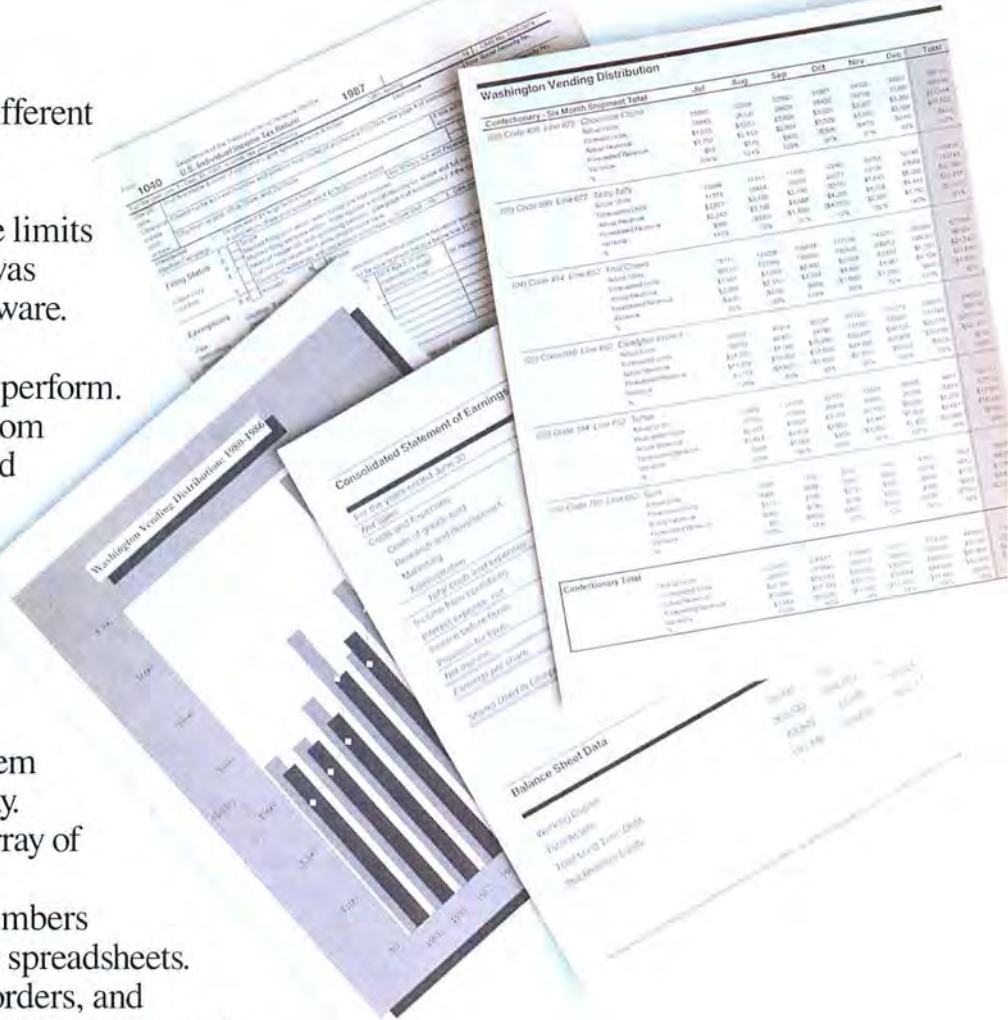
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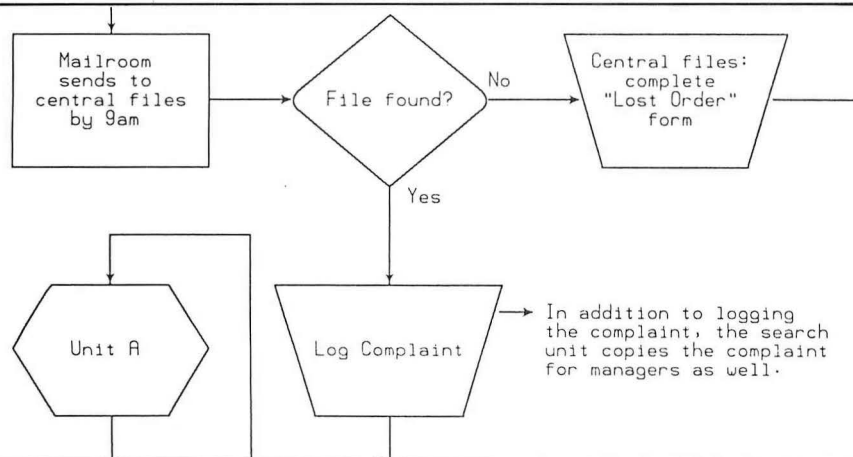
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PC World Forum

part of their management information budget. The problem is that when consumers see an ad for an IBM or Apple that promises them greater productivity, fully automated lives and work, and that everything will be happier and smoother, they assume they will get that solution for their \$2000 investment. Whose responsibility is it to cover the rest of the cost? Should the individual work with others in user groups, or go to the software vendor or dealer? I think the hardware manufacturer should take a lot more responsibility to make equipment easier to use. If IBM took the kind of leadership that Apple has taken in establishing a universal user interface, it would dramatically reduce the cost to the end user.

**Erlich:** I don't know if every company can serve consumers and Fortune 1000 companies at the same time. Companies seem to develop their own personalities. Different companies may have to serve different markets.

**Schneider:** Providing direct phone support isn't the only thing that a company can do. Almost all user organizations have either a mentor program or a help line. I personally get 30 to 50 phone calls a day from users. Multiply that by the hundreds of people in different user groups that do the same kind of thing. If Lotus or IBM or any major vendor were dealing with a corporation that had 1000 PCs, they would provide a service representative, a private number, a publication, and any number of other services. As a user group volunteer, I get a public line I can call and get put on hold like any other individual. We're taking a lot of the burden off vendors and dealers because most dealers can't handle the types of detailed product calls that we re-

(continues)

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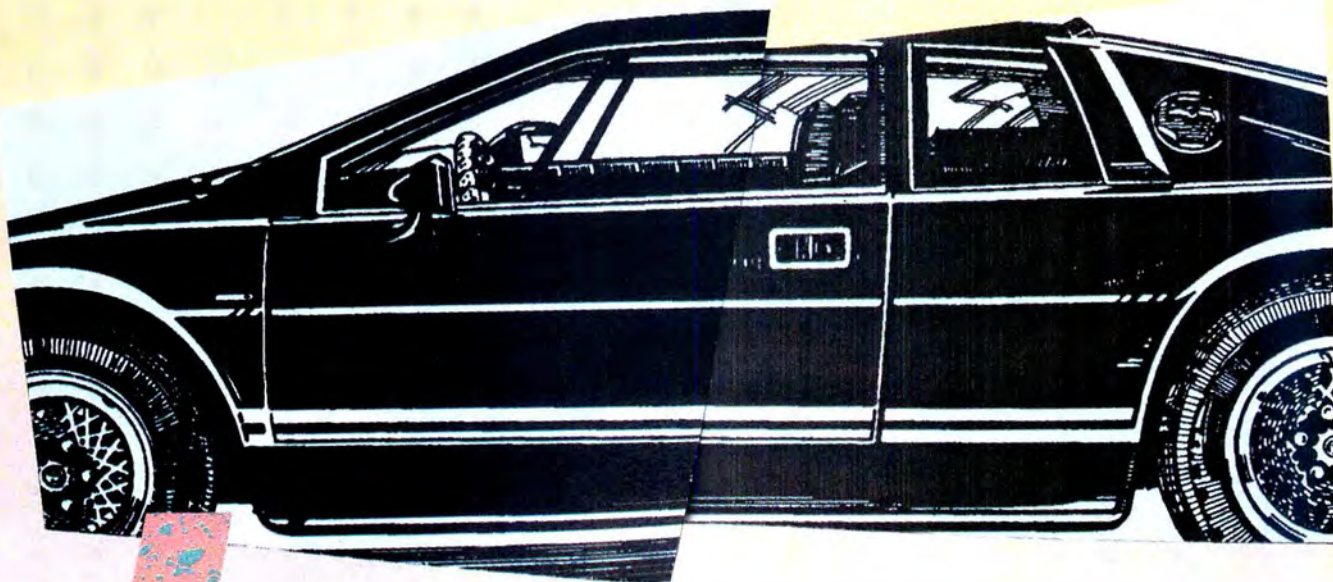








*These unretouched print samples show the superior print quality of QMS-PS 810 over printers using first-generation print engines.*



## Introducing the PostScript laser printer that blacks out at high speeds.

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## The PostScript laser printer sure to get high ratings at its network debut.

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**A network sensation** QMS-PS 800 II holds 500 pages, so operators aren't constantly refilling depleted paper trays. Users can even designate automatic switching between the two trays for doing letterhead/second page printing. Select faceup or facedown collation. And manually feed odd-sized paper stock.

With QMS ASAP™ (Advanced System Architecture for PostScript) proprietary technology, QMS-PS 800 II delivers outstanding performance. In fact, the more complex the page, the more it outperforms other PostScript printers. Two megabytes of memory, expandable to three megabytes, also add to the overall page processing speed when you are creating complex documents.

**Type casting** The QMS-PS 800 II comes with 35 resident typefaces (you can download more if you like). PostScript allows you to scale type to virtually any size, from minuscule to mammoth. PostScript also enables you to design, and redesign, your documents with exacting detail. You have total control over the final appearance of documents, with the ability to place text and graphics anywhere on the page. In short, you get the complete desktop publishing power that only PostScript can give you.

**Critical acclaim** The QMS-PS 800 II is certain to receive rave reviews on your network. And for a single-user set-up, there's the QMS-PS 810 laser printer. For a demonstration of either, call **1-800-523-2696** for the location of the Laser Connection dealer nearest you. And be sure to ask for *The Sourcebook*™ – our exclusive catalog filled with the latest laser printer products and enhancements.

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**Kieper:** Ultimately, no dealer can match the expertise of a product's manufacturer. Some dealers get close, but with the wide variety of products out there, it's impossible for a dealer to be knowledgeable on those esoteric, fringe issues that come up once every 360 calls or so. In that case, it's up to the dealer to be a champion for the user and go back to the vendor or work with a user group or pull together various resources to find the answer.

**PCW:** *Are the people who support your customers getting adequate training from vendors?*

**Kieper:** It's a mixed bag. Some software vendors provide very good training and are willing to come to a nearby city. But most don't have the resources, and I don't think it's economically feasible for a software vendor to be in every dealer location in the country. Competition has been very severe on the software side, and vendors are having to make choices about where they put support. Do they put teams on the road to train dealer representatives, or do they have a well-staffed corporate hot line to serve 80 percent of their sales?

**Erllich:** It's tough, because the large-volume buyers like myself tell the vendors, "I'm not interested in paying for what it costs you to support your dealers. I don't use them. Give me a good price, and I'll find my own support." So now a large percentage of sales are at low margin, and the individual purchases from dealers aren't supported by the entire sales base, only a percentage of it.

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*(continues)*



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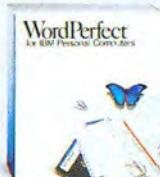
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our products all run from about \$40 to \$70. Our other problem is that there are a million or so users of our programs who don't pay for them. They are using the products legitimately because we provide them free for evaluation. But we have to find some way to keep those people off the telephone so paid users can get in. The ratio of people using the programs versus those who have paid for them is about 10 to 1. That's why we depend heavily on computer clubs, bulletin board systems, and things like that to encourage users to help each other.

I'm not speaking for corporations now, but the individual user's attitude is that a good, long period of support ought to come free with the product. Not only should you be able to get the thing installed on your machine, but you should be able to make it do what the advertising claims it does. If you can't make it do that yourself, you shouldn't have to pay to make it happen.

Erlich: I think users have to understand their responsibility. The vendor isn't there to give us everything that we want whenever we want it. If you're doing complex dBASE programming and you don't know what you're doing, I don't think it's the vendor's responsibility to teach you how to program. Maybe he or she can help you out of a problem, but there is a point at which you should be turning to training or consulting.

PCW: *Perhaps software should be designed so that it requires less support.*

Erlich: That's going to be really hard to accomplish because of the thousands of packages out there. Ultimately we need what Jonathan

(continues)



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Option

1>Prompt Window

2 Remove Prompt

3 Drag Prompt

4 Reorder Prompts

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6 Edit Help Record

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PC World Forum

described earlier—computers and software that are inherently easy to use. We're not there yet. First of all, it's hard to get a good review in a magazine for a product that's not loaded with features. Reviewers tend to be experienced and therefore fond of features. To survive in the marketplace, software companies go well beyond what's really needed in a product. My experience is that most users are lucky if they use 30 percent of the features of any given package, and yet the next revision of the package has to have even more features.

**Rotenberg:** It's a really a catch-22 for the industry. A product will capture the imagination of a significant part of the marketplace, and people will start to use it. But within six months, the users are complaining about it because it does only 80 percent of what they want it to do. That last 20 percent for a given user may only involve putting five mailing labels across the page, or printing sideways in italic type, or whatever. But users feel they need their special features. Multiply them by thousands of users, and that's what makes software-design complicated.

**Kask:** Last year *SuperCalc 4* finally came out with Lotus-type macros, and our people said, "Hey, now that we've got macros, let's teach everybody macro programming." Well, we started doing it this year, but after an hour, we found we got a lot of glassy stares. Ninety-five percent of the people will always use a program at the lowest level. They don't use even 30 percent of the features, they use 10 percent; and, next year when more features come out, they'll use 5 percent of those.

**PCW:** If you could ask vendors and dealers to do only one thing for users, what would it be?

(continues)



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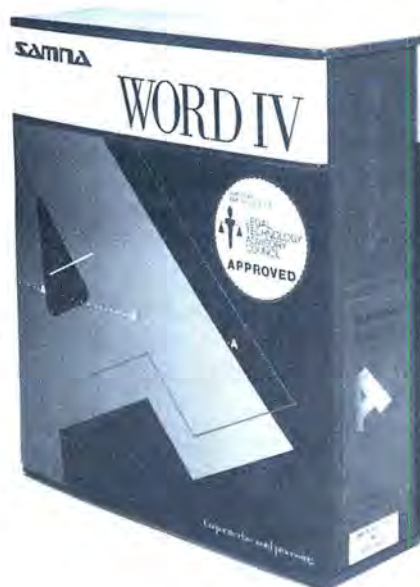
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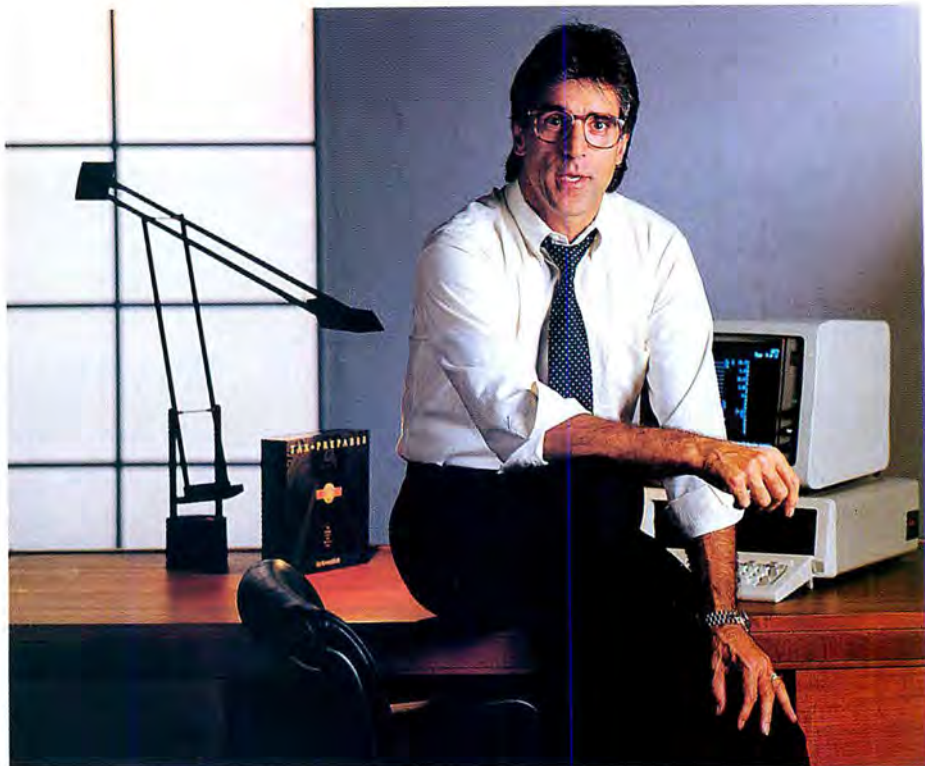
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all I do is enter my raw data.  
The rest is automatic."*

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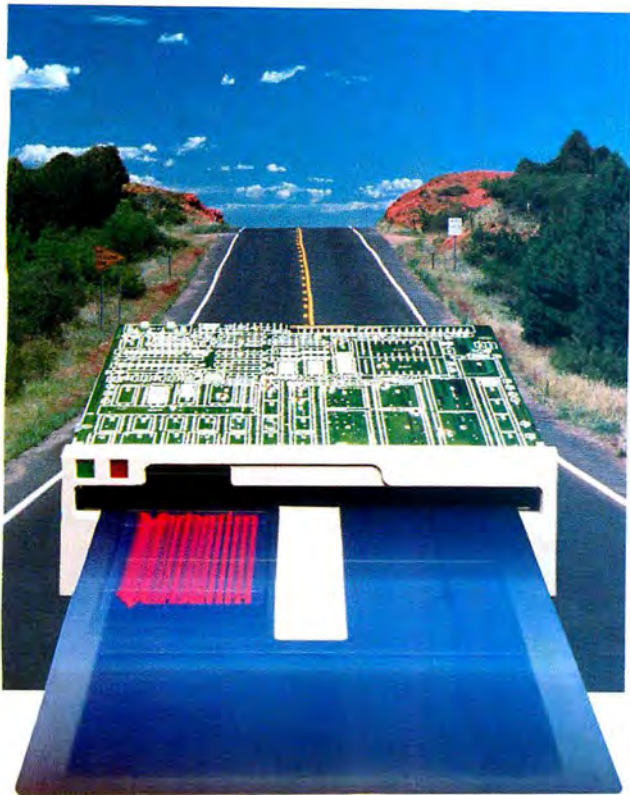
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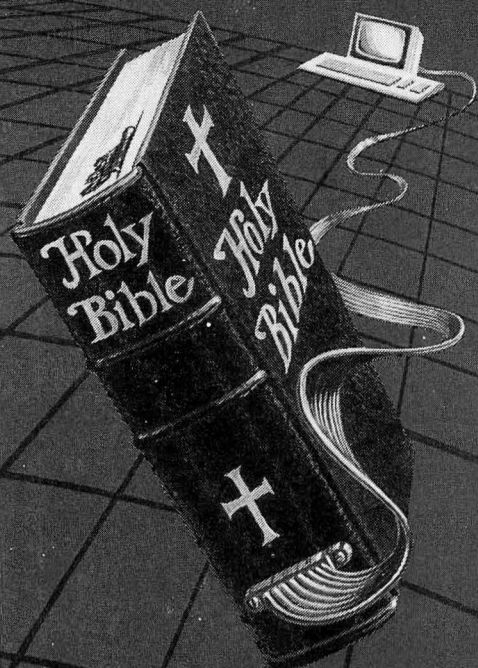


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## PC World Forum

**Schneider:** Very simply, to pay as much attention to individual users as they pay to the corporate and business users.

**Rotenberg:** Don't lose sight of keeping it simple. The vast majority of the world doesn't use personal computers and never will until the industry makes solutions that are easier to understand.

**PCW:** *Is there something users should understand or that they could do to help themselves?*

**Kieper:** I think a basic understanding of the economics would be very helpful.

**Button:** They could send in money for the shareware packages they use. We actually get support calls from people who spend \$6 on an evaluation copy of a product and then call, cancel the product, and ask for a \$6 refund.

**Schneider:** We always remind our members that there's no such thing as a free lunch. Somewhere, someone always has to pay for it.

**PCW:** Well, David Bunnell is paying for this one. ☺

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Source: International Data Corp.



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393 0450 CPS .....	925
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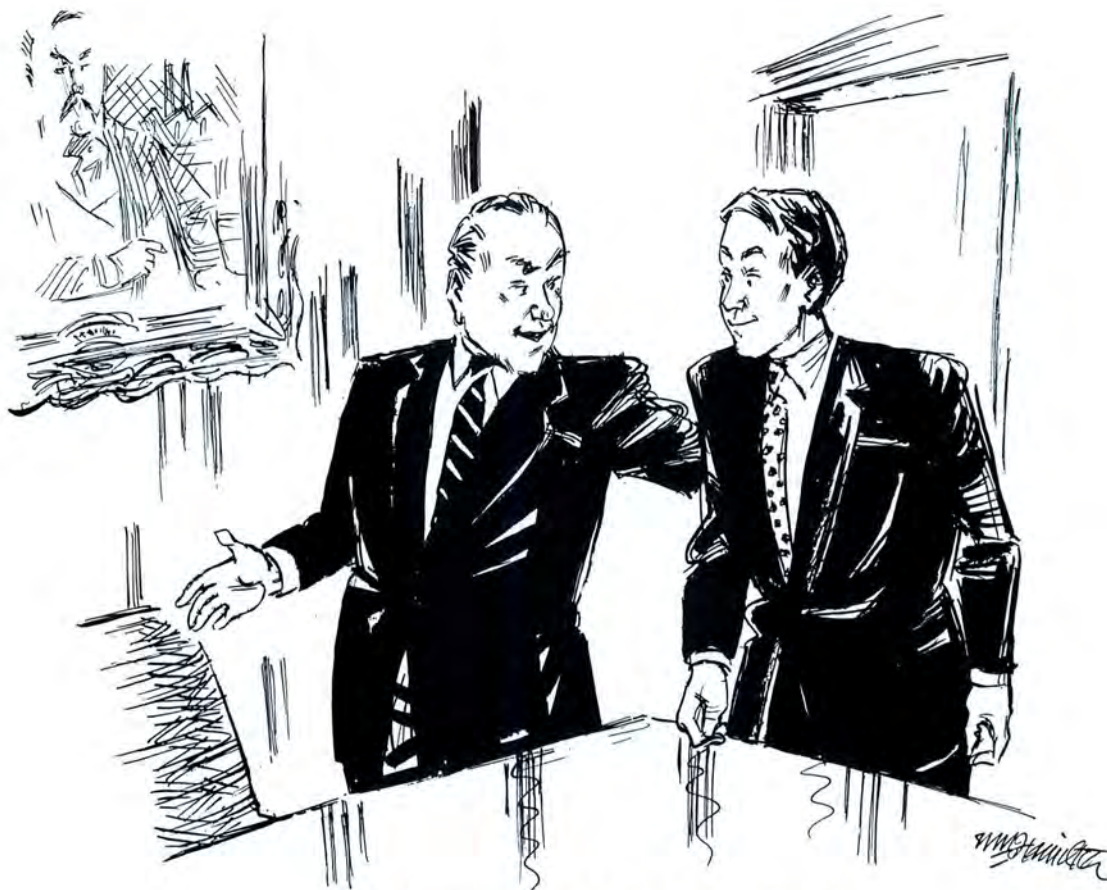
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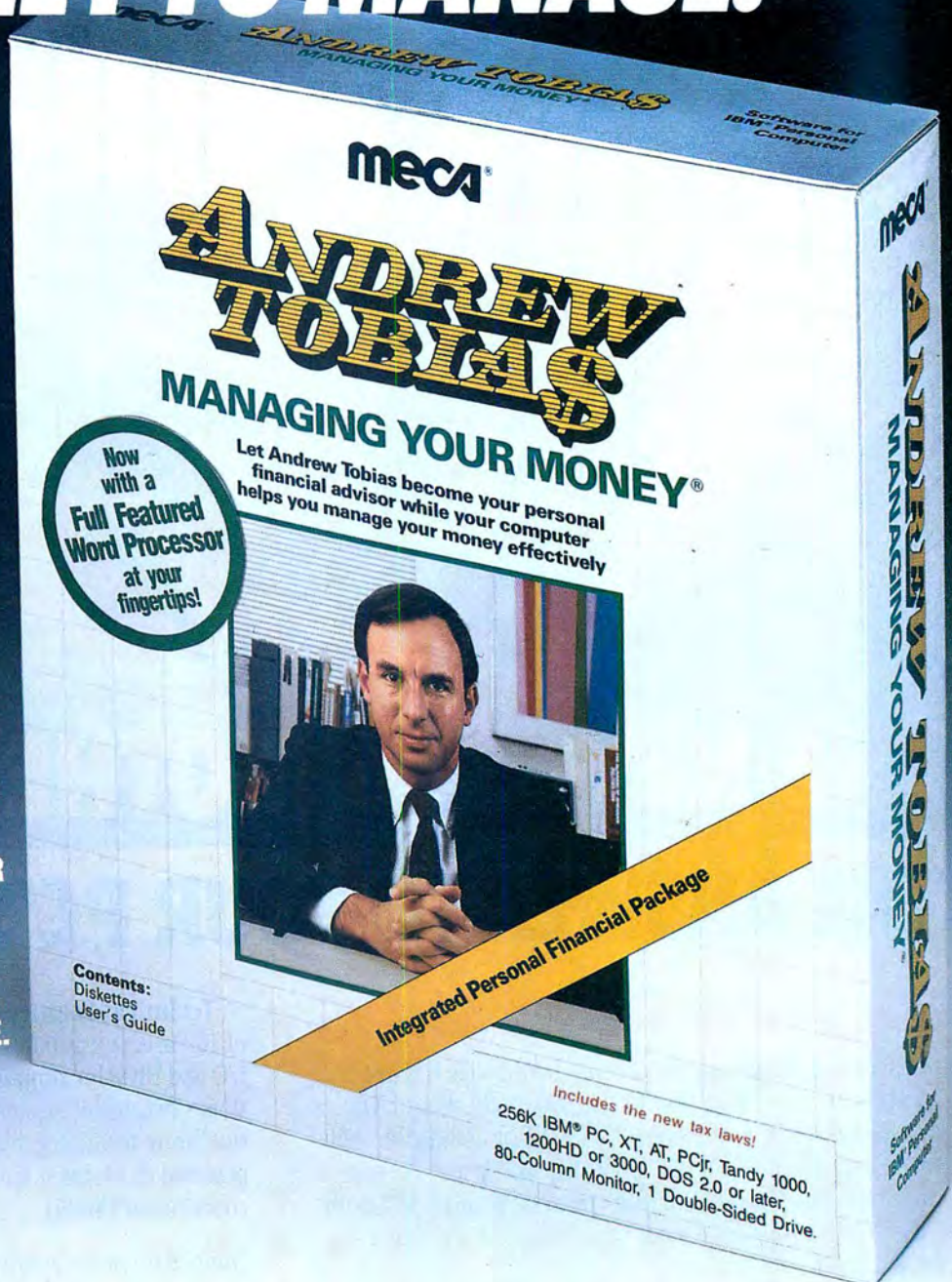
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PC Magazine, 1987

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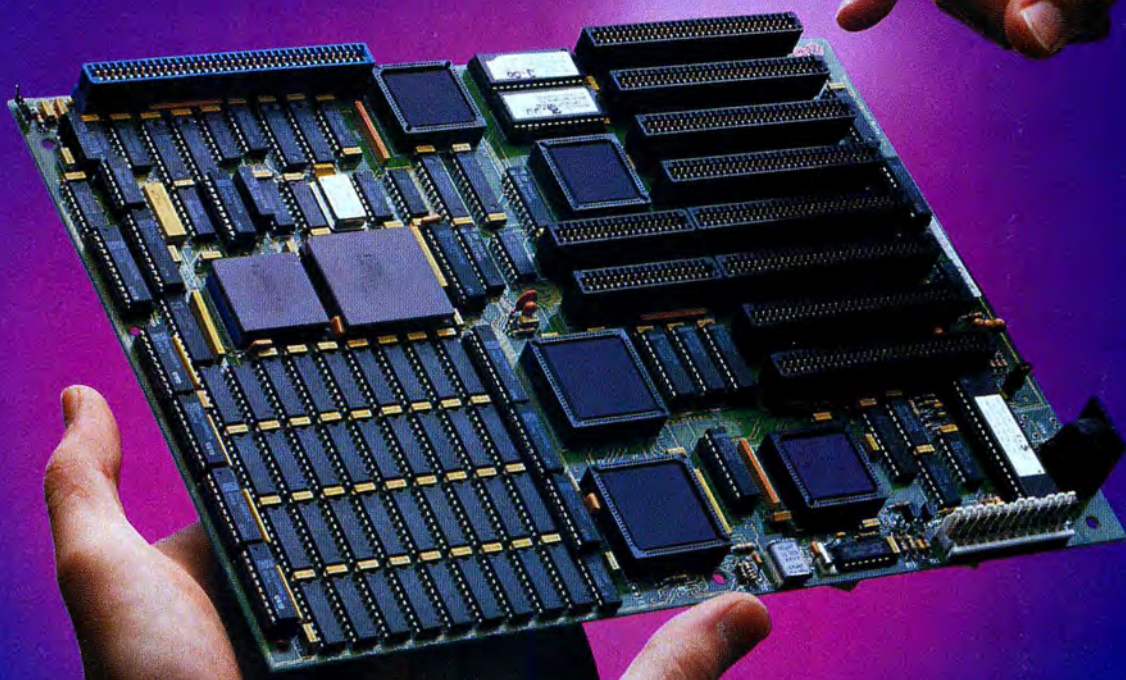
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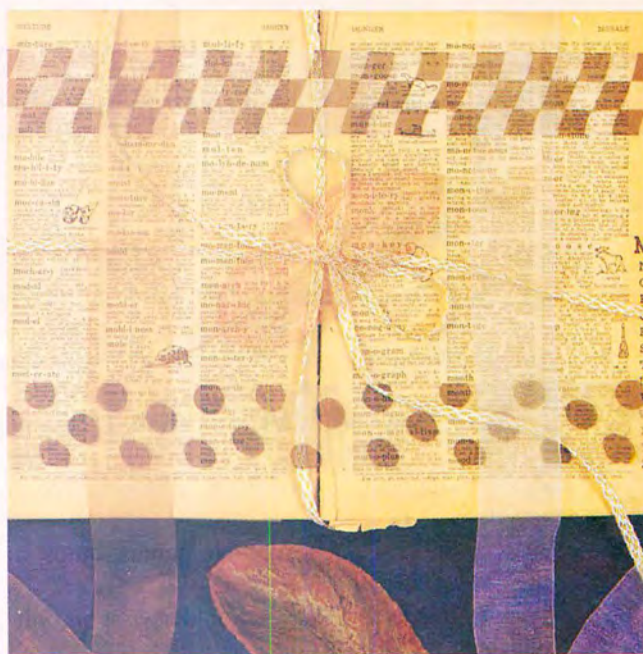
— Robert Luhn, PC World

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That was the year that was—and what a year! Bill Gates earned more than South Dakota, the PS/2 stumbled onto the scene, *Ask God* came unto the market, PR hype reached ever greater heights, and a PC sage returned with some new commandments. The PC world in review.

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## GARLANDS AND GLITCHES

Judy Getts

You can't accuse the PC industry of being dull. Where else could you find a 31-year-old hacker worth \$1 billion, a French émigré-cum-software magnate who hosts industry parties wearing only a toga and a tenor saxophone, and a curmudgeonly boom-and-bust entrepreneur suing Oliver Wendell Jones and the rest of *Bloom County* for libel?

You can always count on the PC business for a few good laughs. What follows is an informal record of recent notable and not-so-notable quotes, quips, and quirky events that every PC user should have at his or her fingertips. Wall Street was never like this.

### No Thanks, I'll Have Milk Instead

According to New York author William A. Marsano, a restaurant in Scotland took a bold step toward worker automation by purchasing a robot to serve wine. The first day on the job, the automaton, clad nattily in top hat and bow tie, spilled wine and knocked over chairs and tables. The next day the robot's head fell off and landed in a customer's lap. And you wonder why your Model 50 won't boot up?

### GARLANDS AND GLASNOST

Starting this spring, Soviet PC users will be able to subscribe to *PC World U.S.S.R.*, a Russian language edition of *PC World* published jointly with the Soviet government. Thanks to the agreement signed last summer, this decidedly non-samizdat publication will boast an initial circulation of 50,000. It will include product reviews along with news about technology, applications, and the PC industry. The magazine will be headquartered in the offices of Radio i Svyaz, a leading publisher of technical magazines in Moscow. Advertising will be accepted.

Photography by  
LES MORSILLO



Tired of rubbing Ben Gay on your keyboard-gnarled hands, bubby? Healthy Hands "exercise putty" can loosen up those cramped digits. The company plans to lure the fashion conscious with a new line of iridescent putty.

### ESPECIALLY WHEN YOU SELL \$2000 PCs

"There are all kinds of problems associated with \$1000 PCs, which would create distribution problems and ruin profit margins." —Rod Canion, president and CEO of Compaq Computer

"If there was anything to 'look and feel,' Las Vegas would have sued Atlantic City and would own it."



When a flood of imitation Hercules graphics boards hit the market, the company naturally responded with the Hercules Clone Smasher doll. "Firmly push arm downward until club strikes clone," say the instructions, "and repeat 128K times."





*Knowledge doesn't grow on trees, but you can hang your PC on one. The Computree from Frontline Products allows you to stack your system in what may be the least ergonomic fashion known to man and machine.*

#### **But All I Wanted Was a New Operating System**

Last fall, a 17-year-old Chicagoan was apprehended by federal authorities for hacking into AT&T mainframes around the world, including those at Bell Labs. AT&T claimed the boy downloaded mainframe artificial intelligence software valued at \$1 million. When FBI and Secret Service agents raided his house, they discovered his electronic crowbar: an AT&T PC 7300.

#### **JUST ONE OF MANY CONVENIENCES**

**"Mechanical Arm Allows User To Position Monitor, Will Help Save His Neck"**  
—headline in *PC Week*

#### **MISSED IT BY THAT MUCH**

"Kevin Jenkins, 32, could hardly have guessed even a few years ago that the presidency of a rapidly growing graphics card company awaited him. If things had gone differently, Jenkins might have been an accountant, or remained a magazine publisher, or, even, a perennial European traveler."  
—press release, Hercules Computer Technology

**Technology House has released a four-disk set of 'educational presentations' on the Iran-Contra affair, called Ollie!!!.**

#### **BUT SOMETIMES A LITTLE MORE HELPS**

"Today's software works best if the computer has memory boards that can hold 640,000 bits of information." —*Wall Street Journal*

#### **THEN AGAIN, WE MIGHT VISIT CD RAPIDS, IOWA**

"I think Seattle is going to go down in CD ROM history as the birthplace of the collective vision behind this new technology. The town ought to be renamed CD-attle." —Leonard Laub, CD ROM pioneer and president of Vision Three

#### **And Would Give It Back**

"If there was anything to 'look and feel,' Las Vegas would have sued Atlantic City and would own it."  
—Philippe Kahn, president of Borland International

#### **Ollie North, EGA Version**

Technology House of Prescott, Arizona, has released a four-disk set of "educational presentations" on the Iran-Contra affair, called *Ollie!!!*. According to the release, the software requires 128K of memory, one floppy drive, and a PC compatible "preferably with color monitor for maximum impact."

#### **WE TRY, BUT GOSH IT'S HARD**

"Users Told to Seek Overall Self-Control"  
—headline, *Network World*

#### **DEPARTMENT OF DUBIOUS APPLICATIONS**

"My first *Eureka* task was elementary planet design....To design a planet, you pick the numbers you want and stuff them into the equations, then solve for everything else. This isn't hard, but it used to be tedious. *Eureka* has changed all that....Of course, you can use *Eureka* for a lot more than planet design."  
—Jerry Pournelle in *Byte*

#### **Registered Users Will Be Sent Moon Helmets**

Getc Software of Vancouver, British Columbia, knows that computer-wary users need more than pop-up tutorials and understandable documentation. They need metaphors they can relate to. To this end, Getc peddles a communications package called *File Shuttle* and an adapter dubbed the Rocket Socket.

Using *File Shuttle* is a cinch—if you trained at Cape Canaveral. Instead of selecting commands from setup or transfer menus, you file a 'flight plan' or select 'Autoland'. There's no word yet on whether Getc will complete the set with *Mission Control*, an AI program designed to talk down queasy telecommunicators.



*Lifestyles of the Rich and Clonable? No, it's just a promotional shot for Yam's PC SoundBuster, a synthesizer board for the PC. The kit also includes the obligatory rock video tape, suitable for home viewing.*



With Ask God, you enter weighty questions and receive the appropriate biblical quotes in reply.



*Worried your mouse might get the shivers?  
Wrap that pesky electronic rodent in  
the Mouse House from American Covers.  
How you'll use the mouse once  
it's swaddled is another problem.*

## Profiles in Angst

The call came on a Friday afternoon, unexpected and unbidden, from halfway around the world. Michael Brown, president of Central Point Software in Portland, Oregon, had finished shipping version 3.2 of *PC Tools* just two days before and was finally taking a well-deserved holiday in Europe. Then the phone rang.

A distraught employee on the other side of the globe delivered the bad news: The just-shipped program had a lethal bug that could, under certain circumstances, trash the file allocation table (and the data) on a user's hard disk.

Like a field commander mobilizing his troops, Brown issued orders that every employee, from accounting to sales, start contacting the approximately 2000 users who had received copies of the upgraded program. Central Point's bug blitzkrieg reached as many customers as it could by phone, then turned to Federal Express to help with a mass mailing. "We must have had every Federal Express worker in Portland out there that afternoon," says Brown. By 4:30 p.m., over 1000 Federal Express packages were ready for Saturday morning delivery.

The bill was steep. Brown estimates that he spent at least \$50,000 total contacting users. "We may have lost every penny on that update, but we had to do it," says Brown. "In retrospect, it was the best business decision I ever made."

## PICK YOUR NETWORK SERVER, PARDNER, AND DRAW

In the fall of 1986, Novell grabbed the media spotlight by challenging network rivals 3Com and IBM to a grudge match. In ads picturing a smoking pistol and intoning, "It's time to prove who's top gun," Novell invited 3Com and IBM to pit their network software against Novell's *Netware* in a public benchmark shoot-out.

When neither vendor showed, Novell staged the contest on its own and declared itself the winner. 3Com cried foul and claimed that the benchmarks were stacked in Novell's favor. IBM, as usual, refused comment.

## SO THAT'S HOW IT'S DONE

"'MCI Mail,' said J. Robert Harcharik, president of MCI Digital Information Services Company, 'enables users to transfer documents among a variety of the most frequently used word processors.' How is MCI able to achieve document transfer between word processors? A combination of hardware and software in MCI's digital switched network facilitates transmission of ASCII." —from an MCI Communications Corp. press release

## File Physician on Call

He is among the most beloved PC celebrities and also one of the most elusive. He's an eccentric who not only makes on-line services colorful but helps them lure new subscribers.

He's known as Dr. File Finder. Co-leader of the IBM PC special interest group on The Source, his claim to fame is his photographic memory. Looking for an obscure public domain program on some out-of-the-way BBS? The good doctor can find it in a flash. He also makes electronic house calls to over 10,000 BBSs a year and has uploaded over 7000 public domain programs to The Source.

Like any do-gooder worth his salt, Dr. File Finder won't reveal his identity. In real life he is a Michigan physician who was felled by a series of paralyzing strokes in his 20s. Why does he put himself on call for PC users? "It's a way for me to help others," he says, "and I feel good about it."

## No One Ever Said It Was Easy

"Desktop Organizers Have Loyal Fans Despite Charges They Are Unnecessary" —headline, *PC Week*

## THE SHORT, HAPPY LIFE OF SMARTY ARTI

When Pride Software of Oakland Park, Florida, introduced its Smarty Arti copy-protection scheme, the company was so confident that it offered a \$25,000 reward to the first person who could crack it.

Four days later a Fort Lauderdale engineer by the name of Ken Claggett stepped forward to claim his prize. "They weren't real happy about it," says Claggett, especially since magazine ads promoting the contest had yet to appear.

But Pride Software made good on its promise of \$25,000. And then it contracted Claggett to help rewrite Smarty Arti.



## SEE WHAT HAPPENS

### WHEN YOU SKIP BREAKFAST?

From a memo entitled "Who Will Eat IBM for Lunch?" circulated by Alan Hald, chairman of MicroAge Computer Stores, on the introduction of the PS/2 line:

Building the Standards Sandwich

"Two Pieces of Bread With Blue Jelly"

Eating the Standards Sandwich

"We Pledge Allegiance to the Standard"

The Peanut Butter Conspiracy

"When Standards Get Sticky"

Million Dollar Crumbs

"Half a Sandwich is Better Than None"

"Darling...

About Your Protected Mode..."

A recent study published in *Micropsych Network: The Psychology and Behavioral Science Computer Newsletter* reports that frequent computer users seek the same cerebral "intensity" in personal relationships that they find in digital ones. According to the newsletter, these people "sought such intense human relationships without the patience normally associated with social encounters." The result? "Frustration and failure." The cure? "Understand the social processes...in our society, and have different expectations from the interaction with the computer."

### Product Reviewer

#### *Unclear on the Concept*

"One intriguing gadget is the Flipper from BDT Products of Irvine, California. This thing fastens onto your HP LaserJet or other laser printer, and turns the sheets over as they come out. I guarantee doing that by hand can get old fast—I had to do it twice for my last novel [*Legacy of Heorot*]." —Jerry Pournelle in *InfoWorld*

### FROM OUR WATER-INTO-WINE FILE

"You can put a high-performance drive and controller on a PCjr and outperform an IBM AT on any tasks that involve moving information, and many users simply don't understand that." —Hal Prewitt, president of hard disk maker Core International



## BE FRUITFUL AND INSERT DISK IN DRIVE A:

Industry pundits may have delusions of divinity, but they can't touch Integrated Systems and Information of Kirkland, Washington. The company recently introduced *Ask God*, a \$49.95 artificially intelligent program that allows you to seek spiritual counsel from the Ultimate Data Base.

With *Ask God*, you enter weighty questions and receive the appropriate biblical quotes in reply. Lest you think you're conversing directly with the Ultimate Kibitzer, the manual cautions, "While the texts are commonly considered to be the WORD OF GOD, any divine nature of the software product is specifically disclaimed." With its Byzantine command structure, the program isn't exactly user-friendly, either. But if you've got the original user manual, why bother?

*Short on inspiration?*

*Ask God taps into the Ultimate Data Base, George Plimpton aids nervous speechifiers with ready-made quips and anecdotes, while HeartWare is just the thing for penning that mash note.*

## Two Sides of Comic Relief

In an April 1985 *Bloom County* comic strip, hacker Oliver Wendell Jones consoled his recently discontinued *Banana Jr.* by reciting a list of other "orphaned" computers—including the Osborne.

But according to an outraged Adam Osborne, the Osborne computer was no orphan. In fact, Osborne Computer had emerged healthy from its recent bankruptcy filing, and Osborne threatened to sue *Bloom County* cartoonist Berke Breathed for libel.

The threat was short-lived. Osborne Computer closed its doors 11 months later.

## AT LEAST THE PAY IS PRETTY GOOD

"Nobody ever said the computer business would be easy."

—Adam Osborne





# Introducing the VGA card

It's VEGA VGA™, just what you'd expect from the company that brought you the award-winning VEGA Deluxe.

This short card gives you VGA compatibility without having to buy a new IBM PS/2 machine.

And at the same time, it gives you capabilities that even IBM can't match.

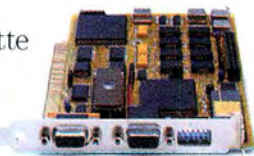
To begin with, VEGA VGA provides a graphic resolution of 640 x 480. And gives you 16 spectacular on-screen colors from a palette of 64, with a variable frequency monitor.

Or if you're using an analog monitor, you can select

256 simultaneous colors with 320 x 200 resolution from a palette of 262,144 or 16 colors with a resolution of 640 x 480.

But this isn't just a BIOS level VGA card. VEGA VGA offers complete software compatibility for all VGA programs. And that's not all.

VEGA VGA is backwards compatible, working with your favorite software programs for EGA, CGA, MDA and Hercules. Guaranteed.







# That'll knock your socks off.

And due to our innovative design, VEGA VGA supports both analog and digital monitors. Which means it will work with the monitor you're currently using.

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Video Seven Inc., 46335 Landing Parkway, Fremont, CA 94538. 1-800-238-0101 (in California, 1-800-962-5700.)

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*We make a clear difference*

Software Compatibility Guarantee for full details. Video Seven reserves the right to change specifications without notice.

**Circle 277 on reader service card**



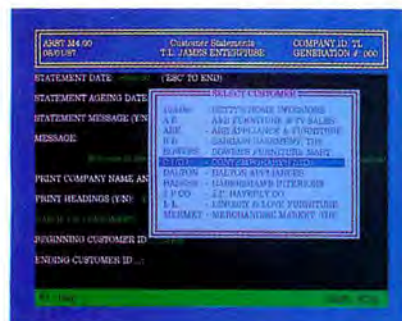
# WE'VE JUST MADE THE BEST EVEN

## Peachtree Complete II: The Business Accounting System

# Better

New

The success story of Peachtree Complete (now with over 200,000 users) continues with the newest member of the Peachtree family, **Peachtree Complete II**. Much more than just an update, Complete II builds upon the comprehensive features that have made Peachtree the leader in small business accounting software for nearly ten years. We've added many exciting new features and designed state-of-the-art methods for using the packages. The result—all eight modules are even more powerful and easy to use, yet still priced at just **\$199**—a 96% price reduction from the original \$4,800.



### Windows and Pop-Up Menus.

Complete II is designed for user convenience. Use the cursor throughout the system to make easy "point-and-shoot" selections. If you can't remember a customer or account number while using a program, simply open a window and scroll through your customer list or chart of accounts. Select the information you're looking for directly from the table!

**Short-Cut Keys.** We speed you from one function to another without the time-consuming task of manually passing through multiple menus.

**Smart HELP.** If you get stuck, the same function key will always bring HELP to your rescue with pop-up windows of information that relate to your individual trouble spot at both program and field levels.

**Quick-and-Easy Error Handling.** Complete II traps errors and gives a plain-English description of the problem along with suggested solutions.

**Range Printing.** Print all information on a report or select a specific range of information for print out. A great feature for restarting long reports or partial printing of certain sections.

**Easiest Installation Ever.** Enter your company's information once and it is reflected throughout the system. Complete II includes a separate Installation Guide, basic Accounting Primer, eight-volume Reference Library and extensive Tutorials on each package — **all at no extra charge!**

**Ideal for Service Businesses.** Enter information free form on service invoices or store pre-defined paragraphs of up to 160 characters. Enjoy full editing capabilities at time of invoice entry.

### Eight Integrated Software Modules

- General Ledger
- Accounts Receivable
- Invoicing
- Accounts Payable
- Inventory
- Fixed Assets
- Job Cost
- Payroll

Complete II includes eight software modules that may be integrated or installed individually and may be distributed among separate computers. Install the most critical modules initially; add others later.

### COMPARE FEATURE FOR FEATURE

#### System-Wide Features

- NEW Over 450 reports
- NEW Unlimited number of companies and consolidations
- NEW Automatic menu-driven conversion of your existing Peachtree Business Accounting data files
- NEW Increased numeric capacities to 999,999,999.99 in key areas

#### General Ledger

- Chart of Accounts includes 76 suggested and 26,000 user-defined accounts
- NEW 1 to 13 user-defined fiscal periods
- Repeating journal entries
- NEW Financial statement comparisons may include current period and year-to-date with budget and/or prior period comparison
- NEW Reversing journal entries

#### Accounts Receivable/Invoicing

- Open item or balance forward customers
- NEW Up to 14,400 customers
- Supports partial payments
- NEW User-defined terms codes and aging periods
- NEW Automatic transactions with monthly, bi-monthly, quarterly, semi-annual, and annual frequency options

#### Accounts Payable

- Up to 14,400 vendors
- NEW Partial payments of invoices
- Cash requirements forecasting by due date
- NEW User-defined billing cycle on automatic invoices
- Checks printed with unlimited invoice listing on stub
- NEW Ability to void and reprint checks

#### Inventory

- Supports average, last purchase and standard costing methods
- Up to 19,500 inventory items (SKUs)
- NEW Automatic price change on multiple items by percent or amount

#### Fixed Assets

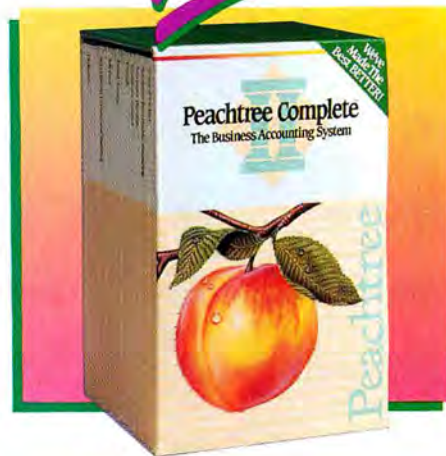
- Handles 13,000 assets and 13 methods of depreciation
- NEW Updated to handle current tax laws

#### Job Cost

- Tracks costs and profitability on a job-by-job basis
- Compares estimated costs with actual costs for specific tasks

#### Payroll

- Built-in current year federal, state, city and county tax tables for all 50 states with automatic calculation capabilities
- Automatic payroll processing supporting hourly, salaried, commission or draw-against-commission pay types
- NEW New tax laws incorporated into program
- Processes up to 3,900 employees
- NEW Supports Cafeteria Plan
- User modifiable tax tables with updates published regularly by Peachtree Software
- NEW Printed and magnetic media W-2s generated automatically



Limited Time Offer: Special Upgrade for Current Customers

For 90 days (through December 1987), Peachtree Complete registered users can purchase a Complete II upgrade with all the new features and enhancements for only \$99\*. Call today with your Peachtree Complete serial number: 1-800-822-2821 or 1-800-247-3224.

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Enjoy the convenience and economy of buying your forms directly from Peachtree Software with guaranteed compatibility. Call 1-800-553-6485 to order forms. In Ohio, call 1-513-973-0110.

### Money-Back Guarantee

When you purchase Peachtree Complete II directly from Peachtree Software, you're protected with a 30-Day Money Back Guarantee. If you're not satisfied, simply return the product in saleable condition within 30 days and your purchase price will be promptly refunded. (A \$20 restocking fee will be charged if disk bag is opened.)

And, of course, Complete II is backed by Peachtree Software's famous technical support, labeled by *InfoWorld* as "the finest in the industry". Technical assistance is available for \$1 per minute with a 20-minute minimum via a toll-free telephone number. You only pay for what you need, without unnecessary support contracts.

#### Hardware Specifications

Requires PC/MS-DOS version 2.0 or higher with 384K of usable memory with a minimum 10 MB hard disk. For use with the IBM® PC, PC XT, PC AT, Personal System/2™ and compatibles. 3 1/2" media optionally available. IBM is a registered trademark and Personal System/2 is a trademark of International Business Machines. Not copy protected.

\* Plus \$12.50 shipping and handling. Money-back guarantee does not apply to upgrades.

To Order by Mail, Send \$199 Plus \$12.50 Shipping and Handling to:  
(In Georgia, add applicable sales tax.)

## Peachtree Software

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Still Only  
**Complete**



## PC WORLD INDEX

(with apologies to Harper's)

- Percentage of Americans who say they are "dissatisfied with honesty and standards" of others: 63
- Percentage of computer users who admit they have used illegally copied software: 56
- Millions of bootleg copies of 1-2-3, dBASE, and WordStar, respectively, in circulation: 2.5, 5, and 3
  - Bill Gates's current estimated worth: \$1,056,408,896
- Total sales revenues of top 100 personal computer software publishers in 1986: \$1,478,289,000
  - Gross national product of Liberia in 1984: \$990,000,000
  - Initial stock price per share of Autodesk in 1985: \$11
    - Peak price per share in 1987: \$90½
  - Initial stock price per share of Microsoft in 1986: \$21
    - Peak price per share in 1987: \$126½
- Amount spent by IBM in 1981 cleaning up one toxic spill in Silicon Valley: \$20 million
  - Current number of EPA "Superfund" toxic sites in Silicon Valley: 19
- Number of times VDT operators report eye problems more than traditional office workers: 5½
  - Number of states that proposed VDT legislation in 1985: 18
    - Number of states with VDT laws on the books today: 5
- Number of personal computers on display at the Museum of Modern Art: 1
  - List price of 128K IBM PC XT in 1983: \$4995
- Street price of a IBM PS/2 Model 60 with a 70MB hard disk today: \$4956
  - Number of Apple computers in American schools in 1986: 350,000
    - Number of IBM PCs: 88,000
  - Percentage of Apple's share of education market: 53
    - Percentage of IBM's share: 13
- Venture capital invested in computer-related products in 1983: \$2.92 billion
  - In 1987: \$2.9 billion
- Percentage of executives who play games on their personal computers at work: 37
  - Who write résumés: 13
- Number of weeks *A Passion for Excellence* was on the *New York Times Book Review* best-seller list: 39
  - Cost of a Source subscription in 1982: \$100
    - In 1987: \$49.95
  - Percentage growth in modem sales for the same period: 22
    - Average weight of *PC World*: 24.8 ounces
  - Japan's percentage share of the U.S. semiconductor market: 9
    - United States' percentage share of Japan's semiconductor market: 9
      - Dollar difference in Japan's favor: \$350 million
- Total tariffs imposed by U.S. government on Japanese personal computer vendors in 1986: \$300 million
  - Companies that announced support for *Microsoft Windows* in 1986: 120
    - Windows* products shipping as of September 1987: 45
  - Processing speed of the PS/2 Model 80 in millions of instructions per second (MIPS): 4
    - Of the MicroVAX 2000: 1
      - Price difference in IBM's favor: \$505
- Number of Model 80s that can be bought for the price of a single B-1B bomber: 42,888

*Figures cited are the latest available as of September 1987. Sources are listed on page 349. ●*

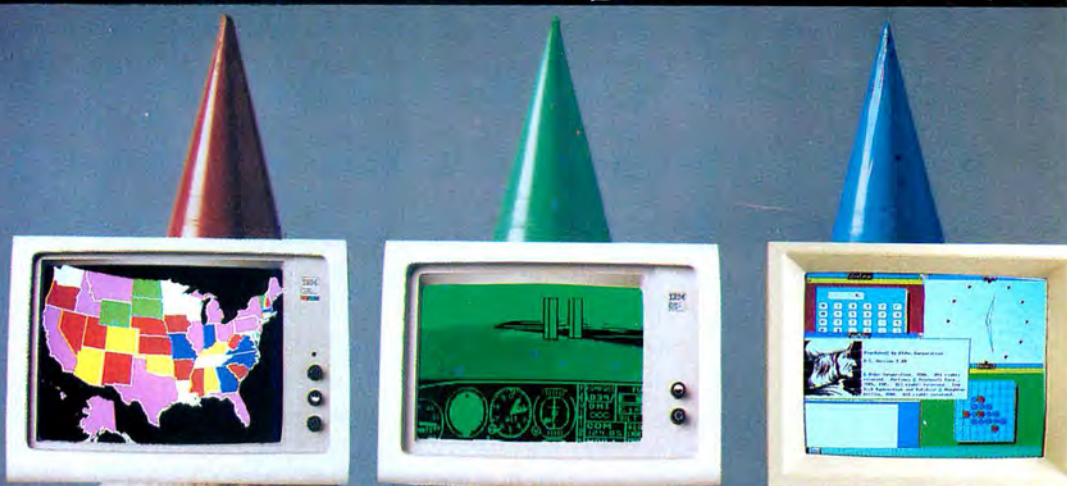


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- 320x200 CGA
- 720x350 MDA
- 720x350 Herc.
- 132 Columns

### Any Monitor

- MultiSync
- EGA Color
- RGB Color
- 25 kHz Color
- TTL Monochrome
- Composite Mono
- PC Portable
- Compaq Portable (2)
- Polaroid Palette

### Any Time

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- GEM
- AutoCAD
- 1-2-3
- Symphony
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- VTerm
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Call today at (416) 756-0711 for more information.

<sup>1</sup> 132 Columns not available on IBM PS/2 Analog Monitors

<sup>2</sup> Compaq via optional Compaq Expansion Module

Trademarks: IBM, PS/2, Model 30, VIDEO GRAPHICS ARRAY, VGA, EGA, CGA, MDA – International Business Machines Corp.; HERCULES – Hercules Computer Technologies Inc.; Multisync – NEC Home Electronics Corp.; COMPAQ – Compaq Computer Corp.; WINDOWS – Microsoft Inc.; GEM – Digital Research Inc.; VENTURA – Xerox Corp.; AUTOCAD – Autodesk Inc.

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Circle 301 on reader service card



Excerpts from the revised edition show why Nelson is computing's most honored visionary.

## ADMIRABLE NELSON

**Ted Nelson** Months before the Altair emerged from its lair, Ted Nelson predicted that the number of personal computers in use would top ten million by 1980—only one of the many far-out Nelson ideas that proved true. Self-published in 1974, Nelson's book, *Computer Lib/Dream Machines*, exerted a pivotal influence on hackers, visionaries, and entrepreneurs such as Mitch Kapor and David Bunnell.

In form and content, *Computer Lib/Dream Machines* displayed a radical intelligence. It was an exuberant, multi-font compendium of computing proverbs, anecdotes, jokes, predictions, and politics. The revised edition from Microsoft Press includes chunks of new material as well as commentary on the old. Its collage format remains faithful to the nonsequential logic of Nelson's most prominent invention—hypertext. Still as fresh and relevant as it was a dozen years ago, *Computer Lib/Dream Machines* is a browser's gold mine.

### LORE OF THE OPERATING SYSTEM

There are two kinds of people: those who can learn to tolerate existing operating systems and those who cannot. The latter compose 85 percent of humanity.

"Cleaning up your files" (making sure they're in the right catalogs and you're rid of what you don't need) requires endless finagling and primping. The people best suited to it have the personalities of stamp collectors, tweezing little scraps from place to place.

How is MS-DOS like MSG? Both raise your blood pressure and give you a tightening sensation around your forehead.

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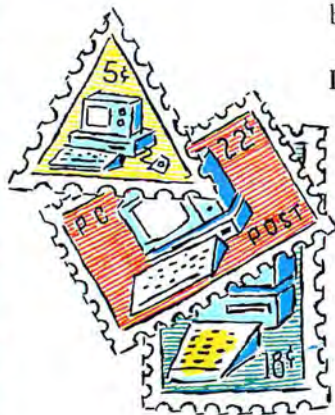
### MICRO SYSTEMS

*A microcomputer is any computer too small to be seen with the naked eye.*

*The PC is authoritarian, the Macintosh is bumpkinish and obtuse. Using the PC may be compared to juggling straight razors. Using the Macintosh is like shaving with a bowling pin.*

*Present-day iconic office systems represent different machines and activities with little pictures. This line of reasoning suggests that to prepare an electronic letter you should see a picture of a letter slide into a picture of an envelope. To send it, you should lick the screen.*

*As a cheap, reliable, worldwide standard, the PC is remarkable. For inconsistent, poorly thought-out complications, it is infuriating. But you can get lots of stuff for it, do lots of programming on it, and get lost in it for years.*

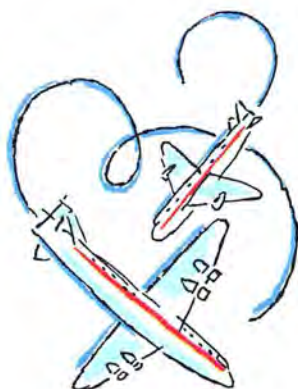




## Spreadsheets

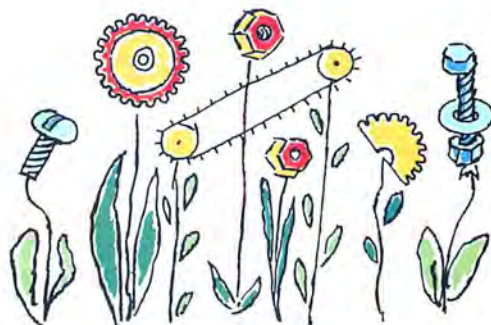
Using a spreadsheet is a new way of programming. You do not write lists of commands; instead, you arrange relationships.

I would argue that it's more important to teach children spreadsheets than to teach them long division.



## Scare Story

The air traffic control system is outdated, overloaded, understaffed, and hell on the people who run it. Their computer screens advise them of problems (planes too close to each other), which the controllers must handle by radio contact with pilots. Now the old margins for error are being shaved. The system has recently been reprogrammed to notice only smaller distances between airplanes. Many flybys that would have been considered near misses in 1985 are now considered acceptable; meanwhile, reported near misses under the new standards are higher than ever.



## METALOGIC

*America is the land where the machine is an intimate part of our fantasy life: Not "Let a hundred flowers bloom," but "Let a hundred gizmos clank."*

- We live in media as fish live in water.
- I think presentation by computer is a branch of show biz and writing, not of psychology, engineering, or pedagogy.
- Confucius was right: A thousand words comes out to a little under 10K of computer storage. So does a modest sort of picture.
- The best machine designs are done by people who know software.
- As long as we proceed from a mental model of success and failure, our systems will be the same old stuff.
- WYSIWYG is advocated by those who think there should be only one view of a thing.
- Laymen are under the false impression that computing is an exact science. On the contrary. It is a babel of different religions and points of view.
- There is really no personal computer world, distinct from the rest. The same data structures are used in the space shuttle and in accounting programs. The same people go from programming text systems to programming video games. Everything is deeply intertwined.

## Let the Buyer Beware

- Before buying a printer, ask the clerk to show you how to change the ribbon. It might change your mind.
- Setting up a computer the way you want it is like customizing a car: It can take all your evenings for two years. And after two years you want something else anyway.
- Be suspicious about all that is said in the software field.
- A data base is *work*. You can't make useful inquiries unless you keep it up to date.
- Good programs do not have fixes piled on fixes.

## Hypertext

Hypertext is nonsequential...an explorable, informalized whole with anecdotes, jokes, cartoons, "enrichment materials," and anything else people might dig.

...readers do better if they don't have to read in sequence, but may establish impressions, jump around, and try different pathways until they find the ones they want to study most closely.

The structure of ideas is not sequential.

A grand hypertext, then, would be a hypertext consisting of "everything" written about a subject or vaguely relevant to it, tied together by editors (not by programmers, dammit!).

Weapons manuals are estimated to cost \$1000 a page. This is an area where the need for hypertext is felt most intensely.

When I explain to people that hypertext will allow the *true uncertainties* of thought to be accurately recorded and shown, they tend not to like this idea. It violates a dearly held notion of closure.

Illustrations by  
WARD SCHUMAKER





## User Friendliness

Using a computer should always be easier than not using a computer.

"If it's not simple enough for Joe Turkey User, it's too complicated."

A globe does not say "good morning." It is simple and clear, not "friendly."

Around 1983 every tenth book sold in America was a computer book. By the end of 1984, computer book sales were way down. Discouragement, probably. People realized personal computers weren't going to simplify and clarify their lives.

I have in hand a collector's item—a pamphlet called *How to Survive a Hotel Fire* from the National Safety Council in Chicago, Illinois. To imagine that anyone would read its 17 fine-print, step-by-step instructions transcends imbecility. However, an excellent exercise for writer-designers would be to reduce its advice to a useful, single-glance card that could be glued to the back of a hotel room's door.

## TUTTLEFIELDS

*There was a legendary maintenance person named Tuttle who supposedly formulated the following conservation law.*

*Tuttle's Law: The amount of functioning equipment in the universe is a constant.*

*This has grim ramifications: 1. The more equipment you own, the less will work.*

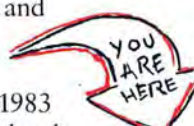
*2. If you fix one thing, another breaks.*

*3. If one thing breaks, another mysteriously resumes working.*

*Now, why is it that if your equipment breaks, it is equipment nearby that gets better, rather than equipment on Alpha Centauri?*

*Because Tuttle's Law is local as well as global. Local subsets of Tuttlefields also conserve brokenness.*

*Thus, research has been urged to ascertain the value of the Tuttle radius, that distance governing the collection of equipment that is tuttlebound.*



## How to Learn Anything

Here are some techniques used by bright people who want to learn something other than by taking courses in it. It's the way Ph.D.'s pick up a second field, it's the way journalists and "geniuses" operate; it brings the general understanding of a field that children of eminent people in that field get as a birthright.

1. DECIDE WHAT YOU WANT TO LEARN. Even though you can't know exactly...

2. READ EVERYTHING YOU CAN ON IT, especially what you enjoy, since that way you read more of it and faster.

3. GRAB FOR INSIGHTS. Regardless of points others are trying to make, when you recognize an insight that has meaning for you, make it your own. Its importance lies not in how central it is to the topic, but in how clear and interesting and memorable it is to you.

4. TIE INSIGHTS TOGETHER. Soon you will have your own string of insights in a field, like a string of lights around a Christmas tree.

5. CONCENTRATE ON MAGAZINES, NOT BOOKS. Magazines have more insights per inch of text and can be read much faster.

6. FIND YOUR OWN SPECIAL TOPICS AND PURSUE THEM.

7. GO TO CONVENTIONS. Don't think you have to be anybody special to go to a convention; just plunk down your money. Calling yourself a consultant is good; student is perfectly honorable.

8. FIND YOUR "MAN." Somewhere in the world is someone who will answer your questions extraordinarily well...a janitor or a teenage kid; no matter. Follow with your begging bowl if that's what it takes.

9. KEEP IMPROVING YOUR QUESTIONS. Don't assume you don't understand; keep adjusting the questions till you get an answer that relates to what you want.

10. YOUR FIELD IS BOUNDED WHERE YOU WANT IT TO BE. Intellectual subjects are connected every which way; your field is what you think it is.

There are limitations. This doesn't give you lab experience, and you will continually have to be filling in the gaps. But for alertness, give me someone who's learned this way, rather than being blinkered and clichéd to death within the educational system.

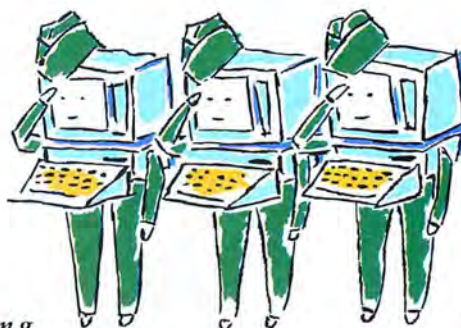


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## Simulation and AI

*Simulation is essentially the frontier of every science now, permitting exploration of untold new realms of ideas, some of which can be checked experimentally and some of which can't.*

*Every simulation has a point of view. It highlights some things, omits others, and always simplifies.*

*Bob Abel Studios created a beautifully simple example of CAD: You could design a roller coaster on the screen—then ride it. An Evans and Sutherland Flight Simulator could take you for a ride on a roller coaster of your own devising—complete with sound effects. It was great.*

*Artificial intelligence is at once the sexiest and most ominous term in the world. In principle it means the simulation of processes of mind, but it generally turns out to be a form of computer simulation.*

*AI is easy! When they say "knowledge," read "data." When they say "heuristics," read "a bag of programming tricks." When they say "expert system," read "hack." —A cynic from Michigan.*

## Programming

The principal activity of programming is THINKING.

■ A good program design is complex, subtle, and infinitely controversial. When programmers are expected to produce a certain amount of program code each day or week, they are either badly managed or doing low-grade work.

■ One of the worst programmers I know had incredible speed and facility. In minutes or hours he would construct a program to do whatever was requested. It would take the technical writers months to explain it, and even then their write-ups were only approximations. It is possible that this one guy messed up the corporation's software beyond all hope. The company went under.

■ Mark Miller's Law of Irrevocable Subdivision: When you break the problem into parts, you've determined its structure—and the work that will be done around it forever.

■ Design long, program short. Don't be in a rush to write code. Think about the problem from every angle, figure out in detail how different strategies affect each other. When you're sure the design is right, code it. Impatience is the enemy. Design is productive work.

■ The real problems of manipulating information are not technical but conceptual and artistic. Marshall McLuhan pointed out that the desire to line things up in even rows—which he thought was a protestant trait—created military marching and grid cities. Also, he might have added, bad data structures.

■ Estimating the size of a programming project is extremely difficult. Nelson's rule of thumb: Take your initial estimate, multiply by a thousand, and divide by the number of weeks you've been in the computer field. In other words, after about 20 years, your estimates tend to be approximately correct.

## Power Plays and Business Plans

■ Power plays involve the selection of computers and systems. Winners (those whose choices get bought) get promoted; losers leave. Salespeople pull strings however they can—sometimes to get rid of people at their customer locations.

■ The Business Plan is a structured fiction much like the fairy tale, from "Once upon a time" to "Happily ever after." But it must be presented more solemnly than a requiem mass. Anyone who giggles is disqualified.

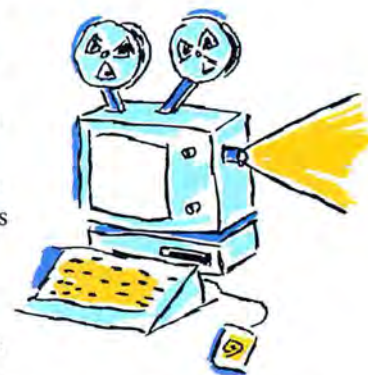
## MACHINES

### AND Manners

*Hypermedia systems will be the principal intellectual environment of the human race hereafter.*

*Personal computers in the year 2000 will make our megabyte machines seem puny. They may include full orchestras and real-time motion-picture generation.*

*The design of interactive systems—from video games to office systems—is a form of moviemaking. Interactive system design is now obviously—to everyone except engineers—the center of our new world. But that doesn't mean everyone knows how to do it.*



*In The Hitchhiker's Guide to the Galaxy, a number of pieces of equipment have objectionable personalities—unctuous doors that make oily remarks as they open and close, and Eddie the Shipboard Computer, who is insufferable. Author Douglas Adams has his finger on something here. Appliance etiquette is too important to be left to engineers. ☹*



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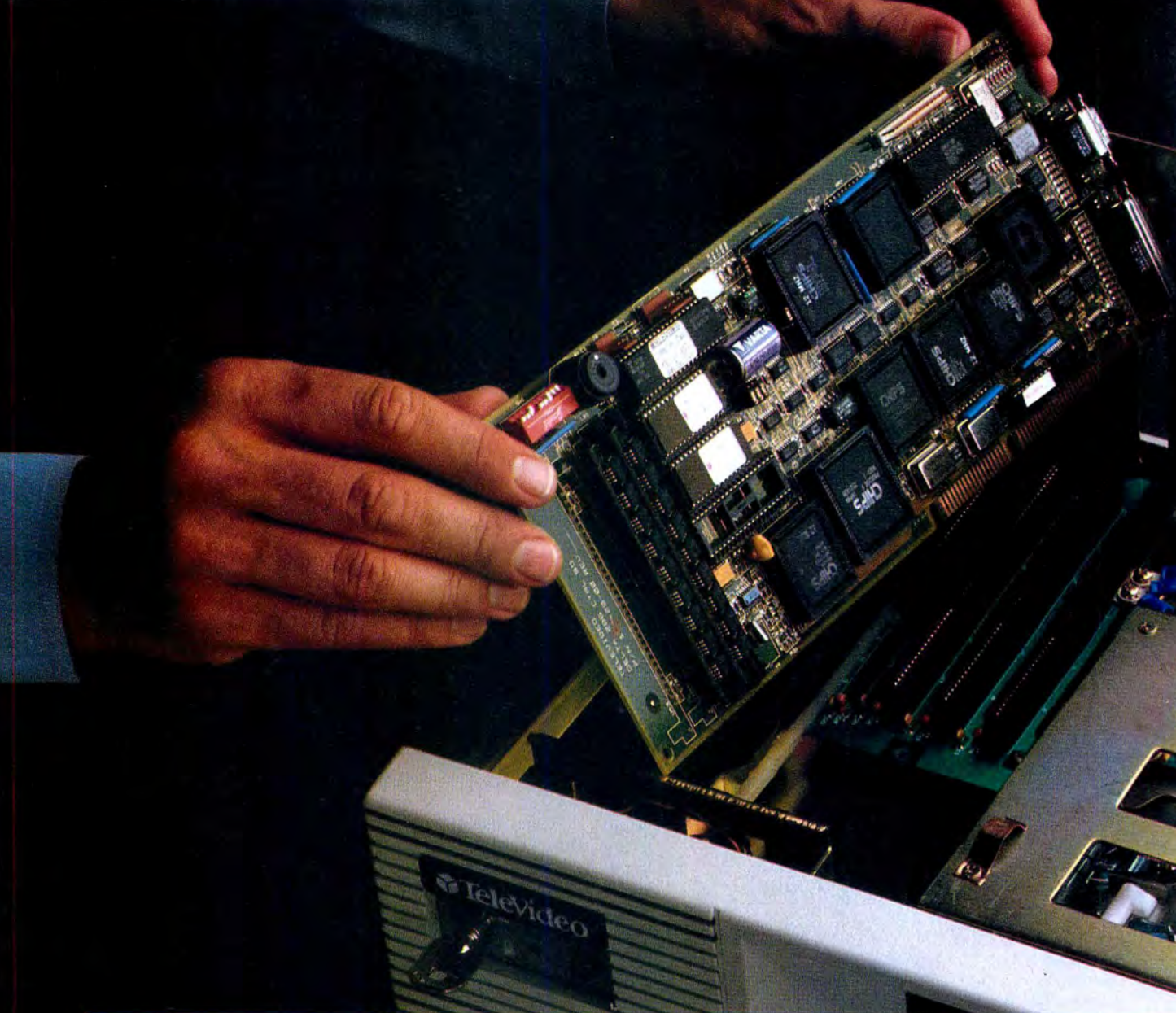
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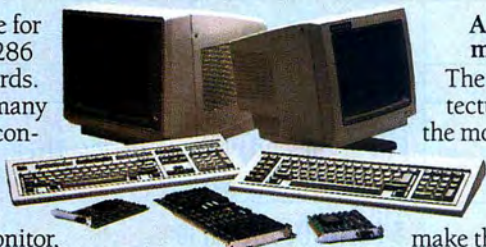




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- NDP Fortran-386 generates code for the 80287, 80387 or MicroWay's mW1167. The mW1167 has a floating point throughput exceeding 2.5 mega-

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## MicroWay® 80386 Support

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The compilers are presently available in two formats: MicroPort Unix 5.3 or MS-DOS as extended by the Phar Lap Tools. MicroWay will port them to other 80386 operating systems such as OS/2 as the need arises and as 80386 versions become available.

The key to addressing more than 640 kbytes is the use of 32-bit integers to address arrays. NDP Fortran-386 generates 32-bit code which executes 3 to 8 times faster than the current generation of 16-bit compilers. There are three elements each of which contributes a factor of 2 to this speed increase: very efficient use of 80386 registers to store 32-bit entities, the use of inline 32-bit arithmetic instead of library calls, and a doubling in the effective utilization of the system data bus.

An example of the benefit of excellent code is a 32-bit matrix multiply. In this benchmark an NDP Fortran-386 program is run against the same program compiled with a 16-bit Fortran. Both programs were run on the same 80386 system. However, the 32-bit code ran 7.5 times faster than the 16-bit code, and 58.5 times faster than the 16-bit code executing on an IBM PC.

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The mW1167™ is a MicroWay designed high speed numeric coprocessor that works with the 80386. It plugs into a 121 pin "Weitek" socket that is actually a super set of the 80387. This socket is available on a number of motherboards and accelerators including the AT&T 6386, Tandy 4000 and MicroWay Number Smasher 386 (Jan. '88). It combines the 64-bit Weitek 1163/64 floating point multiplier/adder with a Weitek/Intel designed "glue chip". The mW1167™ runs at 3.6 MegaWhetstones (compiled with NDP Fortran-386) which is a factor of 16 faster than an AT and 3 to 5 times faster than an 80387 .....\$1495

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¹Includes Occam ²Includes TDS

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MicroPort Unix 5.3 .....from \$399

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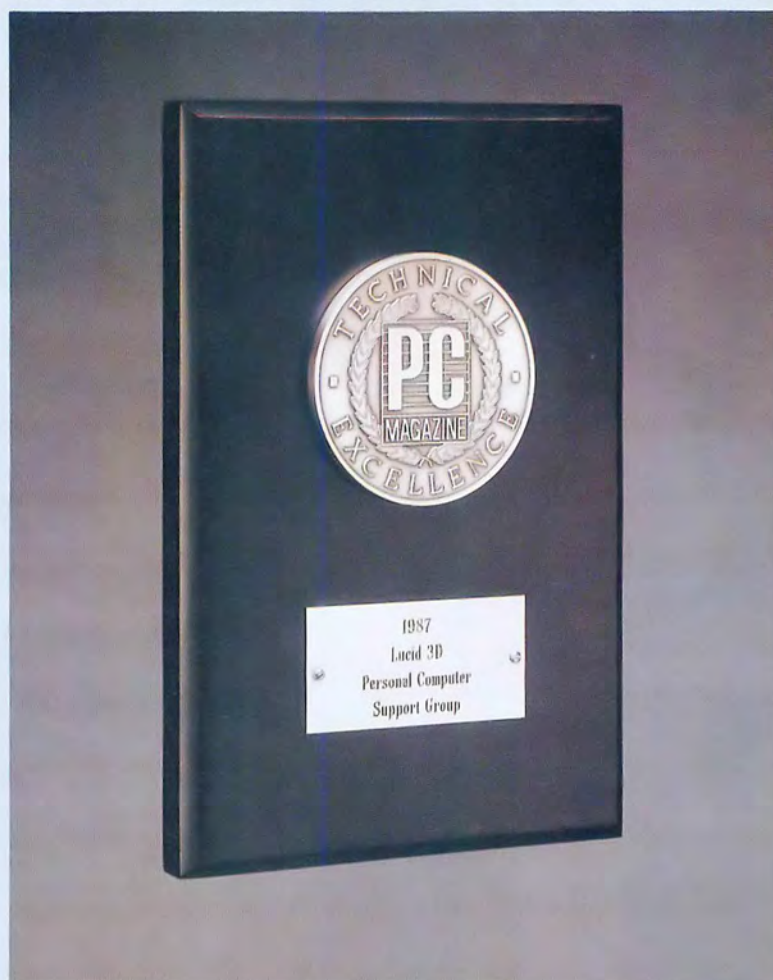
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Everything about Lucid works that way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said, "If there ever was an interface idea so good it ought to be stolen and widely used, this is it."

## Memory Resident

You can pop Lucid up instantly while working in your word processor or any other program. You can cut anything on the screen and paste it right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

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Another 3-D feature is that any cell can also contain a multiple page note window that you instantly access with a single keystroke. You can write notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

## Other Features

Lucid has over 100 innovations that cause users to say it is the best of all the spreadsheet offerings! Things like: **Speed** - background, minimal and visible recalc. **Macros** - learning macros, autoexecute macros, macros work between spreadsheets, user defined macro menus. **Mouseability** - total Mac-like mouse access, but easy keyboard control as well. **Color or Mono** - 17 user controlled color displays. **Audit** - six displays and printouts. **Windows** - multiple sheets on screen at

same time. Multiple views of the same sheet. Pop-up windows of function formulas, range names, favorite labels, macro names, file names, even a calculator. All let you select and insert right



Fig. 2. Here we are instantly. Notice the lower left corner showing we are on level 2. Grey - takes you back. There is no limit to the levels you can go. Move right down to transaction level if you like.

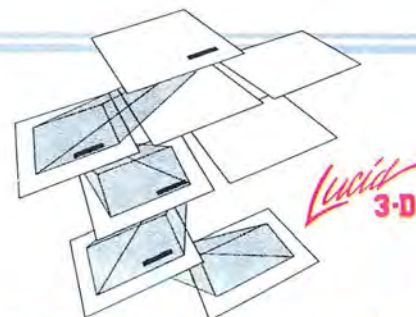
into your spreadsheet. All windows (even notes) resize and move where you want them. **Cut and Copy** - between spreadsheets, documents and between sessions. **Help** - press F1 anywhere, you get help specific to what you are doing.

## Masterwork

Lucid is more than a bag of features. It is a masterwork. The overall feel is tight and polished. In fact, Paul Somerson, executive editor of PC Magazine, used one word to describe it, "Slick".

PCSG has built an excellent reputation as a developmental laboratory. Now those who have worked with Lucid 3-D tell us "you have done it again. This is software everyone should have."

Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are converted between them with ease so there's not



"The Best idea I've seen for a spreadsheet in years"

Jim Seymour, Columnist, PC Magazine, PC Week

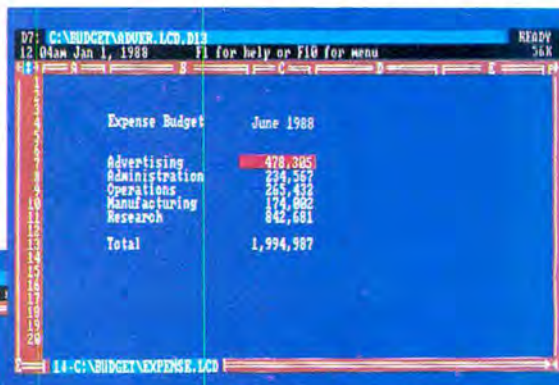


Fig. 1. Let's get the detail on those ad costs, just move the widbar to that cell and press one key (grey +).

Co-Winner of the 1987 PC Magazine Award for Technical Excellence  
The other winner: Microsoft's Excel



Fig. 3. Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many 3-D levels as you like. No one else can do that.

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—PC World. ■ "A pleasure to use."—PC Week.

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—Peter McWilliams/  
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A life saver for your data.



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Which is no small feat, considering that Version 4.0 is selling even faster than its predecessors did.

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**Peter Norton**  
COMPUTING

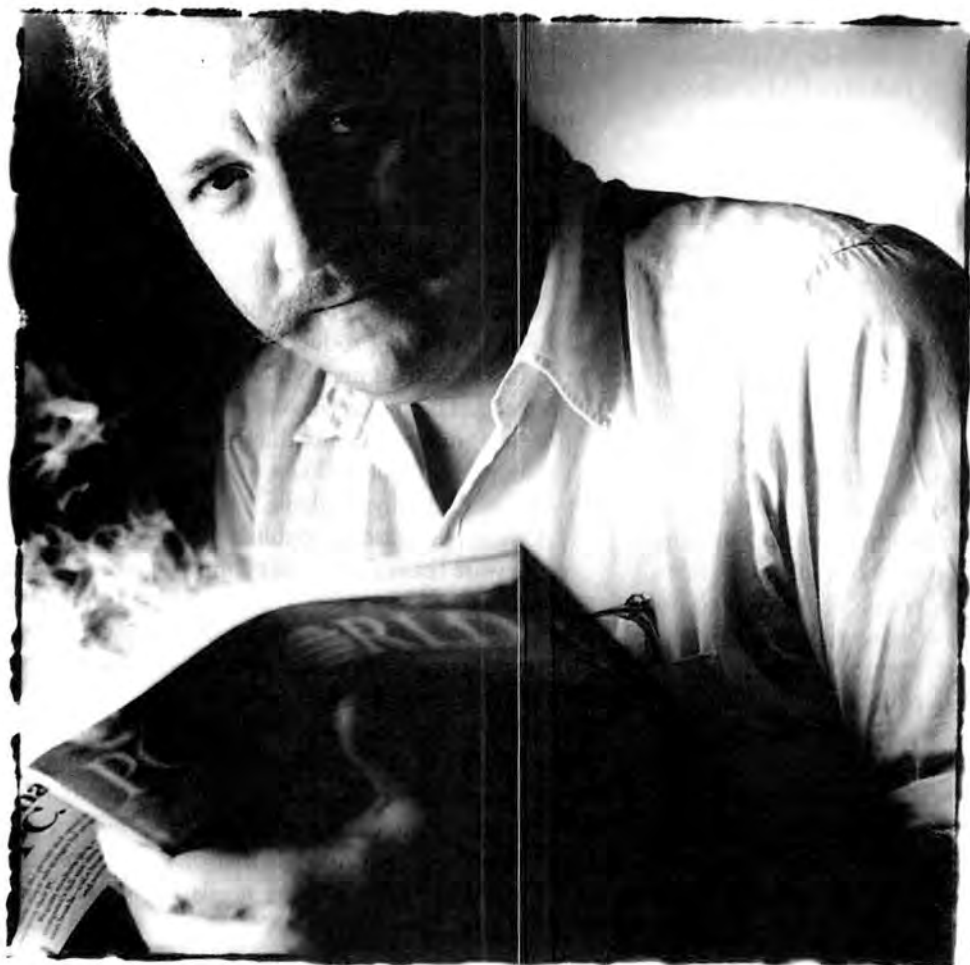
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Circle 92 on reader service card



## STEWART ALSOP'S ALL-TIME VAPORWARE LIST

*The vapors were a  
Victorian malady,  
but times change.  
Today, the computer  
industry has  
succumbed to a  
vaporware epidemic,  
leaving innocent  
consumers out in  
the cold.*



You may or may not know that I happen to be Mr. Vaporware. Contrary to popular opinion, the reason I've acquired that honorable title is not because I don't exist or haven't been shipped yet. The reason is that in my newsletter I maintain "The Official P.C. Letter VaporList." I started this list as a gag to get attention when I began publishing the newsletter. But apparently people take this stuff seriously. So I've now acquired a reputation as that jerk who puts everybody's products on the vaporware list.

Stewart Alsop

*Photography by*  
DAN ESCOBAR



I don't think there's any good reason to announce products in advance of delivery, particularly when a company doesn't know if it can finish the job.

Let me start from the beginning. Some companies in the personal computer industry had a habit of announcing products before they were sure they could finish building them. Companies engaged in this activity for one of two reasons. Either they wanted to judge potential consumer interest in the product before spending too much money on development, or they needed money to develop the product. If they were looking for funding, they wanted potential customers to pay in advance or they wanted to show how much demand existed for the product so that venture capitalists would invest. In those days this practice wasn't considered so horrible; most potential customers knew as much about the products as the developers did and therefore knew which products might not get finished.

Since then the industry has changed. First of all, it made some good products, which led to a lot more people buying personal com-

puters and software, people who weren't necessarily technically astute. A lot more people buying led to a lot more companies making and selling products—products that sometimes were remarkably alike. So then you had a situation where many of the customers couldn't tell whether a product was feasible and were easily confused by trying to compare existing products with products that had merely been announced. There were so many product announcements that it was sometimes difficult to keep track of what was actually available.

One of the reasons I publish the vaporware list is that I don't think there's any good reason to announce products in advance of delivery, particularly when a company doesn't know if it can finish the job. Customers should not be burdened with the task of figuring out when—or whether—a product will be finished. The customer's only job should be to decide whether or not a product fits his or her needs,

not to evaluate the reality of a company's delivery schedule. I've discovered that it not only hurts customers when products are preannounced, but it also usually hurts the companies that do the preannouncing.

Consider the interface wars that erupted in 1982 and 1983. A few weeks before COMDEX/Fall 1982, a company called VisiCorp announced with great fanfare a new "operating environment" called *Visi On*. This environment required an IBM PC XT with 512K of memory and a hard disk, a configuration that only true power users had at the time, but it used the IBM character set and therefore worked with a simple monochrome monitor. VisiCorp said it would deliver the product by June 1983.

By the fall of 1983, it was widely rumored that Apple was getting ready to announce a new computer with a graphics interface, which turned out to be the Macintosh. Feeling its competitive oats (having been adopted as IBM's operating

### The All-Time Vaporware List

PRODUCT	COMPANY	ANNOUNCED	PROMISED	SHIPPED	VAPORTIME*
<i>Ovation</i>	Ovation	10-83	6-84	never	48
<i>Magneto-Optical Disk</i>	Verbatim/Kodak	7-85	12-87	—	27
<i>Crosstalk Mk.4</i>	Microstuf	4-85	6-85	5-87	25
<i>Windows</i>	Microsoft	11-83	9-84	11-85	24
<i>Visi On</i>	VisiCorp	11-82	6-83	11-83	12
<i>Atari PC</i>	Atari	1-87	4-87	—	9
<i>OS/2 version 1.1</i>	IBM	4-87	10-88	—	6
<i>OS/2 Extended Edition</i>	IBM	4-87	7-88	—	6

\*in months, as of 10-87



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Turbo Jumbo Pack (New Ver.)	159
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Signmaster	38
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VisiCorp managed to so distract itself from its existing business that it lost the biggest and richest software franchise (spreadsheets) on the planet.

system mascot), Microsoft decided to move up the announcement of its graphics operating environment for the IBM PC significantly, introducing *Windows* at COMDEX/Fall 1983. I can't quite remember what equipment Microsoft said *Windows* would require since it now requires equipment that didn't exist in 1983 (hard disks with a seek time of less than 40 milliseconds, EGA or VGA graphics, 80286 processors, etc.). Microsoft said it would deliver *Windows* by September 1984.

As it turned out, VisiCorp took until November of 1983 to deliver *Visi On*. Since VisiCorp had decided to build its own applications

for *Visi On*, the product was essentially worthless until the company began to deliver application software in mid-1984. By that time, VisiCorp had nearly been reduced to a shambles as Lotus Development's *1-2-3* took away the market for its cash cow, *VisiCalc*.

Apple did indeed introduce and deliver the Macintosh two months after the *Windows* announcement, in January 1984. Despite some interim difficulties, the company has managed to turn the Macintosh into a hot item. (Similarly, Digital Research announced its *GEM* operating environment in November 1984 and delivered it on schedule

in February 1985. *GEM* has been quite successful in Britain and Europe but has had limited success in the United States.)

Microsoft meanwhile endured three subsequent delays in the delivery of *Windows* and didn't actually deliver the product to customers until November of 1985. Only now, four years after the initial announcement, has Microsoft managed to get people to take the environment seriously. And that's true only because IBM seems to have begrudgingly adopted a version of *Windows* as the standard environment for its new operating system, OS/2.

---

Where we got the idea that something small  
could be powerful.

---





The only honorary graduate of the vaporware list is *Ovation*, a product that was announced before any code had been written.

So what did VisiCorp and Microsoft gain by announcing products so early in their development cycles? VisiCorp managed to so distract itself from its existing business that it lost the biggest and richest software franchise (spreadsheets) on the planet. And Microsoft generated so much skepticism about *Windows* that it has taken two years of evangelism and IBM's endorsement to overcome that wariness. By contrast, Apple's delivery of the Macintosh as promised allowed that company to sell nearly 250,000 units before users began to realize that the thing was seriously underpowered.

On top of that, for more than three years computer users have been living in perpetual uncertainty and confusion about the value or purpose of the so-called operating environments. You could make a case that preannouncements have slowed the development of the industry substantially.

Of course, Microsoft and VisiCorp are hardly the only companies to have preannounced products. The honorary graduate of the vaporware list is *Ovation*, a product that was announced before any code had been written. Indeed, the stories of *Ovation's* introduc-

tion (which I did not attend) have achieved mythical stature: At the announcement at New York's Windows on the World, the company wouldn't allow reporters to actually touch a computer demonstrating *Ovation* because what appeared on the screen was simply a simulation of what the programmers thought they could create. Unfortunately, the company went bankrupt before the program could be finished. It's an honorary graduate of the list because no other company was willing to take on further development of the program, and so it is now history.

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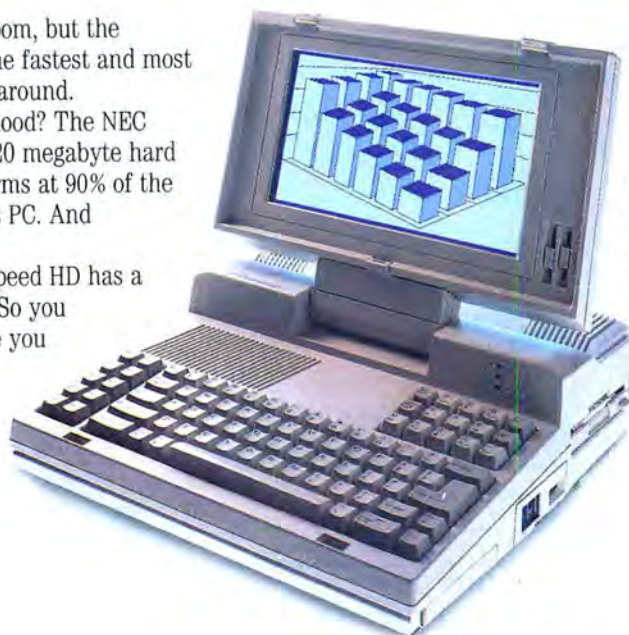
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Beyond the interface wars, the naïveté, and the deception, one company really stands out as an innovator in the world of vaporware: IBM.

While many people felt that the preannouncement of *Ovation* was a calculated deception because it was made so early, the leader of my All-Time Vaporware List is actually a serious project that has simply taken a long time to develop. Verbatim, since acquired by Kodak, announced at the July 1985 National Computer Conference that it was working on a new technology to combine optical and magnetic storage on one disk in order to vastly increase the capacity and flexibility of hard disks. Since it was a brand-new technology, the company thought it should solicit opinions about the best way to configure the disk and therefore an-

nounced the product publicly. Since then, the company has focused on a 3½-inch, removable disk and drive that would give users what amounts to floppy disks that hold about 50MB of data each. The company thinks it will deliver the first samples this month, about a month later than predicted. At press time, the company was still trying to decide how to price the drives and disks.

In between outright deception and new technology lies a zone that we might call naïveté, which accounts for *Crosstalk Mk.4*'s position as the third most vaporous product in the history of DOS.

Crosstalk Communications, which used to be called Microstuf and was acquired by Digital Communications Associates last year, thought it could build a whole new communications program in a few months, just the way it had built the original *Crosstalk XVI*. So it announced the product at COMDEX/Spring 1985 and immediately started advertising it on the back page of *InfoWorld* and other magazines. Microstuf's executives were wrong, and *Crosstalk Mk.4* did not actually ship to retailers for another two years, after at least six revisions in the shipping schedule.

(continues)

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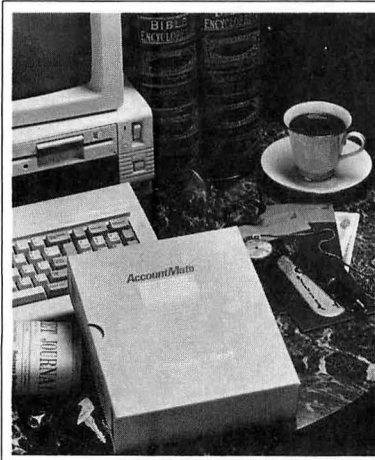
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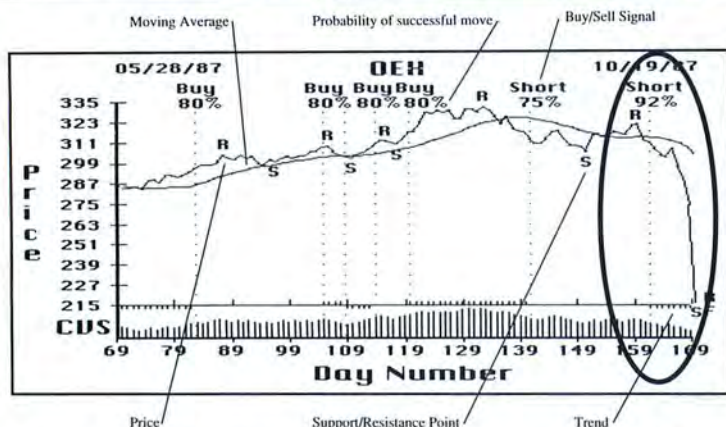
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\* The Index Program generated a short signal for the OEX for execution on 10/08/87, thus 100 OEX puts with a strike price of 300 were purchased on 10/08/87. The profits thru 10/19/87 are approximately \$800,000.

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Circle 34 on reader service card

Stewart Alsop's  
All-Time Vaporware List

There are other, less-definable categories of vaporware, including one that might be called the Jack Tramiel Special Steam Bath. Tramiel, as many people know, built Commodore into a \$1 billion home-computer giant partially by announcing computer models before designing them in order to gauge consumer reaction. Indeed, some impolite industry gurus might swear that Tramiel has announced more computers than he's sold. Tramiel, of course, left Commodore in 1985 and bought out the near-dead Atari Corporation. He's since turned Atari around and made it a semi-hot consumer electronics stock on Wall Street. But he's playing the same old games he played at Commodore.

Take the Atari PC, for example. It was announced with great fanfare last January at the huge Winter Consumer Electronics Show in Las Vegas. Atari was finally going to provide an inexpensive, easy-to-use PC-DOS compatible for the masses, and it was going to do it by April and take the consumer market by storm. When the summer version of the same show rolled around in June, Atari said it would have the PC out in July. In August, the company said any day now. In late September the company claimed that the first production units were rolling off the line in Taiwan. Two weeks later, the company discovered that those units were actually preproduction units and that real computers would be available in November. At this writing, we're still waiting.

But beyond the interface wars, the naïveté, and the deception, one company really stands out as an innovator in the world of vaporware: IBM. Originally, people believed that IBM announced products in advance because the company

(continues)



## Stewart Alsop's All-Time Vaporware List

wanted to freeze the market by forcing customers to wait before they could actually evaluate the products. With this evil empire theory, the industry assigned to IBM the same sort of moral level that Ronald Reagan traditionally assigns to the Soviet Union.

Recently, though, IBM has added a new twist to vaporware. With the advent of consumer marketing of computer products, IBM has figured out that people don't really care whether you preannounce a product, as long as you deliver that product when you say you will deliver it. Forecasting just when you will be able to deliver a product is the tricky part of the business, particularly with software, which theoreticians have discovered takes longer to finish the harder you try to finish it. (Indeed, the best software is developed by giving programmers the incentive to finish it as fast as they can without telling them exactly how long they have to complete it.) So IBM now routinely assigns delivery dates to new products that are so far in the future it can't help but deliver early. (The company has beat every one of its promised delivery dates in the past two years.) Indeed, with both versions of OS/2, the Standard Edition with the Presentation Manager (version 1.1) and the Extended Edition with data base and communications managers, IBM has devised an even more subtle twist: Announce the products but refuse to say when you can deliver them. That way IBM has the best of both worlds. It freezes the market so that its customers must wait to evaluate the new products, and it can't be accused of selling vaporware since it can't miss a delivery date that it never announced. Now that's innovation! ●



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☒ Electric Desk+ 1.1 ... 99.  
☐ Advanced Keyworks 1.0 ... 175.  
☐ Alpha/tree 1.1 (dBase file compatible) ... 219.

### American Small Business Computers

- ☐ Design CAD 3.0 (NCP) ... 169.  
☐ Design CAD 3D 3.0 (NCP) ... 169.

### Application Techniques ... NCP

- ☒ Pizazz 2.0 (see what your printer is missing) 45.

### Ashton-Tate ... NCP

- ☒ dBase III Plus 1.1 (the standard) ... call  
☒ Framework II 1.1 ... call  
☒ Sign Master 5.11 ... 159.  
☒ Diagram Master 5.02 ... 219.  
☒ Chart Master 6.21 ... 229.  
☒ Map Master 6.01 ... 239.  
☒ Rapid File 1.0 ... 279.  
☒ MultiMate Advantage II 1.0 ... 299.

### ATI ... NCP

- ☒ DOS Quick Reference (memory resident) ... 33.  
☐ How to use DOS, BASIC ... each 33.  
☐ How to use Lotus, dBase III Plus ... each 43.

### Best Programs ... NCP

- ☒ PC/TaxCut (for 1987 taxes) ... 45.  
☒ Fixed Asset System 4.3 ... 359.

### Bible Research ... NCP

- ☐ THE WORD 4.0 (specify KJV or NIV) ... 159.

### Borland International ... NCP

- ☐ Turbo Pascal Editor Toolbox 1.0 ... 41.  
☐ Pascal Database Toolbox 1.2 ... 41.  
     Traveling Sidekick 1.01 ... 43.  
☐ Sidekick 1.5 ... 57.  
     Numerical Methods Toolbox 1.0 ... 67.  
☐ Turbo Prolog 1.1 ... 67.  
☐ Prolog Toolbox 1.0 ... 67.  
☐ Turbo BASIC 1.0 ... 67.  
☐ BASIC Database Toolbox 1.0 ... 67.  
☐ Turbo C 1.5 ... 67.  
☐ Turbo Pascal 4.0 ... 67.  
☐ Superkey 1.1 ... 67.  
☐ Turbo Lightning 1.0 (speller, thesaurus) ... 67.  
☐ Reflex Workshop 1.0 ... 67.

## PC Connection Software Special

through January 31, 1988

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- ☐ Reflex 1.1 ... 99.  
☐ Eureka 1.0 ... 109.  
☐ Quattro 1.0 ... 129.  
☒ Paradox 2.0 (easy-to-use database) ... 419.  
☒ Paradox Network ... 589.

### Breakthrough ... NCP

- ☐ Timeline 2.0 (project management) ... 289.  
☐ Timeline Graphics 1.1 ... 105.

### Broderbund ... CP

- ☐ Graphics Library 1 or 2 ... 22.  
☒ Print Shop (banners, signs, etc.) ... 35.  
☒ Print Shop Companion (tools for Print Shop) ... 33.  
☒ Memory Mate 1.0 ... 45.  
☒ Bank Street Writer Plus 1.0 ... 59.

### Chipsoft ... NCP

- ☐ TurboTax Personal/1040 5.0 ... special  
☐ TurboTax Professional/1040 4.0 ... 169.  
☐ Tally Ho 1.01 (financial calculator) ... 32.

### Computer Associates ... NCP

- ☐ Spreadsheet Auditor 3.0 ... 65.  
☒ SuperCalc 4 1.1 ... 299.

### Core International ... NCP

- ☐ Corefast 1.3 ... 109.

### Crosstalk Communications ... NCP

- ☒ Remote 1.3 ... 95.  
☐ Crosstalk XVI 3.61 ... 95.  
☐ Crosstalk MK.4 1.0 ... 129.

### Dac Software ... NCP

- ☐ Dac Easy Mate 2.0 ... 26.  
☐ Dac Easy Report 2.0 ... 26.  
☐ Dac Easy Word II 2.0 ... 32.

- ☐ Dac Easy Base 1.0 ... \$32.  
☐ Dac Easy Payroll 2.0 ... 45.  
☐ Dac Easy Accounting 2.0 ... 59.  
☐ Dac Easy Bonus Pak ... 89.

### Digital Research ... NCP

- ☐ Gem Desktop 2.1 ... 35.  
☐ Gem Word Chart 1.0 ... 89.  
☐ Gem Graph 1.0 ... 159.  
☐ Gem Draw Plus 1.0 ... 189.  
☐ Gem Presentation Team 1.0 ... 319.  
☐ Gem Desktop Publisher 1.0 ... 259.

### Executive Systems ... NCP

- ☐ XTREE 2.0 (DOS shell) ... 45.  
☐ XTREE Pro 1.0 ... 69.  
☐ Hot 4.0 ... 95.

### 5th Generation ... NCP

- ☐ Fastback 5.14 (hard disk backup) ... 89.  
☐ Fastback Plus 1.01 ... 99.

### Funk Software ... NCP

- ☐ Sideways 3.2 ... 42.  
☐ Noteworthy 1.0 ... 49.  
☐ Inword 1.0 ... 59.

### Generic Software ... NCP

- ☐ Generic CADD 3.0 (full-featured) ... 69.  
☐ Drafting Enhancements 1 and 2 ... each 35.  
☐ Dot Plot ... 35.  
☐ Auto Dimensioning ... 35.  
☐ Commercial & Residential Furnishings ... 35.  
☐ Basic Home Design ... 35.  
☐ Electronic Symbols ... 18.  
☐ Flow Charts & Schedules ... 18.

### Harvard Associates ... NCP

- ☐ PC LOGO 2.0 ... 89.

### Hayes ... NCP

- ☐ Smartcom II 3.0 ... 89.

### Headlands ... NCP

- ☐ PC TALK4 1.3 ... 55.

### Hilgraeve Software ... NCP

- ☐ HyperAccess 3.2 ... 89.

### Individual Software ... NCP

- ☐ Smartguide (mem. resident DOS reference) 15.  
☐ The Instructor II ... 26.  
☐ Typing Instructor II ... 26.  
☒ Directory Assistance 1.0 ... 33.  
☐ Professor DOS (with Smartguide) ... 33.  
☒ Training for Lotus or dBASE 3 ... 37.  
☒ Training for Accounting ... 37.  
☒ Training for Lotus 1-2-3 ... 37.  
☒ Training for dBase 3+ ... 37.  
☐ Tutorial Set ... 49.

### Infocom ... NCP

- ☒ Cornerstone 5.2 ... 59.

### Intersecting Concepts ... NCP

- ☐ Display Master 2.11 (for EGA systems) ... 39.

### Javelin Software ... NCP

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☐ Javelin Plus 2.01 ... 159.

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Ready 1.0	55.
<b>Micro Education (MECA) ... CP</b>	
Managing the Market 1.0	85.
Managing Your Money 4.0	129.
<b>MicroPro ... NCP</b>	
Easy Extra 1.5	69.
WordStar Professional Release 4.0	229.
WordStar 2000 Plus Release 3	229.
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<b>Microsoft ... NCP</b>	
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Multiplan 3.02	119.
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Project 4.0	319.
Word 4.0	239.
Chart 3.0	249.
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<b>LANGUAGES</b>	
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Ability 1.2	65.
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<b>Nolo Press ... NCP</b>	
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Timeslips 2.29	79.
Timeslips III 3.1	special
<b>Owl Software ... NCP</b>	
Guide 1.0	99.
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Wines on Disk 1.0	25.
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VP-Expert 1.2 (expert system)	65.
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H/Test-H/Format 1.5 (hard-disk tools)	49.
GRASP 3.0	55.
Mace Utilities 4.1 (DOS utilities)	59.

### Personics ... NCP

SmartNotes 2.0 (Post-It-like notes)	49.
SeeMORE 1.0	49.
@BASE 1.0	119.

### Peter Norton ... NCP

Commander 1.0	39.
Norton Utilities 4.0	55.
Advanced Utilities 1.0	85.
Guides 1.0—Assembly, C, BASIC, Pascal	each 55.
Guides 1.0—Assembly and C	89.
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### Quarterdeck ... NCP

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Webster's New World Speller 1.3	39.
Webster's New World Thesaurus 1.07	43.
Webster's New World Writer 1.04	59.

### Softlogic Solutions ... NCP

Software Carousel 2.0 (everything resident)	35.
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Double DOS 4.0	35.
Cubit 2.0	35.
@ Liberty 1.0	59.

### Softstyle ... NCP

Printworks for Lasers 2.12	75.
Printworks for Dot Matrix 1.05	39.

### Software Group ... NCP

Enable 2.0	399.
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### Software Publishing ... NCP

ClickArt Holidays Graphics 1.0	33.
PFS:Professional File 1.0	59.
PFS:First Publisher 1.0	59.
PFS:First Choice 2.0	89.
PFS:Professional Write 1.03	119.
PFS:Professional File 1.01	149.
Harvard Graphics 2.0	239.
PFS:Professional Network 1.0	299.
Harvard Total Project Manager 2.0	379.

### Springboard ... NCP

Certificate Maker	34.
Certificate Library	22.
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ClipArt for Newsroom & Newsroom•Pro	
ClipArt Volume 1 or 3	each 19.
ClipArt Volume 2	25.

### Symantec ... NCP

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Q & A 386 2.0 (requires 386 CPU)	209.
Q & A Write 1.0	119.

### Traveling Software ... NCP

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### True BASIC, Inc. ... NCP

True BASIC 2.01	57.
Communications Library 1.0	32.
3D Graphics Library 1.0	32.
PC BASIC Converter 1.0	32.
Developers Toolkit 2.0	32.
Sorting and Searching 1.0	32.

### Turner Hall ... NCP

Spellin! 1.0	49.
SQZ!Plus 1.0 (make 1-2-3 sheets smaller)	59.
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WordPerfect Library 1.1	59.
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<b>WordTech Systems ... NCP</b>	
dBXL 1.1	89.
QuickSilver 1.1	359.
<b>Xerox ... NCP</b>	
Ventura Publisher 1.1	489.

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Lovejoys SAT 1.1	39.
<b>Springboard ... CP</b>	
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Easy as ABC (ages 3-6)	24.
<b>Stone &amp; Assoc. ... NCP (reqs. graph. brd.)</b>	
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Memory Master (ages 2-6)	27.
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<b>The Learning Company ... CP</b>	
Reader Rabbit (ages 5-7)	26.
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Math Rabbit (ages 5-7)	32.
Writer Rabbit (ages 5-7)	32.
<b>True BASIC, Inc. ... NCP</b>	
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<b>Broderbund ... CP</b>	
Championship Lode Runner	22.
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Starflight (NCP)	32.
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<b>Hayden Software ... CP</b>	
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<b>Infocom ... NCP</b>	
Bureaucracy	Stationfall
Hollywood Hijinx	Hitchhiker's Guide
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Microleague Baseball (requires CGA)	25.
Team Disk	15.
<b>Microprose ... CP</b>	
F-15 Strike Eagle (requires CGA)	22.
Silent Service (requires CGA)	22.
Gunship (requires CGA or EGA)	32.
<b>Microsoft ... CP</b>	
Flight Simulator 2.13 (reqs. graphics brd.)	32.
<b>Mindscape ... CP</b>	
Balance of Power (reqs. graphics brd.)	30.
<b>One Step Software ... NCP</b>	
Pinehurst	19.
Saint Andrew's	19.

<b>Parlor Software ... NCP</b>	
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Championship Backgammon	26.
Championship Blackjack	25.
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Police Quest	33.
Space Quest	33.
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King's Quest III	33.
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Star Trek/Promethean Prophecy	27.
Star Trek/Kobayashi	27.
<b>Sphere, Inc. ... NCP</b>	
Tellstar II 1.03	12.
GATO (submarine simulation, requires CGA)	12.
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<b>Sublogic ... CP</b>	
Jet 2.0 (EGA, CGA; NCP)	33.
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<b>XOR ... NCP</b>	
NFL Challenge	69.

## HARDWARE

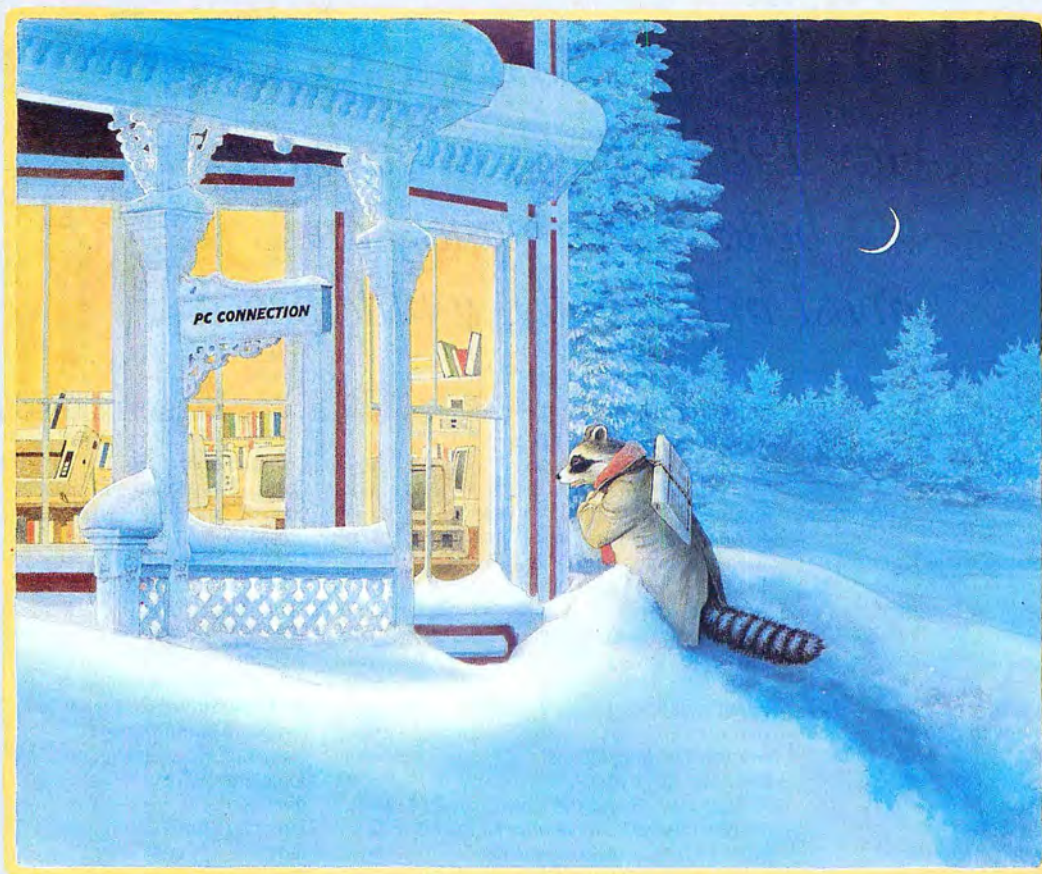
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# PC CONNECTION®





# PC Paradise 5.

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It was five years ago that we and our furry figurehead first entered the fledgling PC mail order market. At the time, Marlow, NH (pop. 550) wasn't exactly *au courant*. When we said we needed an 800 number, the locals suggested 853. Of course, we were all beginners then. Our typical customer was trying to figure out if he really needed a full 256k of RAM.

## Hey buddy, can you spare a paradigm?

Over the years, as our mighty mascots romped across these pages in various uncompromising positions, our customers started using much more powerful software and peripherals. Now, megabytes of memory, mountains of storage, glittering graphics, and professional printouts are available to all.

Marlow, too, has changed. We've rebuilt the dam outside our clapboard headquarters, and transformed the old Inn into a showroom and training center. But the occasional horse can still be seen strolling down the main drag, chickens

still pick pecking orders in the parking lot, and the Blueberry Festival is still the highlight of the year.

We haven't, however, changed our terribly old-fashioned way of doing business. We still think that you, our customers, deserve only the latest versions of products, toll-free technical support, full information on price and availability, and exceptionally fast service.

## A T-shirt in December?

(Or, only 5 days by dogsled from Boca Raton.)



Titillate your torso with your very own 5th Anniversary, all-cotton PC Connection T-shirt. Specify S, M, L, XL or children's. Limit one per customer.

Sure, it still gets a bit cold here in Marlow each winter. But we protect ourselves with the warm and cuddly PC Connection 5th Anniversary T-shirt. And now, so can you! It's free to anyone who places an order of \$500 or more between now and January 31.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit, call ahead to make sure what you want is in stock.

For the IBM-PC (XT & AT) exclusively.

# PC CONNECTION®



# Happy holidays from PC Connection.

*May 1988 bring you more power,  
better performance, and,  
most importantly, a little peace.*

## Orchid Technologies ... 2 years

Tiny Turbo 286	\$289.
PC Turbo 286e w/1 Meg (10 MHz)	729.
Jet 386 (includes cable kit)	869.
RAMquest 2 Meg (for PS/2 models 50/60)	699.

## Practical Peripherals ... 5 years

Microbuffer Mini (par. print buffer w/128k)	79.
Microbuffer Inline (par. print buffer w/256k)	149.
1200 Baud Internal Modem (w/ProComm)	89.
1200 Baud External Modem (w/ProComm)	109.
2400 Baud Internal Modem (w/ProComm)	159.
2400 Baud External Modem (w/ProComm)	189.

## Princeton Graphics ... 1 year

MAX-12E (amber monochrome monitor)	139.
HX-12 (CGA compatible)	449.
HX-12E (640 x 360 max. res.)	499.
Ultrasync (VGA compatible)	529.

## Quadram ... 2 years

EGA+ (supports 640 x 350 res.)	189.
Ultra VGA (supports up to 800 x 600 res.)	319.
ProSync (with mouse; supports 640x480 & 752x410 resolution)	259.
Microfazer II Print Buffer 64k	249.
Microfazer VI Print Buffer 256k	489.

## Sony ... 90 days

Multiscan Monitor (900 x 560 max. res.)	call
---	------

## Tops (formerly Centram Systems)

Tops for the PC (incl. board, cables, software)	299.
---	------

## Toshiba ... 1 year

P321SL printer (80 col., 216 cps, w/tractor)	529.
P341SL printer (132 col., 216 cps draft)	739.
P351 Model 2 (132 col., 300 cps draft)	899.
P351C Model 2 (132 col., 300 cps draft)	1149.
T1000 Laptop (80C88, 6.4 lbs., 5 hr. battery)	call
T1100+ Laptop (80C86, 8 MHz, 8 hr. battery)	call
T1200 Laptop (80C86, 10 MHz, 20 Meg)	call
T3100/20 Laptop (80286, 8 MHz, 20 Meg)	call
Internal Modem (specify computer)	289.
Floppy Link	149.
External 5 1/4" Drive (for laptops)	397.

## Tseng Labs ... 1 year

EVA 480 (supports 640x480 res., includes Dr. Halo II & drivers for Autocad & Lotus 1-2-3)	279.
---	------

## Video 7 ... 2 years

VEGA Deluxe (supports 640x480)	259.
VEGA VGA	329.

## DRIVES

### OMEGA ... 1 year

Bernoulli Box 20 Meg w/PC2 card	1649.
10 Meg cartridge	59.
Bernoulli Box 40 Meg w/PC2 card	1849.
20 Meg cartridge	82.
Bernoulli II (single 20 Meg internal)	949.
Bernoulli II (dual 20 Meg external)	1849.

5 1/4" Data Cartridge	\$59.
-----------------------	-------

### Miniscribe Corp. ... 1 year

ScribeCard 20 Meg (85 ms)	459.
ScribeCard 30 Meg (68 ms)	479.

### Mountain Computer ... 1 year

40 Meg Internal Tape Drive (XT or AT)	379.
40 Meg External Tape Drive (XT or AT)	499.
40 Meg External Tape Drive w/Power Supply (XT or AT)	569.
DriveCard 20 Meg (80 ms)	479.
DriveCard 30 Meg (78 ms)	569.
DriveCard 50 Meg (54 ms)	699.

### Plus Development ... 2 years

Hardcard 20 Meg (49 ms)	special
Hardcard 40 Meg (39 ms)	special

### Seagate ... 1 year

FREE PCTV® Hard Drive Installation Tape with the purchase of Seagate drive for the IBM PC (not for AT). Specify Beta or VHS.	
20 Meg Internal Hard Drive (w/Western Digital controller and cables, 65 ms)	299.

### TEAC ... 1 year

PC, XT 360k Drive (5 1/4" half-height)	99.
--	-----

### Toshiba ... 1 year

PC, XT 360k Drive (5 1/4" half-height)	99.
AT 360k Drive (5 1/4" half-height)	117.
PC, XT, AT 720k Drive (3 1/2", half-height)	119.

## MEMORY

64k Upgrade Set (150 ns, set of 9)	call
256k Upgrade Set (150 ns, set of 9)	call
256k Upgrade Set (120 ns, set of 9)	call

## DISKS

All disks have a lifetime warranty and come 10 disks per box.

### 5 1/4" DS/DD Disks for PC & XT (360k)

Fuji MD2D	12.
Sony	12.
Maxell MD2-DM	13.
Verbatim Datalife	13.

### 5 1/4" DS/High Density Disks for AT (1.2 Meg)

Fuji MD2HD	22.
Sony	23.
Maxell MD2-HDM	23.
Verbatim Datalife	22.

### 3 1/2" DS/DD Diskettes (720k)

Fuji	12.
Sony	19.
Maxell	20.

### 3 1/2" DS/High-Density Diskettes (1.44 Meg)

Fuji	55.
Sony	55.
Maxell	59.

## MISCELLANEOUS

### CompuServe

CompuServe Information Service	\$24.
Grolier's OnLine Encyclopedia	32.
Professional Connection	32.

### Cables ... lifetime

9 to 25 serial converter	15.
Serial printer cable	15.
Epson LQ/EX serial printer cable	15.
Smartmodem-to-AT cable	19.
Parallel Printer cable (15 feet)	19.

### PC Connection Computer Toolkit

Systems Management	22.
Thirty-day money-back guarantee.	
Template 1-2-3	15.
Template DB3+	15.
Template DOS 3.3	15.
Template Microsoft Word	15.
Template WordPerfect	15.
Template Advantage II	15.

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- We accept VISA and MASTERCARD.
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- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax.
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- APO/FPO orders usually shipped 1st Class Mail.
- Allow 1 week for personal and company checks to clear.
- UPS Next-Day-Air available.
- COD max. \$1000. Cash, cashier's check, or money order.
- 120 day limited warranty on all products.\*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday through Friday 9:00 to 5:30.

## SHIPPING

**Note:** Accounts on net terms pay actual shipping.

### Continental US:

- For monitors, printers, Bernoulli Boxes, and computers pay actual charges. Call for UPS 2nd-Day & Next-Day-Air.
- For all other items, add \$2 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.

### Hawaii:

- For monitors, printers, hard drives, and computers, actual UPS Blue charge will be added. For all other items, add \$2 per order.

### Alaska and outside Continental US:

- Call 603/446-3383 for information.

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# PC CONNECTION®

\*DEFECTIVE SOFTWARE REPLACED IMMEDIATELY. DEFECTIVE HARDWARE REPLACED OR REPAIRED AT OUR DISCRETION. ALL ITEMS SUBJECT TO AVAILABILITY.



# Check our prices, take our measure,

*So-low-low, low-low-low, so-so-low*  
*For a wealth of PC treasures*  
*Place a toll-free call to old Marlow.*

## Amdek ... 1 year

LaserDrive-1 (CD-ROM Drive; 90-day wrty.)	\$629.
Video 310A (amber monochrome monitor)	139.
Video 410A (amber monochrome monitor)	169.

## Compucable ... 2 years

Keyboard & Drive Cover Set (PC only)	15.
Monochrome Screen Enhancer	17.
Color Screen Enhancer	19.
2-Position switch box	29.
3-Position switch box	39.
4-Position switch box	49.

## Cuesta ... 1 year

Datasaver 200 Watt (PC backup power unit)	339.
Datasaver 400 Watt (AT backup power unit)	459.

## Curtis ... lifetime

### ACCESSORIES

Disk Holder DB-1 (holds 50 5 1/4" disks)	8.
Printer Stand PS-1	18.
Universal System Stand SS-3	25.
Low Profile Tilt UNI-1 & Swivel Pedestal	25.
Static Mat SM-1	27.
Command Center Plus SPF-4	79.

### CABLES

Smartmodem-to-PC Cable (9 feet)	17.
Printer-to-IBM cable (9 feet)	17.
PS/2 Monitor Ext. cable (3 feet)	27.
PS/2 Keyboard Ext. cable (3-9 feet coiled)	27.
Keyboard Extension cable (3-9 feet coiled)	27.
Color or Mono Ext. cable set (3 feet)	39.

### SURGE SUPPRESSORS

Diamond Chip (1 year wrty.)	15.
2-Position switch box	33.
Safestrip SP-3 (6 outlets; 1 year wrty.)	21.
Diamond SP-1 (6 outlets)	32.
Diamond Plus (w/FAX & modem protection)	41.
Emerald SP-2 (6 outlets; 6 ft cord)	36.
Sapphire SPF-1 (3 outlets)	47.
Ruby (6 outlets; EMI/RFI filtered; 6 ft cord)	59.
Ruby-Plus (w/FAX & modem protection)	69.

## DCA ... 1 year

Irma 2 (3270 emulation board)	729.
Irma PS/2 (for Models 50 and 60)	729.

## Epson ... 1 year

All cps speeds listed are for 12 cpi mode

EX-800 printer (80 column, 300 cps)	call
EX-1000 printer (136 column, 300 cps)	call
FX-86e printer (80 column, 240 cps)	call
FX-286e (136 column, 240 cps)	call
LQ-850 printer (80 column, 264 cps)	call
LQ-1050 printer (136 column, 264 cps)	call
LQ-2500 printer (136 column, 324 cps)	call
LX-800 printer (80 column, 180 cps)	call

Scanner Option (for EX800, EX1000, LQ2500—specify printer)	229.
Printer-to-IBM cable (6 feet)	15.

## Ergotron ... 1 year

Mouse Cleaner	15.
---------------	-----

## PC Connection Hardware Special through January 31, 1988

### Plus Development ... 1 year HardCard 20 & HardCard 40

Plus came out with the first HardCard, and their products are among the best. These space-saving, whisper quiet units, with their own set-up software, are must buys for anyone who needs a trouble-free hard drive.

- Cards include mounting hardware and ROM chips for compatibility with most micros, including PS/2 Models 25 & 30
- Average access times of 49 milliseconds (HardCard 20) and 39 milliseconds or less (HardCard 40)
- Can be used as a single hard drive or the second hard drive in the system

For PC, XT, AT, XT286 & PS/2 Mod. 25 & 30	
HardCard 20	\$579.
HardCard 40	869.

## Everex ... 1 year

Evercom Internal 1200 II (w/Bitcom)	99.
Evercom Internal 2400 II (w/Bitcom)	199.

## 5th Generation ... 6 months

Logical Connection 256k	319.
Logical Connection 512k	379.

## Hayes ... 2 years

Smartmodem 300	135.
Smartmodem 1200	299.
Smartmodem 1200B (with Smartcom II)	299.
Smartmodem 1200B (no software)	265.
Smartmodem 2400	449.
Smartmodem 2400B (with Smartcom II)	449.

## Hercules ... 2 years

Text Only Mono Card	89.
Color Card (without parallel port)	149.
Hercules Color Card (CGA)	159.
Hercules Graphics Card Plus	189.
Hercules Incolor Card (includes RAMfont)	call

## IMSI ... lifetime

Optimouse (includes Dr. Halo II)	99.
----------------------------------	-----

# 1-800/243-8088



**PC Connection**  
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 Marlow, NH 03456  
 603/446-3383

440W

## Intel ... 5 years

Inboard 386 (for AT, req. installation kit)	\$949.
Inboard Installation Kit (specify computer)	139.
Aboveboard 286 512k	319.
Aboveboard PS/286 512k S/P	349.
8087 (for IBM-PC & XT)	114.
8087-2 (for 8 MHz PC compatibles)	215.
80287 (for IBM-PC AT & XT 286)	195.
80287-8 (for 8 MHz 80286 machines)	249.
80287-10 (for 10 MHz 80286 machines)	319.
80387 (16 MHz)	499.
80387-20 (20 MHz)	749.

## Kalmar ... 1 year

Teakwood Disk Case (holds 45 3 1/2" disks)	14.
Teakwood Disk Case (holds 50 5 1/4" disks)	19.
Teakwood Disk Case (holds 100 5 1/4" disks)	29.

## Kensington Microware ... 1 year

Keyboard Slideaway	35.
Printer Muffler (80 column)	39.
Printer Muffler (132 column)	51.
Masterpiece	94.
Masterpiece Plus	109.
Masterpiece Remote	119.

## key tronic ... 3 years

101 Keyboard (enhanced layout)	99.
5151 Keyboard	135.
5153 Keyboard with touchpad	169.

## Kraft ... 1 year

Game Adapter Card	29.
Two-Button Joystick (requires game port)	29.
Three-button Joystick (requires game port)	33.

## Microsoft ... 1 year

Mach 20 (80286-8 accelerator)	339.
Mach 20 Disk Plus Option	69.
Mach 20 Memory Option (includes 512k)	269.
Mouse with Paintbrush (specify bus or serial)	99.
Mouse with Easy CAD (specify bus or serial)	119.

## Migent ... 1 year

Pocket Modem (ext., 1200 baud, w/Bitcom)	169.
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## MSC Technologies ... lifetime

Formerly Mouse Systems Corp.	
PC Mouse w/PC Paint Plus (serial version)	99.
PC Mouse w/PC Paint Plus (bus version)	109.

## NEC ... 2 years

GB-1 (supports 640 x 480 resolution)	279.
Multisync II (800 x 560 max. res.)	547.
Multisync Plus (968 x 750 max. res.)	949.

## NSI Logic ... 3 years

Epic 480 (extended EGA)	129.
Smart EGA Plus (supports 800x600 res.)	269.

## Okidata ... 1 year

Laserline 6	call
Laserline 6 RAM cartridge (384k)	239.
Personality Module (specify ser. or par.)	159.
Toner Cartridge	23.
Prestige Elite Font Cartridge	119.
Letter Gothic Font Cartridge	119.

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## More than the sum of its parts.

Combine a PG 1600 display adaptor and our LM-301 monitor to create a display with incredible resolution and remarkable hardware and software compatibility. The PG 1600 was designed by Cornerstone Technology and is available exclusively from Princeton.

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hardware emulation insures complete PC application software support for Lotus, Microsoft Word, dBase III and many other popular packages. Get a consistently crisp image with no quivers, jitters, or flickers because of non-interlaced technology.

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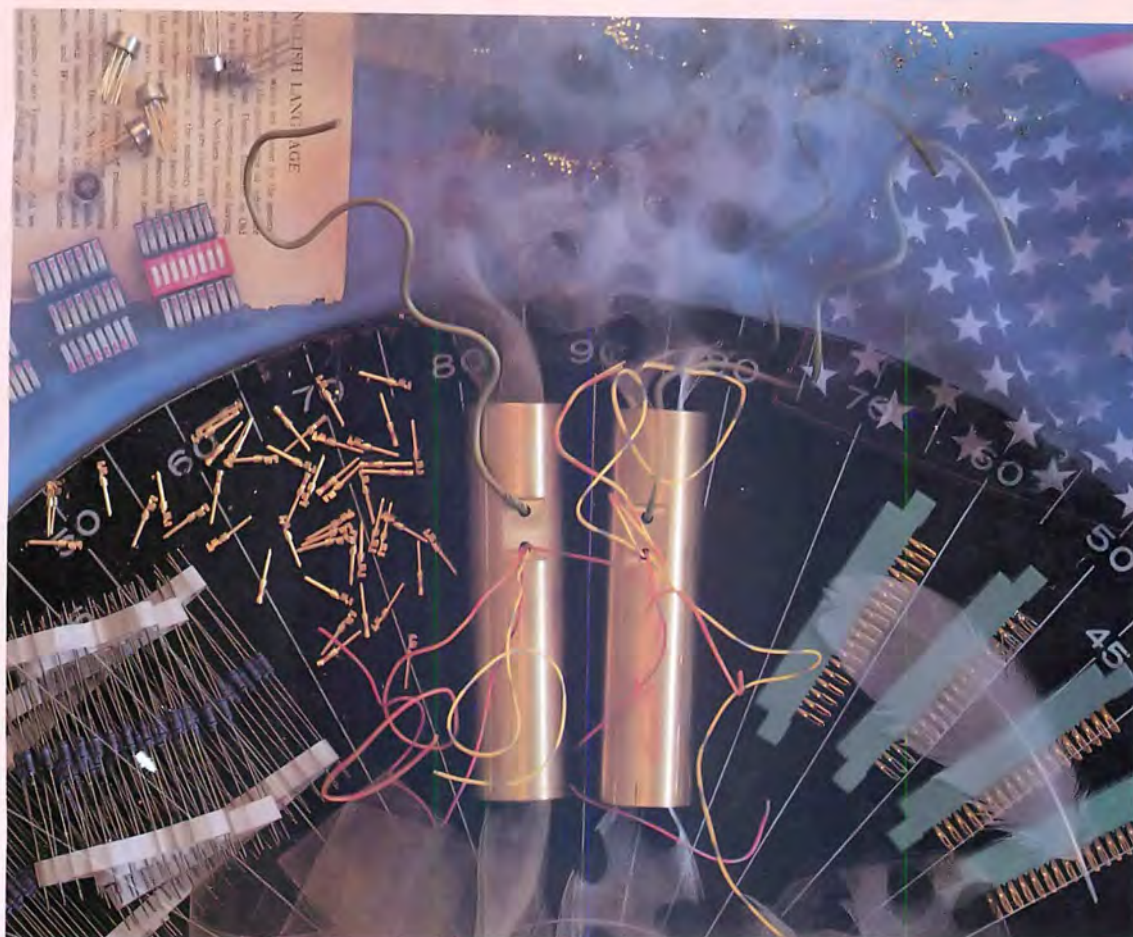
Compatible with IBM XT, AT, PS/2 Model 30, Compaq DESKPRO 386 and compatibles, including Intel 80386-based machines. PG 1600 is a registered trademark of Cornerstone Technology.



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THE VISIBLE EDGE





Like any smart shopper, you want the best system for the least amount of money.

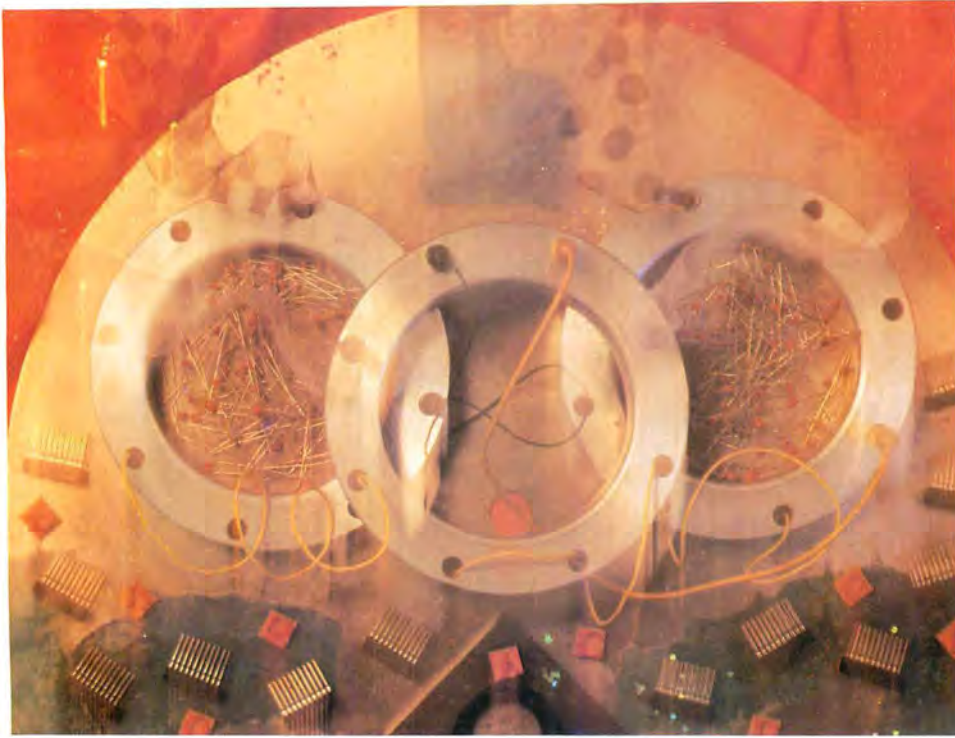
But what's a deal—and what's a disaster? Where do you buy, and how do you protect yourself?

"The Ultimate Buyers' Guide" tackles these questions and provides solid advice, comprehensive product guides, and the first critical, consumer-oriented look at the mail-order market.

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# THE ULTIMATE SYSTEM BUYERS' GUIDE



*PC World presents  
basic buying tips and  
handy directories for  
system units, hard  
disks, display  
adapters, monitors,  
and memory boards.  
Then we put it all  
together with advice  
on tailoring your  
system to specific  
computing tasks.*

**Eric Knorr**

When advising you about what hardware to buy and how to shop for it, *PC World* generally sounds sober, authoritative, and—we hate to admit it—a little stuffy. We say things like “buy from an established vendor” and “consider your needs carefully” and even the hackneyed “try before you buy.”

Sound advice, to be sure. The problem is, when friends ask us what to buy, we generally say “get the cheapest system you can lay your hands on that does what you want it to do.” With or without our counsel, an increasing number of buyers are reaching this conclusion—especially those purchasing systems for themselves rather than for their businesses.

*Photography by*  
ELISABET ZEILON



A large vendor can offer volume  
discounts and elaborate support  
that a mail-order firm can't begin to match.

"The Ultimate System Buyers' Guide" is dedicated to people who aren't afraid of a little risk if they can save some bucks in the bargain. Following this article you'll find product directories for system units, hard disks, display adapters, monitors, and memory boards—complete with feature tables, price listings, and snappy buying tips.

Following the tables, "Top-Value Systems" takes the oft-cited, commonsense approach that the software you're going to use should determine the hardware you buy. The systems suggested are optimized for word processing, data management, and spreadsheet needs. And lest you think we're ignoring your pocketbook, each system type is divided into three price ranges.

Many vendor names listed in the directories will seem familiar, while others will be new to you; needless to say, we can't vouch for the reputability of every vendor listed. The product directories simply tell you what you get and how much it costs—whether you're adding a component to an existing system or building a system from scratch. For comparative purposes, all prices listed are retail; dealer or distributor prices are often much lower.

If you're the cautious type, stick with vendors you've dealt with and feel you can trust. Likewise, you may wish to buy all your components from the same vendor to avoid being caught between two warranties. (This eliminates the risk, for instance, that a hard disk vendor will throw the responsibility

for a flaky drive on the computer vendor, or vice versa.) In the system unit directory, you'll find plenty of vendors that can satisfy your desire for one-stop shopping.

If you know what your system's primary application will be but are not sure how that affects your hardware purchase, pay a visit to "Top-Value Systems" before thumbing through the various product directories. Notice that the product directories are color coded in accordance with "Top-Value Systems" recommendations, so you can quickly narrow down the selection of components to those suitable for specific software.

Now, about the word *ultimate*. Savvy users know that a hardware guide that laid out spreadsheet-style every product from every company would be about twice as thick as the issue you hold in your hands. Thus, this guide can't pretend to be complete. Ultimately, however, it provides a solid sampling of products from all manner of manufacturers, plus enough unofficial advice to help you assemble a system you won't outgrow—no matter who you buy it from.



## The Ultimate Computer Buyers' Guide

It's a rough estimate, but computers are approximately 25 to 30 percent cheaper than they were a year ago. As usual, the mail-order clone vendors are at the vanguard of

price slashing, engaging in a furious price war that's seen more than its share of casualties.

The pros and cons of buying from these mail-order concerns—which represent the lion's share of companies in the product directories that follow—boil down to a simple argument. An enthusiast asks: If Compaq sells a computer for \$4000 and Acme Computer sells a similar unit for \$2000, why throw your money away? And the leery consumer responds: What if I get a defective unit from Acme and the warranty isn't worth the paper it's printed on?

According to "Mail Order—The Smart Buy" in this issue, surprisingly few *PC World* readers have experienced serious problems with mail-order computer vendors. That's reason for optimism, although there's no telling how those same readers will feel about their machines a couple of years from now. The best way to check out a company is to ask around, talk to customers, and keep your eye on the business press. *PC World's* *Consumer Watch* column, for example, regularly flags problem vendors.

Though hardly as plentiful, many prominent vendors also appear in the computer directory. If you're in search of multiple units for your business, buying from an industry leader often makes good sense. Along with generally superior reliability, a large vendor can also offer volume discounts and elaborate support that a mail-order firm can't begin to match.



Even if you're using your machine  
only for word processing, it's tough  
to go back to a PC once you've tried an AT compatible.

Whatever the source, a computer typically comes in a base configuration that includes a system unit (consisting of the chassis, power supply, and motherboard); a single floppy drive; a disk controller; at least 512K of RAM; and a keyboard. (Several ports, a second floppy drive, or a video board may also be included.) To help you compare prices, the Desktop Computer Directory shows the minimum configuration for all listed computers.



## Three Tiers for Performance

Both the price bracket and performance class of a computer depend on a single microprocessor, the central processing unit (CPU). MS-DOS computers generally contain one of three Intel microprocessors, distinguished from one another by the amount of data each can process in a single cycle. The first is the 8-bit 8088, the processor found in the original IBM PC. One step up is the 80286, the 16-bit processor that debuted in the IBM PC AT. At the cutting edge is the 32-bit 80386, which is currently helping PCs give low-end minicomputers a run for their money. A fourth processor, the 16-bit 8086, falls between the 8088 and 80286 in performance; although once seldom used in desktop machines, the 8086 turns up at the low end of the

Compaq Deskpro and IBM PS/2 lines.

In addition to biting off hunks of data in different sizes, each processor has its own *clock rate*. This speed, measured in megahertz (MHz), indicates the rate at which a processor completes a clock cycle—that is, how fast it can process one unit of 8-, 16-, or 32-bit data. The 8088 hit the market running at 4.77 MHz, the 80286 at 6 MHz, and the 80386 at 16 MHz. Today, 8088-based machines often have an 8-MHz speed limit, while 80286-based computers typically offer 8-, 10-, 12-, or even 16-MHz speeds. The average speed for an 80386 machine is still 16 MHz, but 20-MHz machines from Compaq, IBM, Advanced Logic Research, and others should be on the shelves by the time you read this.

The performance difference between an 8088-based PC and an 80286 machine is striking. Even if you're using your machine only for word processing, it's tough to go back to a PC once you've tried an AT compatible. Step up to an 80386 machine after using an AT, however, and you may be disappointed in the performance gain. The real advantages of the 80386 emerge—according to Microsoft, IBM, and others—with software written specially for the chip (such as *Windows/386* and *Desquiver 2.0*).

Concern about future software may substantially affect your buying decision. Microsoft's OS/2, the long-awaited multitasking operating system, promises to break the 640K limit on user memory and play host to applications that use as

much as 16MB of RAM. Be forewarned: You *must* have either an 80286 or an 80386 machine to run OS/2. (Note that OS/2 is designed primarily to unlock the potential of the 80286; although 80386 machines will benefit from OS/2, an operating system that fully exploits the 80386 is still a long way off.)

Once you've decided on a CPU, buying a computer with a high-end clock rate makes good price/performance sense. A 12-MHz 80286 clone, for example, should cost only a few hundred dollars more than its 8-MHz counterpart—and the speed increase will be significant.

If a computer runs at 8 MHz or higher, however, it may be too fast for some older software packages. That's why it's imperative to have a switchable clock, which enables you to downshift to a slower clock speed. Some computers have an external switch for setting clock speed, while most enable you to change it from the keyboard. The best allow you to change speeds without leaving (or crashing) an application.

## Room to Move

Nearly all machines have space for essential expansion boards and at least two mass storage devices. Beyond this, computers vary widely in their expansion capacity.

Two types of expansion slots have gained industrywide acceptance: the IBM PC's 8-bit slots, and the IBM AT's 8/16-bit slots. The IBM PC and XT contain five and eight 8-bit slots, respectively, while



Most users would gladly shave  
a few points off the clock rate  
in exchange for a keyboard they could love.

the AT has two 8-bit slots and six 8/16-bit ones. In most 80386 machines, you'll find two 8-bit and five 8/16-bit slots, plus at least one proprietary 32-bit slot for memory (for a discussion of 32-bit memory issues, see "Beware the Cutting Edge," *PCW*, November 1987). To complicate matters further, IBM's PS/2 line recently introduced Micro Channel slots that won't accept standard 8- or 16-bit boards.

When calculating how much room you'll need for expansion boards, consider the basics first. At the very least, you'll need one slot for the video board and one for the disk drive controller. If the motherboard won't hold enough memory for your application, you'll need another slot for a memory board. Further, an I/O board with at least one parallel and one serial port is mandatory for talking to printers and modems. And if you use a bus mouse, you'll need yet another slot—for a total of five filled slots.

As a general rule, five slots is the absolute minimum—without even considering such extras as internal modems, network boards, special printer controllers, accelerator boards, and tape drive controllers. However, some vendors now build many basic functions into the motherboard. For example, each PS/2 model—with all slots still free—has video circuitry and a floppy disk controller as well as one serial, one parallel, and one mouse port. Obviously, fewer than five slots is acceptable in such cases.

The minimum number of mass storage devices is clearer; even the lowest-priced PC clone should have

room for at least two drives. AT clones and 80386 machines can frequently handle five, but four (or even three) is usually enough.

Having enough space for these devices and properly accommodating them are two different matters. Most PC clones come with a controller that can handle two floppy drives; if you want to add a hard disk, you must buy a separate controller. An AT clone's controller can almost always handle two floppies and two hard disks, but if you want to run a fifth drive, the prospect of buying a second controller looms again.

Five drives may seem like a lot for one machine, but consider a typical AT setup. To begin with, you'll certainly want a hard disk, and a high-capacity 1.2MB floppy drive will likely be included in the base price. Some people also opt for the old-fashioned 360K drives, because you can't share 1.2MB disks with someone who has only 360K drives. (Moreover, 360K disks formatted by 1.2MB drives are sometimes impossible for 360K drives to read.) And if you accumulate more programs and data than you know what to do with, buying a second hard disk is more economical than swapping your old one for a newer, bigger drive. The fifth bay could hold an internal tape-backup device—or even a 3½-inch floppy drive.

Few people pack their systems to the gills, but if you do, you'll need a power supply that's up to the task. A fully loaded 80286 ma-

chine, for example, should have a power supply no less powerful than the IBM AT's 192-watt model. And as a rule of thumb, any machine in which you plan to install a hard disk should have a power supply with at least a 150-watt rating.

### Nice Touch

Performance and expansion are usually matters of necessity, while other factors—such as the size of the footprint or whether or not the machine has a reset button—fall in the realm of convenience and taste. Nevertheless, most users would gladly shave a few points off the clock rate in exchange for a keyboard they could love.

Which keyboard layout you prefer generally depends on what you're used to—bad news for devotees of the original IBM PC layout, which is rapidly becoming extinct. A number of name-brand vendors such as Tandy and Kaypro offer their own quirky variations, but two standards currently dominate: the original IBM PC AT layout (now abandoned by IBM) and the 101-key Enhanced layout currently used with the entire IBM line.

The enhanced keyboard has the advantage of two more function keys, separate cursor and numeric keypads, and duplicate <Ctrl> and <Alt> keys. However, many people still prefer the original AT layout, mostly because the function keys, arranged in two vertical rows at the keyboard's left edge, are easier to access than those arranged in a single row along the top, as on the enhanced keyboard.

What constitutes a good keyboard feel is just one of those per-



Once you've decided on a CPU,  
buying a computer with a high-end  
clock rate makes good price/performance sense.

sonal things; a few keyboards, however, are impossible for anyone to live with. Ailments such as space bars that rattle, nauseatingly mushy action, and a propensity to produce multiple characters can ruin your computing experience.

Of course when you buy by mail, there's no way to check out the keyboard you're going to get. If you're willing to take the trouble, ask the vendor what brand of keyboard comes with the machine and try to test an identical one at a local dealer. Otherwise, you can take what comes up in the shuffle; if you lose out, decent replacement keyboards generally cost less than \$100.

## Consider the Source

With the aid of "Top-Value Systems," suppose you decide on one of the minimally configured computers listed in the product tables. From here, you have two ways to go.

Most people buy the video board, monitor, hard disk, and memory board—in short, the rest of the system—from the same place they bought their computer. This route is clearly the safest; if something goes wrong with any component, one company is clearly responsible. Furthermore, if you're shopping by mail, components purchased with a system are likely to be cheaper than those bought separately from other companies.

If you know the market, however, you may be dissatisfied with a single company's selection of components. And if you buy a name-brand computer, you can often

drastically reduce the price of the total system by buying components elsewhere. With a bare-bones computer as the foundation, you can use the product directories for hard disks, video boards, monitors, and memory boards to assemble a full-fledged system.



## The Ultimate Hard Disk Buyers' Guide

Hard disk storage is like money: The more you have, the more you use. Two years ago a 10MB hard disk was considered big enough for the greediest user. Today, many people find 20MB hard disks confining and are turning to 40MB drives.

As "Top-Value Systems" makes clear, how much elbowroom you need depends (like almost everything else) on your application—but it also depends on your working style. If you compulsively collect software that augments your main application, you'll obviously need more megabytes than "Top-Value Systems" recommends. And if you frequently access historical data, even more capacity is in order.

The biggest drive that DOS—and OS/2—can handle is 32MB. Larger drives must be partitioned into virtual drives (C:, D:, E:, and so on) using DOS's FDISK or one of the many similar utilities bundled with large drives. Some drive manufacturers also include utilities that sidestep DOS, enabling the operat-

ing system to handle drives much larger than 32MB. Compaq DOS 3.30 also breaks this barrier, expanding the possible drive size to 512MB.

As drive capacity increases, so does performance. Today's average hard disk is about three times faster than the original XT's. Unfortunately, determining the performance of a hard disk from specs (without actually testing the drive) is as difficult as it ever was.

Average access time—the average time a drive's read/write head takes to access any track on the platter—is often treated as the key to determining a drive's efficiency. While average access time gives you a ballpark idea of a drive's speed, the number of heads, the controller's performance and interleave capabilities, disk-caching schemes, and numerous other factors contribute to hard disk performance.

The interleave factor, which refers to the way data is stored on disk, is crucial. When the interleave factor is 1:1, data is stored contiguously. If the interleave factor is 2:1, however, the read/write head skips every other sector and thus requires two turns of the disk to read an entire track. The original XT's hard disk has an interleave factor of 6:1, while the AT's comes in at 3:1.

Although reducing the interleave factor increases the data transfer rate to and from the hard disk, it doesn't always improve the overall performance of a system. If a system has a slow CPU, a hard disk with a low interleave may bring a sector under the read/write head before the CPU is ready to read it.



Although reducing the interleave factor increases the data transfer rate to and from the hard disk, it doesn't always improve the overall performance of a system.

In such a case, the CPU must wait for another entire turn of the disk to read the sector—resulting in more time lost than with even the highest interleave. This CPU/interleave mismatch also frequently leads to system crashes.

Regardless of the interleave factor, disk caching generally speeds throughput, simply because accessing RAM takes less time than reading a disk. Caching algorithms ensure that the most frequently accessed data stays in an area of memory (usually extended) and that the CPU looks in RAM before trying the hard disk.

Disk caching works best when you access the same data frequently. If the cache continuously holds an index for a data base, for example, the CPU can find the index pointer in RAM and go directly to a record instead of repeatedly reading the index from disk. In anticipation of the next request, the cache may also hold records nearest to the one being retrieved. When access is less predictable, caching won't work as well; in processing-intensive tasks such as a spreadsheet recalculation, having the CPU look in the cache first may actually slow down your system.

The data transfer rate of a controller also substantially affects performance. Over 90 percent of all controllers for MS-DOS computers (including the XT and the AT) are of the ST506 variety and have a data transfer rate of 5 megabits per second. These controllers are divided into XT- and AT-type devices: XT controllers use 8-bit slots, while AT controllers use 8/16-bit slots. You can't match an AT controller with an XT hard

disk (or vice versa), but otherwise any ST506 controller should work with any ST506 drive. (A recent upgrade of the ST506 standard—dubbed ST412—enables a controller to handle more read/write heads and is completely compatible with ST506.)

To increase hard disk performance and capacity, some manufacturers apply RLL (run length limited) techniques to ST506 and other controllers. An RLL controller uses a special encoding scheme to pack up to twice as much data in the same amount of physical disk space. Although the encoding and decoding circuitry raises the price of the controller, it can drastically lower the drive's cost per megabyte. And with twice the data per track, you can obtain nearly twice the data transfer rate.

In addition to ST506, two other industry standards prevail: ESDI (extended small device interface) and SCSI (small computer systems interface). These designations refer to both the controller and the circuitry on the drive itself; a given type of drive works only with the corresponding type of controller. Both ESDI and SCSI yield approximately double the data transfer rate of ST506.

SCSI (pronounced "scuzzy") drives offer special advantages. Strictly speaking, SCSI drives don't use a controller; the controller circuitry is built into the drive itself. The board that you slip into a slot is actually a universal interface card that can handle a number of different devices. Thus, various devices that adopt the SCSI standard can hook up to a single SCSI inter-

face—a one-size-fits-all strategy bound to reduce the number of boards in your system.

No matter how many bells and whistles it has, a fast drive that fails is always less efficient than a slow, dependable one. The MTBF (mean time between failure) rating, although supplied by the manufacturer, provides a rough gauge of reliability. And to guard against head crashes, machines that get moved around a lot benefit from automatic head parking, which removes the head safely from the platter whenever the hard disk is not operating.

Perhaps your best insurance when selecting a hard disk is nitty-gritty technical advice from computer and hard disk manufacturers. Sometimes, the BIOS on a controller board is incompatible with a computer's BIOS; the only way to avoid this is to get a complete run-down of compatibility caveats from both vendors. Likewise, technical support people should be able to advise you about interleave factors and matching the right drive with the right CPU and power supply. Choosing an internal hard drive isn't a casual chore, but careful shopping may net you a whale of a deal.

*Compatibility between hard disks and computers is a thorny issue. Many hard disks will work only in IBM machines and—at best—a handful of others. If you choose to buy your hard disk from a vendor other than the one that sold you your computer, make sure you get a statement from the hard disk vendor about the compatibility between the specific hard disk model you want to buy and your*



Even if the PS/2s leave you cold,  
it's probably worth investing  
in a VGA-compatible board for a standard bus.

computer. A 30-day return policy is your best protection if compatibility assurances prove false.



## The Ultimate Video Buyers' Guide

Wrestling with video hardware incompatibilities has always been one of the toughest parts of assembling a system. However, two recent de-

velopments make selecting the right equipment easier: multimode video boards and multiscan monitors. The former offer broad software (and multiple-monitor) compatibility, while you can usually drive the latter with any standard video board.

The payoffs from versatile hardware are sometimes impossible to anticipate. For example, outside of IBM's new line of analog monitors, only multiscans are compatible with the PS/2 Multi-Color Graphics Array (MCGA) and Video

Graphics Array (VGA) (see "Magical Multiscan Tour," PCW, September 1987). Until the introduction of the PS/2 line, PCs used digital monitors almost exclusively; the few manufacturers that built analog capabilities into their multiscans (probably anticipating the demand for more colors, which analog monitors are better equipped to meet) showed remarkable foresight.

Naturally, an adaptable display is most useful in environments where you need to mix and match hardware. In some cases—especially

(continues on page 221)

### Common Video Modes at a Glance

	CHARACTER BOX (dots)	GRAPHICS RESOLUTION (pixels)	SIMULTANEOUS COLORS	PALETTE	MONITORS*
MDA	9 × 14	n/a	n/a	n/a	monochrome
HGC	9 × 14	720 × 348	n/a	n/a	monochrome
CGA					
medium resolution	8 × 8	320 × 200	4	16	color, enhanced color
high resolution	8 × 8	640 × 200	2	2	color, enhanced color
EGA					
medium resolution	8 × 8	320 × 200	4	16	color, enhanced color
high resolution	8 × 8	640 × 200	2	2	color, enhanced color
enhanced	8 × 14	640 × 350	16	64	enhanced color
	9 × 14	640 × 350	n/a	n/a	monochrome
VGA					
mode 1	8 × 8	320 × 200	256	256,000	PS/2
mode 2	8 × 16	640 × 480	16	64	PS/2

\* All multiscan monitors are compatible with the MDA, CGA, and EGA. A few are incompatible with the HGC; fewer still lack the analog capabilities for VGA compatibility.



PC WORLD

ULTIMATE SYSTEM  
BUYERS' GUIDE



PRODUCT  
DIRECTORY



# Desktop Computer Directory

Manufacturer	Product	CPU	Clock rate (MHz)	Expansion slots		
				8 bit	16 bit	32 bit
Acer 401 Charcot Ave. San Jose, CA 95131 408/773-8400	Acer 1710	8088	4.77/10	4		
	Acer 900	80286	6/10	2	6	
	Acer 1910	80286	6/10	2	4	
Adtek 3706 Realty Rd. Dallas, TX 75381 214/241-5811	Adtek XT	8088	4.77/8	6		
	Adtek AT	80286	6/8 and 10	8		
	Adtek 386	80386	16	2	4	2
Advanced Logic Research 10 Chrysler Ave. Irvine, CA 92718 714/581-6770	PC/8MHz	8088	4.77/8	8		
	Dart	80286	8/10	2	6	
	386/2	80386	16	2	4	2
Afton Computer 17781 Mitchell St. Irvine, CA 92714 714/553-1611	Western XT Turbo	8088	4.77/8	8		
	Western 286 Turbo	80286	8/10	2	6	
	Western 386 Advantage 1	80386	16	2	5	1
Alphanumeric International 13360 E. Firestone, Ste. F Santa Fe Springs, CA 90670 213/921-8689	ANI PC-2	8088	4.77/8	8		
	ANI AT-12	80286	12	2	6	
	ANI AT-16	80286	16	2	6	
	ANI 386	80386	16	2	6	
American Micro Technology 14751-B Franklin Ave. Tustin, CA 92680 714/731-6800	AMT Junior	8088	4.77/8	8		
	AMT 286	80286	6/10	2	6	
	AMT 386	80386	6/16	2	4	2
American Mitac 410 E. Plumeria Dr. San Jose, CA 95134 408/432-1160	Paragon 88	8088	4.77/8	5		
	Paragon 286S	80286	6/10	1	4	
	Paragon 286	80286	8/12	1	4	
	Paragon 386	80386	16	1	4	
AST Research 2121 Alton Ave. Irvine, CA 92714-4922 714/863-1480	Premium 286	80286	6/8/10	1	6	
AT&T 4513 Western Ave. Lisle, IL 60532 312/971-6000	6300	8086	8	7		
	6312	80286	12	3	4	
	6386 Workgroup System	80386	16		4	3
Beltron Computer 10501 Decatur Rd. Philadelphia, PA 19154 215/824-3100	Beltron 286	80286	10	2	6	
	Beltron 386	80386	16		6	2
Blue Chip Electronics 7305 W. Boston St. Chandler, AZ 85226 602/961-1485	PC Popular	8088	4.77/8	5		
	Blue Chip AT	80286	12	3	16	
	Blue Chip 286	80286	6/8/10	3	16	
Club AT 3401 W. Warren Ave. Fremont, CA 94539 415/490-2201	Club XT Turbo	8088	4.77/8	6	2	
	Club 286	80286	8/10	8	6	
	Club 286-12	80286	12	4	4	
	Club 386	80386	16	2	6	
Compaq Computer 20555 RM 149 Houston, TX 77070 713/370-0670	Deskpro 286 Model One	80286	12	1	5	
	Deskpro 286 Model 40	80286	12	1	5	
	Deskpro 286 Model 20	80286	12	1	5	
	Deskpro 386 Model 40	80386	16	3	8	
	Deskpro 386/20 Model 60	80386	20	1	8	

<sup>1</sup> built into motherboard

<sup>2</sup> includes monochrome monitor

<sup>3</sup> includes EGA monitor

<sup>4</sup> includes 40MB hard disk



Disk drive(s)	RAM included	Maximum RAM on motherboard	Keyboard	Ports		Coprocessor socket	Reset switch	Graphics board included	Half-height device capacity	Power supply (watts)	Warranty		List price
				Serial	Parallel						Parts	Labor	
360K	768K	768K	PC	1	1 <sup>1</sup>	8087	•	•	2	85	1 year	1 year	\$965
1.2MB	512K	512K	PC <sup>7</sup>	2	1 <sup>1</sup>	80287	•	•	5	196	1 year	1 year	\$2095
1.2MB	512K	512K	PC	2	1 <sup>1</sup>	80287	•	•	3	135	1 year	1 year	\$1745
360K	512K	1MB	PC	2 <sup>1</sup>	1 <sup>1</sup>	8087	•	•	4	150	1 year	1 year	\$798
1.2MB	640K	1MB	AT	0	0	80287	•	•	4	192	1 year	1 year	\$1249
1.2MB	512K	512K	AT	1 <sup>1</sup>	1 <sup>1</sup>	80387	•	•	4	220	1 year	1 year	\$3495
360K	640K	640K	101	1	1	8087	•	•	4	135	1 year	1 year	\$795 <sup>2</sup>
1.2MB	512K	512K	101	2	1	80287	•	•	4	195	1 year	1 year	\$1595
1.2MB	1MB	1MB	101	1	1	80287/387	•	•	5	195	1 year	1 year	\$1990
2/360K	640K	640K	AT	1 <sup>1</sup>	1 <sup>1</sup>	8087	•	•	4	150	1 year	1 year	\$875
1.2MB	512K	1MB	AT	1	1	80287	•	•	5	200	1 year	1 year	\$1275
1.2MB	1MB	10MB	AT	0	0	80287/387	•	•	5	200	1 year	1 year	\$2495
2/360K	640K	640K	PC	1	1	8087	•	•	4	150	1 year	1 year	\$599
1.2MB	640K	1MB	AT	1 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	4	200	1 year	1 year	\$1199
1.2MB	640K	1MB	AT	1 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	4	200	1 year	1 year	\$1699
1.2MB	1MB	4MB	AT	1 <sup>1</sup>	1 <sup>1</sup>	80387	•	•	4	200	1 year	1 year	\$2395
360K	640K	640K	AT	0	0	8087	•	•	4	135	90 days	1 year	\$499
1.2MB	640K	1MB	101	0	0	80287	•	•	5	192	90 days	1 year	\$999
1.2MB	2MB	4MB	101	2	1	80287/387	•	•	5	192	90 days	1 year	\$2399
2/360K	768K	768K	AT	1 <sup>1</sup>	1 <sup>1</sup>	8087	•	• <sup>1</sup>	2	145	1 year	1 year	\$1195 <sup>3,4</sup>
1.2MB	640K	1MB	101	1 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	2	145	1 year	1 year	\$2495 <sup>2,4</sup>
1.2MB	1MB	4MB	101	2 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	2	145	1 year	1 year	\$3395
1.2, 1.44MB	2MB	8MB	101	2 <sup>1</sup>	1 <sup>1</sup>	80387	•	•	2	145	1 year	1 year	\$4895 <sup>3,4</sup>
1.2MB	512K	1MB	101	1 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	4	192	1 year	1 year	\$1995
360K	640K	640K	PC	1	1	8087	•	•	2	150	1 year	1 year	\$1485
360K	1MB	1MB	AT	1	1	80287	•	•	3	210	1 year	1 year	\$2895
1.2MB	1MB	1MB	AT	1	1	80387	•	•	4	230	1 year	1 year	\$4899
1.2MB	1MB	1MB	AT	1	1	80287	•	•	3	195	1 year	1 year	\$1595 <sup>2</sup>
1.2MB	1MB	1MB	AT	1 <sup>1</sup>	1 <sup>1</sup>	80387	•	•	2	200	1 year	1 year	\$2995 <sup>2</sup>
360K	512K	640K	PC	1	1	80287	•	•	2	130	1 year	1 year	\$599
1.2MB	1MB	2MB	101	1 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	3	190	1 year	1 year	\$1799
1.2MB	640K	2MB	AT	2 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	3	190	1 year	1 year	\$1499
360K	256K	256K	AT	0	0	8086/8088	•	•	5	135	1 year	6 months	\$460
1.2MB	512K	512K	AT	0	0	80287	•	•	5	195	1 year	6 months	\$995
1.2MB	1MB	1MB	AT	0	0	80287	•	•	3	195	1 year	6 months	\$1495
1.2MB	1MB	1MB	AT	0	0	80287	•	•	5	195	1 year	6 months	\$2100
1.2MB	256K	2.1MB	101	1	1	80287	•	•	4	192	1 year	1 year	\$2999
1.2MB	640K	2.1MB	101	1	1	80287	•	•	4	192	1 year	1 year	\$4999 <sup>4</sup>
1.2MB	640K	2.1MB	101	1	1	80287	•	•	4	192	1 year	1 year	\$3999 <sup>5</sup>
1.2MB	1MB	10MB	101	1	1	80387	•	•	4	192	1 year	1 year	\$6499 <sup>4</sup>
1.2MB	1MB	16MB	101	1	1	80387	•	•	4	192	1 year	1 year	\$7499 <sup>6</sup>

<sup>5</sup> includes 20MB hard disk

<sup>6</sup> includes 60MB hard disk

<sup>7</sup> special configuration



# Desktop Computer Directory

Manufacturer	Product	CPU	Clock rate (MHz)	Expansion slots		
				8 bit	16 bit	32 bit
Computer Classifieds 17830 N.E. 5th Ave. Miami, FL 33162 305/651-5853	CCI XT/88	8088	4.77/8	8		
	CCI ST/286	80286	6/10	2	6	
	CCI ST/286 12	80286	12	2	6	
Computer Products United 1254 E. Colorado Pasadena, CA 91106 818/338-5959	CPU 286/10	80286	10	8		
	CPU 286/12	80286	12	8		
	CPU 386	80386	20	8		
ComputerLand 2901 Peralta Oaks Ct. Oakland, CA 94605 415/546-1592	BC 88	8088	4.77/8	8		
	BC 286	80286	6/8	8		
Cordata 275 Hillcrest Dr. Thousand Oaks, CA 91360 805/375-1500	WPC CS40	8088	8	4		
	ATD-8-Q	80286	8	5		
	ATD-8-QII	80286	8	5		
	CS 4210 Slimline 286	80286	8	4		
Datamaxx USA 1815 S. Gadsden St. Tallahassee, FL 32301 904/224-8213	Exxpert III Model 710	8088	4.77/10	4		
	Exxpert III Model 900	80286	6/10	2	6	
	Exxpert III Model 910	80286	6/10	2	4	
	Exxpert III Model 1100	80386	16	2	5	1
Dynatech 3081 N. 1st St. San Jose, CA 95134 408/943-0155	Dynaturbo XT	8088	8	8		
	Dynaturbo 286	80286	10	2	6	
	Dyna 386	80386	16 or 20	4	4	
Epson America 2780 Lomita Blvd. Torrance, CA 90505 213/539-9140	Equity I+	8088	4.77/10	5		
	Equity II+	80286	8/10	3	3	
	Equity III+	80286	6/8/12	2	7	
Fivestar Electronics 12900 Valley Branch #400 Dallas, TX 75234 214/733-4100	Fivestar XL	NEC V20	4.77/8	6	2	
	FS 286	80286	6/10	4	8	
	Fivestar 286/10	80286	6/10	2	6	
Hewlett-Packard 1820 Embarcadero Rd. Palo Alto, CA 94303 408/720-3882	HP Vectra CS	NEC V30	7.16	7		
	Vectra ES	80286	8	2	5	
	Vectra ES 12	80286	12	2	5	
Ibi Systems 6842 N.W. 20th Ave. Ft. Lauderdale, FL 33309 305/978-9225	FX 100T	8088	4.77/8	8		
	FX 100ET	8088	10	8		
	XT 100	80286	6/10	2	6	
IBM 900 King St. Rye Brook, NY 10573 914/934-4822	PS/2 Model 30	8086	8	3		
	PS/2 Model 50	80286	10		3	
	PS/2 Model 60	80286	10		7	
	PS/2 Model 80	80386	16		5	3
Ivy Microcomputer 15 Ararat St. Worcester, MA 01606 617/853-6914	DT-10	8088	10	8		
	DT-20	80286	10	2	6	
	Ivy 3 386	80386	16	2	5	1

<sup>1</sup> built into motherboard

<sup>2</sup> includes monochrome monitor

<sup>3</sup> includes EGA monitor

<sup>4</sup> includes 40MB hard disk



Disk drive(s)	RAM included			Maximum RAM on motherboard	Keyboard	Ports		Coprocesor socket	Reset switch	Graphics board included	Half-height device capacity	Power supply (watts)	Warranty		List price
	Serial	Parallel	Parts			Labor									
360K	640K	640K	101	0	1	8087		•	•	4	150	1 year	1 year	\$995 <sup>2,5</sup>	
1.2MB	1MB	1MB	101	0	1	80287		•	•	2	200	1 year	1 year	\$1595 <sup>2,5</sup>	
1.2MB	1MB	1MB	101	0	1	80287		•	•	2	200	1 year	1 year	\$1795 <sup>2,5</sup>	
1.2MB	1MB	4MB	101	2	1	80287		•	•	2	200	18 months	18 months	\$895	
1.2MB	1MB	4MB	101	2	1	80287		•	•	2	200	18 months	18 months	\$995	
1.2MB	1MB	16MB	101	2	1	80287		•	•	2	200	18 months	18 months	\$2995	
none	256K	640K	AT	1	1	8087		•		4	155	90 days	90 days	\$1495	
none	512K	640K	AT	2	1	80287		•		4	155	90 days	90 days	\$2895	
2/360K	512K	768K	AT	0	1	8087		•	•	2	130	1 year	1 year	\$1095	
1.2MB	640K	768K	AT	1	1	80287		•	•	4	130	1 year	1 year	\$1895	
1.2MB	640K	768K	none	1	1	80287		•		4	130	1 year	1 year	\$1795	
2/360K	640K	640K	AT	1	1	80287		•		2	130	1 year	1 year	\$1380	
2/360K	640K	768K	AT	1	1	8087		•	• <sup>1</sup>	3	85	1 year	1 year	\$895	
1.2MB	640K	1MB	AT	2	1	80287		•	• <sup>1</sup>	5	135	1 year	1 year	\$2795	
1.2MB	640K	1MB	AT	2	1	80287		•	• <sup>1</sup>	4	135	1 year	1 year	\$2095	
1.2MB	1MB	1MB	AT	2	1	80387		•	• <sup>1</sup>	5	196	1 year	1 year	\$4595	
360K	640K	640K	AT	1	2	8087			•	4	150	1 year	1 year	\$545	
1.2MB	1MB	1MB	101	1	2	80287		•	•	5	150	1 year	1 year	\$1085	
1.2MB	2MB	2MB	101	1	2	80287		•	•	4	150	1 year	1 year	\$2395	
360K	640K	640K	101	1	1	8087		•		2	80	1 year	1 year	\$1095	
1.2MB	640K	640K	101	1	1	80287		•		3	110	1 year	1 year	\$1595	
1.2MB	640K	15.5MB	101	1	1	80287		•		5	192	1 year	1 year	\$2295	
360K	640K	640K	101	0	0	8087				4	150	1 year	1 year	\$599	
1.2MB	640K	640K	101	0	0	80286				4	230	1 year	1 year	\$1095	
1.2MB	640K	640K	101	1	1 <sup>1</sup>	80286				5	200	1 year	1 year	\$995	
360K	640K	640K	101	1	1	8087				3	134	1 year	1 year	\$1195	
1.2MB	640K	640K	101	1	1	80287				3	134	1 year	1 year	\$2595	
1.2MB	640K	640K	101	1	1	80287				3	134	1 year	1 year	\$2995	
360K	640K	640K	AT	0	1	8087		•	•	4	150	6 months	6 months	\$559 <sup>2</sup>	
360K	640K	640K	AT	0	1	8087		•	•	4	150	6 months	6 months	\$559 <sup>2</sup>	
1.2MB	1MB	1MB	AT	0	1	80287		•	•	3	200	1 year	1 year	\$1100 <sup>2</sup>	
720K	640K	640K	101	1	1 <sup>1</sup>	8087			• <sup>1</sup>	2		1 year	1 year	\$1695	
1.44MB	1MB	1MB	101	1	1 <sup>1</sup>	80287			• <sup>1</sup>	2	94	1 year	1 year	\$3595	
1.44MB	1MB	2MB	101	1	1 <sup>1</sup>	80287			• <sup>1</sup>	2	207	1 year	1 year	\$5295	
1.44MB	1MB	4MB	101	1	1 <sup>1</sup>	80387			• <sup>1</sup>	2	207	1 year	1 year	\$6995	
360K	640K	640K	AT	2	1	8087			•	4	150	1 year	1 year	\$595	
1.2MB	640K	640K	101	1	2	80287			•	4	200	1 year	1 year	\$1695	
1.2MB	1MB	1MB	101	1	2	80287			•	4	200	1 year	1 year	\$1995	

<sup>5</sup> includes 20MB hard disk

<sup>6</sup> includes 60MB hard disk

<sup>7</sup> special configuration



# Desktop Computer Directory

Manufacturer	Product	CPU	Clock rate (MHz)	Expansion slots		
				8 bit	16 bit	32 bit
Kaypro 533 Stephens Ave. Solano Beach, CA 92075 619/481-3900	Kaypro PC	NEC V20	4.77/10	7	2	
	Kaypro EXP	NEC V20	4.77/8	7	2	
	Kaypro 286-i-A	80286	10	2	6	
	Kaypro 386 A	80386	16	2	4	2
Micro 1 557 Howard St. San Francisco, CA 94105 415/974-5439	Micro Smart Turbo	8088	4.77/10	8		
	Micro 1 Power 286	80286	8/10	6	6	
	Power 386	80386	16/20	2	6	
NCR 1610 S. Main St. Dayton, OH 45479 513/445-2078	NCR PC 6	8088	4.77/8	8		
	NCR PC 810	80286	6/10	2	2	
	PC 710	80286	6/10		2	
Osicom Technologies 198 Green Pond Rd. Rockaway, NJ 07866 201/586-2550	Osicom Turbo 88	8088	4.77/8	8		
	Osicom AT	80286	6/10	2	6	
	Osicom 386	80386	6.8/16	2	4	2
Packard Bell Electronics 21800 Oxnard Blvd. Woodland Hills, CA 91367 800/521-7979	VX88	NEC V40	5.55/8	4		
	PB 286-12	80286	6/8/12	3	5	
	PB Exec-286	80286	10		2	
	PB 386-S20	80386	20	3	5	
PC Designs 2500 N. Hemlock Cir. Broken Arrow, OK 74012 918/251-5550	Plain Vanilla	8088	4.77/7.6	6		
	GV-286-100	80286	6	2	6	
	GV-286-120	80286	6	2	6	
	GV-386	80386	8/16	2	6	
Proteus Technology 377 Route 17 S, Airport 17 Ctr. Hasbrouck Hts., NJ 07604 201/288-8629	Proteus 286 e	80286	10	2	6	
	Proteus 386 a	80386	20	2	6	
	Proteus 286 f	80886	8/10	2	6	
Tandy 1800 One Tandy Center Fort Worth, TX 76102 817/390-3700	Tandy 1000 TX	80286	4/8	5		
	Tandy 3000 HL	80286	4/8	4	3	
	Tandy 3000	80286	6/12	2	7	
	Tandy 4000	80386	16	2	6	1
Tandon Computer 405 Science Dr. Moorpark, CA 93021 805/523-0340	PCX 2	8088	4.77	7		
	Pac 286	80286	8/10.77	1	4	
	PCA 1	80286	8/10.77	2	6	
	Targa	80286	8/10.77	1	4	
TeleVideo Systems P.O. Box 3568 Sunnyvale, CA 94088-3568 408/745-7760	Telecat Model 1	80286	8/6	1	4	
Victor Technologies 395 Phoenixville Pike Milburn, PA 19355 408/438-6680	VPC III 286	80286	6		5	
Zenith Data Systems 1000 Milwaukee Ave. Glenview, IL 60025 800/842-9000	Eazy PC	NEC V40	7/16	1		
	Z-159	8088	4.77/8		4	
	Z-248	80286	8		4	
	Z-386	80286	8		2	

<sup>1</sup> built into motherboard

<sup>2</sup> includes monochrome monitor

<sup>3</sup> includes EGA monitor

<sup>4</sup> includes 40MB hard disk



Disk drive(s)	RAM included			Maximum RAM on motherboard			Keyboard	Ports		Coprocesor socket	Reset switch	Graphics board included	Half-height device capacity	Power supply (watts)	Warranty		List price
				Serial	Parallel	Parts		Labor									
360K	768K	none	101	0	0	8088	•	•	4	160	1 year	1 year	\$1595 <sup>2</sup>				
360K	256K	768K	PC	0	1	8087	•	•	4	132	90 days	90 days	\$1195 <sup>2</sup>				
1.2MB	640K	640K	101	0	0	80287			4	217	1 year	1 year	\$1995				
1.2MB	512K	512K	101	1	2 <sup>1</sup>	80387			5	217	1 year	1 year	\$3995				
360K	640K	640K	AT	0	1	8087	•	•	4	150	1 year	1 year	\$715				
1.2MB	640K	640K	AT	0	1	80287	•	•	6	238	1 year	1 year	\$1838 <sup>2</sup>				
1.2MB	1MB	1MB	AT	0	1	80387	•	•	5	220	1 year	1 year	\$2820 <sup>2</sup>				
360K	256K	256K	PC	1 <sup>1</sup>	1	8087			4	115/230	1 year	1 year	\$1775				
1.2MB	640K	640K	101	1 <sup>1</sup>	1	80287			5	220	1 year	1 year	\$2950				
720K	640K	640K	101	1 <sup>1</sup>	1	80287		•	2	75	1 year	1 year	\$1954				
360K	640K	640K	PC	0	0	8087		•	1	150	1 year	1 year	\$609				
1.2MB	1MB	1MB	101			80287		•	3	150	1 year	1 year	\$1295				
1.2MB	512K	512K	101	1	1	80287		•	2	150	1 year	1 year	\$3690				
360K	640K	640K	AT	1	1	8087	•	•	2	150/230	1 year	1 year	\$999				
1.2MB	640K	640K	101	1	1	80287	•		5	150/230	1 year	1 year	\$2795				
1.2MB	1MB	1MB	PC	1	1	80287	•	•	2	150/230	1 year	1 year	\$2695				
1.2MB	1MB	1MB	101	1	1	80387	•		5	150/230	1 year	1 year	\$4799				
360K	640K	640K	AT	2	2	8087		•	4	145	1 year	1 year	\$910				
1.2MB	1MB	1MB	101	2	1	80287	•		5	145	1 year	1 year	\$1425				
1.2MB	1MB	1MB	101	2	1	80287	•		5	145	1 year	1 year	\$1950				
1.2MB	1MB	1MB	101	2	1	80287	•		5	145	1 year	1 year	\$2425				
512K	1MB	1MB	PC	2	1	80287	•	•	5	230	15 months	15 months	\$1095				
1.2MB	1MB	1MB	101	2	1	80387	•	•	5	230	15 months	15 months	\$2495				
1.2MB	1MB	1MB	PC	2	1	80287	•		5	230	15 months	15 months	\$1295				
720K	640K	640K	AT <sup>7</sup>	1 <sup>1</sup>	1 <sup>1</sup>	80287	•	•	2	67	90 days	90 days	\$1199				
360K	512K	512K	101	0	1 <sup>1</sup>	80287	•		3	135	90 days	90 days	\$1499				
1.2MB	640K	640K	101	1	1	80287	•		3	192	90 days	90 days	\$1999				
1.44MB	1MB	1MB	101	1	1	80287	•		3	192	90 days	90 days	\$2599				
360K	256K	256K	101	0	1	8087		•	4	192	1 year	1 year	\$899				
1.2MB	1MB	1MB	101	1	1	80287	•		2	192	1 year	1 year	\$2148				
1.2MB	1MB	1MB	101	1	1	80287			4	192	1 year	1 year	\$1899				
1.2MB	1MB	1MB	101	1	1	80287	•		3	192	1 year	1 year	\$1999				
1.2MB	512K	512K	AT	1 <sup>1</sup>	1 <sup>1</sup>	80287		•	3	140	90 days	90 days	\$2395				
1.2MB	640K	640K	101	1	1	80287			1	230	1 year	1 year	\$1695				
720K	512K	512K	AT	0	1	none	•	•	2	150	1 year	1 year	\$999				
360K	640K	640K	AT	1	1	8087	•	•	2	150	1 year	1 year	\$1599				
1.2MB	512K	512K	AT	1	1	80287	•	•	4	150	1 year	1 year	\$2999				
1.44MB	512K	512K	101	1	1	80287	•	•	2	150	1 year	1 year	\$2399				

<sup>5</sup> includes 20MB hard disk

<sup>6</sup> includes 60MB hard disk

<sup>7</sup> special configuration



# Internal Hard Disk Directory

Manufacturer	Product	Interface	Formatted capacity (MB)	Average access time (ms)	Drive size	Mean time between failures (hours)	Auto head parking	List price <sup>1</sup>
Century Data/CAST 2055 Gateway Pl. San Jose, CA 95110 408/224-8030	CAST 10304	ESDI/SCSI	75	28	half	30,000	•	\$850 <sup>1</sup>
	CAST 10305	ESDI/SCSI	95	28	half	30,000	•	\$950 <sup>1</sup>
	CAST 14404	ESDI/SCSI	114	25	half	30,000	•	\$1225
	CAST 14405	ESDI/SCSI	140	25	half	30,000	•	\$1495
	CAST 14406	ESDI/SCSI	170	25	half	30,000	•	\$1795
	CAST 24509	ESDI/SCSI	258	18	full	35,000	•	\$2635
	CAST 24611	ESDI/SCSI	315	18	full	35,000	•	\$3250
	CAST 24713	ESDI/SCSI	372	18	full	35,000	•	\$3800
Control Data OEM Product Sales P.O. Box O Minneapolis, MN 55440 612/853-8100	Wren II 94155-48	ST506	40.2	28	full	30,000	•	\$975
	Wren II 94205-51	ST506	43	28	half	30,000	•	\$925
	Wren II 94155-57	ST506	48.3	28	full	30,000	•	\$1025
	Wren II 94155-67	ST506	56.3	28	full	30,000	•	\$1065
	Wren II 94155-85	ST506	71.3	28	full	30,000	•	\$1180
	Wren II 94155-86	ST506	72.5	28	full	30,000	•	\$1180
	Wren II 94156-86	ESDI	72.5	28	full	30,000	•	\$1180
	Wren III 94161-86	SCSI	86	16.5	full	30,000	•	\$1745
	Wren III 94166-101	ESDI	86	16.5	full	30,000	•	\$1645
	Wren III 94211-91	SCSI	91	18	half	30,000	•	\$1565
	Wren III 94216-106	ESDI	91	18	half	30,000	•	\$1465
	Wren III 94161-121	SCSI	121	16.5	full	30,000	•	\$1895
	Wren III 94166-141	ESDI	121	16.5	full	30,000	•	\$1795
	Wren III 94166-182	ESDI	155	16.5	full	30,000	•	\$1945
	Wren IV 94171-300	SCSI	300	16.5	full	30,000	•	\$2470
Core Int'l 7171 N. Federal Hwy. Boca Raton, FL 33431 305/997-6055	AT32	ST506	31.9	21	full	51,000	•	\$1295
	AT43	ST506	40.2	26	full	51,000	•	\$1395
	AT40F	ESDI	40.4	10	full	51,000	•	\$2995
	AT72	ST506	72.3	26	full	51,000	•	\$1995
	HC90	ESDI	90	17	half	51,000	•	\$2995
	AT150	ESDI	156.1	16	full	51,000	•	\$4495
	AT310	ESDI	311	25	full	51,000	•	\$5495
Fuji Electric Corp. of America 2000 Wyatt Dr. Santa Clara, CA 95054 408/986-1700	FK309-26	ST506	20.1	65	half	20,000	2	
	FK305-39	ST506	30.2	65	half	20,000	2	
	FK308S-39R	SCSI	30.2	65	half	20,000	2	
	FK309-39R	ST506	30.2	65	half	20,000	2	
	FK303-52	ST506	40.3	40	half	20,000	2	
	FK309S-50R	SCSI	41.5	40	half	20,000	2	
	FK305-58R	ST506	45.3	65	half	20,000	2	
	FK308S-58R	SCSI	45.3	65	half	20,000	2	
	FK303-76R	ST506	60	40	half	20,000	2	
JCT 8550 New Hope Rd. Grants Pass, OR 97527 503/474-5678	JCT120	ST506	20	100	half	30,000	•	\$240

<sup>1</sup> The retail prices listed are for comparative purposes only; dealer prices may be 30 percent—or even as much as 60 percent—lower. If you plan to install a hard disk in a non-IBM computer, make sure the hard disk is compatible with your machine.

<sup>2</sup> Prices determined by dealer



# Internal Hard Disk Directory

Manufacturer	Product	Interface	Formatted capacity (MB)	Average access time (ms)	Drive size	Mean time between failures (hours)	Auto head parking	List price <sup>1</sup>
Maxtor 211 River Oaks Pkwy. San Jose, CA 95134 408/432-1700	XT-1085	ST506/412	71	28	full	30,000	•	2
	XT-1140	ST506/412	119.85	27	full	30,000	•	2
	XT-3170	SCSI	146.64	30	full	30,000	•	2
	XT-4170E	ESDI	149.15	16	full	30,000	•	2
	XT-4170S	SCSI	149.15	18	full	30,000	•	2
	XT-2190	ST506/412	159.8	30	full	30,000	•	2
	XT-1240R	ST506	196.6	27	full	30,000	•	2
	XT-3280	SCSI	244.41	30	full	30,000	•	2
	XT-4380S	SCSI	319.61	18	full	30,000	•	2
Micropolis 2113 Nordhoff St. Chatsworth, CA 91311 818/709-3300	1323	ST506	35	28	full	35,000	•	\$895
	1323A	ST506	44	28	full	35,000	•	\$925
	1333A	ST506	44	30	full	25,000	•	\$795
	1324	ST506	53	28	full	35,000	•	\$1015
	1334	ST506	53	30	full	25,000	•	\$895
	1324A	ST506	62	28	full	35,000	•	\$1055
	1325	ST506	71	28	full	35,000	•	\$1095
	1335	ST506	71	30	full	25,000	•	\$995
	1373	SCSI	77	23	full	30,000	•	\$1850
	1353	ESDI	79	23	full	30,000	•	\$1650
	1373A	SCSI	96.3	23	full	30,000	•	\$1915
	1353A	ESDI	99	23	full	30,000	•	\$1720
	1374	SCSI	115.5	23	full	30,000	•	\$1980
	1354	ESDI	119	23	full	30,000	•	\$1790
	1374A	SCSI	134.8	23	full	30,000	•	\$2050
	1354A	ESDI	139	23	full	30,000	•	\$1855
	1375	SCSI	154	23	full	30,000	•	\$2095
	1355	ESDI	159	23	full	30,000	•	\$1895
Microscience Int'l 777 Palomar Ave. Sunnyvale, CA 94086 408/730-5965	HH-325	ST506/412	21.31	80	half	20,000	•	2
	HH-825	ST506/412	21.31	65	half	20,000	•	2
	HH-330	ST506/412	31.3	80	half	20,000	•	2
	HH-830	ST506/412	31.3	65	half	20,000	•	2
	HH-1050	ST506/412	44.56	28	half	20,000	•	2
	HH-1060	ST506/412	66.84	28	half	20,000	•	2
Miniscribe 1861 Lefthand Cir. Longmont, CO 80501-6798 303/651-6000	3212 Plus	ST412	10.7	53	half	20,000	•	2
	8212	ST506/412	10.7	68	half	20,000	•	2
	3425	ST506/412	21.4	85	half	20,000	•	2
	3425 Plus	ST412	21.4	53	half	20,000	•	2
	8425	ST506/412	21.4	68	half	20,000	•	2
	6032	ST506/412	26.7	28	full	25,000	•	2
	3438	ST506/412	32.7	85	half	20,000	•	2
	3438 Plus	ST412	32.7	53	half	20,000	•	2
	8438	ST506/412	32.7	68	half	20,000	•	2
	3053	ST412	44.6	25	half	30,000	•	2
	6053	ST506/412	44.6	28	full	25,000	•	2
	6085	ST506/412	71.3	28	full	25,000	•	2
	6128	ST506/412	110.1	28	full	25,000	•	2

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<sup>2</sup> Prices determined by dealer



# Internal Hard Disk Directory

Manufacturer	Product	Interface	Formatted capacity (MB)	Average access time (ms)	Drive size	Mean time between failures (hours)	Auto head parking	List price <sup>1</sup>
Peripheral Technology 685 E. Cochran St. Simi Valley, CA 93065 805/581-1000	TT225	ST/506, MFM	21.4	35	half	25,000	•	\$695
	PT338	ST/506, MFM	32.1	35	half	25,000	•	\$755
	PT351	ST/506, MFM	42.8	35	half	25,000	•	\$775
Rodime 29525 Chagrin Blvd. Pepper Pike, OH 44122 216/765-8414	3055	ST506/412	45.6	28	half	18,000	•	2
	5075S	SCSI	64.3	28	half	20,000	•	2
	5125S	SCSI	107.1	25	half	20,000	•	2
	5180S	SCSI	150	25	half	20,000	•	2
Seagate Technology 920 Disc Dr. Scotts Valley, CA 95066 800/468-3472	ST213	ST412	10.7	65	half	20,000		2
	ST225	ST412	21.4	65	half	20,000		2
	ST125	ST412	21.4	28	half	20,000		2
	ST225N	SCSI	21.4	65	half	20,000		2
	ST4038	ST412	31.9	40	full	15,000		2
	ST138	ST412	32.1	28	half	20,000		2
	ST138N	SCSI	32.3	28	half	20,000		2
	ST238R	ST412	32.7	65	half	20,000		2
	ST138R	ST412	32.7	28	half	20,000		2
	ST4051	ST412	42.5	40	full	15,000		2
	ST251	ST412	42.8	40	half	20,000		2
	ST251N	SCSI	43.1	40	half	20,000		2
	ST251R	ST412	43.6	40	half	20,000		2
	ST4053	ST412	44.5	28	full	15,000		2
	ST157N	SCSI	48.6	28	half	20,000		2
	ST157R	ST412	49.1	28	half	20,000		2
	ST277N	SCSI	64.9	40	half	20,000		2
	ST277R	ST412	65.5	40	half	20,000		2
	ST4077N	SCSI	67.6	28	full	15,000		2
	ST4077R	ST412	68.2	28	full	15,000		2
	ST4096	ST412	80.2	28	full	15,000		2
	ST4096N	SCSI	83.9	17	full	15,000		2
	ST4144N	SCSI	122.1	28	full	15,000		2
	ST4144R	ST412	122.7	28	full	15,000		2
	ST4192N	SCSI	168.5	17	full	15,000		2
Tandon Computer 405 Science Dr. Moorpark, CA 93021 805/523-0340	TM262	ST506	20	85	half	20,000		2
	TM362	ST506	20	85	half	20,000		2
	TM244	ST506	40	37	half	20,000		2
	TM264	ST506	40	85	half	20,000		2
	TM344	ST506	40	85	half	20,000		2
	TM364	ST506	40	85	half	20,000		2
	TM2085	SCSI	85	25	full	20,000		2
	TM3085	ST506	85	25	full	20,000		2
	TM2128	SCSI	128	25	full	20,000		2
	TM2170	SCSI	170	25	full	20,000		2

<sup>1</sup> The retail prices listed are for comparative purposes only; dealer prices may be 30 percent—or even as much as 60 percent—lower. If you plan to install a hard disk in a non-IBM computer, make sure the hard disk is compatible with your machine.

<sup>2</sup> Prices determined by dealer



# Video Board Directory

Manufacturer	Product						Ports		List price
		MDA	CGA	HGC	EGA	VGA	132-column	parallel	
Advanced Transducer Devices 234 Santa Ana Ct. Sunnyvale, CA 94086 408/720-1938	Monochrome Graphics	•		•			1	0	\$133
	Enhanced Graphics	•	•	•	•		0	0	\$399
AST Research 2121 Alton Ave. Irvine, CA 92714-4992 714/863-1333	Preview I/O	•		•			• 1	1 <sup>1</sup>	\$249
	AST-3G Plus	•	•	•	•		0 <sup>2</sup>	0	\$359
	AST-3G I/O	•	•	•	•		1	1 <sup>1</sup>	\$459
ATI 450 Esna Park Dr. Markham, Ontario Canada L3R 1H5 416/756-0711	The Graphics Solution	•	•	•			• 0	0	\$239
	EGA Wonder	•	•	•	•	•	0	0	\$399
	VIP	•	•	•	•	•	0	0	\$499
Basic Time 3040 Oakmead Village Dr. Santa Clara, CA 94041 408/727-0877	HR-720G	•		•			• 1	0	\$199
	HR-640E	•	•	•	•		• 1	0	\$349
Boca Research 6401 Congress Ave. Boca Raton, FL 33487 305/997-6227	EGA	•	•	•	•		0	0	\$199
	Mono-Master/Plus	•		•			1	1 <sup>1</sup>	\$199
	Multi-EGA	•	•	•	•		• 0	0	\$299
Datafox 205 S. 29th St. Phoenix, AZ 85034 602/275-2072	XT-Herc-1	•		•			1	1	\$133
	XT-EGA-1	•	•	•	•		1	1	\$333
Everex 48431 Milmont Dr. Fremont, CA 94538 415/498-1111	Evergraphics Plus	•		•			• 1	0	\$109
	Evergraphics Deluxe	•			•		• 1	0	\$199
	Everex Edge	•	•	•			• 1	0	\$399
	Micro Enhancer	•	•	•	•	•	• 0	0	\$399
	Micro Enhancer Deluxe	•	•	•	•	•	• 1	0	\$399
Genoa Systems 73 E. Trimble Rd. San Jose, CA 95131 408/432-9090	Spectrum Half-Card	•	•	•			• 1	0	\$299
	SuperEGA	•	•	•	•		• 0	0	\$499
	SuperEGA HiRes	•	•	•	•		• 1	0	\$599
Hercules Computer Technology 921 Parker St. Berkeley, CA 94710 415/540-6000	Hercules Text Card	•					1	0	\$139
	Hercules Graphics Card	•		•			1	0	\$299
	Hercules Graphics Card Plus	•		•			1	0	\$299
	Hercules InColor Card	•		•			1	0	\$499 <sup>3</sup>
IBM 5201 S. Congress Ave. Boca Raton, FL 33431 305/998-2000	Enhanced Graphics Adapter	•	•	•	•		0	0	\$524
Leading Technology 10430 S.W. 5th Ave. Beaverton, OR 97005 800/999-5323	RAGE Super-Short	•		•			• 1	1	\$68
	LTI-285	•	•	•			1	1	\$143
	LTI-Pack	•		•			1	2	\$153
	RAGE Level-1 EGA Card	•	•	•	•		0	0	\$180
	LTI Super EGA Level III	•	•	•	•		• 0	0	\$210

<sup>1</sup> second serial port optional

<sup>2</sup> optional

<sup>3</sup> includes special color Hercules mode



# Video Board Directory

Manufacturer	Product	MDA	CGA	HGC	EGA	VGA	132-column	Ports		List price
								parallel	serial	
Mylex 47650 Westinghouse Dr. Fremont, CA 94538 800/446-9539	Mylex Business Master II	•		•			•	1	0	\$169
	Enhanced Graphics Adapter	•	•	•	•		•	0	0	\$399
	Envision II	•	•	•	•		•	1	0	\$595
	Advanced Graphics Adapter		•		•		•	0	0	\$595
Paradise Systems 150 N. Hill Dr. Brisbane, CA 94405 415/468-6000	Basic Video Card	•	•	•				0	0	\$149
	AutoSwitch Monochrome EGA Card	•	•	•	•		•	0	0	\$249
	Paradise VGA Plus	•	•	•	•	•		0	0	\$399
	Paradise VGA Professional Card	•	•	•	•	•	•	0	0	\$599
Quadram One Quad Way Norcross, GA 30093-2919 404/923-6666	QuadEGA +	•	•	•	•			0	0	\$295
	QuadVGA	•	•	•	•	•	•	0	0	\$495
Sigma Designs 46501 Landing Pkwy. Fremont, CA 94538 415/770-0100	SigmaEGA	•	•	•	•			0	0	\$299
	EGA 480	•	•	•	•		•	0	0	\$399
	Color 400	•	•		•			0	0	\$499
	VGA	•	•	•	•	•	•	0	0	\$499
STB Systems 1651 N. Glenville Richardson, TX 75081 214/234-8750	Chauffeur HT	•	•	•			•	1	0	\$199
	STB EGA	•	•	•	•			0	0	\$199
	Multi Res II	•	•	•	•	•	•	0	0	\$349
	VGA Extra	•	•	•	•	•	•	0	0	\$495
Tatung Company of America 28500 El Presidio St. Long Beach, CA 90810 213/979-7055	200 Mono-HP	•		•				1	0	\$99
	500 Combo Card	•	•	•				1	0	\$199
	900 Omni Card	•	•	•	•		•	1	1	\$399
	800 Supreme EGA	•	•	•	•		•	1	1	\$399
Taxan 111 Corporate Blvd., Ste. E South Plainfield, NJ 07080 800/437-3636	Model 562		•		•			0	0	\$495
	Model 570		•		•		•	0	0	\$595
	Model 560		•	•	•			0	0	\$595
Tecmar 6225 Cochran Rd. Solon, OH 44139 216/349-0600	MG 1000	•		•				1	0	\$295
	EGA Master	•	•	•	•		•	0	0 <sup>2</sup>	\$395
	EGA Master 480	•	•	•	•	•	•	0	0	\$495
	EGA Master 800	•	•	•	•	•	•	0	0	\$595
Thomson 5731 W. Slauson Ave. Culver City, CA 90230 800/325-0464	Enhanced Graphics Adapter	•	•					0	0	\$295
	Enhanced Graphics Adapter Ultra	•	•	•	•			0	0	\$495
Tseng Laboratories 10 Pheasant Run Newtown, PA 18940 215/968-0502	CM II	•	•	•			•	0	0	\$50
	UltraPak-Short	•	•	•			•	1	0	\$199
	EVA				•		•	1	0	\$299
	UltraPak	•	•	•			•	1	1 <sup>1</sup>	\$545
Video-7 46335 Landing Pkwy. Fremont, CA 94538 415/656-7800	Vega	•	•	•	•			0	0	\$500
	Vega Deluxe	•	•	•	•	•	•	0	0	\$500

<sup>1</sup> second serial port optional

<sup>2</sup> optional

<sup>3</sup> includes special color Hercules mode



# Monitor Directory

Manufacturer	Product	Screen (diagonal inches)	Digital	Analog	MDA	CGA	HGC	EGA	VGA	List price
Amdek 1901 Zanker Rd. San Jose, CA 95112 408/436-8570	Amdek Monitor/310	12	•		•		•	•		\$199
	Amdek Monitor/432	14		•		•		•	•	\$245
	Amdek Monitor/410	12	•		•		•	•		\$250
	Amdek Monitor/600S	13	•			•		•		\$550
	Amdek Monitor/732	12		•		•		•	•	\$625
	Amdek Monitor/722	13	•			•		•		\$750
	Amdek Monitor/1230	15	•		•	•	•			\$999
AST Research 2121 Alton Ave. Irvine, CA 92714-4992 714/863-1333	AST Premium Display/monochrome	14	•		•		•	•		\$195
	AST Premium Display/enhanced color	14	•			•		•		\$695
Basic Time 3040 Oakmead Village Dr. Santa Clara, CA 95051 408/727-0877	HR-31-350	14	•			•		•		\$699
Conrac 600 N. Rimsdale Ave. Covina, CA 91722 818/966-3511	Model 7064	13	•			•		•		\$735
Datafox 205 S. 29th St. Phoenix, AZ 85034 602/275-2072	12-TTL	12	•		•		•			\$139
Electrohome 809 Wellington St. N Kitchener, Ontario Canada N2G 4J6 519/744-7111	EVM 920	9	•		•		•			\$676
	EVM 1220	12	•		•		•			\$750
	EVM 1519	15	•		•		•			\$816
	EVM 1719	17	•		•		•			\$897
Leading Technology 10430 S.W. 5th Ave. Beaverton, OR 97005 800/999-5323	LTI-1210	12	•		•		•			\$125
	SM-12SS31A6	12	•		•					\$125
	SM-12SSLAA7	12	•		•					\$135
	Imtec 1252G	12	•		•					\$145
	SM-12SFLAA7	12	•		•					\$175
	LTI-1443	14	•		•	•	•			\$185
	SM-430	14	•		•					\$195
	LTI-4215	13	•			•				\$465
	Imtec 1464W	14	•			•				\$475
	LTI-1410	14	•			•				\$495
	LTI-4235	13	•			•		•		\$565
	Imtec 1453M1	14	•			•		•		\$595
	LTI-5154	14	•			•		•		\$595
	LTI-5155	14	•	•	•	•		•	•	\$795
Magnavox NAP Consumer Electronics P.O. Box 455 Jefferson City, TN 37760 615/475-3801	PC Monitor 80 7BM613	12	•		•		•			\$189
	PC Monitor 80 7BM623	12	•		•		•			\$200
	RGB Monitor 80 8CM515	14	•	•		•				\$399
	Enhanced Display 9CM053	14	•			•		•		\$549
	VGA Display 9CM082	14		•					•	\$69
	Multimode Display 8CM873	14	•	•		•		•	•	\$899
Mitsubishi Electronics 991 Knox St. Torrance, CA 90502 213/515-3993	XC-1409C	14	•			•				\$519
	XC-1410C	14	•					•		\$659
	XC-1430C	14	•					•		\$739
	XC-1412C	14	•					•		\$799
	AUM-1371A	14	•	•	•	•	•	•	•	\$889
Nanao 23510 Telo Ave. #5 Torrance, CA 90505 213/325-5202	3030AL	12	•		•		•			\$235
	8030H	14	•			•				\$641
	8042S	14	•					•		\$799
	8060H	14	•	•	•	•	•	•	•	\$889
	8060S	14	•	•	•	•	•	•	•	\$919



# Monitor Directory

Manufacturer	Product	Screen (diagonal inches)	Digital	Analog	MDA	CGA	HGC	EGA	VGA	List price
NEC Home Electronics 1255 Michael Dr. Wood Dale, IL 60191-1094 800/447-4700	MultiSync II	14	•	•	•	•	•	•	•	\$899
Princeton Graphic Systems 601 Ewing St., Bldg. A Princeton, NJ 08540 800/221-1490	PSM-03	12	•		•	•	•			\$250
	MAX-15	14	•	•	•	•	•			\$280
	PSC-28	12	•	•	•	•	•	•	•	\$695
	LM-300	15	•	•	•	•	•	•	•	\$750
	UltraSync	12	•	•	•	•	•	•	•	\$795
Quadram One Quad Way Norcross, GA 30093-2919 404/923-6666	QuadChrome Enhanced Display	13	•			•		•		\$795
Sony Corp. of America 9 W. 57th St. New York, NY 10019 212/371-5800	Multiscan	13	•	•	•	•	•	•	•	\$979
Tatung Company of America 2850 El Presidio St. Long Beach, CA 90810 213/979-7055	MM-1222A or G	12	•		•					\$199
	MM-1422A or G	14	•		•					\$249
	MM-1295	12	•	•	•	•	•	•	•	\$260
	CM-1365	13	•			•				\$549
	CM-1380F	13	•			•		•		\$745
	CM-1370	13	•							\$749
	CM-1495	14	•	•	•	•	•	•	•	\$799
Taxan 6220 N. Beltline Rd. #204 Irving, TX 75063 214/550-1244	Model 118	12			•		•			\$180
	Model 124	12	•		•		•			\$189
	Model 720	14	•			•				\$595
	Model 635	12	•			•		•		\$695
	Model 650	12	•			•		•		\$795
	Model 765	14	•			•		•		\$795
Tektronix P.O. Box 1000 Wilsonville, OR 97070 503/644-0161	PCD13	13		•						\$895
Thomson 5731 W. Slauson Ave. Culver City, CA 90230 800/325-0464	230A Monochrome Monitor	12	•		•		•			\$159
	450A Spreadsheet Monitor	14	•		•	•	•			\$295
	4120 CGA Monitor	14	•	•	•	•	•			\$449
	4160 CGA Monitor	14	•	•	•	•	•			\$595
	4460 EGA Monitor	14	•		•	•	•	•		\$595
	4375M UltraScan Monitor	14	•	•	•	•	•	•	•	\$895
T.W. Casper 2153 O'Toole Ave. San Jose, CA 95131 408/922-0188	Casper GM-1266	12	•		•		•			\$159
	GM-1288	12	•		•		•			\$169
	Casper HP-14	14	•		•		•			\$259
	Casper HP-14D	14	•		•	•	•			\$279
	Casper HD-55	14	•		•	•	•			\$399
	Casper EGA (TE-5154)	14	•		•	•	•	•		\$695
	Casper MultiScan	14	•	•	•	•	•	•	•	\$795
Wyse Technology 3571 N. First St. San Jose, CA 95134 408/433-1000	WY-530	14	•		•		•			\$235
	WY-630	14	•		•	•	•			\$499
	WY-640	14	•		•	•	•	•		\$749



# EMS Board Directory

Manufacturer	Product	Base memory		Extended	EMS	Minimum memory		Data path (8/16 bit)	Capacity	Capacity with daughterboard		Ports		List price for 2MB
										Parallel	Serial	Parallel	Serial	
AST Research 2121 Alton Ave. Irvine, CA 92714-4992 714/863-1333	SixPak Premium	•			•	256K	8	1MB	2MB	1	1 <sup>1</sup>	\$345		\$899
	RAMpage/2	•			•	64K	8	2MB	n/a	0	0	\$345		\$995
	Advantage Premium	•	•		•	512K	16	512K	2MB	1	1 <sup>1</sup>	\$499		\$949
	RAMpage 286	•	•		•	512K	16	2MB	n/a	0	0	\$545		\$849
Boca Research 6401 Congress Ave. Boca Raton, FL 33487 305/997-6227	Bocaram/AT	•	•		•	128K	16	2MB	4MB	0	0	\$245		\$595
	Bocaram/XT				•	256K	8	1MB	2MB	0	0	\$245		\$575
Computer Peripherals 2635 Lavery Ct. #5 Newbury Park, CA 91320 805/499-3751	Ramsack	•	•		•	0	8	2MB	n/a	0	0	\$345		\$985
	Overachiever	•	•		•	0	8	1.5MB	3MB	1	2	\$495		\$730
	386 Memoire	•	•		•	1MB	32	1MB	2MB	0	0	\$845		\$1395
Everex 48431 Milmont Dr. Fremont, CA 94538 415/498-1111	Maxi Magic	•			•	0	8	2MB	n/a	0	0	\$199		<sup>2</sup>
	RAM 2000	•	•		•	0	16	2MB	n/a	0	0	\$208		<sup>2</sup>
	RAM 3000 Deluxe	•	•		•	0	16	3MB	n/a	0	0	\$228		<sup>2</sup>
	Multifunction EMS	•			•	0	8	1MB	n/a	1	1 <sup>1</sup>	\$228		<sup>2</sup>
IBM 5201 S. Congress Ave. Boca Raton, FL 33431 305/998-2000	IBM Enhanced Memory Expansion Adapter	•	•		•	0	16	12MB	n/a	1	1	\$495		\$1340
IDEAssociates 29 Dunham Rd. Billerica, MA 01821 617/663-6878	IDEAmax 30				•	512K	8	8MB	n/a	0	0	\$485		\$995
	IDEA Supermax/EMS	•	•		•	512K	16	16MB	n/a	1	2	\$545		\$1145
	Supermax 30				•	512K	8	8MB	n/a	1	2	\$635		\$1145
Intel 5200 N.E. Elam Young Pkwy. Hillsboro, OR 97124-6497 503/629-7354	AboveBoard/PC	•	•		•	64K	8	2MB	4MB	0	0	\$345		\$995
	AboveBoard PS/PC	•	•		•	64K	8	1.5MB	3.5MB	1	1	\$395		\$995 <sup>3</sup>
	AboveBoard	•	•		•	512K	16	2MB	n/a	0	0	\$395		\$995
	Piggyback Memory													
	AboveBoard 286	•	•		•	512K	16	2MB	4MB	0	0	\$545		\$1095
	AboveBoard PS/286	•	•		•	512K	16	2MB	4MB	1	1 <sup>1</sup>	\$595		\$1145
Maynard Electronics 460 E. Semoran Blvd. Casselberry, FL 32707 305/331-6402	Accent PC	•	•		•	0	8	2MB	n/a	0	0	\$295		\$975
	Accent AT	•	•		•	0	8	2MB	n/a	0	0	\$395		\$1075
	Accent 286	•	•		•	0	16	2MB	n/a	0	0	\$479		\$1159
Orchid Technology 45365 Northport Loop W Fremont, CA 94538 415/683-0344	RamQuest	•	•		•	2MB	8	2MB	8MB	0	0	\$995		\$995

<sup>1</sup> second serial port optional

<sup>2</sup> determined by dealer

<sup>3</sup> price for 1.5MB

<sup>4</sup> optional

<sup>5</sup> price for 2.5MB



# EMS Board Directory

Manufacturer	Product	Base memory	Extended	EMS	Minimum memory	Data path (8/16 bit)	Capacity	Capacity with daughterboard	parallel	serial	Ports	w/minimum memory	List price for 2MB
Osicom Technologies 198 Green Pond Rd. Rockaway, NJ 07866 201/586-2550	OCIT Memory Board	•	•	•	0	16	2MB	n/a	0	0	\$210	\$430	
PC Technologies 704 Airport Blvd. Ann Arbor, MI 48108 800/821-3086	RAMpartner	•		•	0	8	2MB	n/a	0	0	\$300	\$900	
Practical Peripherals 31245 La Baya Dr. Westlake Village, CA 91632 818/991-8200	Practical EMS Board	•	•	•	0	8 or 2MB 16	n/a	0	0	\$129	<sup>2</sup>		
Profit Systems 30150 Telegraph Rd. Birmingham, MI 48010 313/647-5010	Elite 16	•	•	•	512K	16	16MB	n/a	1	1 <sup>1</sup>	\$695	\$1295	
Sigma Designs 46501 Landing Pkwy. Fremont, CA 94538 415/770-0100	Maximizer-AT	•	•	•	64K	8	2MB	4MB	0	4	\$299	\$428	
STB Systems 1651 N. Glenville St. Richardson, TX 75085-0957 214/234-8750	Memory Companion RapidMEG	• •	•	• •	0K 2MB	8 16	2MB 2MB	n/a n/a	0 0	0 0	\$229 \$995	\$871 \$995	
Tall Tree Systems 2585 E. Bayshore Rd. Palo Alto, CA 94303 415/493-1980	JRAM 3 JRAM AT3 JRAM AT4	• • •	• • •	• • •	0 0 0	8 16 16	2MB 2MB 8MB	n/a n/a n/a	4 4 4	4 4 4	\$269 \$349 \$399	\$749 \$829 \$1299	
Tecmar 6225 Cochran Rd. Solon, OH 44139 216/349-0600	Captain PS/30 Maestro AT Captain Plus Captain 286	 • •	 • •	• • •	0 0 256K 128K	8 16 8 16	2MB 2.5MB 1MB 15MB	n/a n/a 2MB n/a	0 1 1 1	0 1 1 <sup>1</sup> 1	\$245 \$399 \$495 \$645	\$995 \$1395 <sup>5</sup> \$1345 call	
Vutek Systems 10885 Sorrento Valley Rd. San Diego, CA 92121 619/587-2800	Above All L/P Mega Mem	 •	• •	• •	0 0	8 16	2MB 2MB	n/a n/a	0 0	0 0	\$279 \$291	<sup>2</sup> <sup>2</sup>	

<sup>1</sup> second serial port optional

<sup>2</sup> determined by dealer

<sup>3</sup> price for 1.5MB

<sup>4</sup> optional

<sup>5</sup> price for 2.5MB



The chips on 8-bit RAM boards generally aren't fast enough to accommodate the high clock rates of an 80286 machine's expansion bus, an incompatibility that will crash your system.

if you're buying a machine for personal use—an old-fashioned monochrome monitor and board may be all you need. And if you want to upgrade later, the price of monochrome hardware is now so low, you won't feel too bad scrapping it.

The two industry-standard monochrome video boards are the IBM Monochrome Display Adapter (MDA) and the Hercules Graphics Card (HGC). The MDA produces characters only, while the HGC combines its own widely supported monochrome graphics standard with the MDA's capabilities. Aside from driving a multiscan, the two cards can drive only IBM's Personal Computer Display (the original PC's monochrome monitor) or a clone.

Interestingly, the MDA, the HGC, and the Personal Computer Display are no longer made or sold by the original manufacturers. In fact, other than the Enhanced Graphics Adapter (EGA), IBM now sells video hardware solely for the PS/2 line, while Hercules pushes an enhanced HGC with special character-graphics capabilities. And no wonder—neither company cares to compete with the prices of imitators.

Even in cloned form, the MDA is dying out because adding HGC graphics capabilities costs next to nothing. If you're buying a computer with a monochrome display included, make sure you ask for a Hercules card; otherwise, someone may try to unload an old MDA clone and rob you of graphics capabilities.

If you want color, you have two viable video board options: the EGA and the new VGA (the MCGA is simply a less colorful subset of the VGA). IBM's tired old Color/Graphics Adapter (CGA) is too low in resolution (320 by 200 pixels with 4 colors and 640 by 200 pixels with 2) and offers too few colors (a palette of 16) to be useful for text processing or graphics work. Even though CGA-compatible color monitors are about half the price of EGA compatibles, you're better off settling for monochrome or shelling out the extra cash for an EGA board and monitor.

The EGA delivers a maximum resolution of 640 by 350 pixels and 16 simultaneous colors from a palette of 64. That's enough for comfortable text processing and fairly interesting graphics. Many EGA boards have HGC and CGA graphics capabilities, which enable them to work with just about any graphics package. In addition, a number of EGAs offer a special mode or two that can drive a multiscan monitor at close to its highest resolution (although most of those modes are compatible only with *Microsoft Windows* and a handful of other programs).

Some EGAs have been enhanced to imitate the VGA's 640-by-480-pixel, 16-color mode. However, none of them are compatible with the VGA's 320-by-200-pixel mode, which provides 256 simultaneous colors from a palette of 256,000. This mode lacks the sharpness desired for text processing but produces absolutely stunning graphics; to reap the benefits, you need one of several currently available

boards designed from the ground up for VGA graphics.

Like any new graphics standard bearer, the VGA lacks software that fully exploits it, and it may be a year before the market accords it widespread support. Nonetheless, even if the PS/2s leave you cold, it's probably worth investing in a VGA-compatible board for a standard bus; a VGA and a multiscan together are only a few hundred dollars more than a standard EGA board and monitor. Networked environments, where broad compatibility is desirable, are especially suited to multimode hardware. For a small difference in price, you'll be on the cutting edge of graphics, while maintaining effortless compatibility with virtually all previous standards.



## The Ultimate EMS Board Buyers' Guide

Standards, like rules, are made to be broken. The expanded memory specification (EMS) cracked the DOS 640K limit on user memory with an ingenious gimmick: Make DOS *think* it is addressing 64K of memory between 640K and 1MB (a little-used space normally reserved for system hardware), while in fact it's addressing chunks of expanded RAM swapped in and out of four 16K windows. Boards with the appropriate EMS drivers and



Last August the authors of EMS and  
EEMS got together and released  
EMS 4.0, which combines the two competing specifications.

memory management circuitry could make up to 8MB of expanded memory available to programs written to spec.

The rationale behind using expanded memory is simple: Keep a large file entirely in RAM instead of on disk, and speed (especially with calculation-intensive tasks) should increase dramatically.

Spreadsheets are the most common application to expand their memory horizon in this way, but a growing number of data base management, desktop publishing, and CAD programs are following suit.

The enhanced expanded memory specification (EEMS) provided a competing standard to the original EMS. Aside from offering 64 rather than 4 16K windows and raising the expanded memory ceiling to 16MB, the EEMS also opened up windows in the lower 640K, where programs run. This meant entire programs could run in expanded memory, not just large files. For example, Quarterdeck's environment manager, *Desqview*, is written for the EEMS and allows several programs to run concurrently in expanded RAM.

Last August the authors of EMS and EEMS got together and released LIM 4.0, which combines the two competing specifications—as well as adding support for RAM-resident programs and pushing the expanded memory limit to 32MB. By the time you read this, most board makers should support LIM 4.0 with new drivers; the major software vendors have also vowed to follow the new spec in upgrades.

Given the felicitous consolidation under LIM 4.0, which board type should you use? With the new driver, the average EEMS board should run slightly faster than old EMS boards; boards designed with the new 4.0 spec in mind should perform even better. Beyond this marginal performance issue lie other more important concerns.

The most obvious distinction between boards is whether they support 8- or 16-bit memory. Usually about half the price of their 16-bit counterparts, 8-bit memory boards are designed to be installed in the 8-bit slots of a PC or XT. You can also plug them into an 8-bit or 8/16-bit slot in an AT, but using 8-bit memory with an 80286 yields significantly slower memory access times than using 16-bit memory. Moreover, the chips on 8-bit RAM boards generally aren't fast enough to accommodate the high clock rates of an 80286 machine's expansion bus, an incompatibility that will crash your system. Advertisers (especially mail-order vendors) don't always make the 8-bit designation clear, so check carefully.

Because they fit only in 8/16-bit slots, 16-bit memory boards are obviously incompatible with PCs and XTs. You can, however, install one in the 8/16-bit slot of an 80386 machine—although doing so makes little sense. The memory management functions of an expanded memory board are built into the 80386 chip itself; all 80386 machines come with an EMS or EEMS driver. All you need is more memory—preferably 32-bit.

Currently there are no standard 32-bit memory boards for 80386

computers, since 32-bit slots vary from machine to machine. In most cases, 32-bit memory boards can be obtained only from the computer manufacturer—although the Compaq Deskpro 386 and the PS/2 Model 80 have garnered some third-party support.

Over and above these basic distinctions are the added features. For example, some expanded memory boards enable you to *backfill* user memory. In other words, if your PC has only 512K, you can use part of the board's RAM to bring your system to a full 640K, while the rest can be used for expanded memory.

Another desirable feature of an expanded memory board is support for extended memory. This isn't an issue with PCs, because 8088 processors can't use extended memory. An 80286, however, can use 16MB of the stuff. Extended memory, which is distinct from user and expanded memory, can't be used by DOS except for RAM disks (RAM that DOS treats as a storage device), print spoolers, and disk caches. Better vendors include software for extended memory applications with their boards.

The bad news about expanded memory boards is that they're often difficult to install. Some come with dozens of DIP switches to fiddle with, while others offer menu-driven software installation. Determining a board's ease of installation and compatibility with your system is difficult without getting your hands on it. If possible—yes, you guessed it—try before you buy. ●



## TOP-VALUE SYSTEMS



**TJ Byers** With multiprocessor architectures and multitasking operating systems sharing the spotlight, it seems like we are all more interested in the future than in getting our work done. But the truth is, people are increasingly satisfied with what the market has to offer now; it's perfectly possible to find a PC today that will fill your needs for a long, long time.

If you're in search of a computer, you probably just want a box that will do justice to the software you use most often. You want a monitor that doesn't strain your eyes, sufficient storage space for your files, and enough power to keep from getting bored while waiting for the program to execute. These needs may seem simple, but fulfilling them without spending a bundle adds a catalog of considerations to your buying decision.

*Avoid being underpowered—or wasting money on hardware you don't need. Here's how to buy components for the three most popular applications: word processing, spreadsheets, and data management.*

*Illustration by*  
**ANTHONY RUSSO**



Buying an 8088 system for heavy-duty data management is sheer folly; an 8-MHz 80286 machine is a good place to start.

"Software first!" is the key to system configuration. Many application programs demand stellar performance from some components while barely taxing others. If you're reasonably certain what you'll use your machine for, you'll know where to spend heavily and where to conserve cash.

This guide is designed to help you select the optimum system. Conceived with the predominant application types in mind, it divides system configurations into word processing, spreadsheet, and

data management categories. These distinctions are a matter of emphasis rather than hard-and-fast rules. For instance, you may not actually need an 80286 for word processing, but your taste for speed might dictate otherwise.

The systems suggested here are cut to fit a variety of budgets. Each of the three tables offers a minimal configuration for budget-conscious users plus better and best systems for people with more to spend. When you have an idea of the system you want, turn to "The Ulti-

mate System Buyers' Guide" in this issue for further advice on selecting components. From there, move on to the product directories and compare features and prices.

## Word Processing

Many word processing programs demand less from a system than any other type of application. Programs such as *WordStar* and *pfs:write* crave little processing power, occupy a small amount of storage space, and require only a basic monochrome display. An 8088-based PC with two floppy drives (one for the program and one for data) will do just fine. If you buy from a mail-order vendor, this system may cost as little as \$800, monochrome monitor included.

More than other applications, word processing requires long hours of staring at the screen, so a good display is critical. A green or amber monochrome monitor and a video board with Monochrome Display Adapter (MDA) capabilities—the industry standard for character-based display—are all that most word processing programs require.

A number of high-end word processors, however, need more. For example, *Samma Word* and Lotus's *Manuscript* let you preview a full page of text on the screen, a feat that demands graphics capabilities. *Microsoft Word*, while less ambitious, also offers a mode that shows special character attributes on screen—and that calls for graphics.

## MIKE ROYKO'S FIVE REASONS

Why You Shouldn't Buy a PC

### 1. YOU CAN'T AFFORD IT.

The average person can't afford to spend \$2000 dollars for a PC when a typewriter would do. Typewriters are a hell of a lot cheaper.

### 2. ANY TYPE OF

appliance, machine, or electronic device will eventually break. So the fewer you have, the fewer problems you'll have, and the happier you'll be.

### 3. YOU MIGHT START

playing computer games. This is a total waste of time, and you can get addicted to the dumb things. I refuse to play computer games because I'm easily addicted. Why waste time trying to get a dumb duck across the road? You should read a book instead.

### 4. THE AVERAGE PERSON

shouldn't buy a PC because they begin to think they can write. This is a problem because they'll write me letters telling me how stupid they think my columns are. With letter quality printing, a dumb letter looks and sounds more intelligent than it is. If they write a letter by hand, it looks as dumb as it sounds and I don't have to read it.

### 5. PEOPLE WITH

addictive personalities, like me, can get addicted to using a PC. The next thing you know they're talking to bulletin boards and trying to hack their way into banks, schools, and big corporations. Then again, that's why I want to learn how to use a PC, so I can become a hacker and take a look at some people's tax records.



A green or amber monochrome monitor and a video board with Monochrome Display Adapter capabilities are all that most word processing programs require.

A Hercules Graphics Card (HGC) enables you to display graphics on a monochrome monitor, while offering all of the MDA's text-based capabilities. An HGC board costs about the same as an MDA, so even if your word processing program doesn't use graphics, you might as well go ahead and buy one. You never know when you might need graphics, and a host of programs support the HGC's crisp, 720-by-348-pixel graphics standard.

If you prefer color the EGA is your choice, but be prepared to pay for it: An EGA board and monitor will set you back at least \$500. Be aware, however, that not all word processors give you a choice of screen colors, so look before you leap. (Certain screen utilities will set background and foreground colors when your software won't, but none of them works with all programs.)

In most cases, performance is a relatively minor issue for word processing, but some users may want AT-class power for their word crunching. If you do a lot of document formatting and reformatting, such power may not be overkill. With most programs, jobs like globally changing margins or justifi-

cation are processing-intensive tasks; they take far less time on an 80286, and that can make a big difference with large documents.

With disk-intensive word processors like *Word*, *WordPerfect*, and *MultiMate Advantage*, the most significant step-up you can take is not from an 8088 to an 80286 but from a floppy to a hard disk. Because these programs hold only a small amount of program and text data in RAM, using floppies means that summoning features or scrolling through a file often results in annoying pauses. Hard drives are so much faster (and quieter) than floppies that disk access is virtually unnoticeable under normal conditions. A 20MB hard disk offers more storage than 50 360K floppies and costs as little as \$300.

If you plan to use a RAM-based word processor like *WordStar* or *XyWrite*—and you intend to produce reports and correspondence rather than voluminous dissertations—then the tried-and-true 8088 PC and its trusty floppies are perfectly acceptable. You can always upgrade later. In the meantime, if you can sit tight through a few time-consuming loads, saves, and spelling checks, you'll save yourself a few hundred bucks.

## Spreadsheets

For number crunching with a spreadsheet, the most important component of your system is the computer itself. A spreadsheet program is processing intensive, so unless you're using the thing for laundry lists, a 4.77-MHz 8088 will execute complex calculations too slowly for most tastes. A typical system has an 80286, a hard disk drive, and an EGA-compatible board and display. Mail-order prices start as low as \$1500.

You may be able to get away with an 8088 or an 8086 CPU, provided the chip runs at 8 MHz or faster. And if you add an 8-MHz 8087-2 math coprocessor, you're reaching the performance level of the original IBM PC AT (sans coprocessor). By relieving the CPU of numeric processing, a coprocessor can speed the performance of your spreadsheet by as much as 30 percent.

Intel sells the original 4.77-MHz 8087 for \$175; the 8-MHz 8087-2 and 10-MHz 8087-1 are \$250 and \$330, respectively. 80287 coprocessors speed the numeric processing of 80286 machines; you can whiz through calculations using an 80287 running at 6 MHz for \$295, 8 MHz for \$410, or 10 MHz for \$490. Proud owners of 80386 machines face higher prices for the 80387: \$795 for the 16-MHz version and \$1195 for 20 MHz. Some 80386 machines are socketed for an 80287, but most PCs will use only a coprocessor that is matched to its processor. In all cases you

### Suggested Systems for Word Processing

	VIDEO	DRIVE	CPU
<i>Best</i>	EGA	40MB	8-MHz 80286
<i>Midrange</i>	HGC	20MB	8-MHz 8088
<i>Minimum</i>	HGC	Dual floppies	4.77-MHz 8088



A Hercules Graphics Card costs about the same as a Monochrome Display Adapter, so even if your word processing program doesn't use graphics, you might as well go ahead and buy one.

can use a coprocessor with a lower or higher clock rate than the CPU with no adverse effects.

People who like large worksheets often use expanded memory. Unlike word processors, the majority of spreadsheet programs hold the whole work file in RAM; when you run out of memory, the program simply won't let you enter more data. An expanded memory board can give you space for the largest worksheet, and with 2MB of on-board memory to play in, RAM-resident utilities should also have room to spare.

Once a worksheet is loaded, almost everything happens in RAM, but you'd be surprised how long it can take to write a 400K file to disk. A fast hard drive can cut load and save times dramatically; a floppy-based system may keep you waiting to the point of distraction. A medium-size hard disk (40MB) should supply all the elbowroom most users need.

A problem that's plagued spreadsheet users since day one is the small viewing area offered by standard video boards. With a screen only 80 characters wide,

### Suggested Systems for Spreadsheets

	VIDEO	DRIVE	CPU	OPTIONS
<i>Best</i>	EGA*	70MB	16-MHz 80386	EMS board
<i>Midrange</i>	HGC*	40MB	10-MHz 80286	EMS board
<i>Minimum</i>	HGC	20MB	8-MHz 8088	None

\* 132-column mode

you can count on seeing far less than that number in spreadsheet columns, a constraint that makes for a lot of unnecessary scrolling and panning. To remedy this, several video adapters—such as STB's Chauffeur HT and the Hercules Graphics Card Plus—include special drivers that enable you to display 132 columns of spreadsheet text. (You can also use the *SeeMore 1-2-3* add-in to achieve the same effect.)

Whether you view your spreadsheet in monochrome or in color is a matter of preference, but graphics capability of some kind is strongly recommended. Spreadsheet data provides the basis for almost all business graphs, and most spreadsheet programs—including *1-2-3* and *SuperCalc*—have some business graphics capability. The HGC will give you a monochrome preview, but if you plan on color output of any kind, add an EGA board and monitor.

### Data Management

Flat-file managers like *pfs:professional file* don't demand much power. But if you're concerned with *real* data management—using the relational capabilities of a

*dBASE III* or a *Paradox*—you need brute force. A large-capacity, fast hard disk is the most important component of a system devoted to data management. A typical system uses an 80286 CPU, a 70MB hard disk drive, and a monochrome monitor. Prices start as low as \$1500.

Data base files fatten quickly. While light-duty applications can usually make do with a 20MB hard drive, any heavyweight work will require at least 40MB to 70MB. Even a voluminous 114MB drive will fill up sooner than you expect, and it's not unusual for a data management system to contain two or more hard disks.

Sorting, searching, storing, indexing—just about everything a data base program does is disk intensive. As the number of files increases, so does the time required to locate data; with a slow hard disk, retrieval times may become intolerable. An investment in a fast hard disk—with an average access time of less than 35ms and an interleave factor of no more than 3:1—is money well spent.

No matter how fast the disk, however, disk access can never ap-

## THE TOP FIVE Personal Computer Hardware Companies in 1986

1. IBM
2. Apple
3. Tandy
4. Compaq
5. AT&T

Source: Future Computing Inc.



A spreadsheet program is processing intensive, so unless you're using the thing for laundry lists, a 4.77-MHz 8088 will execute complex calculations too slowly for most tastes.

proach the speed of memory access. Some programs, including Symantec's *Q&A* and Software Publishing's *pfs:professional file*, enable you to load records into expanded memory, resulting in impressive speed gains. In addition, you can create a RAM disk, usually in extended memory, and achieve much the same effect. Disk-caching software, which attempts to read the most frequently accessed data (ideally, the index and the most salient records) into cache RAM, turns a relatively slow hard disk into a capable performer.

Data management also puts a hefty load on the CPU. Buying an 8088 system for heavy-duty data management is sheer folly; an 8-MHz 80286 machine is a good place to start. An 80386 machine, with its 32-bit bus and 16- or 20-MHz clock, is ideal for manipulating large amounts of data and should be considered a prime candidate for high-end data management.

Aside from having raw power, a computer for data management should also be sufficiently expandable. Drives with 70MB of storage are often full-height rather than half-height devices. If you think you'll need two hard disks—

which is often a more economical way to upgrade storage than buying a new, bigger drive—buy a computer with space for two full-height devices and one half-height unit.

Unlike spreadsheets, data management programs are seldom combined with business graphics applications, so monitor requirements are minimal. Nonetheless, a number of data managers make excellent use of color. If screen aesthetics are important to you—and your budget supports your tastes—step up to an EGA board and display.

### Banking on the Future

The advice you find here is based on today's market. The future, as usual, is murky but promising: Tomorrow portends true multitasking, applications that use 16MB of RAM, and graphics-intensive interfaces. In other words, future software will put demands on hardware that are difficult to anticipate now.

If you want to stay on the cutting edge of software, buy a computer with an 80286 or an 80386 CPU. This will enable you to run Microsoft's long-awaited OS/2 operating system and the new genera-

### THE TEN Personal Computers Most Frequently Purchased in 1986

1. IBM PC XT
2. IBM PC AT
3. Apple IIc
4. IBM PC
5. Apple Macintosh Plus
6. Apple IIe
7. Apple Macintosh 512K
8. Compaq Deskpro
9. AT&T PC 6300
10. Compaq Deskpro 286

*Source: Storeboard Inc.*

tion of applications that will run under it. An 80386 computer has the most promise, delivering its virtual 86 mode for running several present-day applications concurrently—plus the potential to directly address up to a gigabyte of RAM. *Windows/386* already enables users to juggle their favorite applications within an elegant multitasking environment.

Nonetheless, occasional users, home users, and those with constrained budgets shouldn't be ashamed to buy into low-end, 8088-based computing. Software vendors are well aware that the vast majority of personal computers are still 8088-based PCs; software for this class of machine will continue to improve. And with today's commodity prices, buying an old-fashioned PC clone is a win-win proposition. ●

### Suggested Systems for Data Management

	VIDEO	DRIVE	CPU	OPTIONS
<i>Best</i>	EGA	100 + MB	20-MHz 80386	EMS board
<i>Midrange</i>	HGC	40MB	12-MHz 80286	EMS board
<i>Minimum</i>	HGC	20MB	8-MHz 8088	None





## MAIL ORDER—THE SMART BUY

*How do you feel about shopping by mail?*

*A survey of PC World subscribers reveals a surprisingly high level of satisfaction.*

*Survey participants rave about mail-order bargains and the convenience of door-to-door delivery.*

*But evidence shows that satisfaction isn't automatically guaranteed:*

*It's tied to smart shopping.*

*Photography by*  
ELISABET ZEILON



So confident were survey participants about mail-order shopping that they didn't hesitate to spend large sums and buy often.

#### Anita Amirrezvani

The verdict is in: Despite recent tremors in the mail-order industry—among them PC Network's Chapter 11 reorganization and the CompuSystems snafu—*PC World* subscribers like mail order. Of the 103 randomly selected subscribers we surveyed, 98 percent reported being somewhat or very satisfied with their mail-order transactions. This endorsement is good news indeed.

Many subscribers say they're reaping the rewards of careful shopping. "I check out mail-order companies before I deal with them," says Wayne Hutchinson, an electrical designer who works for a Big Three auto company in Detroit. "I look for companies that are visible, stable, and that advertise frequently. And I try to avoid the fly-by-night businesses."

So confident were survey participants about mail-order shopping that they didn't hesitate to spend large sums and buy often. In the last year, half of those who shopped by mail for their companies spent more than \$1000, and nearly one-third used mail order four or more times. Software, printers, disk drives, and PCs, in that order, were the most popular purchases.

Naturally, subscribers who shopped by mail for themselves spent less overall than corporate shoppers and purchased more home products like games and educational software. Still, this group's liberal expenditures reflect a good deal of trust: One-third made purchases totaling \$1000 or more in the last 12 months, and almost one-third shopped by mail four times or more in the same period. Of

course, most subscribers probably spent far more corporate dollars on computer goods at their local dealers.

But buying trends suggest that *PC World* subscribers purposely use mail order to get the very best deals—with a minimum of risk. Software was by far the most popular purchase, probably because it's relatively inexpensive, less prone to shipping damage than hardware, and easy to exchange if defective. Although most subscribers said they'd feel comfortable buying either software or hardware through the mail, 20 percent said they'd shy away from buying mail-order PCs. "From the standpoint of service, I would prefer to be able to get my computer or parts back ASAP instead of waiting weeks for a delivery," says David Rose, an engineering technician in Fredericksburg, Virginia.

For most shoppers, low prices and convenience play key roles in their decision to shop through the mail. People with specialized needs, like programmers and PCjr owners, look to mail-order firms as the best outlet for hard-to-find products. Others say they simply can't rely on the selection or expertise available at local stores. "The retail outlets in my area don't have an adequate stock of software; besides, they don't know any more about the products than a mail-order company," says Lea Latta, owner of Key-Strokes, a computer consulting firm in Modesto, California.

Overall, *PC World* subscribers feel that the mail-order industry has given them a fair shake. So it's no surprise that when survey participants voted on the best and the worst mail-order companies they'd dealt with, there was no quorum.

In fact, 37 percent of those who had dealt with more than one company didn't single out a favorite, and 78 percent had no *bête noire*. Even the most favored company, PC Connection, got only 18 percent of the vote. PC Network was rated worst by 8 percent.

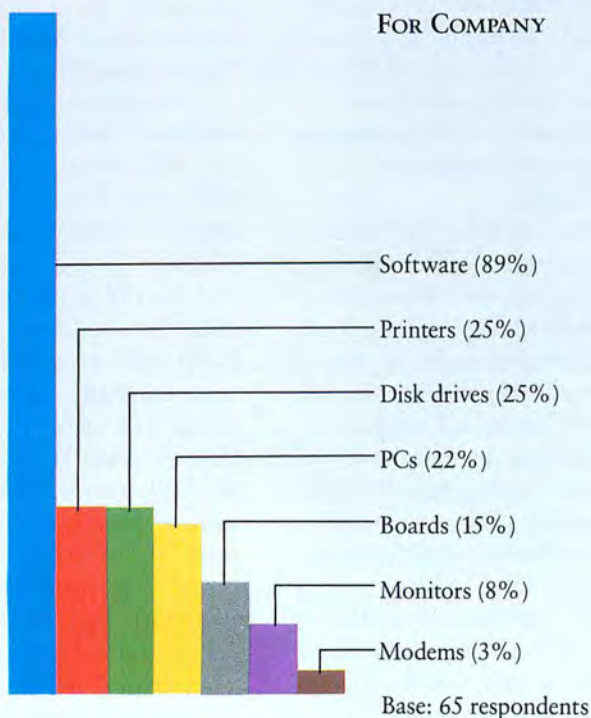
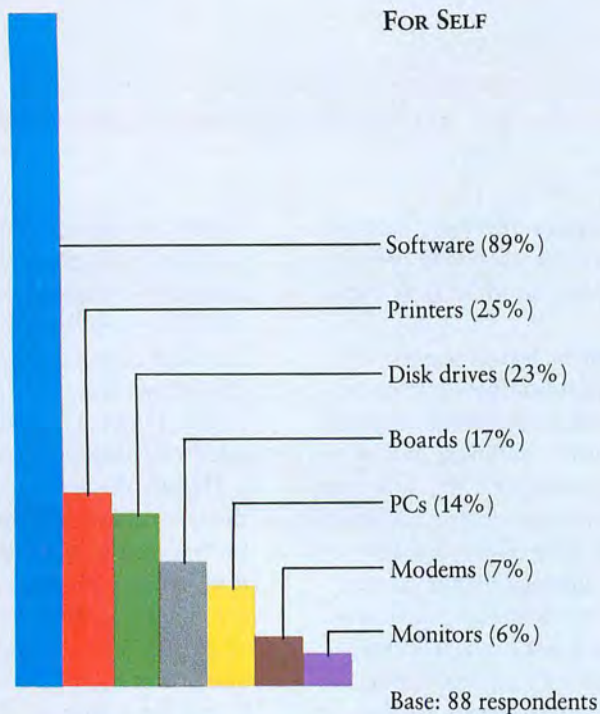
Despite this lack of consensus, the companies described as either the best or the worst had a good deal in common. When describing a company as the best, most respondents stressed good service and low prices in the same breath. "I can get a product in 24 hours and save 20 to 25 percent off retail on good-quality software, not bargain stuff," says Gary Metzger, a bookkeeper in New York City who favors Logicsoft.

Conversely, most bad experiences with mail-order companies involved poor service and outright dishonesty. Rita Margolies, a self-employed editor in Cleveland Heights, Ohio, walked into a hornet's nest of problems when she tried to buy a C compiler. Margolies, who requested that the mail-order company remain anonymous, first saw an ad for Borland's Turbo C in February 1987. After calling the mail-order company and confirming that the product was in stock, she ordered it. The sales rep promised it would be on her doorstep in ten days. After a month passed and the product didn't appear, she decided to cancel the order—and found that her credit card account had already been billed.

"It turned out there was no way the mail-order company could have had that compiler," says Margolies, "because when I called Borland and asked when it would be re-



## Software Tops the List



Some survey participants stayed away from ordering big-ticket items like PCs by mail, citing fears about shipping damage, delays, and lack of support.

leased, even they didn't know. The fact was, I spoke to six or seven people at the mail-order company, and they all lied." To top it off, Margolies' account wasn't credited until June, and only after she complained to her credit card company. Turbo C was officially released on May 15.

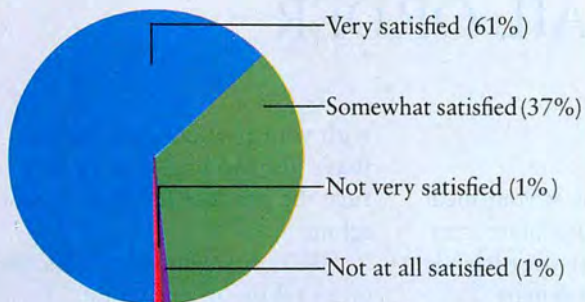
Fortunately, most companies take care of problems with more aplomb. A recent *Consumer Reports* survey of 165,000 readers found that although problems occurred in one out of five mail-order transactions, the vast majority of complaints were resolved to the customer's satisfaction.

Among *PC World* survey participants, complaints about mail-order companies were rare; and most of those who'd had problems said the difficulties had been resolved in their favor. Nonetheless, several subscribers called for the creation of a watchdog organization that would keep an eye on mail-order companies and report on the best and the worst among them. *Consumer Watch*, our regular column, covers this field and attempts to help consumers who feel they've gotten a raw deal.

But a subject as large as this one can't be adequately explored without input from readers. To help us keep the industry on its toes, let us know about your experiences with mail order. Tell us about the quality of service you receive—including purchase advice, product availability, speed of delivery, warranty terms, technical support, and repair. Send your comments to *Consumer Watch*, *PC World*, 501 Second St., San Francisco, CA 94107, or use MCI Mail PC-WORLD/179-3813, CompuServe 74055,412, or The Source STE908. Include your name, address, and daytime phone number and the name of the mail-order company you dealt with. We'll continue to air readers' comments and concerns in upcoming issues. ●



## Mail-Order Shopping Is a Boon

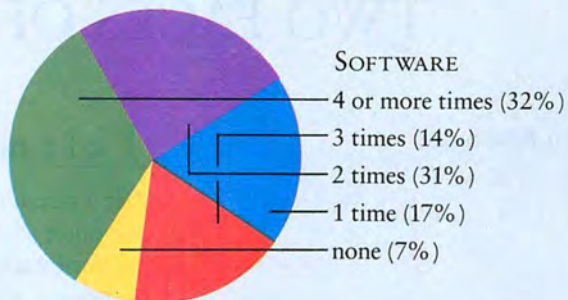


Base: 103 respondents

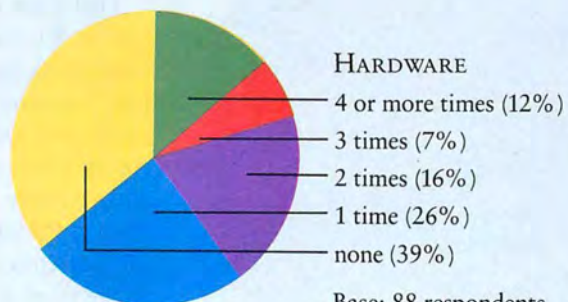
Despite occasional complaints, the vast majority of survey participants gave mail order a vote of confidence.

## Mail-Order Shoppers Buy Often

### FOR SELF



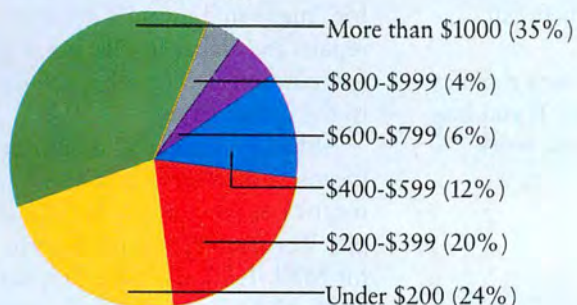
### HARDWARE



Base: 88 respondents

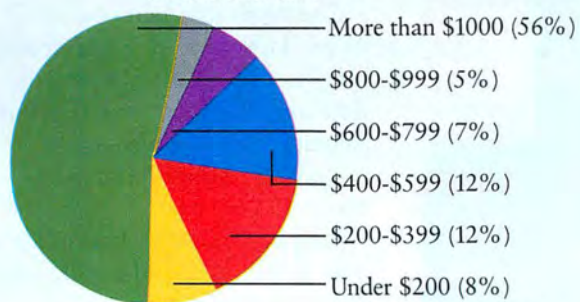
## Spending Is High

### FOR SELF



Base: 84 respondents

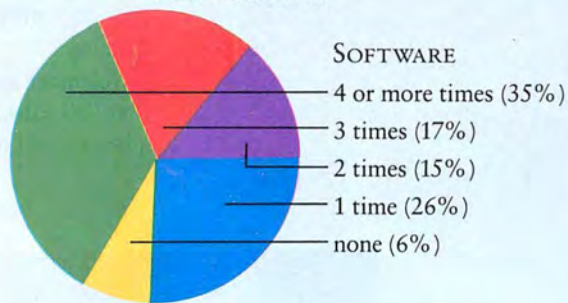
### FOR COMPANY



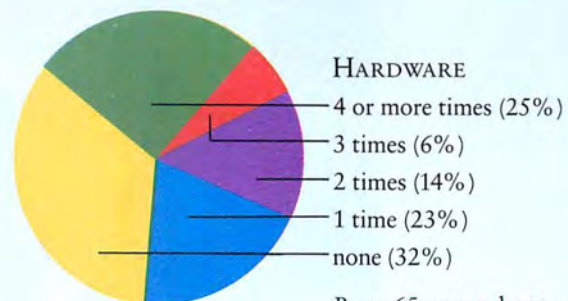
Base: 59 respondents

In the last year mail-order expenditures of more than \$1000 were quite common among *PC World* subscribers, particularly for business. (Percent totals don't always equal 100 due to rounding.)

### FOR COMPANY



### SOFTWARE



Base: 65 respondents

Surprisingly, nearly one-third of survey participants purchased software for themselves by mail 4 or more times in the past year; more than one-third bought at that rate for the workplace. Hardware was less popular. (Percent totals don't always equal 100 due to rounding.)



## TWO FACES OF MAIL ORDER

John Eckhouse

*With mail order,  
there's a clear choice.  
For rock-bottom  
prices, shop at  
companies like  
Telemart. For a host  
of services—advice,  
hand-holding, money-  
back guarantees—  
check out businesses  
like Black Box.*

### T e l e m a r t

Ask a dozen questions at your local computer store, bug manufacturers for information, pester your friends for advice—then call Telemart.

That's not really the Phoenix mail-order company's slogan, but it clearly reflects Telemart's philosophy. The company promises virtually the lowest prices in the country for computer hardware and software, but that's about all you get for your money.

"Our customers have to know where to go for hand-holding," says Telemart president Paul Farnell. "If they have questions, they have to get support from a friend, neighbor, co-worker—anywhere but from us."

Telemart also maintains a policy that "all sales are final." If you buy a board and find it won't work

with your particular PC clone, that's just too bad. You can't return the product for exchange or refund.

"We're basically a sophisticated order-taking organization," Farnell notes. "You tell us what you want, and we'll get it to your desk in 24 hours. I can't possibly take it back just because you didn't do your shopping before calling us."

Two years ago, Telemart adopted a bare-bones approach: It laid off its highly paid, technically trained salespeople in favor of mere order takers. The two technical support people still employed handle only questions about Telemart's PC clones (named MIT, which is short for "made in Taiwan"). Telemart repairs the clones it sells, but it refers customers with other problems to the manufacturer.

Although Telemart's approach means limited service, it also means low, low prices. For example, *WordPerfect* version 4.2 sells for \$189, 1-2-3 version 2.01 costs \$305, and a box of Maxell double-sided, double-density 5¼-inch disks runs \$8.25.

The company claims to sell all its products at 35 to 50 percent off list price. As a kicker, it pays the difference between air and ground shipments on all orders under 10 pounds. That saves customers about \$5 per order.

Telemart has been around for only about three-and-a-half years, but it's part of a company that dates back to 1980. The parent company, of which Farnell is also president, is called CW Marketing. It began operations as the Comput-

'Our customers have to know where to go for hand-holding,' says Telemart president Paul Farnell.





'The high level of customer support we give distinguishes us from every other mail-order company,' claims Black Box's Peter Highberg.



er Warehouse and still operates a mail-order business and a three-store retail computer chain under that name. CW also has a third mail-order outlet called Silicon Specialties.

CW found that the most successful sales method was to offer extremely low prices and fast delivery, so now all three mail-order companies operate on that principle. Telemart does most of the advertising, however.

Asked to comment on other mail-order chains that stress service over low prices, Farnell says, "That's quite proper; we've just decided to go another way." It seems to work: CW projects sales of about \$50 million this year, of which 80 percent will come from mail order.

## Black Box

For mail-order shoppers who want to be pampered, Black Box Corporation is an oasis. The Pittsburgh company sells virtually all its products at full retail prices, differentiating itself in the crowded, discount-oriented computer mail-

order business by providing an almost unheard-of level of service.

Black Box has 25 technicians on duty 12 hours a day to handle inquiries from clients and potential customers. The techs answer questions about products, offer advice, troubleshoot, and even talk novice buyers through complex installation procedures.

"This is what we call the Black Box difference. The high level of customer support we give distinguishes us from every other mail-order company," claims Peter Highberg, vice president of marketing and sales. "Although we want customers to buy from us, we even recommend products we don't carry if we feel that'll be best for their problem. We think customers will appreciate this and eventually come back to Black Box."

The company also offers one of the strongest warranties in the industry. Customers can try any hardware product for 60 days and return it during that period for a full refund for any reason, even if

they just don't like its color. Black Box manufactures about 50 percent of the products it carries and offers its own one-year warranty on every item it sells and a lifetime warranty on its switches and cables. Black Box even sends customers a loaner if a defective product is being repaired under warranty.

The company started out a decade ago selling data communications products such as switches, cables, modems, and interface converters, then added books and some communications software such as *Crosstalk*. Sales had reached about \$14 million five years ago when Black Box was purchased by Micom Systems for about \$17 million. Highberg says sales hit \$61 million in 1986.

Last April, Black Box made its first strong push into the software business by purchasing International Software Data Base Company of Fort Collins, Colorado. That firm has spent the past seven years compiling an on-line data base of some 175,000 software programs that are kept in stock and sold under the company name Menu.

Black Box plans to sell subscriptions to the data base to corporations and individuals for an annual fee of about \$200. The fee pays for a limited number of searches, but the programs cost extra.

Black Box currently has about 400 employees, making it one of the largest high-tech employers in the Pittsburgh area. It recently installed a bank of fax machines so customers can place orders or ask technical questions 24 hours a day.

"Our intent is to satisfy customers and make sure they enjoy doing business with us," Highberg says. ●



## MAIL-ORDER DIRECTORY



Anita Amirrezvani

*Part of getting a good deal is knowing where to shop. But finding a mail-order outlet that offers the products and services you need can take some work. In this special guide, 50 mail-order companies bare their policies on everything from financing to money-back guarantees.*

Until now, few publications have scrutinized mail-order companies from the customer's point of view. Shoppers have had to dig for information on their own, poring over ads and catalogs or grilling salespeople. But sales pitches can be confusing or incomplete, and it's not always easy to wrest details from a salesperson eager to take your order.

The pages that follow contain a guide to 50 mail-order companies in a format that makes comparison-shopping easy. By covering issues of special concern—payment policies, delivery time, technical support, and warranties—the Directory offers a comprehensive look at each company from the perspective of customer service. *PC World* in no way endorses the companies listed; our intention is to arm our readers with the information they need to make smart choices.

The Mail-Order Directory purposely includes a wide range of companies that serve different needs. Dell Computer (d/b/a PC's Limited), for example, manufactures and sells its own line of hardware; 47th Street Computer sells a potpourri of products at bargain

prices; PC-SIG focuses on shareware. Some of the companies listed stress discounts; others charge more but emphasize service. With the Directory in hand, you can determine which company offers the best mix of products and services for your needs. This explanation of the table will help you get the most out of it:

*Size and ownership.* Along with the basics—company name, address, phone number, hours of operation—we've listed the year each company was founded. Longevity may not guarantee good service, but it certainly implies it. The president's or owner's name and a customer service contact are also included.

To provide some perspective on the size of each company, we've listed the number of employees. (Annual sales figures, a good indicator of size, are not available for many of the companies because they're privately owned.) Finally, we note whether a company's salespeople are paid on commission—a fact that can sometimes help you determine if you're being pushed into a sale.

*Types of products.* The listings under hardware, software, and ac-

*Illustration by*  
ANTHONY RUSSO



The Mail-Order Directory offers a comprehensive look at 50 mail-order companies from the perspective of customer service.

cessories provide a general idea of each company's range of offerings. Note, however, that most companies refused to answer questions about gray-market products (products they are not authorized by the manufacturer to sell). "Everybody in the business sells gray market," claimed one industry executive. "But if you ask, they'll either lie and say they don't, or they'll say they can't discuss it." Authorized dealers for products manufactured by IBM and Compaq, among others, are bound by contract not to sell these products to unauthorized retailers. But some do.

There's no harm in buying gray-market hardware as long as you know that's what you're getting. It's much cheaper to go this route than to buy from an authorized dealer; the disadvantage is that manufacturers' warranties may not apply. Of course, the best way to find out if a mail-order company is authorized for a given product is to ask. Although some companies claim to be authorized for all the products they sell, it's worthwhile to double-check before you buy: Call the hardware manufacturer and ask if the mail-order company is an authorized dealer.

If you're buying software, be sure to confirm that the version you're getting is the latest release. The software vendor is the best source for this information.

**Financing.** Payment options vary widely. If a mail-order company accepts company purchase orders or credit cards, you're better off than if you dispatch a money order or a check that can be cashed right away. Credit cards are probably

safest because you can involve the credit card issuer in case of a dispute. But here's a caveat: Some companies levy a surcharge on credit card purchases. This usually shows up in ads as a "discount for cash" and is noted in the Directory. Moreover, some firms bill credit card accounts before shipping orders, which can be annoying if delays occur and interest accrues. Check the Directory and ask before buying.

**Delivery.** The vagaries of delivery charges and shipping times make these subjects difficult to pin down. Usually, delivery charges vary according to the weight of the product, the speed of delivery, and where you live. In the "Delivery Charge" column of the Directory, *shipping* means that standard charges apply for UPS ground or air shipping and for Federal Express. *Shipping/handling* means you'll also have to pay a variable fee for handling. Note that some companies slap on a flat fee; others levy a minimum charge; still others ship for free.

Although delivery times also vary tremendously, most of the mail-order companies we contacted quoted an average delivery time (often a range). Before ordering, it's wise to ask whether the product you want is in stock and how soon it will be shipped. Check the Directory for information on COD shipping policies—a safe and convenient way to shop.

**Technical support.** Some companies are more committed than others to after-sales support. The Directory lists the days and hours a company's technical support staff (if any) is available; you can tell from the number whether it's toll-

free or on your own nickel.

**If there's trouble.** It's comforting to know what to expect if the product you order doesn't work out. The Directory includes information on money-back guarantees and on restrictions such as "restocking" fees. We've also noted whether warranties are provided by the manufacturer or the mail-order company; whether a repair center exists on site; and what the average turnaround time is for repairs.

It may seem strange that some companies with on-site repair centers indicate that their products are covered only by manufacturers' warranties. In some cases, the mail-order companies are authorized by the manufacturer to perform repairs; in others, they provide repair services for gray-market goods and for the clones that bear their own brand names.

**Flux is inevitable.** Naturally, this guide is subject to change. Before buying a product through the mail, call and confirm that the services you need are available. Use the "Mail-Order Shopping Report" (see page 251) to compare companies on price and service. Get a written guarantee on any particularly sensitive points. If a problem occurs, contact the company and try to resolve it, keeping a careful record of your efforts. If that doesn't work, write *Consumer Watch*, c/o *PC World*, and send copies of your letter to the mail-order company, the local Better Business Bureau, and the state attorney general's office (see listings in this issue). These organizations, *PC World* included, will help mediate disputes. ●



Name, address, order number, hours open (all times are local unless otherwise specified)	Year founded	Owner (or President) Head of customer service	Number of employees	Salespeople paid on commission?	Product catalog available?	Hardware sold (PCs, monitors, printers, boards, modems)	Number of software titles	Accessories sold (paper, furniture, disks, cables)	Personal checks accepted?	Days for check to clear	Credit cards accepted
47th Street Computers 36 E. 19th St. New York, NY 10003 800/221-7774 9-6 M-Th 9-2 F 10-4 Sun	1965	Irving Goldstein Joe Friedman	400	●	all	1000	all		● 0		AmEx, MC, Visa
707 Computer Sales 707 Dartmouth Dr. Buffalo Grove, IL 60089 800/426-CITY 312/537-3600 9-5:30 M-F	1982	Darryl Moskowitz Tom Wall	8	●	all	0	cables		● 10		MC, Visa
800-Software 940 Dwight Way #4 Berkeley, CA 94710 415/644-3611 7:30-5:30 M-F 10-2 Sat	1982	Steve Brown Sarah Chambers	95	●	● all	2000	disks, cables		● 0		AmEx, MC, Visa
Aerocomp 2544 W. Commerce St. Dallas, TX 75212 800/527-0347 (orders) 214/634-3336 9-7 M-F 9-3 Sat	1979	John Lancione Fred Raymond, Kelly Harring	22	●	all	1500	all		● 0		AmEx, MC, Optima, Visa
AMT 14751 Franklin Ave. Tustin, CA 92680 714/731-6800 213/477-6320 LA 415/490-7967 SF 8-5 M-F	1984	Perry Lamba J. B. Said	20	●	all	0	disks, cables		● 14		MC, Visa
Arlington Computer Products 3025-E S. Malmo Arlington Heights, IL 60005 800/548-5105 312/228-6333 8:30-6:30 M-F	1984	Arly Gunther Kathy Stanton	16		all	15	disks, cables		● 10		AmEx, MC, Visa
BCE 3832 S. Four Mile Run Dr. Arlington, VA 22206 800/545-7447 (orders) 703/824-9200 9-8 M-F	1984	Paul Sailer Leslie Ries	60		● all	15-20	disks		● 0		MC, Visa
Bell Atlantic Business Supplies 456 Creamery Way Exton, PA 19341 800/523-0552 8-5 M-F	1983	Marvin Venable Marilyn Nathan	55	●	● modems	8-10	all		● 0		AmEx, MC, Visa
Black Box P.O. Box 12800 Pittsburgh, PA 15241 412/746-5500 8-8 M-F	1977	Micom Systems William Bradley	450		● modems, etc.	175,000	data cables, switches, connectors		● 10		AmEx, Diners Club, MC, Visa
Bulldog Computer Products 3241 E. Washington Rd. Martinez, GA 30907 800/438-6039 404/860-7364 9-6 M-F	1982	Jim Drawdy Maurie West	18	●	all	300	disks, cables, ribbons		● 10		AmEx, MC, Visa
Businessland Direct Division 1001 Ridder Park Dr. San Jose, CA 95131 800/551-2468 6-5 M-F	1982	David Norman, president Miles Walsh	17		● none	200	all		● 5-15		AmEx, Business- land, MC, Visa

① no answer

② varies



Surcharge for credit cards?	Credit cards billed before shipment?	Company P.O.s accepted?	Delivery charge	Average delivery time (days)	Goods sent COD?	Technical support hours and phone number	Money-back guarantee?	Restocking fee	Warranty (m = manufacturer's only)	Repair center on site?	Turnaround time for repairs (days)
0	●	●	\$6.95 min.	7-10	\$50 min.; 10% deposit required	9-4 M-Th 9-11 F 800/847-4191	②	②	m	●	②
3%		●	shipping	2	with cashier's check	9-5:30 M-F 800/426-CITY	30 days on hardware	20%	m	●	2
0		●	shipping/handling	2	\$1000 max.	8-5 M-F 415/644-3611	②	②	m	n/a	n/a
0		●	shipping	1	deposit required for orders over \$500	9-12:30/ 1:30-6 M-F 214/638-8886	30 days on hardware	none	1 year	●	1
3%		●	shipping	7-10	●	9-4 M-F 714/731-5914	none	n/a	m	●	2
3%		●	shipping	ships in 2 days	●	8:30-6:30 M-F 312/228-1470	90-day replacement if defective	n/a	m	●	2
0			shipping/handling	7-10		9-5 M-F 703/845-2662	7 days	20% (\$20 min. \$80 max.)	m		n/a
0	●	●	shipping	3-7	●	8-5 M-F 800/523-0552	90 days	none	1 year		1
0		●	free	1	●	8-8 M-F 412/746-5565	60 days	after 60 days 10-50% depending on purchase date, up to one year	1 year (lifetime for some items)	●	5 max.
3%		●	3% of order	2-10	●	9-6 M-F 404/860-7034	30-day replacement guarantee if defective	15% if not compatible	90 days	●	2
0		●	free for prepaid orders	3-4		available for a fee	15-day replacement guarantee if defective	15%	②	n/a	n/a

① no answer

② varies



Name, address, order number, hours open (all times are local unless otherwise specified)	Year founded	Owner (or president) Head of customer service	Number of employees	Salespeople paid on commission?	Product catalog available?	Hardware sold (PCs, monitors, printers, boards, modems)	Number of software titles	Accessories sold (paper, furniture, disks, cables)	Personal checks accepted?	Days for check to clear	Credit cards accepted
Chicago Computer Connection 5239 N. Harlem Ave. Chicago, IL 60656 312/774-0091 9-7 M-F	1985	Don Collins, Curt Hawley Gayl Jarwosky	6	●	●	all	400	all	●	10	AmEx, MC, Visa
Club AT 46707 Fremont Blvd. Fremont, CA 94539 415/490-2201 7:30-6:30 M-Sat	1986	Neilan Mehta David DelGreco	120	●	●	all	0	none	●	2	AmEx, MC, Visa
CMO 477 E. Third St. #A103 Williamsport, PA 17701 800/233-8950 9-9 M-F	1980	Scott Shauffer Patrick Blair	100	●	●	all	1000	disks	●	15	AmEx, Diners Club, MC, Visa
Compuclassics 6934 Canby St. #109-110 Reseda, CA 91335 800/328-4473 800/231-6603 CA 818/705-1895 7:30-6 M-F 10-2 Sat	1982	Philip Cramer Anita Bilar	20			all	600	disks, cables	●	1	AmEx, MC, Visa
Computer Direct 22292 N. Pepper Rd. Barrington, IL 60010 312/382-5050 8-8 M-F 9-12 Sat	1980	John Steele Diana Paramski	125	●	●	all	2000	all	●	10	MC, Visa
Computer Discount Warehouse P.O. Box 3048 Northbrook, IL 60065 800/233-4426 312/498-1426 IL 7:30-7:30 M-F	1980	Mike Michaels John Marks	35	●		all	5	disks, surge protectors, cables	●	10	AmEx, MC, Visa
Dartex Computer Supply 421 Eisenhower Ln. S Lombard, IL 60148 800/323-1872 (orders) 312/495-9000 7:30-6 M-F	1979	Daniel R. Randolph, president Mike Craig	25		●	all	20-30	all	●	0	AmEx, MC, Visa
Dell Computer/PC's Limited 1611 Headway Circle Bldg. 3 Austin, TX 78754 800/426-5150 (orders) 512/339-6800 7-7 M-F 9-2 Sat	1984	Michael Dell Ralph Merriman	400	●		all	0	none	●	0	AmEx, MC, Visa
Devoke Data Products 1500 Martin Ave. Santa Clara, CA 95050 408/980-1360 6-5 M-F	1963	Norman Bunas, president Michelle Bernal	500		●	modems	0	all	●	0	MC, Visa
Disk World 2200 W. Greenleaf Rd. Evanston, IL 60202 312/492-5060 8:30-5 M-F	1983	Rose Carroll Susan McMahon	12			none	0	disks, cases	●	0	MC, Visa
The Drawing Board Greenwood's Industrial Park P.O. Box 2995 Hartford, CT 06104-2995 203/379-9911 8-5 M-F	1952	Pitney-Bowes Bob Munson	500	①	●	none	0	all	●	5	AmEx, MC, Visa

① no answer

② varies



Surcharge for credit cards?	Credit cards billed before shipment?	Company P.O.s accepted?	Delivery charge	Average delivery time (days)	Goods sent COD?	Technical support hours and phone number	Money-back guarantee?	Restocking fee	Warranty (m = manufacturer's only)	Repair center on site?	Turnaround time for repairs (days)
10%	●	shipping		5-8		10-5 M-F 312/763-3661	30 days (if not compatible with software or defective)	none	m	●	2
0	●	free for prepaid orders		ships in 1 day	●	8-5 M-F 415/683-6580	30 days	none	m	●	1
3% MC, Visa; 6% AmEx	●	3% of order, \$7 min.		ships same day	●	9-6 M-F 800/233-8950	30 days on defective systems; no compatibility guarantee	10%	m	●	5
2% AmEx	●	\$4 min.		3-7	●	8-5:30 M-F 800/328-4473 800/231-6603 CA	30 days on defective systems	15% if not defective	m		n/a
0	●	shipping		7-10	●	8:30-4:30 M-F 312/382-2882	15 days	none	90 days		n/a
3%		\$5		3-7	with cashier's check	9-5 M-F 312/498-1426 IL 800/233-4426	none	n/a	m	●	2
0	●	free for prepaid orders		3-5	●	7:30-5 M-F 800/323-1872	45 days	none if in original package	m	●	5-10
0	●	free		10-15	●	7-7 M-F 800/624-9896	30 days	none	1 year	●	1
0	●	shipping		3-5	●	8-5 M-F 800/822-3132	45 days	20%	m		n/a
0	●	\$3 per 100 disks		7-14	●	n/a	30 days	none	lifetime	n/a	n/a
0	●	shipping plus \$1.95 handling		1		8-5 M-F 203/379-9911	1 year	none	1 year	n/a	n/a

① no answer  
② varies



Name, address, order number, hours open (all times are local unless otherwise specified)	Year founded	Owner (or president) Head of customer service	Number of employees	Salespeople paid on commission?	Product catalog available?	Hardware sold (PCs, monitors, printers, boards, modems)	Number of software titles	Accessories sold (paper, furniture, disks, cables)	Personal checks accepted?	Days for check to clear	Credit cards accepted
Global Computer Supplies 45 S. Service Rd. Plainview, NY 11803 800/845-6225 9-5 M-F (all time zones)	1961	① Gloria Tyson	400	●	all	100	all	● 0			AmEx, MC, Visa
Inmac 2465 Augustine Dr. San Mateo, CA 95051 408/737-7777 714/641-3100 8-5 M-F	1970	Ken Eldred, president Harry Fekkes, vice president, sales	350	●	● none	24	all	● 0			MC, Visa
Jade Computers P.O. Box 5046 Hawthorne, CA 90251-5046 800/421-5500 800/262-1710 CA 213/973-7707 8-5 M-F	1976	John Leeper Lil Tominata	25	●	● all	100	furniture	● 7			AmEx, MC, Visa
JDR Microdevices 110 Knowles Dr. Los Gatos, CA 95030 800/538-5000 (orders) 408/866-6200 7:30-5 M-F	1979	Jeff Rose Reyna Gooding	100		● all	0	disks, cables	● 0			MC, Visa
Logisoft 110 BiCounty Rd. Farmingdale, NY 11735 800/645-3491 (credit cards) 800/431-9037 (corporate accounts) 516/249-8440 9-6 M-F	1983	David Pasternack Andrea Rosser	250	●	● all	3600	ribbons, cables	● 0			AmEx, MC, Visa
Midwest Micro-Peripherals 6910 U.S. Route 36 E Fletcher, OH 45326 800/423-8215 (orders) 513/368-2309 9-6 M-F	1982	Mark Runkel Rick Wilt	25	●	● periph- erals	5	paper, disks, cables, ribbons	n/a			AmEx, MC, Visa
Misco One Misco Plaza Holmdel, NJ 07733 800/631-2227 201/946-3500 9-5 M-F (all time zones)	1977	Gillette Karen Oliver	130	●	● none	0	all	● 5			MC, Visa
Modem Mart 905 Bassett Rd. Westlake, OH 44145 800/321-2510 (ordering/ service) 216/835-8400 8-6 M-F	1976	Avis Enterprises Ed Rimmel	105	●	● modems, 0 etc.	0	none	n/a		none	
Moore Business Products P.O. Box 20 Wheeling, IL 60090 800/323-6230 312/520-3245 ext. 216 7-7 M-F (all time zones)	1981	Moore's Business Forms Wendy Blanchfield	150	●	● none	0	all	● 0			AmEx, MC, Visa
Nitro Micro 120 W. Main St. Carmel, IN 46032 800/382-3888 317/843-1403 IN 9-9 M-F 12-5 Sat	1986	Robert Hayes, president Paula Stoops	12	●	● all	900	all	● 15			MC, Visa

① no answer

② varies



Surcharge for credit cards?	Credit cards billed before shipment?	Company P.O.s accepted?	Delivery charge	Average delivery time (days)	Goods sent COD?	Technical support hours and phone number	Money-back guarantee?	Restocking fee	Warranty (m = manufacturer's only)	Repair center on site?	Turnaround time for repairs (days)
0	●	shipping		ships in 1 day		9–5 M–F (all time zones) 800/845-6225	30 days	case by case if not in original package	m		n/a
0	●	free	1		●	6–5 M–F 800/527-8522 CA 800/527-8523	45 days	none for first 45 days	1 year	● ②	
0	●	shipping	5–7		cashier's check required over \$500	9–12 M–F 800/421-5500	10 days on hardware	15%	m		n/a
0	●	shipping	7–10		●	8:30–4 M–F 408/866-6200	30 days	none	1 year		n/a
0	●	free	1		cashier's check required over \$1000	9–5 M–F 800/645-3491 800/431-9037 (corporate accounts)	30 days	none	m	● 2	
0		shipping	2–10			8:30–5 M–F 513/368-2307	replacement under warranty	none	m		n/a
0	●	shipping	1			9–5 M–F (all time zones) 800/631-2227	30-day free trial period; 1-year money-back guarantee	none	m		n/a
0	n/a	●	shipping	2	●	8–6 M–F 800/321-2510	30 days	20% 30–90 days after purchase	m	● 10	
0	●	shipping	3–7			7–7 M–F (all time zones) 800/323-6230	30 days	none	6 months	n/a	n/a
0		2% of order	3–7		●	9–9 M–F 12–5 Sat 800/382-3888	15 days	none	m	● 2–5	

① no answer

② varies



Name, address, order number, hours open (all times are local unless otherwise specified)	Year founded	Owner (or president) Head of customer service	Number of employees	Salespeople paid on commission?	Product catalog available?	Hardware sold (PCs, monitors, printers, boards, modems)	Number of software titles	Accessories sold (paper, furniture, disks, cables)	Personal checks accepted?	Days for check to clear	Credit cards accepted
pcAmerican 17151 Newhope #104 Fountain Valley, CA 92708 800/654-5365 714/754-1154 CA 8:30-5:30 M-F 9-2 Sat	1985	Phil Herman Richard Boucher	7		●	all	1000	none	●	10	AmEx, MC, Visa
PC Connection 6 Mill St. Marlow, NH 03456 800/243-8088 (orders) 603/446-3383 9-9 M-F 9-5:30 Sat	1982	David Hall, Patricia Gallup Peter Haas	150			all	500	all	●	5	MC, Visa
PC Mart 1485 Northeast Expressway NE Atlanta GA 30329 800/241-0286 404/634-5995 8-8 M-F 10-5 Sat	1975	Grey Hodges Pat Carew	12	●	●	all	250	paper, disks, cables	●	5	AmEx, MC, Visa
PC-SIG 1030 E. Duane Ave. #D Sunnyvale, CA 94086 800/245-6717 800/222-2996 CA 408/730-9291 8-5 M-F	1983	Richard Peterson Linda York	6-8	①	●	none	820 (share- ware only)	none	●	0	MC, Visa
PC Source 12303-G Technology Blvd. Austin, TX 78727 800/626-4029 8-5 M-F	1982	① John Nichols	200		●	all	0	all	●	10	MC, Visa
PC Systems 3705 Shares Pl. West Palm Beach, FL 33404 305/863-8446 9:30-6 M-F	1983	Stuart E. Fason Kimberly Fleming	22			all	0	none	●	7	AmEx, MC, Visa
Priority One Electronics 21622 Plummer St. Chatsworth, CA 91311 800/423-5922 818/709-6789 6-5 M-F	1977	Heath Kline, Heath Group Ltd. Mike Lucas	130	①	●	all	100	paper, furniture, cables, ribbons	●	0	MC, Visa
Pryor 224 William St. Bensonville, IL 60106 800/558-6866 (orders) 312/860-3100 7-6 M-F	1959	Lee Pryor Cherry Smith	260		●	none	0	all	●	0	AmEx, MC, Visa
QIC Research 753 Ames Ave. Milpitas, CA 95053 408/942-8086 7:30-5:30 M-F 10-3 Sat	1984	Jonathan Wan Chuck Wilhelm	56	●	●	all	0	cables	●	7	AmEx, MC, Visa
Qubié 507 Calle San Pablo Camarillo, CA 93010 800/821-4479 805/987-9741 8-5 M-F 8-11 Sat	1982	Charles E. Smith, Jr., president Donna Gard	30	●		all	0	cables	●	18	MC, Visa

① no answer

② varies



Surcharge for credit cards?	Credit cards billed before shipment?	Company P.O.s accepted?	Delivery charge	Average delivery time (days)	Goods sent COD?	Technical support hours and phone number	Money-back guarantee?	Restocking fee	Warranty (m = manufacturer's only)	Repair center on site?	Turnaround time for repairs (days)
2% MC, Visa; 5% AmEx			shipping	3-7		8:30-5:30 M-F 714/754-1154	30 days	20% if not defective	m	●	1-2
0	●	\$3	1	\$1000 max.		9-9 M-F 9-5:30 Sat 800/722-8324	②	15% if not defective	4 months	●	1
2% AmEx	●	●	shipping	2-5	●	8-8 M-F 10-5 Sat 800/241-0286	15-day exchange	n/a	m	●	2
0	●	\$4 per order	7-10	\$25 min.		8-5 M-F 408/730-9291	lifetime guarantee on defective merchandise	n/a	n/a	n/a	n/a
0	●	free UPS ground	3-7	\$50 min.		8-5 M-F 800/527-3125	30 days	after 30 days, variable fee	1 year	●	2
②	●	\$5 min.	3-7	10% deposit required		9:30-6 M-F 305/863-8446	7 days from delivery	none	m	●	1
0	●	shipping	3-7			10-2:30 M-F 818/709-6789	7 days	after 7 days, variable fee	m	●	7 max.
0	●	shipping	ships in 1 day			7-6 M-F 800/882-8833	30 days	none	30 days		n/a
0	●	shipping	ships in 1 day	●		7:30-5:30 M-F 408/945-0651	30 days	none	1 year		n/a
0	●	free shipping except on purchase orders	3-10	with cash or cashier's check		8-5 M-F 8-11 Sat 805/987-9741	30 days	none	1 year	●	2

① no answer

② varies



Name, address, order number, hours open (all times are local unless otherwise specified)	Year founded	Owner (or president) Head of customer service	Number of employees	Salespeople paid on commission?	Product catalog available?	Hardware sold (PCs, monitors, printers, boards, modems)	Number of software titles	Accessories sold (paper, furniture, disks, cables)	Personal checks accepted?	Days for check to clear	Credit cards accepted
Silicon Express 5955 E. Main St. Columbus, OH 43213 800/228-0755 800/225-0755 OH 614/868-6868 9-9 M-F	1984	Fred Ashbough Gerry Saul	10		●	periph- erals	2200	paper, disks, cables, ribbons	● 10		MC, Visa
Telemart 2222 E. Indian School Rd. Phoenix, AZ 85016 800/426-6659 602/944-1037 6-6 M-F	1980	①	60	②		all	350	furniture, disks, cables	● 15		MC, Visa
Tussey Computer Products P.O. Box 1006 State College, PA 16804 800/468-9044 (orders) 814/234-2236 9-9 M-Th 9-6 F 10-6 Sat 12-6 Sun	1984	Pete Sattler Amy Burd	20	●	●	all	disks	disks	● 10		MC, Visa
Uarco 121 N. Ninth St. Dekalb, IL 60115 800/435-0713 815/756-9581 IL 7:30-6 M-F	1892	Uarco Business Forms Gayle Avii	①	①	●	periph- erals	0	all	● 5		MC, Visa
USA-FLEX 135 Brandon Dr. Glendale Heights, IL 60139 800/872-3539 7-7 M-F 10-3 Sat	1977	Chuck Wolande, Phil Corcoran Dave Keilman	80	●	●	all	0	disks, cables	n/a		MC, Visa
Visible Computer Supply 3626 Stern Ave. St. Charles, IL 60174 800/323-0628 312/377-0990 IL 7-7 M-F	1942	Wallace Computer Services, Inc. Sue Mazzie	100		●	none	0	all	● 0		AmEx, Diners Club, MC, Visa
Warehouse Data Products 2701 W. Glendale Ave. Phoenix, AZ 85051 800/421-3135 602/246-2222 AZ 6-9 M, W, Th 6-6 T, F, Sat	1979	Arbor Industries Bill Dirks	56	●		all	1100	disks, cables	● 14		MC, Visa
Whole Earth Electronics 2990 7th St. Berkeley, CA 94710 800/323-8080 415/653-7758 CA 8-5 M-F	1987	Gene Farb, president Vincent Yu	11		●	all	200	furniture, disks, cables	● 7		MC, Visa

① no answer

② varies



Surcharge for credit cards?	Credit cards billed before shipment?	Company P.O.s accepted?	Delivery charge	Average delivery time (days)	Goods sent COD?	Technical support hours and phone number	Money-back guarantee?	Restocking fee	Warranty (m = manufacturer's only)	Repair center on site? Turnaround time for repairs (days)
0	●	\$3	10	●	9-5 M-F 614/868-6868	30 days; exchange only	20%	m	n/a	
0	●	shipping	3-7	for orders between \$250 and \$1000	8-1 M-F 602/944-1037	none	n/a	m	n/a	
1.9%	●	\$4 per order up to 8 lbs. for Federal Express	2	\$3-per-box surcharge	9-5 M-F 800/468-9044	none	none for unopened items	m	● 5	
0	●	● shipping	2	●	7:30-5 M-F 800/435-5555	90 days	none	m	n/a	
0	●	shipping/handling	7	\$250 min. for first-time buyers; handling surcharge	8:30-5:30 M-F 312/351-7172	30 days	20% if not defective	m	● ②	
0	●	shipping	2	●	7-7 M-F 800/323-0628	30 days	none	m	n/a	
0	●	\$5 for software; higher for systems	2-5		9-5 M-Sat 602/246-2222	none	n/a	m	● ②	
0	●	● free shipping on systems; \$3 min.	7 max.	\$50 min.; \$5 surcharge; deposit required	8-5 M-F 800/323-8080 415/653-7758	30 days	none	m	● 1	

① no answer

② varies



## WHEN ALL ELSE FAILS...



Here's a list of attorney generals' offices and the names and phone numbers of employees responsible for consumer protection. Typically, these offices mediate disputes between consumers and businesses, provide educational programs, and take action against companies that don't comply with the law. The following list, provided by the U.S. Office of Consumer Affairs, was excerpted from the *Consumer's Resource Handbook*, an excellent guide to government consumer protection offices; Better Business Bureaus; industry consumer contacts; and arbitration associations. Free single copies of the handbook are available by writing *Handbook*, Consumer Information Center, Pueblo, CO 81009.

*Illustration by*  
ANTHONY RUSSO

### Alabama

Michael A. Bownes, Acting  
Director  
Consumer Protection Division  
Office of Attorney General  
11 S. Union St.  
Montgomery, AL 36130  
205/261-7334, 800/392-5658  
Alabama

### Alaska

Robert E. Mintz, Acting Chief  
Consumer Protection Section  
Office of Attorney General  
1031 W. Fourth Ave. #110  
Anchorage, AK 99501  
907/279-0428

James C. Hayes, Investigator  
Office of Attorney General  
100 Cushman St. #400  
Fairbanks, AK 99701  
907/456-8588

### Arizona

Patrick Murphy, Chief  
Counsel  
Financial Fraud Division  
Office of Attorney General  
1275 W. Washington St.  
Phoenix, AZ 85007  
602/255-3702 fraud only,  
800/352-8431 Arizona

John F. Kelly, Assistant Attorney General  
Financial Fraud Division  
Office of Attorney General  
402 W. Congress St. #315  
Tucson, AZ 85701  
602/628-5501



## Arkansas

*Tom J. Hicks, Director*  
Consumer Protection Division  
Office of Attorney General  
201 E. Markham St.  
Little Rock, AR 72201  
501/371-2341 voice and TDD,  
800/482-8982 voice and  
TDD in Arkansas

## California

*Michael A. Kelley, Director*  
California Department of  
Consumer Affairs  
1020 N St.  
Sacramento, CA 95814  
916/445-0660 complaint assis-  
tance, 916/445-1254 con-  
sumer information,  
916/322-1700 TDD

Public Inquiry Unit  
Office of Attorney General  
1515 K St. #511  
P.O. Box 944255  
Sacramento, CA 94244  
916/322-3360, 800/952-5225  
California, 800/952-5548  
TDD in California

California Department of  
Consumer Affairs  
107 S. Broadway, Rm. 8020  
Los Angeles, CA 90012  
213/620-4360, 213/620-2179  
TDD

## Colorado

*Helen Davis, Consumer and  
Food Specialist*  
Department of Agriculture  
1525 Sherman St., 4th floor  
Denver, CO 80203  
303/866-3561

*Garth C. Lucero, Chief*  
Consumer Protection Unit  
Office of Attorney General  
1525 Sherman St., 3rd floor  
Denver, CO 80203  
303/866-5167

## Connecticut

*Mary M. Heslin,  
Commissioner*  
Department of Consumer  
Protection  
State Office Building  
165 Capitol Ave.  
Hartford, CT 06106  
203/566-4999, 800/842-2649  
Connecticut

*Robert M. Langer, Assistant  
Attorney General*  
Antitrust/Consumer  
Protection  
Office of Attorney General  
30 Trinity St.  
Hartford, CT 06106  
203/566-5374

## Delaware

*Donald E. Williams, Director*  
Division of Consumer Affairs  
Department of Community  
Affairs  
820 N. French St., 4th floor  
Wilmington, DE 19801  
302/571-3250

*William Erhart, Deputy-in-  
Charge*  
Economic Crime/Consumer  
Rights Division  
Office of Attorney General  
820 N. French St.  
Wilmington, DE 19801  
302/571-3849

## District of Columbia

*Donald G. Murray, Director*  
Department of Consumer and  
Regulatory Affairs  
614 H St. NW  
Washington, DC 20001  
202/727-7000

## Florida

*Helen S. Webb, Assistant  
Director*  
Department of Agriculture  
and Consumer Services  
Division of Consumer Services  
508 Mayo Building  
Tallahassee, FL 32399  
904/488-2226, 800/327-3382

information and education  
in Florida, 800/342-2176  
TDD in Florida

*Sheldon Zipkin, Chief*  
Consumer Litigation Section  
Consumer Protection Division  
Office of Attorney General  
401 N.W. Second Ave. #450  
Miami, FL 33128  
305/377-5619

## Georgia

*Barry Reid, Administrator*  
Governor's Office of Consum-  
er Affairs  
2 Martin Luther King, Jr.  
Dr., SE  
Plaza Level—East Tower  
Atlanta, GA 30334  
404/656-7000, 800/282-5808

## Hawaii

*Philip Doi, Director*  
Office of Consumer Protection  
Department of Commerce and  
Consumer Affairs  
250 S. King St., Rm. 520  
P.O. Box 3767  
Honolulu, HI 96812  
808/548-2560 administration  
and legal in Hawaii,  
808/548-2540 complaints  
and investigations in  
Hawaii

## Illinois

*Drinda L. O'Connor, Director*  
Governor's Office of Citizen  
Assistance  
201 W. Monroe St.  
Springfield, IL 62706  
217/782-0244, 800/642-3112  
Illinois

*Elaine Hirsch, Director*  
Department of Citizen Rights  
100 W. Randolph, 12th floor  
Chicago, IL 60601  
312/917-3289, 312/793-2852  
TDD

*William Sullivan, Chief*  
Consumer Protection Division  
Office of Attorney General  
100 W. Randolph, 12th floor  
Chicago, IL 60601  
312/917-3580, 312/793-2852  
TDD

## Indiana

*David A. Miller, Chief Coun-  
sel and Director*  
Consumer Protection Division  
Office of Attorney General  
219 State House  
Indianapolis, IN 46204  
317/232-6330, 800/382-5516  
Indiana

## Iowa

*William P. Angrick II, Iowa  
Citizens' Aide/Ombudsman*  
515 E. 12th St.  
Des Moines, IA 50319  
515/281-3592, 800/358-5510  
Iowa

*Richard Cleland, Assistant  
Attorney General*  
Consumer Protection Division  
Office of Attorney General  
1300 E. Walnut St., 2nd floor  
Des Moines, IA 50319  
515/281-5926

## Kansas

*Arthur R. Weiss, Chief*  
Consumer Protection Division  
Office of Attorney General  
Kansas Judicial Center, 2nd  
floor  
Topeka, KS 66612  
913/296-3751, 800/432-2310  
Kansas

## Kentucky

*Robert V. Bullock, Director*  
Consumer Protection Division  
Office of Attorney General  
209 Saint Clair St.  
Frankfort, KY 40601  
502/564-2200, 800/432-9257  
Kentucky

*Robert L. Winlock,  
Administrator*  
Consumer Protection Division  
Office of Attorney General  
514 W. Liberty St. #139  
Louisville, KY 40202  
502/588-3262



## Louisiana

*Jean Ray, Chief*  
Consumer Protection Section  
Office of Attorney General  
State Capitol Building  
P.O. Box 94005  
Baton Rouge, LA 70804  
504/342-7013

*Linda Morrison, Assistant Commissioner*  
Office of Agro-Consumer Services  
Department of Agriculture  
325 Loyola Ave., Rm. 317  
New Orleans, LA 70112  
504/568-5472

## Maine

*Harry W. Giddings, Acting Superintendent*  
Bureau of Consumer Credit Protection  
State House Station 35  
Augusta, ME 04333  
207/289-3731

*Stephen Wessler, Chief*  
Consumer and Antitrust Division  
Office of Attorney General  
State House Station 6  
Augusta, ME 04333  
207/289-3716 (9 a.m. to 1 p.m.)

*Southern Maine Mediation Consumer Service*  
Office of Attorney General  
991 Forest Ave.  
Portland, ME 04104  
207/797-8978 (1 p.m. to 4 p.m.)

## Maryland

*Steven J. Cole, Chief*  
Consumer Protection Division  
Office of Attorney General  
7 N. Calvert St.  
Baltimore, MD 21202  
301/528-8662 (9 a.m. to 1 p.m.), 301/576-6372 TDD in Baltimore area, 301/565-0451 TDD in Washington metropolitan area

*Larry Munson, Director*  
Western Maryland Branch Office  
Consumer Protection Division  
Office of Attorney General  
138 E. Antietam St. #210  
Hagerstown, MD 21740  
301/791-4780

*Emalu Myer Twilley, Consumer Specialist*  
Eastern Shore Branch Office  
Consumer Protection Division  
Office of Attorney General  
State Office Complex  
Rt. 50 and Cypress St.  
Salisbury, MD 21801  
301/543-6620

## Massachusetts

*Mark Covan, Chief*  
Consumer Protection Division  
Department of Attorney General  
One Ashburton Pl., 19th floor  
Boston, MA 02108  
617/727-8400 information and referral only

*Paula W. Gold, Secretary*  
Executive Office of Consumer Affairs and Business Regulation  
One Ashburton Place, Rm. 1411  
Boston, MA 02108  
617/727-7780 information and referral only

*Richard Dalton, Assistant Attorney General*  
Consumer Protection Division  
Department of Attorney General  
436 Dwight St.  
Springfield, MA 01103  
413/785-1951

## Michigan

*Kent Wilcox, Executive Director*  
Michigan Consumers Council  
414 Hollister Building  
106 W. Allegan St.  
Lansing, MI 48933  
517/373-0947, 517/737-0701 TDD

*Frederick H. Hoffecker, Assistant Attorney General*  
Consumer Protection Division  
Office of Attorney General  
670 Law Building  
Lansing, MI 48913  
517/373-1140

## Minnesota

*Curt Loewe, Director*  
Office of Consumer Services  
Office of Attorney General  
117 University Ave.  
St. Paul, MN 55155  
612/296-2331

*Gary Simonson, Complaint Mediator*  
Consumer Services Division  
Office of Attorney General  
320 W. Second St.  
Duluth, MN 55802  
218/723-4891

## Mississippi

*Joe B. Hardy, Director*  
Regulatory Services  
Department of Agriculture and Commerce  
High and Presidents Streets  
P.O. Box 1609  
Jackson, MS 39215  
601/359-3648

*Joan McLeod, Assistant Attorney General and Chief*  
Consumer Protection Division  
Office of Attorney General  
P.O. Box 220  
Jackson, MS 39205  
601/354-6018, 601/359-3680

## Missouri

*Carl M. Koupal, Jr., Director*  
Department of Economic Development  
P.O. Box 1157  
Jefferson City, MO 65102  
314/751-4962

*Richard Thurman, Chief Counsel*  
Trade Offense Division  
Office of Attorney General  
P.O. Box 899  
Jefferson City, MO 65102  
314/751-2616, 800/392-8222 Missouri

## Montana

*Brinton Markle, Attorney*  
Consumer Affairs Unit  
Department of Commerce  
1424 Ninth Ave.  
Helena, MT 59620  
406/444-4312

## Nebraska

*Mark D. Starr, Assistant Attorney General*  
Consumer Protection Division  
Department of Justice  
2115 State Capitol  
P.O. Box 94906  
Lincoln, NE 68509  
402/471-2682

## Nevada

*Shari B. Compton, Commissioner of Consumer Affairs*  
Department of Commerce  
State Mail Room Complex  
Las Vegas, NV 89158  
702/486-4150

*Ray Trease, Consumer Services Officer*  
Consumer Affairs Division  
Department of Commerce  
201 Nye Building, Capitol Complex  
Carson City, NV 86710  
702/885-4340

## New Hampshire

*Amy Ignatius, Chief*  
Consumer Protection and Antitrust Division  
Office of Attorney General  
State House Annex  
Concord, NH 03301  
603/271-3641

## New Jersey

*James J. Barry, Jr., Director*  
Division of Consumer Affairs  
1100 Raymond Blvd., Rm. 504  
Newark, NJ 07102  
201/648-4010



Andrea Filkowitz, Deputy  
Attorney General  
Division of Law  
Office of Attorney General  
1100 Raymond Blvd., Rm. 316  
Newark, NJ 07102  
201/648-4730

Alfred A. Slocum,  
Commissioner  
Department of the Public  
Advocate  
CN 850, Justice Complex  
Trenton, NJ 08625  
609/292-7087, 800/792-8600  
New Jersey

## New Mexico

Randy Childress, Director  
Consumer and Economic  
Crime Division  
Office of Attorney General  
P.O. Drawer 1508  
Santa Fe, NM 87504  
505/872-6910, 800/432-2070  
New Mexico

## New York

Richard Kessel, Chairperson  
and Executive Director  
New York State Consumer  
Protection Board  
99 Washington Ave.  
Albany, NY 12210  
518/474-8583

Richard Kessel, Chairperson  
and Executive Director  
New York State Consumer  
Protection Board  
250 Broadway, 17th floor  
New York, NY 10007  
212/587-4482

Rachael Kretser, Assistant  
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Bureau of Consumer Frauds  
and Protection  
Office of Attorney General  
State Capitol  
Albany, NY 12224  
518/474-5481

Peter Bienstock, Assistant  
Attorney General  
Bureau of Consumer Frauds  
and Protection  
Office of Attorney General  
120 Broadway  
New York, NY 10271  
212/341-2300

## North Carolina

James C. Gulick, Special Dep-  
uty Attorney General  
Consumer Protection Section  
Office of Attorney General  
Department of Justice  
Building  
P.O. Box 629  
Raleigh, NC 27602  
919/733-7741

## North Dakota

Nicholas J. Spaeth  
Office of Attorney General  
State Capitol Building  
Bismarck, ND 58505  
701/224-2210

Thomas Engelhardt, Director  
Consumer Fraud Division  
Office of Attorney General  
State Capitol Building  
Bismarck, ND 58505  
701/224-3404, 800/472-2600  
North Dakota

## Ohio

William A. Spratley,  
Consumers' Counsel  
137 E. State St.  
Columbus, OH 43215  
614/466-9605 voice and TDD,  
800/282-9448 Ohio

Ric Sheffield, Chief  
Consumer Frauds and Crimes  
Section  
Office of Attorney General  
30 E. Broad St.  
State Office Tower, 15th floor  
Columbus, OH 43266  
614/466-8831, 614/466-4986,  
614/466-1393 TDD,  
800/282-0515 Ohio

## Oklahoma

Jane Wheeler, Assistant Attor-  
ney General for Consumer  
Affairs  
Office of Attorney General  
112 State Capitol Building  
Oklahoma City, OK 73105  
405/521-3921

## Oregon

Timothy Wood, Attorney in  
Charge  
Financial Fraud Section  
Department of Justice  
Justice Building  
Salem, OR 97310  
503/378-4320

## Pennsylvania

John E. Kelly, Deputy  
Attorney General  
Bureau of Consumer  
Protection  
Office of Attorney General  
1009 State Office Building  
1400 W. Spring Garden St.  
Philadelphia, PA 19130  
215/560-2414

Caren L. Mariani, Deputy  
Attorney General  
Bureau of Consumer  
Protection  
Office of Attorney General  
Manor Building, 4th floor  
564 Forbes Ave.  
Pittsburgh, PA 15219  
412/565-5135

## Rhode Island

Edwin P. Palumbo, Executive  
Director  
Rhode Island Consumers'  
Council  
365 Broadway  
Providence, RI 02909  
401/277-2764

Lee Baker, Director  
Consumer Protection Division  
Department of Attorney  
General  
72 Pine St.  
Providence, RI 02903  
401/277-2104

## South Carolina

Steve Hamm, Administrator  
Department of Consumer  
Affairs  
P.O. Box 5757  
Columbia, SC 29250  
803/734-9452, 800/922-1594  
South Carolina

W. Jefferson Bryson, Jr., State  
Ombudsman  
Office of Executive Policy and  
Program  
1205 Pendleton St., Rm. 412  
Columbia, SC 29201  
803/734-0457, 803/734-0467

Ken Moore, Assistant Attor-  
ney General  
Consumer Fraud and Antitrust  
Section  
Office of Attorney General  
P.O. Box 11549  
Columbia, SC 29211  
803/734-3970

## South Dakota

Jeff Hallem, Assistant  
Attorney General  
Division of Consumer Affairs  
Office of Attorney General  
Anderson Building  
Pierre, SD 57501  
605/773-4400

## Tennessee

Elizabeth Owen, Director  
Division of Consumer Affairs  
Department of Commerce and  
Insurance  
1808 West End Building #105  
Nashville, TN 37219  
615/741-4737, 800/342-8385  
Tennessee



*Perry A. Craft, Deputy Attorney General*  
Antitrust and Consumer Protection Division  
Office of Attorney General  
450 James Robertson Pkwy.  
Nashville, TN 37219  
615/741-2672

## Texas

*H. Clyde Farrell, Assistant Attorney General and Chief*  
Consumer Protection Division  
Office of Attorney General  
Capitol Station, P.O. Box 12548  
Austin, TX 78711  
512/463-2070

*Stephen Gardner, Assistant Attorney General*  
Consumer Protection Division  
Office of Attorney General  
Renaissance Place, 7th floor  
714 Jackson St.  
Dallas, TX 75202  
214/742-8944

*Esther Chavez, Assistant Attorney General*  
Consumer Protection Division  
Office of Attorney General  
4824 Alberta St. #160  
El Paso, TX 79905  
915/533-3484

*Richard Tomlinson, Assistant Attorney General*  
Consumer Protection Division  
Office of Attorney General  
1001 Texas Ave. #700  
Houston, TX 77002  
713/223-5886

*Maria Luisa Mercado, Assistant Attorney General*  
Consumer Protection Division  
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806 Broadway #312  
Lubbock, TX 79401  
806/747-5238

*Aaron Valenzuela, Assistant Attorney General*  
Consumer Protection Division  
Office of Attorney General  
200 Main Plaza #400  
San Antonio, TX 78205  
512/225-4191

## Utah

*Dixie L. Minson, Director*  
Division of Consumer Protection  
Department of Business Regulation  
160 East 300 South  
P.O. Box 45802  
Salt Lake City, UT 84145  
801/530-6601

*James L. Barker, Assistant Attorney General for Consumer Affairs*  
Office of Attorney General  
130 State Capitol  
Salt Lake City, UT 84114  
801/533-5319

## Vermont

*Denise Johnson, Assistant Attorney General and Chief*  
Public Protection Division  
Office of Attorney General  
109 State St.  
Montpelier, VT 05602  
802/828-3171

## Virginia

*Betty Blakemore, Director*  
Office of Consumer Affairs  
Department of Agriculture and Consumer Services  
Rm. 101, Washington Building  
1100 Bank St.  
Richmond, VA 23219  
804/786-2042, 800/552-9963

*Edward P. Nolde, Assistant Attorney General*  
Division of Consumer Counsel  
Office of Attorney General  
Supreme Court Building  
101 N. Eighth St.  
Richmond, VA 23219  
804/786-2115

*Fred Albrecht, Coordinator*  
Northern Virginia Branch  
Office of Consumer Affairs  
Department of Agriculture and Consumer Services  
100 N. Washington St. #412  
Falls Church, VA 22046  
703/532-1613

## Washington

*Renee Olbricht, Investigator*  
Consumer and Business Fair Practices Division  
Office of Attorney General  
North 121 Capitol Way  
Olympia, WA 98501  
206/753-6210

*John R. Ellis, Assistant Attorney General and Chief*  
Consumer and Business Fair Practices Division  
Office of Attorney General  
1366 Dexter Horton Building  
Seattle, WA 98104  
206/464-7744, 800/551-4636

*Owen Clarke, Chief*  
Consumer and Business Fair Practices Division  
Office of Attorney General  
W. 1116 Riverside Ave.  
Spokane, WA 99201  
509/456-3123

*Sally Sterling, Office Manager*  
Consumer and Business Fair Practices Division  
Office of Attorney General  
949 Market St. #380  
Tacoma, WA 98402  
206/593-2904

## West Virginia

*Thomas L. Hindes, Director*  
Consumer Protection Division  
Office of Attorney General  
812 Quarrier St., 6th floor  
Charleston, WV 25301  
304/348-8986, 800/368-8808

## Wisconsin

*Donald Soberg, Administrator*  
Division of Trade and Consumer Protection  
Department of Agriculture, Trade, and Consumer Protection  
801 W. Badger Rd.  
P.O. Box 8911  
Madison, WI 53708  
608/266-9836, 800/362-3020

*Kevin O'Connor, Assistant Attorney General*  
Office of Consumer Protection  
Department of Justice  
P.O. Box 7856  
Madison, WI 53707  
608/266-1852, 800/362-8189

*Patricia Suschil, Regional Supervisor*  
Division of Trade and Consumer Protection  
Department of Agriculture, Trade and Consumer Protection  
10320 W. Silver Spring Dr.  
Milwaukee, WI 53225  
414/438-4844

*Pamela Magee-Heilprin, Assistant Attorney General*  
Office of Consumer Protection  
Department of Justice  
Milwaukee State Office Building  
819 N. 6th St., Rm. 520  
Milwaukee, WI 53203  
414/227-4948

## Wyoming

*Laura Beard, Assistant Attorney General*  
Office of Attorney General  
123 State Capitol Building  
Cheyenne, WY 82002  
307/777-7841, 307/777-6286



## Mail-Order Shopping Report

When you call the mail-order companies that catch your eye, fill out this form and use it to compare prices and service. Once you've ordered a product, keep the form as a record of your transaction. Also, feel free to send the form to *Consumer Watch* with evaluative comments.

Company name	_____	_____
Phone number	_____	_____
Full name of salesperson	_____	_____
Today's date	_____	_____
Product name	_____	_____
Price (including all charges)	_____	_____
Is the product compatible with your system?	_____	_____
Is the product in stock?	_____	_____
When will it be shipped?	_____	_____
<b>Types of payment accepted:</b>		
Purchase order	_____	_____
Check (note days for check to clear)	_____	_____
COD (note restrictions)	_____	_____
Credit card (note if account billed before shipment)	_____	_____
<b>If buying hardware:</b>		
Is the company an authorized dealer?	_____	_____
Who provides the warranty?	_____	_____
Length of warranty	_____	_____
<b>If buying software:</b>		
Product version	_____	_____
Is this the latest version?	_____	_____
<b>Support and service:</b>		
Name of the head of customer service	_____	_____
Technical support phone number	_____	_____
Technical support hours/days	_____	_____
Is a money-back guarantee provided?	_____	_____
Duration	_____	_____
Restocking fee (if any)	_____	_____



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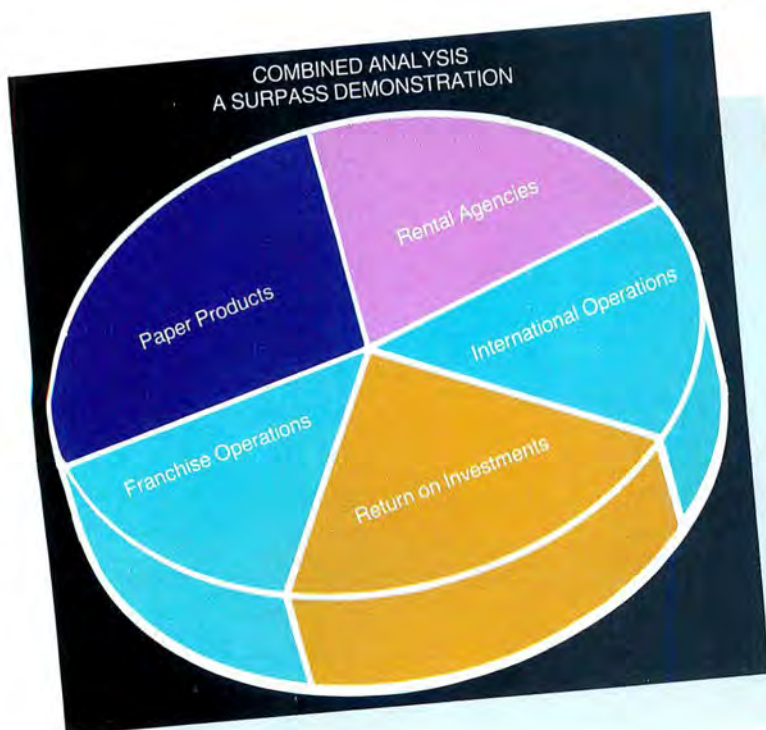
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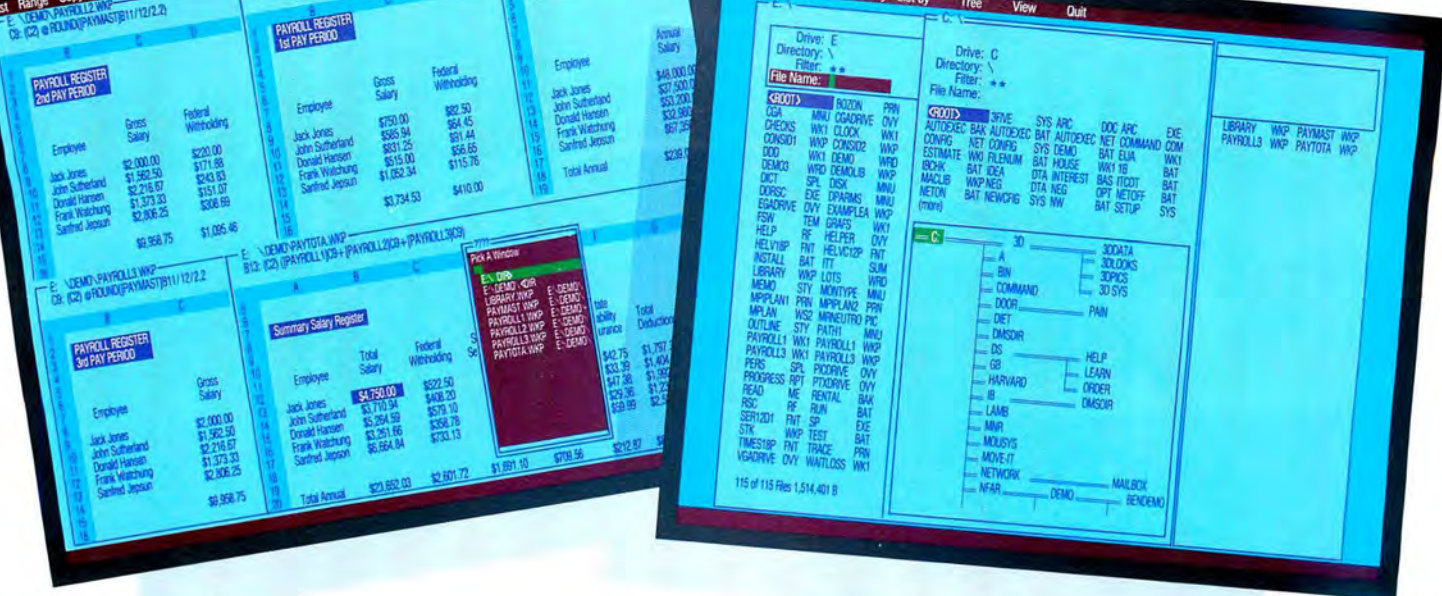
**Tim Bajarin - Creative Strategies International** "I'm amazed at how fast it works. It has exceptional speed."

ITEM	SURPASS	LOTUS 1-2-3	QUATTRO	EXCEL
Hot Links in Formulas	✓	NO	NO	✓
Hot Links in Commands	✓	NO	NO	✓
Hot Links in Macros	✓	NO	NO	✓
Hot Links to Unloaded Files	✓	NO	NO	NO
Hot Links in Extended POINT Mode	✓	NO	NO	NO
View Multiple Spreadsheets in Multiple Windows	✓	NO	NO	✓
Macro Recorder	✓	NO	NO	✓
Macro Library	✓	NO	NO	✓
Macro Multiple Window Access	✓	NO	NO	✓
Macro Single Step Macro Debugging Environment	✓	NO	✓	NO
Column Adjustment by Range	✓	NO	NO	NO
Column Adjustment - Automatic	✓	NO	NO	NO
80286 / 386 Version Included	✓	NO	NO	✓
8088 Version Included	✓	✓	✓	NO
Operation is 512K RAM	✓	✓	✓	NO



SURPASS™ is the next generation spreadsheet combining multiple worksheets in windows with *Hot Links™* between work-sheets. Hot Links can be used as a natural part of every operation including range name specification, macro notation and Extended POINT mode operations. A Macro Keystroke Recorder function, Macro Trace function, Macro Library Capability, and enhanced macro commands allow anyone to create powerful macros that can operate on a single worksheet and on a collection of worksheets. SURPASS' Dependency-Based Recalculation and Background Recalculation give it the performance needed to tackle a new generation of spreadsheet applications. SURPASS has Advanced Consolidation Graphics utilizing multiple data sources for





# Them All!

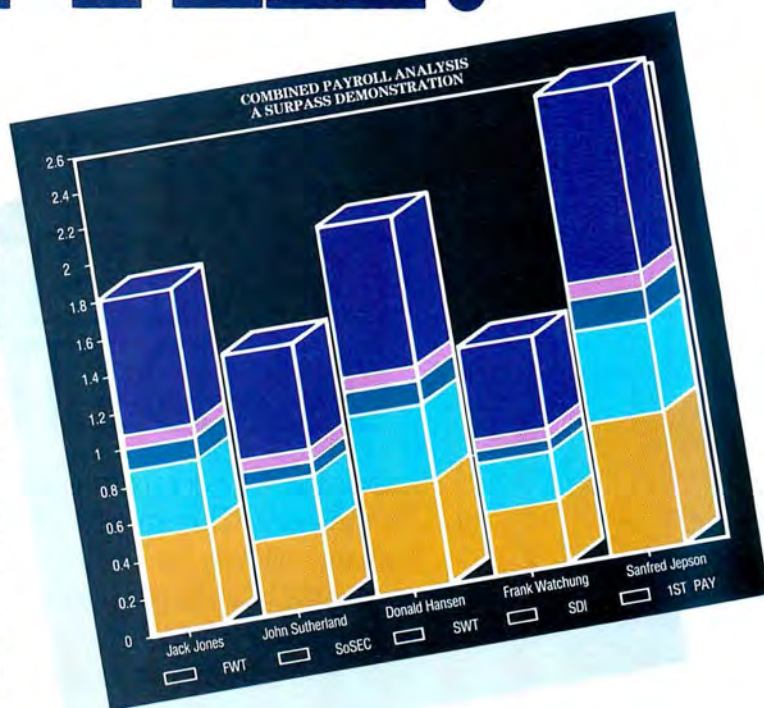
## Software features:

ITEM	SURPASS	LOTUS 1-2-3	QUATTRO	EXCEL
Graphics — 3-D Effects	✓	NO	✓	✓
Graphics — Presentation Quality	✓	NO	NO	✓
Graphics — Integrated Printing	✓	NO	✓	✓
Graphics — On-Screen Fonts	✓	NO	✓	✓
Graphics — Full Customization	✓	NO	✓	✓
Graphics — Compare Data from Multiple Worksheets in a Single Graph	✓	NO	NO	✓
Minimal Recalc	✓	NO	✓	✓
Background Recalc	✓	NO	NO	✓
Single Keystroke Undo	✓	NO	NO	✓
100% 1-2-3 Compatible	✓	✓	✓	NO
Network Support (LAN)	✓	NO	NO	✓
CGA Support	✓	✓	✓	NO
Ability to Create WKS, WK1 Files	✓	NO	NO	NO
Visual Manager	✓	NO	NO	NO
Price	\$495	\$495	\$195	\$495

\*Limited

comparison graphics generation. A full UNDO capability and sophisticated Visual File Manager allow the user to manage the expanded work environment as an integral part of SURPASS. Intuitive pull-down menus tie the new features into the 1-2-3™ interface. A subset of SURPASS' capabilities implements 100% of 1-2-3 keystrokes, file structures, macros, commands, functions and formulas (version 1.A, 2.0 and 2.01). Keystroke Recorder, Automatic Column Range Width Adjustment, Worksheet Find, Slide-Show, Hot Links Consolidation, Comprehensive Network Capability (LAN) and enhanced EMS Memory Support add further to the rich set of features. Surpass is also available in a 286/386 optimized version for reduced memory and higher speed performance.

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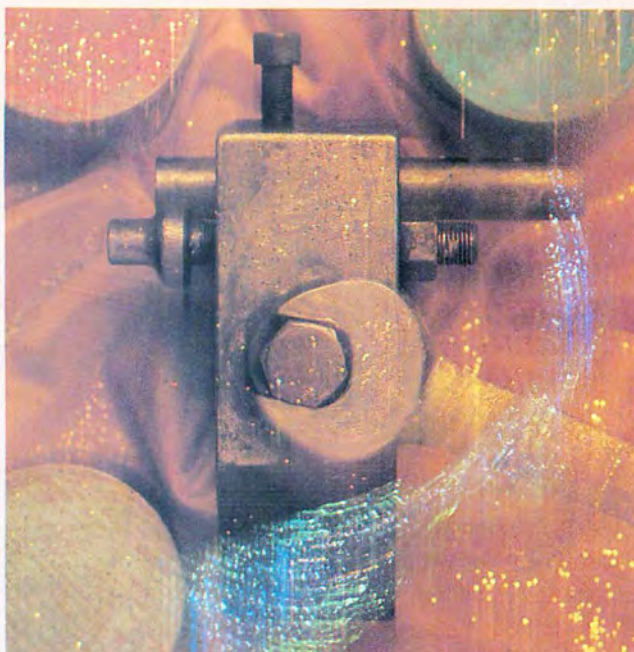
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<u>EIGHT COMMON PROBLEMS (AND HOW TO SOLVE THEM)</u>	257
<u>MATCH WITS WITH PC WORLD</u>	284
<u>TEN TIME-SAVERS</u>	296



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September 15, 1987

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## EIGHT COMMON PROBLEMS (AND HOW TO SOLVE THEM)

Edited by Michael Goodwin Millions of computer users have been victimized by the Gang of Eight, a notorious collection of common (and hated) computer problems. *PC World* has tracked down these digital desperados and offers expert advice on running the rascals out of town.

*Have you ever suspected that your computer is not your friend? That it's just waiting until you're on a deadline to go into major malfunction mode? Calm yourself. Help is on the way.*



Figure 1



Figure 2

### 1 Floppy Disk Failure

If you receive an error message while using a floppy disk, the problem may simply be that the disk is not spinning freely within its jacket. To correct the problem you need to flatten the edges of the disk, raising the jacket walls slightly from the disk surface. Follow these steps:

- a) Grasp the disk by two adjacent corners and hold it upright at the edge of a desktop, as in Figure 1.
- b) Pressing lightly, draw the edge of the disk along the edge of the desk, as in Figure 2.

c) Repeat steps *a* and *b* for each edge. Take care when passing the write-protect notch and the two notches near the disk window.

The disk is now ready for use.  
—Karl Koessel

### 2 The Wrong Start-Up Files

**Doomsday scenario 1:** You can't get along without your memory-resident spelling checker for word processing, and your spreadsheet simply must have a memory-resident calculator on line. But when the two TSR programs are resident at the same time, they crash your machine.

*Illustrations by*  
STEVE LYONS



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**Positively charged ions produced by the CRT collect on the screen and attract airborne dust and smoke particles at an alarming rate.**

**Doomsday scenario 2:** Most of the time you can get along with a 64K print buffer, but once a month you need to print a giant 400K document that ties up the computer all afternoon. You could create a permanent 400K print buffer, but then you wouldn't have enough memory left for the productivity software you use the rest of the month.

**Solution:** a library of specialized AUTOEXEC and CONFIG files. One AUTOEXEC/CONFIG combo creates the giant print buffer and leaves out the rest of the TSRs. Another set loads the spelling checker but not the calculator. A third combo loads the calculator but not the spelling checker.

You could replace the preexisting AUTOEXEC.BAT and CONFIG.SYS with one of the specialized sets and reboot the computer every time you needed a different system setup, but who has time for that? Instead, enter a fabulously useful write-it-yourself batch file called BOOTSET.BAT.

#### BOOTSET.BAT

```
COPY C:\AUTOEXEC.X1 C:\AUTOEXEC.BAT
COPY C:\CONFIG.X1 C:\CONFIG.SYS
WARMBOOT
```

You still need to write specialized AUTOEXEC and CONFIG files using different three-letter extensions. For example, you could write an AUTOEXEC/CONFIG combo to load the 400K print buffer, and call the files AUTOEXEC.BUF and CONFIG.BUF. Write another set to load your "daily" combination of TSRs and normal 64K print buffer, and name these

files AUTOEXEC.STD and CONFIG.STD.

Then, to set your system for the giant printing job, simply type BOOTSET BUF and press <Enter>. BOOTSET will perform the file replacements automatically and reboot the system (using a public domain utility called WARMBOOT.COM) to make the new settings functional. If you don't have access to WARMBOOT, see *The Help Screen*, August 1987 ("Pick a Partition"), for instructions on how to create it. Or just reboot manually with the ever-popular <Ctrl>-<Alt>-<Del>. When you've finished printing, type BOOTSET.STD, press <Enter>, and you're back to your standard system.

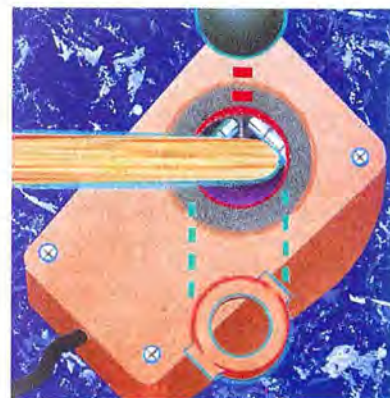
For simplest installation, put your library of specialized AUTOEXEC and CONFIG files in the root directory. —M. G.

### 3 Keeping It Clean

Dirt. Ugh! Keyboards, monitors, and mice seem to attract dust, coffee stains, and donut crumbs with relentless power. Tape and floppy disk drives pick up magnetic oxides and general crud from storage media. Printers get gummed up with ink, dust, and the little disks that fall out of the fanfold paper. Keeping your system clean will stave off expensive repair bills and data fatalities.

And have you ever noticed how fast your screen gets dirty? It's not just your imagination. Positively charged ions produced by the CRT collect on the screen and attract airborne dust and smoke particles at an alarming rate.

If you're in a hurry, a quick and easy technique is to ground your-



#### Scraping Goop From Your Mouse

Once you've popped out the mouse ball, you can carefully scrape hardened dirt from position rollers with a piece of wood or plastic.

self with one hand (for example, by touching the fan grille on the rear of a plugged-in, grounded PC) and pass your other hand over the screen surface. Most of the dust will lift right off. Onto your hand (ick). A better method is to turn off the monitor and use a mild, ammonia-based glass cleaner like Windex or Glass Plus. To keep liquid from dripping inside the box, spray the cleaner on the cloth, not the computer—and keep a few paper towels close at hand just in case. If you prefer, special handi-wipes are available at computer stores. (Note: Some screens have special antiglare surfaces and should only be cleaned according to the manufacturer's instructions.)

Keyboards can get almost as grimy as monitors. Cleaning the keys is easy. You'll need a small cup, a box of cotton swabs, a box of tissues, and an all-purpose liquid cleaner like Fantastik. (Don't use alcohol or strong solvents unless

(continues)





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## E i g h t Common Problems (and How to Solve Them)

you're a touch typist; they may take the characters off the keys.) First, turn off the computer. Spray about half an inch of cleanser into the bottom of the cup. Then, with swab in one hand and tissue in the other, clean one key at a time. Dip the swab in the cleaner, rub the key surface with a circular motion, and wipe it dry immediately to keep excess liquid from dripping. Replace swabs and tissues as needed.

The gunk on your keys won't degrade the performance of your keyboard; the real enemy lies within. To dislodge the detritus stuck in between the keys, pick the keyboard up, turn it over, and give it a couple of gentle taps. Follow this with a careful vacuuming—or better yet, by blowing with canned air (available at photo stores).

The rubber ball in your mouse rolls through dirt all day long, picking it up from your desk and depositing it on the internal positioning rollers, producing a substance very much like chewing gum. To get at the gum, you'll need to pop the ball out; in most cases, unsnapping the retaining ring will release it. Once you're inside, a little glass cleaner on a cloth should clean the goop off the rollers. If it's too tough to wipe, scrape it off very gently with a piece of wood or plastic. Cleaning the ball itself is a cinch—once again, just use a little glass cleaner. (Avoid alcohol; it can dry and crack the ball's rubber shell.)

If you prefer, several commercial mouse-cleaning kits are available. Ergotron's Mouse Cleaner 360 (\$16.95) gets rid of roller crud by means of a bristled scrubber ball. You install the scrubber ball, roll the mouse in circles over a Velcro scrubber pad, and then remove the ball. Max the MouseDuster (\$5.95 from Applied Elastomerics) is a plastic blob that picks up all the dirt from the ball itself.

The magnetic heads in tape backup units build up a coating of magnetic oxide that flakes off the tape. You can clean these heads as easily as the heads in an audio deck, and in exactly the same way—with isopropyl alcohol and a cotton swab. First, turn off the power.

Look inside for the head—it's a shiny, flat piece of metal—and swab it off. If the swab comes out dirty, throw it away and repeat the process with a fresh one until no more dirt shows up. If you can get to the capstan, give it a going-over too. Try not to leave cotton fibers behind, and let the alcohol evaporate before using the drive.

There are various kits available for cleaning the read/write heads of floppy drives, but the smart word is that they create more problems than they solve, and should therefore be used very infrequently—like every year or two. For the most part, floppy read/write heads are self-cleaning, and abrasive cleaning disks wear them out quickly.

If you thought your keyboard was full of crud, take a close look at the inside of your printer. To get the dust and paper bits out of the gears, go in very carefully with a small-tipped vacuum cleaner accessory. Then, blow away what's left with canned air. Clean the rubber roller with platen cleaner. Here too, avoid alcohol, which hardens and destroys rubber; special cleaners, available in office supply stores, will soften and preserve the platen.

Now that your computer is clean-room clean, you want to keep it that way. Smoking near a computer is not smart; smoke particles glom onto disk surfaces and circuit boards, potentially creating data errors. Having food and drink around that can spill on the machine is also a bad idea. The best way to keep your computer clean is simply to cover it when you're not using it. You don't need to buy ex-

(continues)



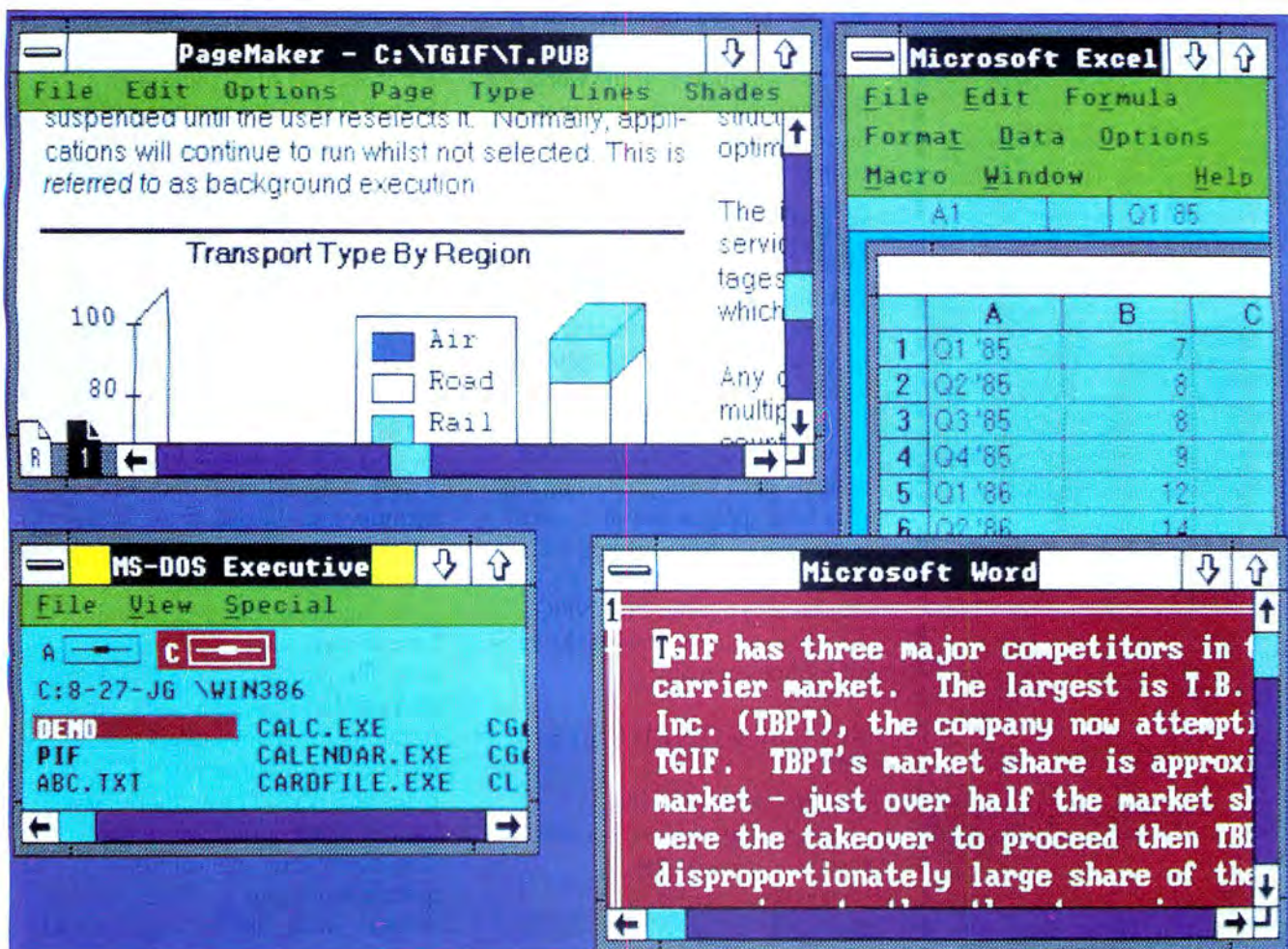
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## Eight Common Problems (and How to Solve Them)

pensive custom-fitted covers or plastic shells; a bath towel works just fine. Or you might consider a stunning antique prayer rug. Friends will marvel at the workmanship and steer clear of that most deadly topic of conversation—computers. —Scott Spanbauer

### 4 Configuring Out CONFIG.SYS

Optimizing CONFIG.SYS for your hardware and applications will speed up your computer significantly. For instance, setting your FILES and BUFFERS commands to 24 will improve performance for most modern word processing and data base applications—but you'd never guess it from reading the DOS manual. Fortunately, it's not that hard to optimize CONFIG.SYS once you know what the various options actually do.

#### Typical CONFIG.SYS

```
device=c:\util\mouse.sys
device=c:\dos\ramdrive.sys 1500 /e
device=c:\dos\ansi.sys
buffers=24
files=24
fcbs=24,24
```

Every time you turn on your PC, before the software routines embedded in your ROM BIOS run COMMAND.COM, they first look for a file called CONFIG.SYS in the root directory of the boot disk. When they find it, they read it to learn how to reCONFIGure the SYStem default settings, as well as how to add device drivers.

The FILES command sets the maximum number of files that can be opened by an application at one time. The default is 8 files, with 5 dedicated to standard input, output, error, printer, and an auxiliary device. That only leaves you 3, which is just not enough for many programs. Running *dBASE III*

with the default of 8, for example, sometimes produces a 'Too many files open' error. To avoid this the FILES command should provide for at least 24 files (you can go as high as 255). Files are cheap as far as RAM goes, requiring only 48 or 64 bytes each. But the BUFFERS command should be set at least as high as the FILES command—and buffers *do* use up memory.

The BUFFERS command tells the computer how much RAM to set aside for data buffers. Up to a certain point, buffers can speed up hard disk access time by holding in RAM portions of data being transferred back and forth between memory and the disk drive. When an application needs information, it checks the buffers first.

As a general rule, you should have at least one buffer for every open file—probably more. BUFFERS can be set as high as 99, but installing too many buffers wastes memory (each buffer eats 528 bytes of RAM). Furthermore, having too many buffers can actually slow down your application, requiring more time to check through all the buffers than it would to go directly to the disk drive.

Applications that perform a lot of random disk accesses—like data bases—need lots of buffers, but seldom more than 30. An all-purpose, high-performance CONFIG.SYS with FILES and BUFFERS set between 24 and 30 will serve nicely in most contexts. Your documentation will usually tell you when an application calls for a special BUFFERS or FILES setting. If the manual is mum, the only way to determine the optimum number of buffers is to experiment, increasing the BUFFERS command from 10 to 90 by increments of 10, rebooting, and timing how long it takes to execute a typical task.

Every once in a while you may see an error message reading 'File

(continues)



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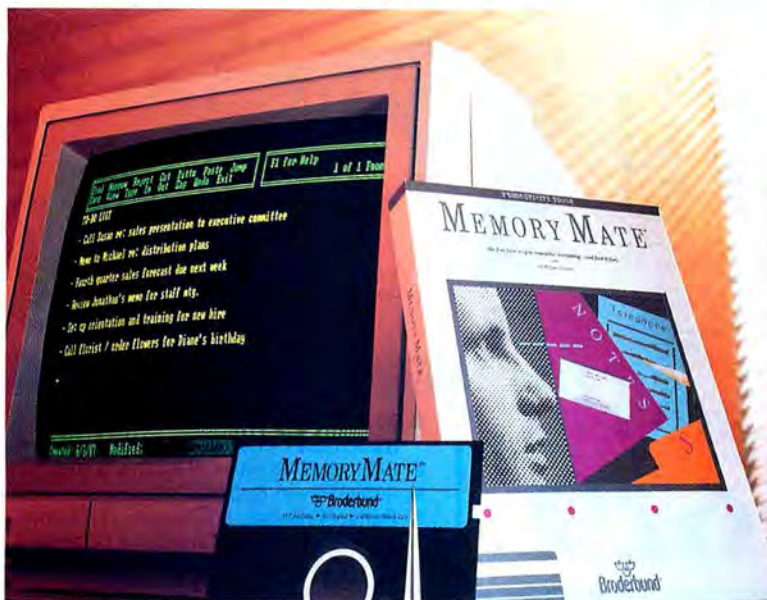
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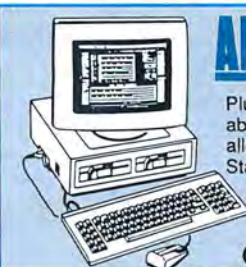
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## E i g h t Common Problems (and How to Solve Them)

control block error'. In that event, add the command FCBS=24,24 to CONFIG.SYS. The first 24 specifies how many files can be opened simultaneously; the second indicates the number of files that cannot be closed automatically. The default setting is 4,0.

Device drivers coordinate the activities of DOS and such devices as disk drives, COM ports, mice, scanners, and expanded memory boards. In the old days some device drivers were installed by running .COM programs, but now DOS provides the DEVICE command in CONFIG.SYS to tell the system which drivers to look for—MOUSE.SYS, EMM.SYS, RAM-DISK.SYS, etc.—and in what directory they may be found. Sometimes you need to juggle the loading order of the drivers to make them work properly.

ANSI.SYS is a device driver that is present on the DOS disk. It enhances the capabilities of a system's automatically installed default screen and keyboard driver—and should be installed in every CONFIG.SYS file. Assuming your DOS files reside in C:\DOS, place the line DEVICE=C:\DOS\ANSI.SYS in CONFIG.SYS. Many applications require ANSI.SYS in order to operate.

Users of DOS 3.20 will also need to add a STACKS command. There is a bug in DOS 3.20 (it was eliminated in 3.21 and later versions) that involves what are known as stack pointers. These are software devices that help the computer keep track of what it's doing. The bug causes the stack pointers to get mixed up, producing errors that usually lead to a system crash.

Happily, simply adding the line STACKS=64,128 to your CONFIG.SYS file will swat that worrisome bug.

Remember that once you have created or altered your CON-

FIG.SYS file, you need to reboot your system by pressing <Ctrl>-<Alt>-<Del> to put the new configuration settings in effect.  
—Lewis Perdue

## 5 TSR Terrorists

You buy a new memory-resident spelling checker, and it works great. Then you press an innocuous key in your spreadsheet program—one that's always worked before. Suddenly, off goes your computer into the twilight zone with a locked keyboard and a monitor display that looks like an acid-rock light show.

TSR (terminate-and-stay-resident, or memory-resident) print spoolers, cursor speedup utilities, keyboard macro processors, calculators, thesauruses, notepads, command-line editors, RAM disks, and so forth all can be tremendous time-savers—until they start vying for the same interrupts or memory locations. How's a person to find out which program (or combination of programs) is the troublemaker?

The first thing to check is whether any of your TSRs are using the same hot keys. If they are, try re-installing one or the other so that it uses a different key.

If that's not the problem, try reloading the new TSR in a different position. Many times a TSR that crashes the system can be run successfully if it's loaded in a different order relative to the other TSRs. Since most people load TSRs automatically at start-up with a series of lines in the CONFIG.SYS and/or AUTOEXEC.BAT files, you can use these files to pin down TSR terrorists and tame them.

Using your favorite ASCII text editor, go into the CONFIG.SYS file, disable each line by inserting two periods in front of it, and save  
(continues)





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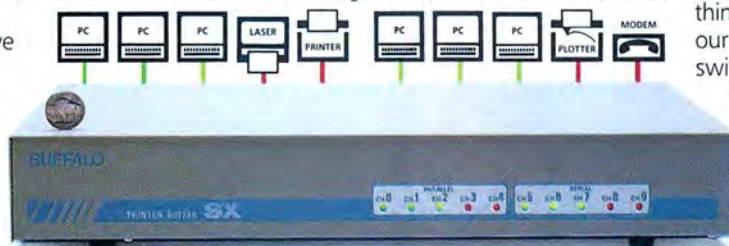
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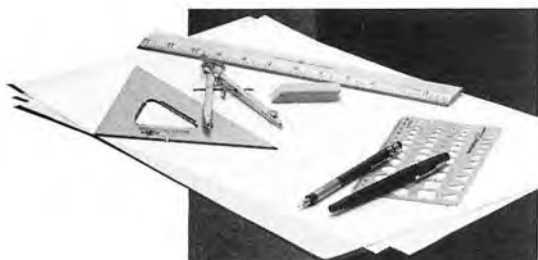
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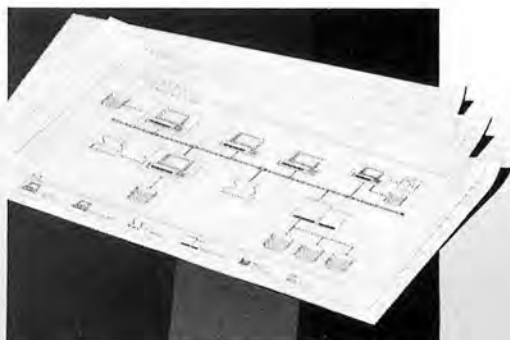
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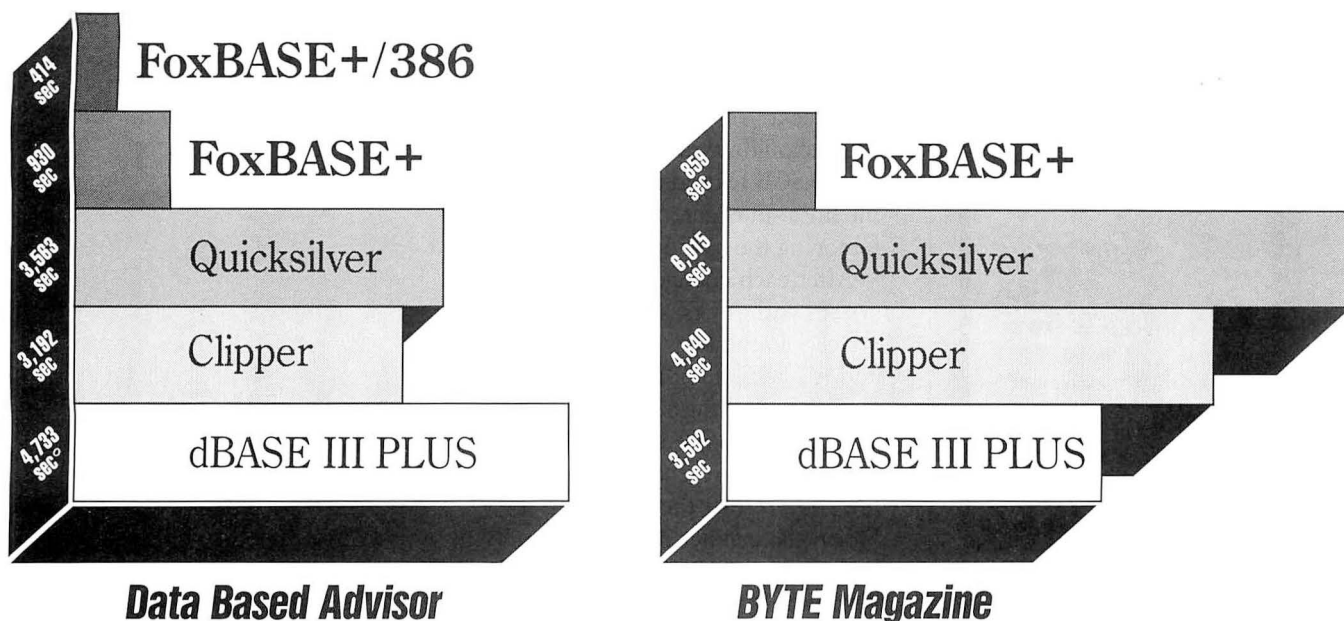
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\*Using the benchmark timings published in BYTE, September 1987.

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## E i g h t Common Problems (and How to Solve Them)

the file. The next time you boot the computer you'll get a series of error messages reading 'Unrecognized command in CONFIG.SYS', but no harm will be done. Do the same thing with your AUTOEXEC.BAT file, but put REM and a space at the start of each line instead of two periods and then save the file. Now the computer will treat all the command lines in AUTOEXEC.BAT as remarks; none of them will be executed.

Booting the computer with the commands in CONFIG.SYS and AUTOEXEC.BAT disabled will produce a "vanilla" system; everything should work fine. Now, using your ASCII text editor, re-enable the lines—in order, *one by one*—by removing the two periods or REM.

After each change, restart the system with <Ctrl>-<Alt>-<Del> so the new CONFIG.SYS and AUTOEXEC.BAT can take effect. If everything seems to be OK as you go along, leave the good lines in place, re-enable the next line, and restart the computer. When the conflict reappears, you'll know which TSR is the culprit. If you suspect that TSR of interacting badly with a previously enabled TSR, leave the malefactor (that is, the most recently enabled TSR) enabled while you disable previous lines selectively until the conflict disappears again.

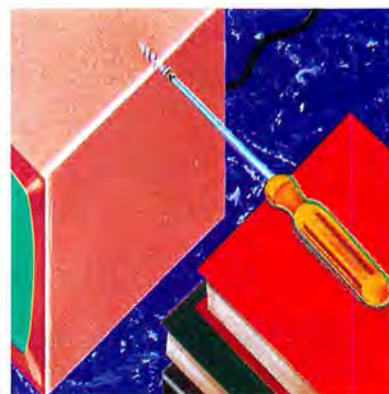
Once you've identified the guilty party (or parties), try loading them in different order. *SideKick*, for instance, likes to be loaded last; other TSRs may have preferences too. A call to the manufacturer can be instructive.

Some TSRs produce status messages as they load that help determine if something odd is going on. Unfortunately they often scroll off the screen too fast to read, especially if your CPU is a speed demon. You can, however, pipe status messages to your line printer for

easier debugging. (Sorry, folks, this only works with AUTOEXEC.BAT, not CONFIG.SYS.) Adding >PRN to the end of an AUTOEXEC line will send all installation information to the printer. —M. G.

## 6 Screwing Up

It's happened to all of us (too many times), especially owners of no-name clones; a tight Phillips screw in the system unit won't yield. The mighty muscles of your forearms apply major torque—and gouge out the cross-shaped slots in the screw head! Terrific. Now how do you get the screw out?



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glue the driver into the offending screw. Improvise a scaffold or gantry to hold the screwdriver in position. (A short pile of books will do if the screw is horizontal; you may need several if the screw is vertical.) Don't be afraid to position the system unit on its front, side, or back—as long as it's not likely to get knocked over. (If your cat likes to jump up on your desk, be sure to back up the hard disk before standing the unit on its end.) Let the epoxy harden overnight. The next day, remove the troublesome screw and throw it and the screwdriver away.

In a worst-case scenario, you'll have to drill the screw out and either leave the hole empty (if there are two or three good screws left) or use a metal tap to rethread the hole and put in a larger diameter screw.

If you do any hacksawing or drilling, you'll want to keep metal filings from dropping onto the motherboard, where they can short-circuit the electronics. Start by covering the motherboard carefully with a cloth. Then make a tight "collar" by cutting a hole in a piece of paper just a hair larger than the screw head and taping it all around the screw to keep filings out. A magnet placed near the area will help keep steel (but not aluminum) filings out of harm's way, but be very careful to keep it away from any disks or tapes or you may scramble valuable data.

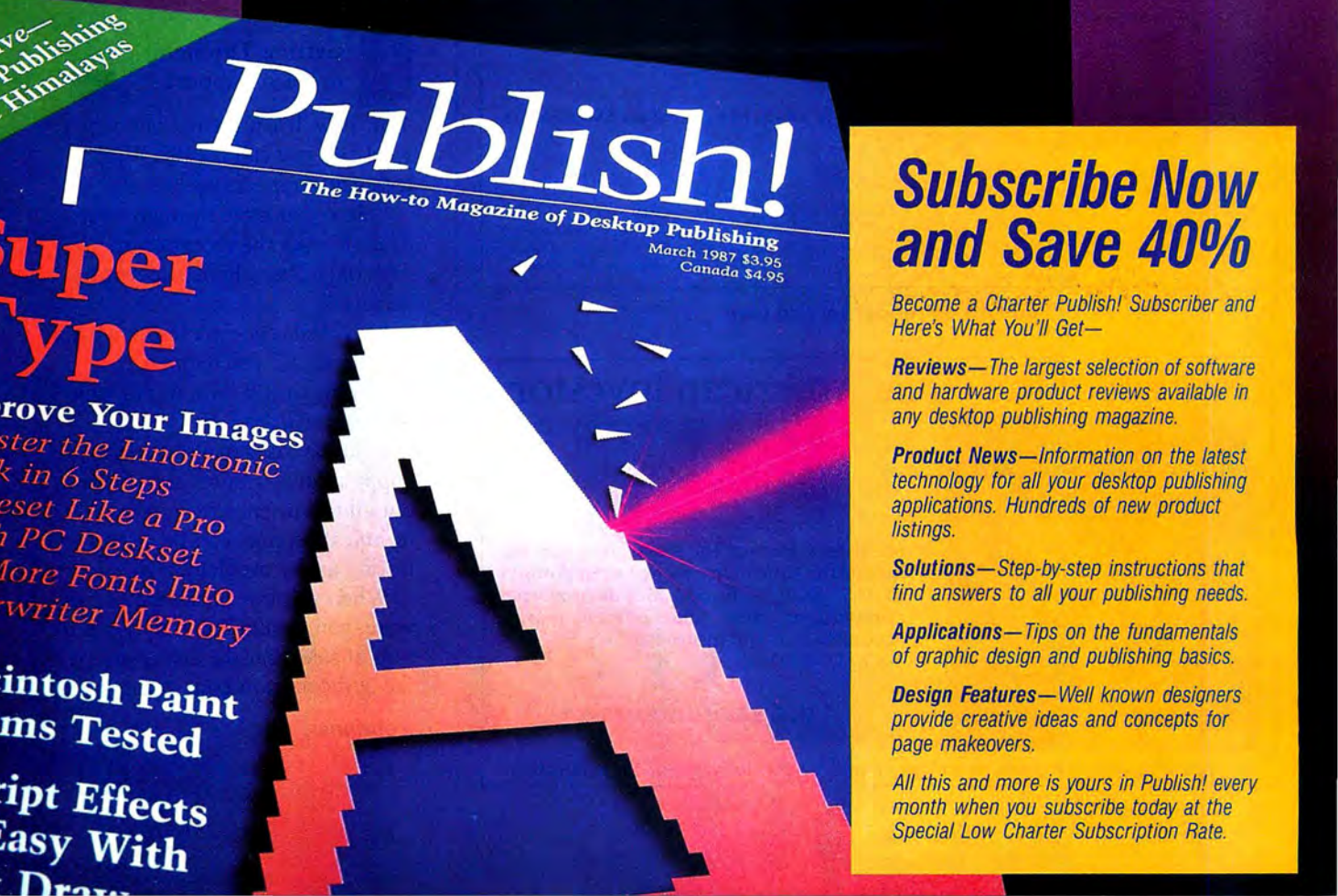
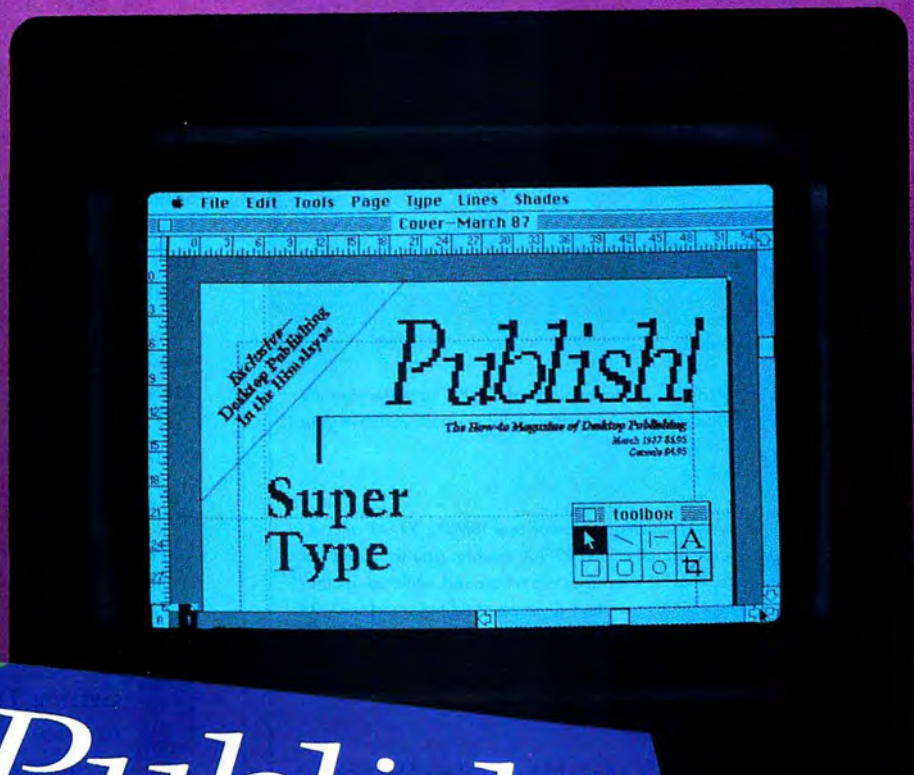
As in so many crises, the best defense is a good offense: Use nut drivers on all screws with hex heads. And before you strip a Phillips screw again (and you will), replace all the Phillips-heads in your machine with slotted screws. (Make sure the replacements are precisely the same length as the originals, or you may do permanent damage to circuit boards.) If

(continues)

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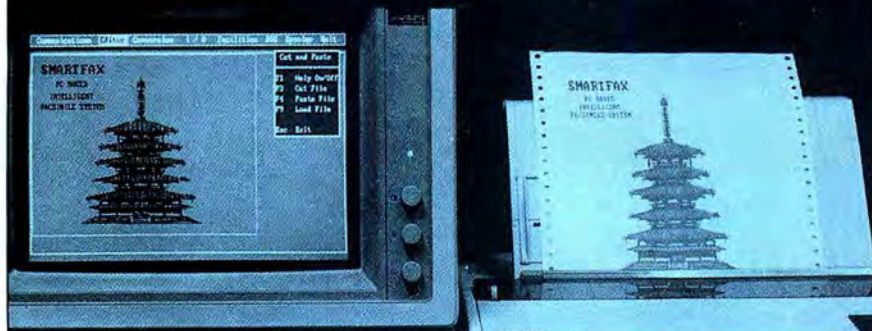


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## Eight Common Problems (and How to Solve Them)

you can get hexagonal-head, slotted screws, all the better. —Lewis Perdue

## 7

### Unformatted Floppy Follies

**Q:** How can you tell if a floppy is formatted before you try to use it?  
**A:** You can't—at least not by looking. (You can always find out the hard way, but who wants to?)

Attempting to write to (or read from) an unformatted floppy disk is a bad idea. Most applications will send you a polite error message, but there are still a few programs around that will throw up their digital hands and crash, returning you rudely to a DOS prompt and sending your unsaved work to Dimension X.

The man who sold me my first computer back in the late seventies (his name was Bill Effros) taught me a fail-safe technique. Effros's Law: *Always format every disk as soon as you break the shrink-wrap on the box.* Now you know; go and sin no more. —M. G.

## 8

### Getting Through to Tech Support

Your new TeleWhiz modem won't work, so you call the TeleWhiz technical support line.

"Have you gone through your dealer?" asks the receptionist. "We only offer phone support to dealers."

"My dealer doesn't know what a serial port is," you explain.

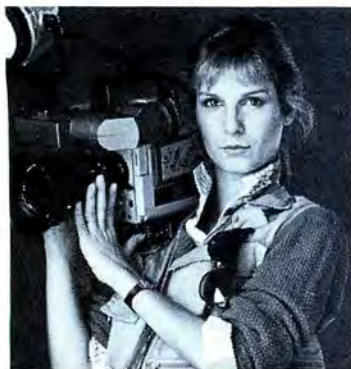
"Sorry, sir, I'll have to put you on hold." *Click.*

In many cases manufacturers are happy to give support to end users, but all too often getting reliable technical support can be as frustrating as the problem itself.

When you buy hardware or software, you should insist, as a condition of sale, that the dealer give you the authorization code that entitles

(continues)

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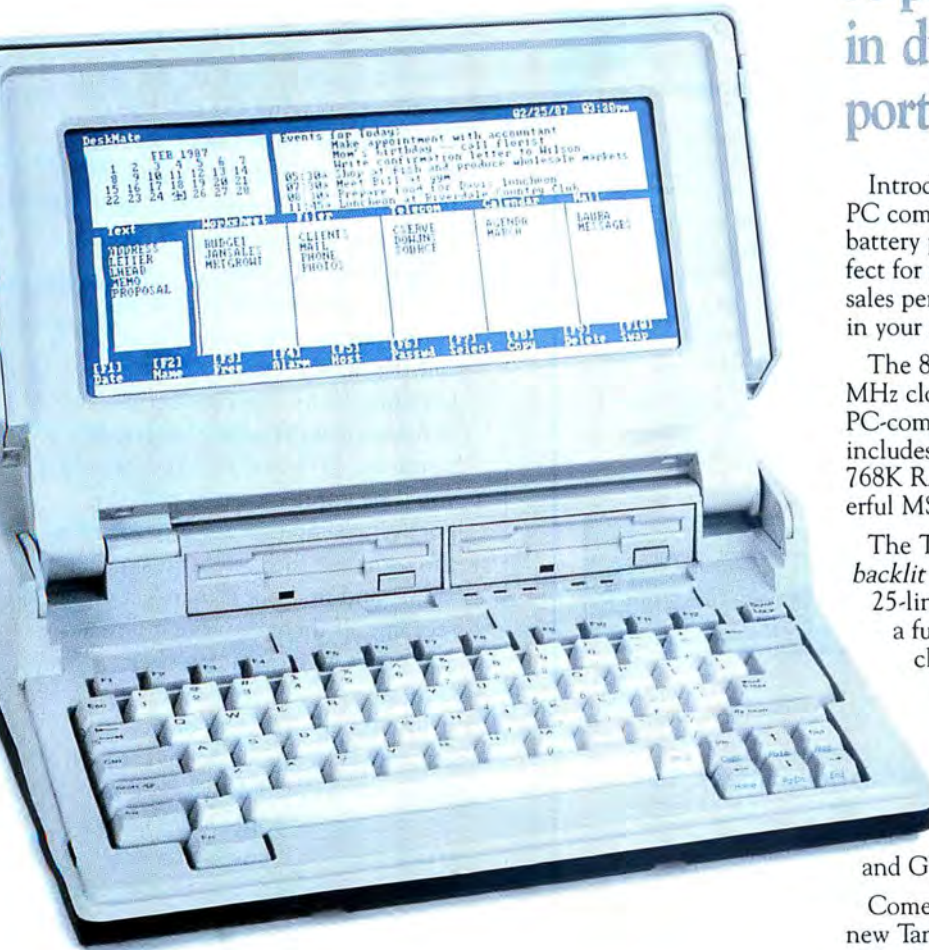
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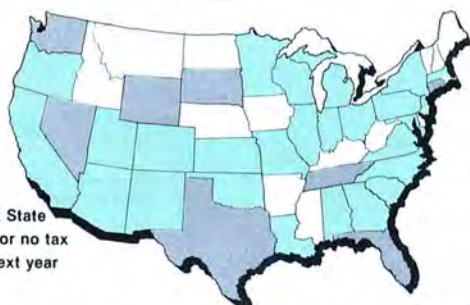
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### Eight Common Problems (and How to Solve Them)

employees to talk to the tech support folks. This is often easy to do at the point of sale and awkward to do later. While you're at it, get the tech support phone number.

Even when you have the phone number and dealer authorization code, you still need to get past the dratted busy signal. If you and the tech support office are on the East Coast, place the call early in the morning, before West Coast callers (who are presumably still snoozing) can clog the support line. Conversely, if you're both on the West Coast, try placing the call late in the day, after most East Coast businesses have closed. If you and the tech office are on opposite coasts, you'll just have to cope. Midday calls are usually futile.

If the busy signals persist and your business has ground to a halt, call the manufacturer's main number and ask for the product manager for your particular product. Be polite but persistent, and eventually you'll be connected to a tech support representative. Once you get through, ask the tech for his or her name, and find out if there's a direct line. If there is, write it down and use it when you can't get through on the public number.

In a pinch, you may be able to get answers without going through the dealer or manufacturer at all. Try contacting your local PC user group and see if anyone there is using the product.

If you have a modem, post a Mayday on a local bulletin board or a large on-line information service like CompuServe. You may even discover a message with the answer to your problem already posted.

Finally, some manufacturers (like Lotus, Microsoft, and Borland) have forums on CompuServe. If you can't find the answer there, you will at least have the opportunity to ask an expert. —Jonathan Maslow ●



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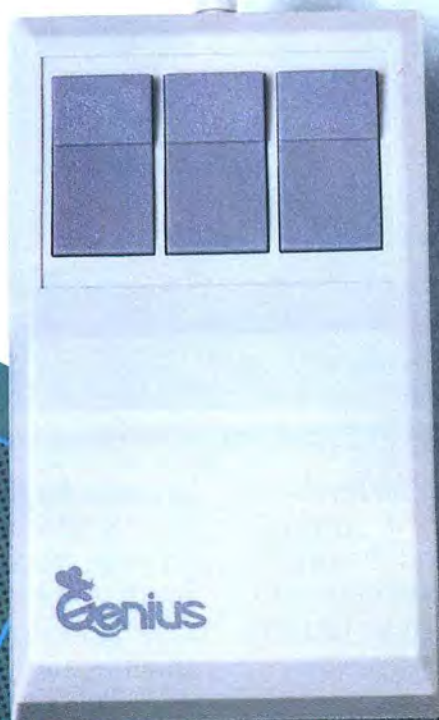
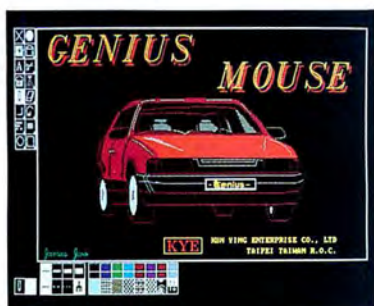
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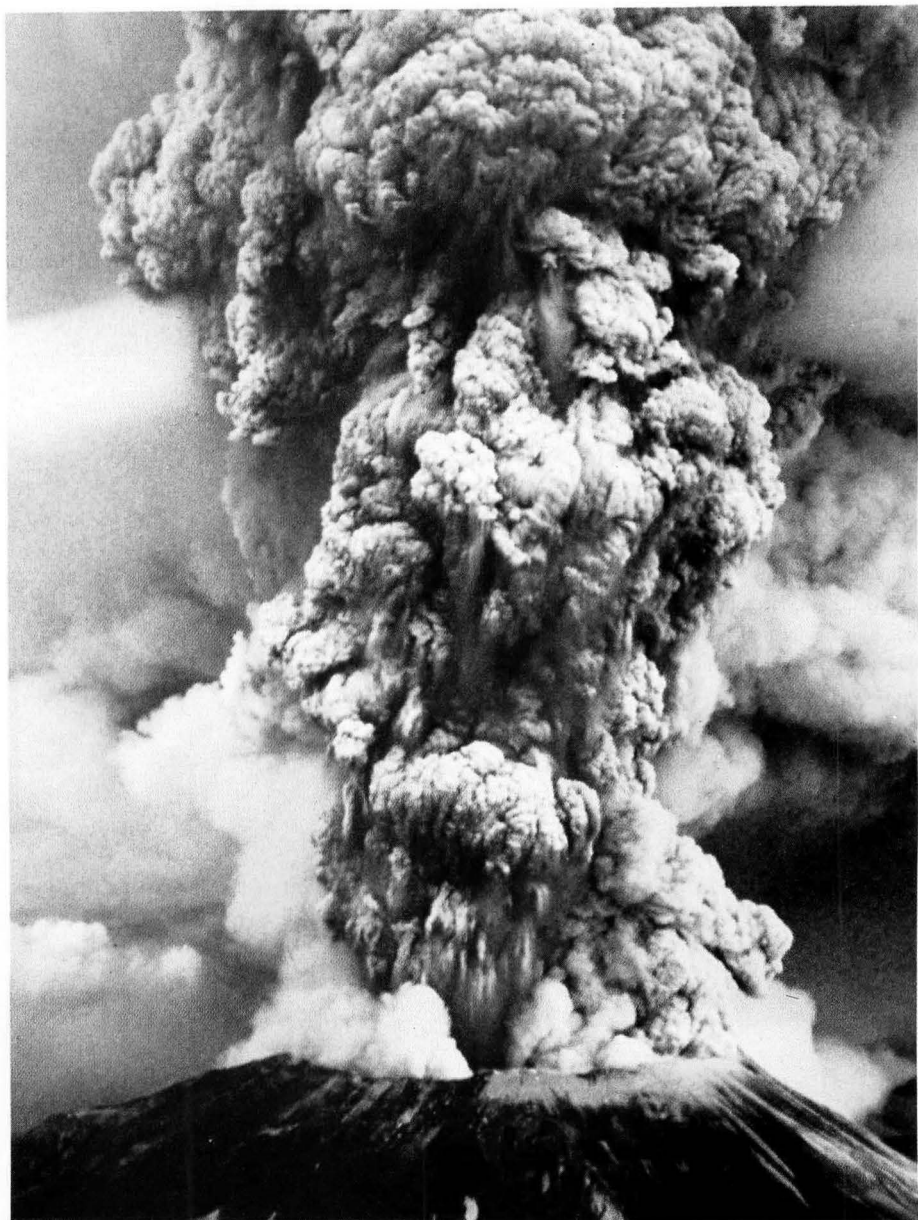
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## MATCH WITS WITH PC WORLD

Edited by Robert Luhn and Michael Goodwin

*Have you ever  
wondered how good  
you really are? Pit  
your experience,  
knowledge, and  
perseverance against  
PC World's editors in  
this merciless quiz—  
and win big prizes.*

Are you the office computer doctor? When PCs are crashing on every side, do lines of panic-stricken users form at your desk? Do you get long-distance calls from people you don't know with feverish queries about obscure DOS commands?

If you can answer yes to even one of those questions, have we got a quiz for you. A *serious* quiz, compiled by the editors of *PC World*—with ten equally serious top prizes. “Match Wits With PC World” ranges from the riddles of RAM to applications expertise and historical esoterica. Each of the ten winners will receive a complete set of Borland's acclaimed Turbo Languages—Turbo Basic, Turbo Pascal, Turbo C, and Turbo Prolog—plus the Turbo Toolbox of his or her choice.

You don't need to be a software cowboy or a ninja programmer to take on this mind-bender—but “Match Wits With PC World” is definitely not a beginner's exercise. Aimed at advanced users, it can help you judge where you stand in the pantheon of PC elders—and how far you've come from the day you first saw a DOS prompt and wondered what in heaven's name to do next.

If you're thoroughly familiar with the PC and its major peripherals and application programs, you're a serious contender. If you don't even think about putting the screws back when you replace your PC's cover (because you know you'll be back under the hood tomorrow), you're probably well on your way to the winner's circle.

The rules: All entries must be submitted on the official answer sheet found at the end of the quiz (or on a reasonable facsimile) and postmarked no later than February 1, 1988. Mail answer sheets to “Match Wits With PC World,” *PC World* Editorial, 501 Second St., San Francisco, CA 94107. If you have comments about the test, send them to *Letters*, c/o *PC World*.

Answers will be scored by a panel of *PC World* editors. In case of tie scores, entries with the earliest postmarks will win. Employees of *PC World*, PCW Communications, IDG Communications, or their subsidiaries are not eligible.

Good luck! Have fun! Don't mess up!



1. Who developed the first electronic digital computer, and what was it called?

- a. John von Neumann; Mark I
- b. Tom Watson, Sr.; The Electronic Pernambulator
- c. Eckert and Mauchly; the ENIAC
- d. Sperry and Rand; the UNIVAC



2. Which Hayes AT (attention) command sets a modem to answer an incoming call on the second ring?

- a. ATS, 2
- b. ATSO = 2
- c. ATS0 = 2
- d. ATI = 2

Illustrations by  
CRAIG SHANNON



Do you get long-distance calls from people you don't know with feverish queries about obscure DOS commands?

3. Which of the following programming languages does not support the CASE statement or its equivalent?

- a. MS-BASIC
- b. True BASIC
- c. Turbo Pascal
- d. Turbo C



4. Which of the following redirects a directory listing to a disk file?

- a. COPY DIR LPT1:
- b. DIR drive:\path &lt; filename
- c. COPY DIR PRN:
- d. DIR drive:\path > filename

5. Which program cannot tap the Color/Graphics Adapter's 640-by-200, high-resolution, black-and-white graphics mode?

- a. Framework
- b. WordStar
- c. Microsoft Word
- d. 1-2-3

6. Who was the programming language Ada named after?

- a. Ada Hollerith, Herman Hollerith's wife
- b. Ada Lovelace, Charles Babbage's paramour
- c. Pascal's mother-in-law
- d. No one—Ada stands for Algorithmic Data Architecture

7. What command prevents the cells above the pointer of a 1-2-3 worksheet from scrolling up and down?

- a. /Worksheet Window Horizontal
- b. /Worksheet Titles Horizontal
- c. /Range Input range
- d. /Window Horizontal

8. Which statement, when placed in CONFIG.SYS, allows DOS 3.30 to format 3½-inch disks at 720K in an external drive D:?

- a. DEVICE=DRIVER.SYS /D:3/F:2
- b. DRIVER.SYS=/D:3/F:2
- c. DRIVPARM=/D:3/F:2
- d. DEVICE=DRIVPARM /D:3/F:2

9. The precursor to ThinkTank was originally called what and developed at which company?

- a. VisiText, VisiCorp
- b. Microsoft Outline, Microsoft
- c. MaxThink, MaxThink, Inc.
- d. Framework, Ashton-Tate

10. A medium-resolution picture on a CGA-equipped color display is worth 1000 words—and how many bytes?

- a. 8000
- b. 16,000
- c. 16,384
- d. 4256

11. The PC's print screen function is

- a. a BIOS routine
- b. an internal DOS command
- c. an external DOS command
- d. a BASIC function

12. A 'Tape DMA overrun error' message during a tape backup session usually means

- a. the device memory allocation buffer is full; backup can't proceed unless the buffer is cleared
- b. another device or program (such as a memory-resident utility) is using the DMA channel
- c. you must reboot the computer and start again
- d. the DEVICE=ANSI.SYS statement must be removed from CONFIG.SYS and the system rebooted



13. What is the difference between a compiler and an interpreter?

- a. A compiler constructs a complete machine language translation of a program; an interpreter doesn't.
- b. A compiler translates an entire program into machine language in a single step; an interpreter translates it one statement at a time.
- c. A compiler has a built-in full-screen editor.
- d. A compiler handles C or Pascal; an interpreter handles BASIC or FORTH.

14. How many Micro Channel slots remain free in an IBM PS/2 Model 30 with a 20MB hard disk?

- a. 0
- b. 1
- c. 2
- d. 3



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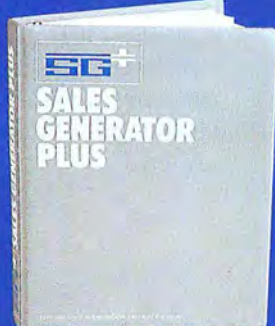
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15. To make *Microsoft Windows* print a text file to disk, you must

- select the 'Print All' command from the file menu
- add *filename.PRN* to the [ports] section of *WIN.INI*
- open the setup menu on the Control Panel and specify 'Plain' in the 'Printer...' option
- merely load the file and select 'Print to disk' from the file menu

16. The 80386 microprocessor can address

- 64 terabytes of virtual memory and 4 gigabytes of linear physical memory
- 16 terabytes of virtual memory and 16MB of linear physical memory
- 64 gigabytes of virtual memory and 16MB of banked, physical memory
- 16MB of expanded memory

17. DOS 4.00 was first introduced

- in Germany
- in France
- in England
- to CP/M 386 at COMDEX; they later married

18. The 8088's CX register

- holds the sum of AX and BX
- holds the current code segment
- accumulates the results of math operations
- is automatically decremented by the LOOP instruction

19. The maximum physical baud rate for an RS-232C serial port is

- 9600
- 19,200
- 38,400
- 1200



20. If a 180K 5¼-inch disk has 512-byte clusters and a 360K 5¼-inch disk has 1024-byte clusters, how big are the clusters on a 1.2MB 5¼-inch disk?

- 512 bytes
- 1024 bytes
- 2048 bytes
- 4096 bytes



21. *Cruise Control* and similar utilities speed up the cursor by

- boosting the clock rate of the system's microprocessor
- augmenting certain BIOS routines that control the keystroke repeat rate
- copying the bootstrap loader into RAM
- turning up the cursor clock

22. While receiving a file over your modem with *PC-Talk III*, you accidentally save it as MAIL 816 instead of MAIL816. To your horror, you discover you can't TYPE the file, much less read it with your word processor. What do you do?

- Call Peter Norton
- Use *PC-Talk*'s 'file compress' option
- Type REN MAIL?816 MAIL816
- Type COPY .?816 MAIL816

23. To execute the command REVISE.BAT as a subroutine from within AUTOEXEC.BAT, which line would you add to AUTOEXEC.BAT?

- REVISE.BAT
- RUN REVISE.BAT
- COMMAND/C REVISE.BAT
- EXIT \ REVISE.BAT

24. COPY A:\*. \*B: is to COPY A:. B: as

- FORMAT is to FORMAT /S
- DEL is to ERASE
- SORT is to FIND
- DIR is to SORT

25. The DOS prompt Wed 9-30-87 17:01:32>

is produced with which DOS command?

- PROMPT \$d\$\_\$t\$g
- PROMPT \$d\$\_\$t\$h\$h\$h\$h\$g
- PROMPT \$d;\$t\$h\$h\$h\$h\$g
- PROMPT \$d\$13\$t\$h\$h\$h\$h\$g

26. When telecommunicating a .WKS file between PCs, what parameters must you use?

- equal parity, 7 data bits, no stop bits
- odd parity, 7 data bits, no stop bits
- no parity, 7 data bits, 1 stop bit
- no parity, 8 data bits, 1 stop bit



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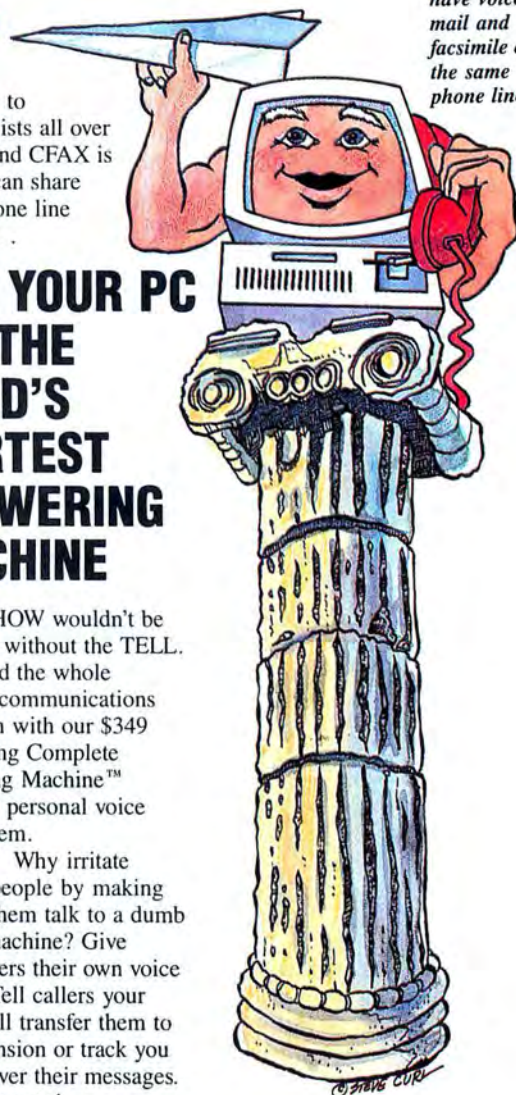
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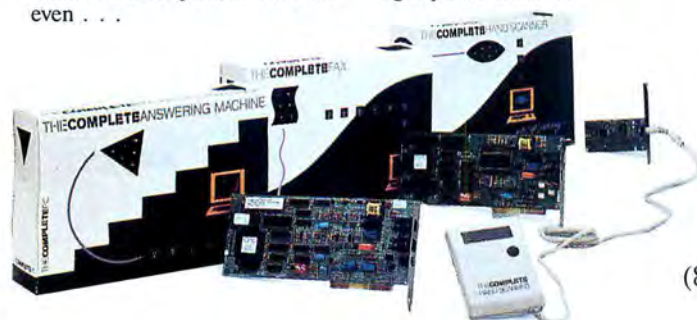
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TRBA

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A medium-resolution picture on a CGA-equipped color display is worth 1000 words—and how many bytes?

27. A disk holds two files, ZIP.COM and ZIP.BAT. What happens if you type ZIP at the DOS prompt?

- a. Both files will try to execute, and the system will lock up.
- b. ZIP.BAT will execute.
- c. ZIP.COM will execute because .COM files take first priority.
- d. DOS will issue an 'Out of environment space' error message.



29. How do you prevent the ECHO OFF message from displaying in a batch file run under DOS 3.30?

- a. Place VERIFY ON at the beginning of the file.
- b. Replace ECHO OFF with ~ECHO OFF.
- c. Replace ECHO OFF with @ECHO OFF.
- d. Place MESSAGES OFF at the beginning of the file.



28. How many colors, from a palette of how many colors, can the VGA display simultaneously at 640-by-480 resolution?

- a. 16 out of 16,048,576
- b. 16 out of 262,144
- c. 256 out of 16,048,576
- d. 256 out of 262,144



30. Identify the wrong match.

- a. 8086 and 8087
- b. Steve and Eydie
- c. 80386 and 80287
- d. 80286 and 80387

31. Which <Ctrl>-key command in WordStar 3.3 has an entirely different function in WordStar 4.0?

- a. ^KF
- b. ^KS
- c. ^QM
- d. ^L

32. A 512K LaserJet Plus can output a 300-dpi image that covers

- a. one-third of a page
- b. one-half of a page
- c. three-fifths of a page
- d. an entire page

33. API stands for

- a. Advanced Programming Interface
- b. Application Program Interface
- c. Ancillary Program Instruction
- d. Association of Professional Instigators

34. A floppy disk's *clip rate* indicates

- a. how much you're being overcharged per disk
- b. the disk's relative reliability
- c. how fast the disk can spin
- d. why your drive is making that funny sound

35. A hard disk's interleave is set

- a. during low-level format
- b. with Setup
- c. with FORMAT
- d. by issuing the 16H controller interrupt

36. dBASE III Plus's INKEY( ) function returns what value for the function key <F9>?

- a. -9
- b. -8
- c. 9
- d. no value—only <F1> is supported

37. EEMS boards, such as the AST RAmPage, offer access to megabytes of banked RAM via a

- a. 16K window
- b. 32K window
- c. 64K window
- d. 256K window



38. DOS 3.20 is limited to

- a. 2 serial ports and 2 parallel ports
- b. 3 serial ports and 2 parallel ports
- c. 2 serial ports and 3 parallel ports
- d. 1 serial port and 2 parallel ports



39. What's the name of 1-2-3's automatically executing macro?

- a. \0
- b. \A
- c. \X
- d. \V

40. Your PC is cabled to a LaserJet Plus. You press <Shift> -

<PrtSc> to take a quick snapshot of the text displayed on the monochrome display. The LaserJet's On Line light blinks awhile and then stops. Nothing comes out of the printer. What's going on? And what's a solution?

a. The LaserJet can't accept print screens. You must use a screen snapshot utility like *Hotshot*.

b. The printer must be off line before you press <Shift>-<PrtSc>. Take the printer off line, issue the command, put the printer on line, and the image will roll out.

c. The LaserJet's memory is full. Reset the printer.

d. The LaserJet won't eject a page until it's full. Place the printer off line and press the formfeed button to eject the page.

41. ANSI.SYS cannot be used to

- a. redefine key assignments
- b. change the system's buffer allocation
- c. set screen colors
- d. control the cursor



42. A device driver is

- a. always referenced in CONFIG.SYS
- b. a file containing instructions that tell DOS or an application how to work with a device
- c. a file that patches the BIOS
- d. a terminate-and-stay-resident portion of the command processor

43. You can enter upper ASCII characters in many programs by

- a. pressing <Ctrl> and entering the appropriate ASCII decimal value of the character
- b. holding down the appropriate <Shift> key while entering the appropriate hexadecimal value from the numeric keypad
- c. holding down <Alt> while entering the appropriate ASCII decimal value from the numeric keypad
- d. you can't; upper ASCII characters cannot be accessed by DOS applications.

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44. What is the difference between *bits per second (bps)* and *baud rate*?

- a. *bps* refers to the number of bits a computer is sending and receiving, while *baud* refers to the frequency at which the bits are being transmitted.
- b. *bps* refers to a digital signal being transmitted from your PC to your modem; *baud* applies to the signal once it is converted to analog by the modem.
- c. *bps* refers to an amplitude modulation technique; *baud*, to a frequency modulation technique.
- d. none of the above

45. The external 5¼-inch disk drive manufactured by IBM for the PS/2 can

- a. read 5¼-inch 360K disks but not write them
- b. read, write, and format 5¼-inch 360K disks
- c. read, write, and format 1.2MB disks
- d. read, write, and format 3½-inch disks

46. How many BIOS-supported text and graphics modes does IBM's Enhanced Graphics Adapter offer?

- a. 3 and 5
- b. 3 and 3
- c. 5 and 7
- d. 3 and 7

47. In Pascal a variable name can contain numbers and letters, but it must begin with

- a. \$CHR
- b. a colon
- c. a letter
- d. a number

48. The ASCII code for the letter A is 65; if you press <Ctrl> and A simultaneously, what code is sent to the system?

- a. 130
- b. 65
- c. 1
- d. 2



49. Which operating system is oldest?

- a. Apple DOS
- b. CP/M
- c. PC-DOS
- d. UNIX

50. To execute a full-system backup using 3 + Share network software you must be logged on as

- a. SYSOP
- b. Admin
- c. Server-User
- d. Big Boss

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1. a. b. c. d.

2. a. b. c. d.

3. a. b. c. d.

4. a. b. c. d.

5. a. b. c. d.

6. a. b. c. d.

7. a. b. c. d.

8. a. b. c. d.

9. a. b. c. d.

10. a. b. c. d.

11. a. b. c. d.

12. a. b. c. d.

13. a. b. c. d.

14. a. b. c. d.

15. a. b. c. d.

16. a. b. c. d.

17. a. b. c. d.

18. a. b. c. d.

19. a. b. c. d.

20. a. b. c. d.

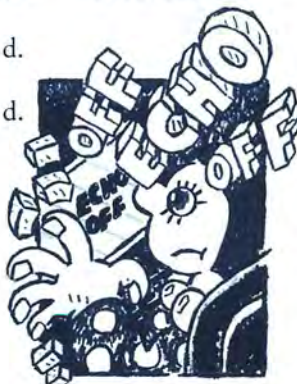
21. a. b. c. d.

22. a. b. c. d.

23. a. b. c. d.

24. a. b. c. d.

25. a. b. c. d.



26. a. b. c. d.

27. a. b. c. d.

28. a. b. c. d.

29. a. b. c. d.

30. a. b. c. d.

31. a. b. c. d.

32. a. b. c. d.

33. a. b. c. d.

34. a. b. c. d.

35. a. b. c. d.

36. a. b. c. d.

37. a. b. c. d.

38. a. b. c. d.

39. a. b. c. d.

40. a. b. c. d.

41. a. b. c. d.

42. a. b. c. d.

43. a. b. c. d.

44. a. b. c. d.

45. a. b. c. d.

46. a. b. c. d.

47. a. b. c. d.

48. a. b. c. d.

49. a. b. c. d.

50. a. b. c. d.



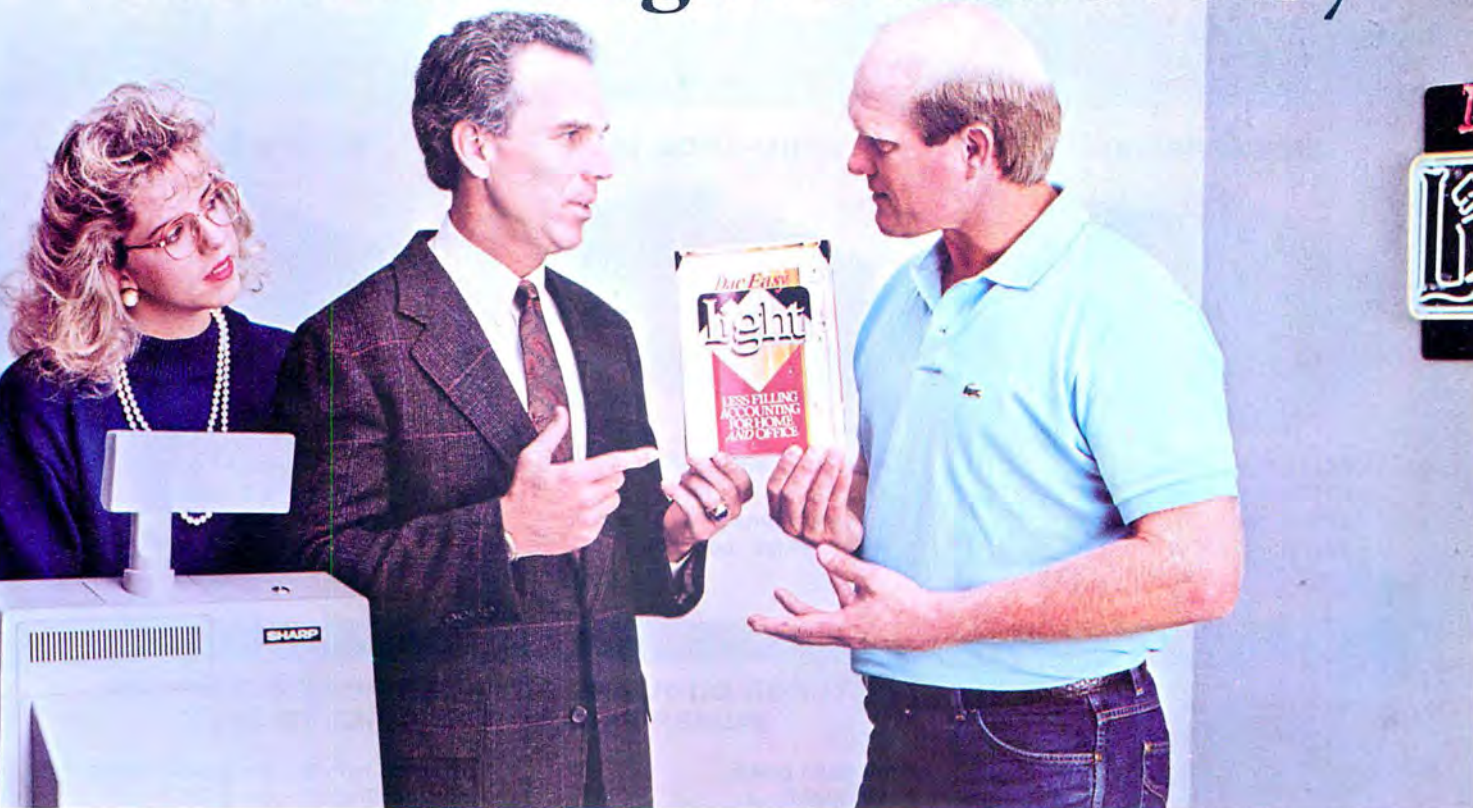
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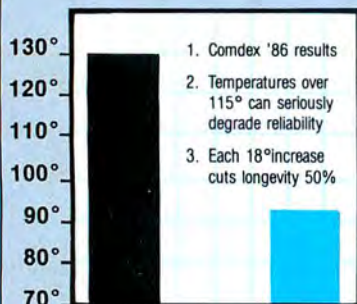


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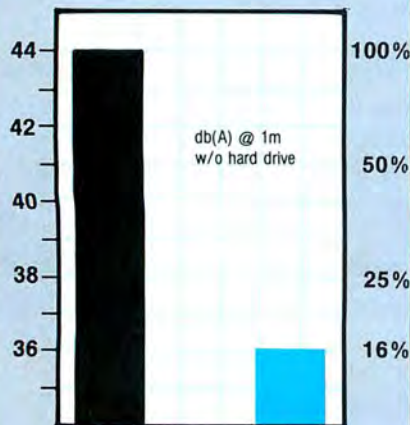


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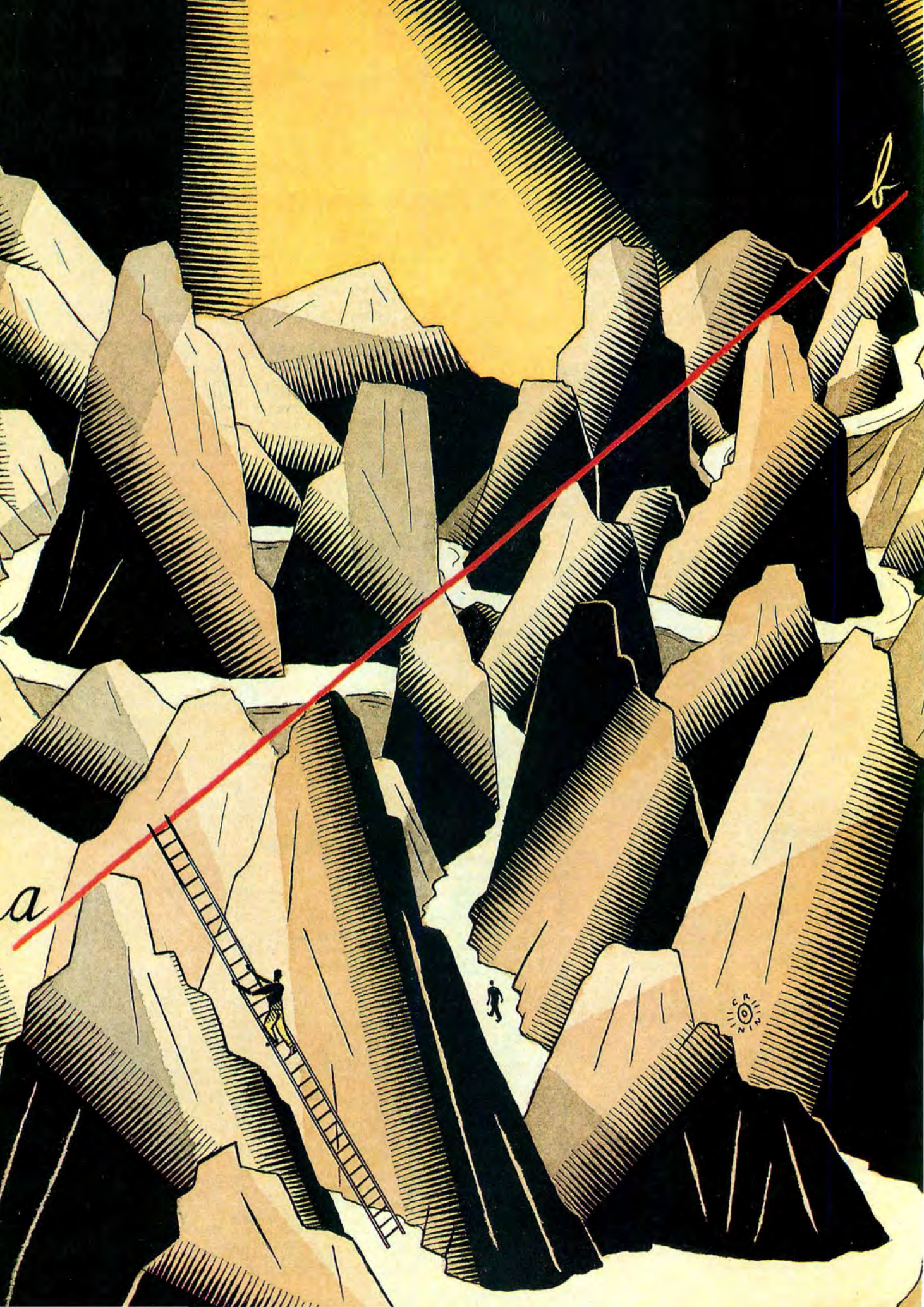
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## TEN TIME-SAVERS

**Tom Swan** Whether you're a pro or a novice, you've probably developed a repertoire of tricks that make your computer zip. From using obscure DOS commands to saving keystrokes with macro processors, it's the little shortcuts that speed up your PC—and help you get your work done more efficiently.

---

Now you can add a few gems to your collection. The grab bag of tips that follows contains hints on using DOS commands such as XCOPY; instructions for setting up a RAM disk; plus various and sundry application-specific tidbits. For newcomers, basics like DOS's redirection and pipe symbols are covered, but even experts will benefit from acquaintance with the likes of the BASIC program that severs the print-screen function.

---

Some of the tips require you to type commands into CONFIG.SYS and batch files such as AUTOEXEC.BAT, which require straight ASCII text. An easy way to create and edit an ASCII file is to use a word processor and save the file in ASCII format. In *WordPerfect* that means typing text as you normally would, then pressing <Ctrl>-<F5>1 and specifying a file name. In *WordStar*, simply select the nondocument option by pressing N instead of D when you open a file at the main menu. If you use another word processor, check your manual to find out how to create

*Illustrations by*  
BRIAN CRONIN





ASCII text. You can also use DOS's line editor, EDLIN, or a programming editor like Turbo Pascal or Turbo BASIC.

## Gun the Copying Motor

If you have DOS 3.20 or a later version, you can speed up copying by using XCOPY instead of COPY—especially when you use the wild card characters ? and \* to copy multiple files. Unlike COPY, XCOPY reads from the source disk as many files as it can fit in RAM before it writes to the destination disk. If you have batch files that contain the COPY command, substituting XCOPY will make them faster.

## Kill That Print Screen

You probably know that pressing <Shift>-<PrtSc> (or <Print-Scrn> on 101-key keyboards) prints all text displayed on screen. But if you initiate a print-screen operation by accident—especially if you don't have a printer and your system freezes—you may wish you could turn the feature off, at least temporarily.

A little-known trick does the job. Setting memory location 0000:0500 (hexadecimal) to 1 disables the function by fooling the print-screen ROM routine into thinking that a print screen is al-

To create a handy guide, you could send a sorted directory to a disk file, insert a description of each directory file, and then print out the file for future reference.

ready in progress. Setting that same location to 0 re-enables the function.

In BASIC, simply type **DEF SEG=0:POKE 1280,1** <Enter> to disable the key or **DEF SEG=0:POKE 1280,0** <Enter> to enable it. In Turbo Pascal, use **MEM[0:1280]:=1** to put the function out of commission and **MEM[0:1280]:=0** to turn it back on. Remember, if you have a compiler such as QuickBASIC, Turbo BASIC, or Turbo Pascal, you can compile a short program containing the appropriate line and create an .EXE file that you can run from DOS.

## Print on the Fly

When you press <Ctrl>-<Prt-Scrn> or <Ctrl>-P, just about everything that appears on screen from that point on is sent to the printer. Pressing the keys again turns the function off. This function comes in handy if you want to print the contents of an ASCII file; simply start printer echo and use the DOS command **TYPE filename**.

But a faster and more elegant way to print an ASCII file is to use the DOS command **TYPE filename >PRN**. The redirection symbol, >, tells DOS to send the file to the printer rather than display it on screen. And this technique is not limited to the TYPE command. The command **DIR >PRN**, for example, sends the directory listing to the printer.

You can also direct output such as a directory listing to a file. The command **DIR >DIR.TXT** saves a copy of the current directory in a

file named DIR.TXT. This overwrites DIR.TXT if it already exists.

To append text to an existing file, use >> instead of >. For example, to send the directory listings of the disks in drives A:, B:, and C: to a single text file and then print that file, type

```
DIR A: > DIR.TXT <Enter>
DIR B: >> DIR.TXT <Enter>
DIR C: >> DIR.TXT <Enter>
TYPE DIR.TXT > PRN <Enter>
```

To feed the output of one DOS command to another, use !, the pipe symbol. For example, to print an alphabetized directory, type the DOS command **DIR ! SORT > PRN** <Enter>. DIR tells DOS to list the current directory; then the pipe directs DIR's output to SORT, which sorts the listing. The last part of this command, >PRN, redirects SORT's output to the printer. Of course, you could also send SORT's output to a disk file like DIR.TXT. To create a handy guide, you could then insert a description of each directory file, save DIR.TXT, and print it out for future reference.

## Load Files Fast With WordStar 4.0

To load documents from WordStar 4.0 directories quickly, type **D** from the opening menu as you normally do, press <CursorDown> to move the cursor into the file listing, then press any character key to move the cursor to the first file starting with that character. Typing T, for example, moves the cursor to the first file beginning with T; just press <Enter> to load it.

(continues)



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## Ten Time-Savers



### Automate Desqview

Every time you use *Desqview 2.0*, you may have to open four or five windows manually. To cut down on keystrokes, you can create an automatic start-up sequence using scripts (i.e., macros). First, type **DV** to start *Desqview*; then press **<Shift> - <Alt>** and select 'Start a Script' to prime *Desqview* to record your keystrokes.

Next, type an exclamation point. When the program requests a 'Script Name', type **!Startup Desqview <Enter>**; the main menu will appear. Type in all the commands you normally use when starting the program (but don't use your mouse); then press **<Shift> - <Alt>** and select 'Finish Script'. Select 'Quit DESQview', save the scripts, and answer yes when the program asks if you're sure you want to quit. Next time you start *Desqview*, your auto-start-up sequence will run automatically.

### Refine Movements With Generic CADD

Even if you use *Generic CADD* without a mouse, you can change the distance the cursor moves each time you press the cursor keys. **<Ctrl>-F** reduces the distance, and **<Ctrl>-G** increases it. Note, how-

ever, that the commands are linked. When you've got the cursor set at its finest movement, one more **<Ctrl>-F** sets the cursor to move the greatest distance. To return to the finest movement, you must type **<Ctrl>-G**. This seems backward until you try it a few times.

### Expedite Searches With PC Tools

A relatively obscure *PC Tools* operation helps speed searches for files residing in subdirectories such as C:\UTIL\TOOLS. If you instruct DOS to use a file in this subdirectory, for example FORMAT.COM, it first searches C:\ for UTIL, then searches UTIL for TOOLS, and finally searches TOOLS for FORMAT.COM; only at that point can it use the file.

To hasten the process, you can use *PC Tools* to sort each directory that contains subdirectories. Start *PC Tools* and press the **<Space>** bar, type **S** to start sorting, and select a sorting method and an order (ascending or descending). After the sorted directory is displayed, type **U** to save it to disk.

Saving the directory to disk has two important consequences. First, *PC Tools* moves subdirectory names to the top of the directory instead of sorting them along with file names. DOS can then find multidirectory path names more quickly. Second, saving the sorted directory results in a more compact directory. Why? Although DOS marks the files you've previously deleted, it does not remove them altogether. Clearing these marked

(continues)



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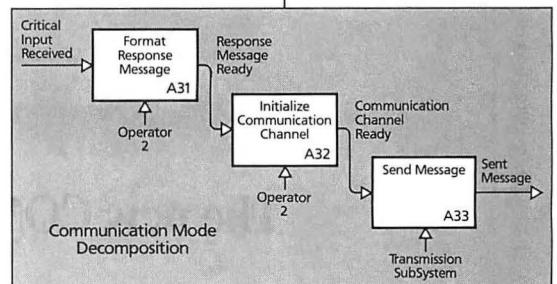
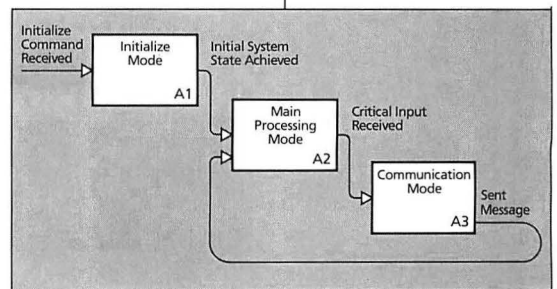
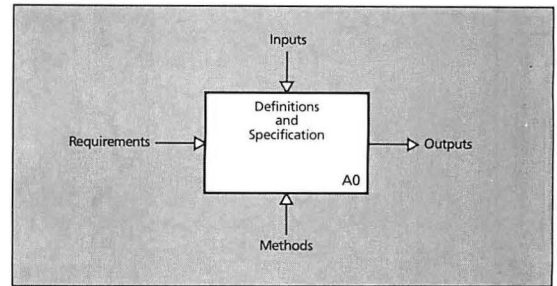
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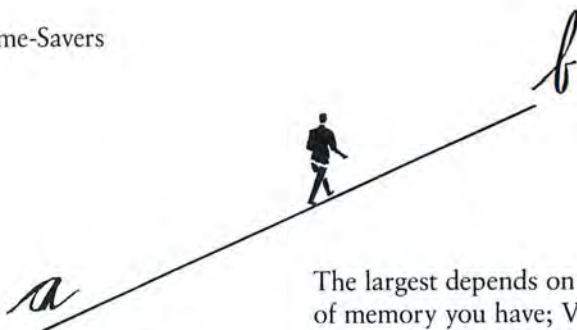
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## Time-Savers



directory entries makes it possible for DOS to search faster.

## Rev Up With a RAM Disk

A RAM disk is a computer program that simulates a disk drive in high-speed memory. RAM disks operate no differently than real disk drives. You can save files on RAM disks, create and remove subdirectories, and copy files between RAM disks and floppies and hard drives.

The catch? When you switch off the power, the contents of a RAM disk evaporate like ice on a hot tin roof. Without power, memory circuits lose the ability to hold information. If you save important files on a RAM disk, be sure to copy the files to a real disk before turning off the PC.

If you have DOS 3.00 or later, you can use DOS's RAM disk driver to speed up your work. First, make sure the file VDISK.SYS is in your hard disk's root directory; if it's not, copy it from your original DOS disk. (Floppy users, copy VDISK.SYS to your boot disk.) Next, tell DOS to load VDISK.SYS when you boot by adding your customized version of the following command to CONFIG.SYS in your boot disk's root directory: DEVICE = VDISK.SYS Buffer size = 180 Sector size = 512 Directory entries = 32.

Buffer size represents the capacity of the RAM disk in kilobytes, 180 in our example. The smallest RAM disk you can create is 1K.

The largest depends on the amount of memory you have; VDISK always leaves 64K free. Note that if you don't leave enough memory free for your applications, you won't be able to run them.

Sector size can be one of three values: 128, 256, or 512 bytes. The RAM disk is fastest when you set sector size to 512. However, if you want to try to squeeze more files into a RAM disk, reduce sector size.

Directory entries, or the maximum number of files the RAM disk can store, may be set to any value from 2 to 512; the default is 64. To save space, use only the number of directory entries you need.

If your system has extended memory, VDISK will use it if you add /E to the end of the DEVICE command. With /E, you can also specify the number of sectors VDISK transfers at a clip. For example, /E:4 tells VDISK to transfer data 4 sectors at a time. VDISK uses 8 by default, but you can use any value from 1 to 8. Caution: When DOS transfers RAM disk sectors to and from extended memory, it turns off interrupt servicing. If the transfer value is high, a background communications program may lose incoming characters while interrupt servicing is off. Adjusting the transfer value takes care of this problem.

When you're ready to install the new RAM disk, reboot the PC so it can read the new CONFIG.SYS file. VDISK will display a message indicating the drive letter, buffer size, sector size, number of direc-

(continues)





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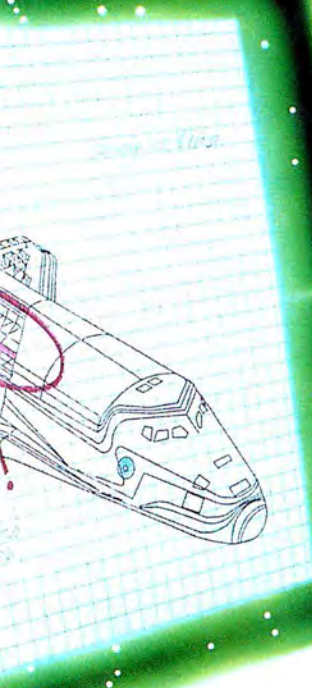
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## T e n Time-Savers

tory entries, and transfer size. Now all you need do is copy the files you want to use to the RAM disk. When you use the files, you'll notice an astounding increase in speed. RAM disks are many times faster than physical disk drives will ever be. Just don't forget to copy your files back to a hard or floppy disk when you're through.

## Reload Programs in a Snap

Here's a tip for floppy disk users who want to avoid that blasted message 'Insert disk with \COMMAND.COM in drive A: and strike any key when ready'. This message appears when you finish using a program and DOS has to reload portions of COMMAND.COM.

To make reloading nearly instantaneous, you can copy COMMAND.COM to a RAM disk and have DOS reload that copy of COMMAND.COM instead of the one on the boot disk. Assuming your RAM drive is C:, add these lines to your AUTOEXEC.BAT file:

**COPY A:\COMMAND.COM C:  
SET COMSPEC+C:\COMMAND.COM**

The first line copies COMMAND.COM to the RAM disk; the second line tells DOS where to find the copied file. Reboot to activate the commands. ●

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No extra keystrokes. To retrieve information you just press G (for Get), with any word or phrase—you’ll watch Tornado zip through your windows like lightning linking and opening those requested. You can even flip through your windows with the arrow keys and watch them instantly pile up and lift away. These are just three of 18 easy but powerful features.

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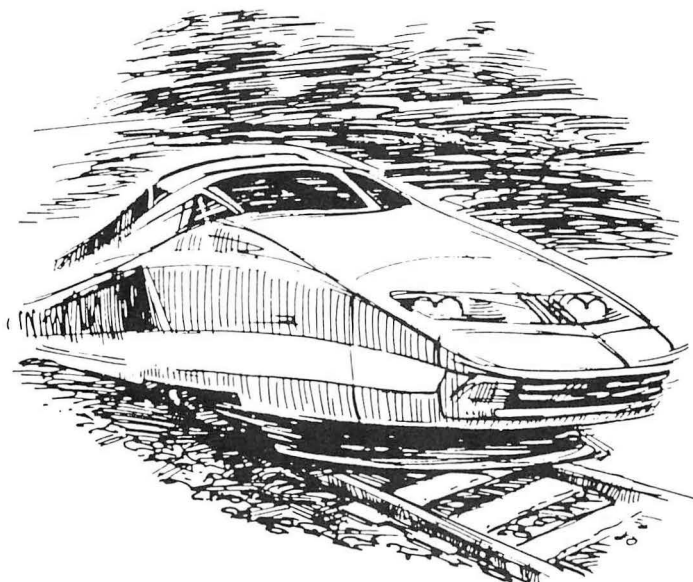
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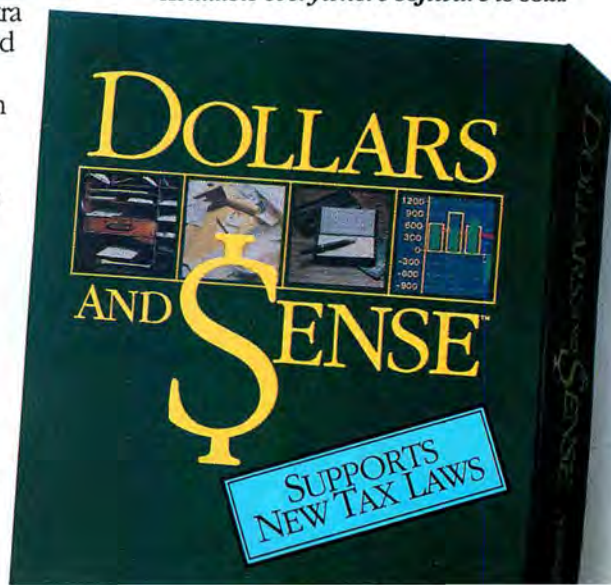
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Purchase the SPSS/PC + Base Package before 4/30/88 and we'll give you a free copy of SPSS/PC + Graph-in-the-Box,<sup>™</sup> which turns your SPSS/PC + results into graphs, instantly. See our ad in this issue. Mail coupon, with name, address & phone, directly to: Microsoft Sales, SPSS Inc., 444 N. Michigan Ave., Chicago, IL 60611.

SPSS/PC + and SPSS/PC + Graph-in-the-Box are trademarks of SPSS Inc. Graph-in-the-Box is a trademark of New England Software. **SEE BACK**

# SPSS inc.

# 50% OFF

## ADVANCED REVELATION DEMO DISK!

Evaluate the most powerful database applications environment for the PC and save 50% off the retail price of \$29.95! To order, mail this coupon with payment of \$14.95 plus \$2.00 shipping to: COSMOS, Inc., 3633 136th Place S.E., Bellevue, WA 98006; (206) 643-9898.

Payment enclosed \_\_\_\_ Visa/Mastercard/American Express \_\_\_\_  
# \_\_\_\_\_ Signature \_\_\_\_\_

Exp. Date \_\_\_\_ Offer expires 5/31/88.

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# COSMOS<sup>™</sup>

# \$15 REBATE

## On SYLVIA PORTER'S YOUR PERSONAL INVESTMENT MANAGER

New from Timeworks, program combines portfolio management with powerful graphics, communications and analysis capabilities. To receive rebate: 1) Write name and address on back of coupon, 2) Return coupon along with product registration card and copy of dated sales receipt to: Timeworks, Inc., 444 Lake Cook Rd., Deerfield, IL 60015. Offer expires 6/15/88. Limit 1 rebate per package. **SEE BACK**

# NITRO<sup>MICRO</sup> OVERNIGHT

Announces that all standard orders will be sent FEDERAL EXPRESS<sup>®</sup> Priority One for next business day delivery. With our everyday low, wholesale price and FEDERAL EXPRESS<sup>®</sup> Priority One delivery, you will know why NO ONE DELIVERS LIKE WE DO. Nitro Micro overnight, Toll-Free 1-800-382-3888. See our ad in this issue. **SEE BACK**

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# PC WORLD



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With Purchase Of **DOLLARS  
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"Using Dollars and Sense on the IBM" (a \$16.95 value). The comprehensive guide for those who want to get more out of the world's most popular personal financial management program. Mail this coupon with your registration and copy of sales receipt to Monogram to receive this 440 pg. Quebook FREE. Good for purchases made between 12/21/87 and 2/29/88. **SEE BACK** Expires 4/15/88.

**DOLLARS  
AND SENSE™**

# 50% OFF

**1986 TEAMS DATA DISK**  
When You Buy **EARL WEAVER BASE BALL**

\$19.95 value, only \$9.95. See our ad in this issue. Send us order form included with Earl Weaver Baseball, dated register receipt with price circled, and this coupon along with \$12.95 (\$9.95 plus \$3 S/H) to: Electronic Arts PC World Coupon, P.O. Box 7530, San Mateo, CA 94403. CA residents add 6.5% tax. Allow 4-6 weeks for delivery. Offer expires 6/15/88. **SEE BACK**



ELECTRONIC ARTS®

# INTRODUCTORY OFFER...

**SURPASS™ SPREADSHEET**  
SOFTWARE SYSTEMS INC.

# FOR \$295

A special PC World 5th Anniversary offer! Purchase SURPASS, the Ultimate Spreadsheet, for just \$295! Reg. \$495. Offer good through April 15, 1988. Send check, money order or

VISA \_\_\_\_\_

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**SURPASS**  
SOFTWARE SYSTEMS INC.

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# SPECIAL PRICES FROM

# -Softline-

Softline Corporation  
1333 60th Street, Brooklyn, N.Y. 11219  
(718) 438-6057  
1 (800) 221-1260

Special Prices from Softline!

Call Softline TODAY for these special limited-time offers:

- AST PREMIUM 286-120 ..... \$2199.00
- MICROSOFT EXCEL ..... \$ 299.00
- ATI VIP BOARD ..... \$ 299.00

Offer expires April 15, 1988. To order call TOLL-FREE 1-800-221-1260 and mention this coupon; or write to: Softline Corporation, 1333 60th St., Brooklyn, NY 11219. **SEE BACK**

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# PC WORLD



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# SAVE 50%

on **DESQview** DATEBOOK

Datebook is a DESQview companion that gives you an appointment scheduler, alarm clock, hour/day/week/month/year calendar and much more. Offer good for all registered DESQview owners. Return coupon with your product registration number and check or money order for **\$25** to Quarterdeck, 150 Pico Blvd., Santa Monica, CA 90405. CA residents, add 6.5% sales tax. Offer expires April 15, 1988. **SEE BACK**



# FREE

## SOFTWARE \$40 VALUE

Purchase CCS Designer before April 30, 1988 and receive one of these add-on packages:

**CCS.DXF.** Converts CCS Designer and other drawings to AutoCAD/vice-versa.

**Symbol Libraries.** Vol. 1: electrical, electronic and plumbing symbols. Or Vol. 2: home design/furnishings. Or Vol. 3: flow charts/project planning. Redeemable at dealer or Complete Computer Services, Inc., 849 Mitten Rd. #24, Burlingame, CA 94010; (415) 692-7250. **SEE BACK**

# \$10 REBATE

## ON MANAGING YOUR MONEY

Offer good on products purchased between 1/1/88 and 3/31/88. To receive rebate: 1) write your name, address, phone, and serial number from Disk 1 on the back of this coupon, 2) attach your dated sales receipt, and 3) send to: MECA, 355 Riverside Ave., Westport, CT 06880. Expires 6/15/88. Not open to dealers or distributors. **Coupon cannot be reproduced. SEE BACK**



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From MicroWay, Inc. Triple the execution speed of IBM PC, XT or compatibles: FastCACHE 286-9 MHz \$349.00 (\$35 OFF) • FastCACHE 286-12 MHz \$499.00 (\$50 OFF) • Turbo Daughterboard \$75.00 (\$7.50 OFF). First Fortran using 32-bit protected mode of the 80386: NDP Fortran-386 \$595.00 (\$60 OFF). Offers good w/coupon only. Expires 6/15/88. **SEE BACK**

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(617) 746-7341



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# FREE

## SOFTWARE

PC-SIG, the world's largest library of Shareware software for the IBM and compatible PCs, will give each person who orders a disk from our library a FREE disk highlighting the latest additions to the PC-SIG Library since the printing of our 4th Edition catalog. Call 800/245-6717. In CA, 800/222-2996. Offer expires April 15, 1988. PC-SIG, 1030-D East Duane Ave., Sunnyvale, CA 94086.

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## On The Purchase Price Of GRAPH-In-The-BOX RELEASE 2!

New in Release 2: VGA, MCGA; full page horizontal printout; makes HPGL and PostScript® files; batch printing; multiple graphs per page; slide show format; expanded manual. Offer cannot be combined with other manufacturers' promotions. See back of coupon for offer details. New England Software, Inc., Greenwich Office Park #3, Greenwich, CT 06831; (203) 625-0062. Offer good through April 15, 1988. SEE BACK



**NEW ENGLAND SOFTWARE, INC.**  
Greenwich Office Park #3  
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# \$50 OFF

## COMPLETE STATISTICAL SYSTEM

The only high-end statistical package that offers mainframe comprehensiveness in a super-fast interactive environment — with data management and presentation quality graphics integrated with all procedures. CSS is not only powerful and fast (written in Assembler and C), but also "elegant" and extremely user friendly. See our **PC World** ads, contact your participating dealer or StatSoft, 2325 E. 13th St., Tulsa, OK 74104; (918) 583-4149. Offer expires 6/15/88.

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## Instant Access To Any Word In The Bible!!

With this coupon and the purchase of THE WORD processor for only \$199.95 plus shipping, we will give you our \$50 Instant Access product. Send coupon or call for more information. Offer good through April 15, 1988. Bible Research Systems, 2013 Wells Branch Parkway #304, Austin, TX 78728; (512) 251-7541.

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# FREE RAPIDFILE™ QUARTZ WATCH WHEN YOU PURCHASE RAPIDFILE™

A \$39.95 value. RapidFile is the fast, easy-to-use database for managing lists and related tasks, such as mailing labels, reports, and form letters. Gives you more speed and storage capacity than any other database of its kind. Offer expires 4/15/88. To respond, send coupon with proof-of-purchase to: Ashton-Tate, RapidFile Watch, 20101 Hamilton Ave., Torrance, CA 90502-1319.

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# SAVE \$20 ON CHECK MATE

A multipurpose check register accounting system. Regularly \$89.95. Just \$69.95 with this coupon. Call 1-800-654-5901 or 713-495-6516. Or write to Viewpoint Software, 12101 Beechnut, Houston, TX 77072. Offer expires April 15, 1988.

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# UP TO \$7<sup>50</sup> BACK ON DISK TECHNICIAN™

Repairs and maintains hard disks by predicting and correcting failures — without removing programs and data! Get \$5 back when you buy *Disk Technician*™ or \$7.50 back when you buy *Disk Technician +*! To obtain rebate, send proof-of-purchase, completed user registration and original coupon to: *DISK TECHNICIAN* REBATES, 1940 Garnet Ave., San Diego, CA 92109. Offer expires 6/15/88.

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# FREE \$100 UPDATE, IF YOU BUY REAL ESTATE ANALYZER now!

Buy Howardsoft's 3rd edition of *REAL ESTATE ANALYZER*® from your dealer now, and get the next update on the new tax laws FREE. *REAL ESTATE ANALYZER*, from the authors of *TAX PREPARER*®, generates 30-year projections of before & after-tax cash flow and R.O.I. Send this coupon, user registration & dated sales receipt to: Howardsoft®, P.O. Box 8432, La Jolla, CA 92038. (619) 454-0121. Offer expires 4/30/88.

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## HowardSoft®



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 **Seagate 40 Mb HARD DISK**

**SAVE \$75**

**AND RECEIVE 100  
DISKETTES**

**FREE!**

Save \$75 off our regular low price and receive your choice of 100 5 $\frac{1}{4}$ " Double-Side Double Density or 30 5 $\frac{1}{4}$ " Double-Side High-Density diskettes FREE! Reg. price \$499. Price with coupon plus diskettes ONLY \$424! To order, call Supply Line Inc. at 800-458-LINE (IL 312- 495-7540) and MENTION THIS OFFER. Offer expires 4/15/88. **SEE BACK**

**SupplyLine** INC.

**R&R REBATE  
\$15**

dBASE Users: Prepare reports in half the time, without programming — see our ad in this issue. To save \$15, return coupon with your Owner Registration Card and proof of purchase dated between 12/15/87 and 6/1/88. Rebate mailed within 4 to 6 weeks. Coupon must be redeemed by 6/15/88. Does not apply for copies returned for refund. Concentric Data Systems, Inc., 18 Lyman St., Westboro, MA 01581; or call 800-325-9035.

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**FREE  
NFL TEAM BAG**

With the purchase of NFL Challenge or any 2 products by XOR Corporation, receive an athletic bag (valued at \$13.50) with your favorite NFL team's color & logo. Made of rugged cotton duck by the Athletic Bag Company. Offer expires April 4, 1988. Purchases must be direct from XOR Corporation, 5421 Opportunity Court, Minnetonka, MN 55343. Or call Theresa Rosencrantz, (612) 938-0005. **SEE BACK**

**XOR**™  
CORPORATION

**SAVE \$5  
PC/ LABEL MASTER**

This easy-to-use mailing list management program produces mailing labels, envelopes, rolodex cards, follow-up cards, and rosters. Reg. \$49.00; with coupon PC/Label Master is only \$44.00 plus shipping and handling. To order, call Best Programs at 1-800-368-2405 (in VA, 1-703-820-9300) and mention PC World coupon. Offer expires 6/15/88. **SEE BACK**

**BEST  
PROGRAMS**  
"The Quality Software Company"



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With purchase of any Okidata printer. A \$15.00 value. From Arlington Computer Products Inc. Call 1-800-548-5105. Offer expires April 15, 1988. In Illinois, call 312-228-6333. **SEE BACK**

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Use this coupon to purchase Personal Tax Preparer (PTP) for only \$24.00 plus \$3.00 S/H (normally \$29.00 plus \$3.00 S/H). Computes and prints Form 1040, Schedules A, B, R, and Form 2441. Offer expires 4/15/88. To order, send name, address, and coupon or call 1-800-223-6925. Check/VISA/MC/C.O.D. **SEE BACK**



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## PRIMAL SCREEN!

Genest Technologies invites you to take \$15 off the suggested retail price of PRIMAL SCREEN, an automatic macro system for word processors and spreadsheets. Must be redeemed by 4/30/88. See our ad in this issue for more information. **One time discount only. Not available with other special offers. Discount does not apply to dealers and distributors.** 1331 E. Edinger Ave., Santa Ana, CA 92705; 800-828-9641 or 714-547-0880. **SEE BACK**



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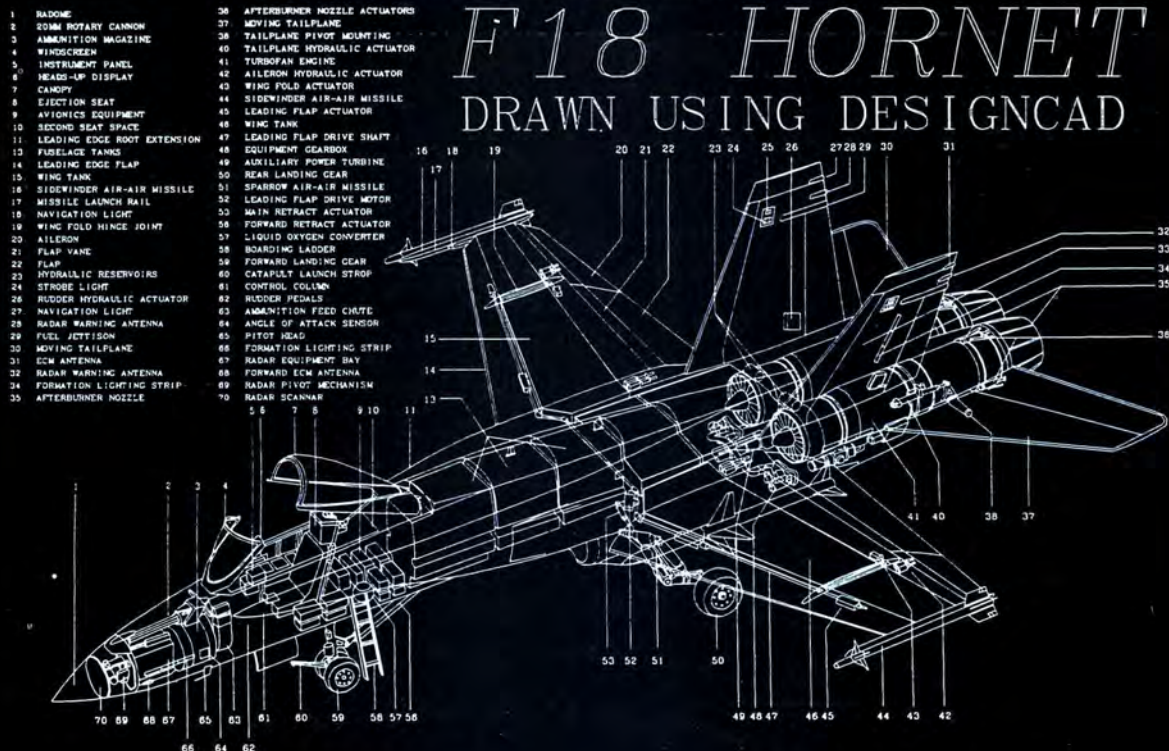
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# PC WORLD INDEX VOLUME 5

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	Dykstra, Dennis	May	230	R	<b>Simply Integrated</b> <i>pfs:first choice</i> and <i>Electric Desk</i> : integrated packages for the entry-level user
	Seiter, Charles	Nov.	243	SS	<b>Ability Plus</b> Integrated package
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	Getts, Judy	April	266	H	<b>Network Security Strategies</b> Commonsense tips to sew up holes in your local area network
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Printers	Trivette, Donald B.	Jan.	165	HS	<b>Epson EX-1000</b> Dot matrix printer
	Nace, Ted	Jan.	236	R	<b>A Bold New Face</b> AST's TurboLaser is a whiz at high-speed, general-purpose printing
	Brown, Eric	Feb.	140	HS	<b>Brother M-1109</b> Dot matrix printer
	Trivette, Donald B.	Feb.	146	HS	<b>Epson HI-80</b> Low-cost A-size plotter
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	Weinberger, David	April	140	HS	<b>Texas Instruments Model 857 Color Printer</b> Color dot matrix printer
	Trivette, Donald B.	June	156	HS	<b>AMT Office Printer</b> Color printer
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	Gardner, Michael	Aug.	228	R	<b>A Streamlined LaserJet</b> The budget-priced LaserJet Series II reviewed
	Gardner, Michael	Sept.	128	HS	<b>PC Laser 6000</b> Laser printer
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	Goodwin, Michael	Dec.	229	HS	<b>Toshiba P341SL</b> Wide-carriage 24-pin dot matrix printer
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	Dykstra, Dennis	Feb.	187	SS	<b>Extended Batch Language</b> A DOS shell that provides a super batch language
	Katz, Richard	Mar.	266	H	<b>Unleashing Framework</b> How to create user-designed functions with FRED, <i>Framework's</i> built-in command language
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	Keller, Bob	Sept.	228	S	<b>Routines for Rent</b> Application program interfaces let you soup up old DOS applications with new features
Publishing	Norton, Peter	Dec.	316	HT	<b>Power Your PC With Batch Files</b> A beginner's guide to boosting your productivity with DOS batch files
	Crider, Bill	Feb.	174	SS	<b>MP-XL</b> Professional typesetting package for the PC and Cordata LP-300 laser printer
	Neuhaus, Peter	Feb.	292	H	<b>Custom LaserJet Forms</b> How to create customized, laser-printed business forms with <i>Polaris Forms</i>
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	Jantz, Richard	June	198	R	<b>Publishing Meets Its PageMaker</b> <i>PageMaker's</i> typography and graphics handling put it at the top of the publishing heap
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	Nace, Ted	June	264	H	<b>Basic Business Reports With Ventura Publisher</b> Learn how to create a three-page, multiple-column business report that can serve as a model for more ambitious efforts
	Jantz, Richard	July	229	R	<b>Ivy League Publishing</b> <i>Harvard Professional Publisher</i> tries for the big leagues, but it doesn't make the cut
	Jantz, Richard	Aug.	240	R	<b>Are You the DeskSet Type?</b> <i>DeskSet</i> offers rewards for those in search of true typesetting
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	Badgett, Tom	July	261	R	<b>Figuratively Speaking</b> With its word processing component, <i>Words &amp; Figures</i> may be what 1-2-3 should have been
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	Oct.	89	On IBM: What Personal Computers Mean to Big Blue	After making PCs a business necessity, IBM's top-dog position is threatened by them
Zachmann, William F.	Nov.	91	On IBM: Does OS/2 Extended Lock Out Clones?	IBM is sending conflicting signals about its new systems: open to third-party developers, but closed to clone makers
	Dec.	89	On IBM: The Connectivity Battle Ahead	IBM and Microsoft will be vying for OS/2 users in the local area networking market



# THE UPGRADE PATH

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Compatibility	More Than Compatible?	May	303	IBM ROMs in an AT clone
Displays	More Than a Multiscan	Sept.	256	Getting another third of the screen for <i>Ventura Publisher</i>
Expansion Boards	Cautionary Tales	Aug.	273	Two slots on one card?
Input Devices	Snappy Keyboards	June	292	Tips for swapping keyboards from the PC and AT
	Keyboard Extenders	July	312	Adding an extra keypad
	Son of Snappy Keyboards	Oct.	308	An enhanced-style keyboard for the PC and AT
Memory	Terms of Installation	May	304	Properly using Setup with EMS boards
	Thanks for the Memory	July	306	The AboveBoard in the PC
	More Equity	Sept.	254	Slotless 256K for the Equity I
	Slotless Compaq RAM	Nov.	346	Double the Compaq or XT's motherboard RAM with a \$12 chip
Miscellaneous	Do-It-Yourself Reset Button	Oct.	301	Adding a reset button to the PC
Motherboards	Fast-Track XT	Sept.	247	The Mach 10 can double the XT's performance
Power Supplies	Portables Power	May	300	Caveats for installing the Compaq Portable's power supply
	Power to the PC	May	303	Replacing the PC's power supply with a 135-watt unit
	A Quiet Power Supply	Oct.	306	The PC Cooling power supply—more power and quieter
Printers	HP LaserWriter	June	277	Turning the LaserJet into a PostScript printer with PS Jet
	Letter Quality MX-80	July	305	Getting the LQ printer out of your Epson MX-80
Processors	CPU Sidekick	June	278	Installing the 80287 numeric coprocessor
	Poor Man's Turbo Board	Oct.	302	Crank up the AT's 80286 to 12 MHz
Storage	Double Your Storage	May	288	Installing a 3½-inch 720K floppy drive
	The 50 Percent Solution	May	294	An RLL controller that increases hard disk storage
	Bernoulli Box Bonanza	June	286	Attaching the Bernoulli Box to the PC
	A Bernoulli by Any Other Name	Aug.	259	Installing the 5¼-inch Bernoulli Box in the AT
	PC to XT—The First Step	Aug.	266	Adding a new BIOS ROM to an ancient PC
	Upgrade Update	Sept.	258	Using DOS and 3½-inch floppy drives
Systems	From the Upgrade Bookshelf	Sept.	258	Order information for <i>Upgrading Your Compaq Plus or Portable</i> by R. H. Martin
	The Ultimate Turbo Board	Nov.	339	Steps for transforming your PC or XT with an 80386-based motherboard



# CONSUMER WATCH

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Mail Order	June	300	How to make the most of mail-order shopping
	Dec.	331	Where to turn for evaluations of mail-order companies and stores
Resources	Nov.	357	A resource list for hardware complaints; the premiere of "Second Look," which updates previously reviewed products
Storage	Aug.	279	Hard disk drive buying tips and technical jargon demystified
	Sept.	263	What to look for in a floppy disk drive; how to save money on floppy disks
Warranties	July	316	A summary of the protections software and hardware warranties provide

# SOURCEBOOKS

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	Nov.	387	<i>The Secret Guide to Computers, 12th edition, Volume 2: Secret Thrills</i> by Russ Walter
	Nov.	396	<i>The Shareware Book: Using PC-Write, PC-File, PC-Talk</i> by Emil and Miriam Flock and Howard Schulman
Artificial Intelligence	April	285	<i>Machinery of the Mind: Inside the New Science of Artificial Intelligence</i> by George Johnson
	April	288	<i>Artificial Intelligence for Microcomputers: The Guide for Business Decisionmakers</i> by Mickey Williamson
	June	315	<i>Tools For Thought: The People and Ideas Behind the Next Computer Revolution</i> by Howard Rheingold
	Sept.	283	<i>The Cognitive Connection: Thought and Language in Man and Machine</i> by Howard Levine and Howard Rheingold
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Finance	May	314	<i>Automating Your Financial Portfolio: An Investor's Guide to Personal Computers, second edition</i> by Donald R. Woodwell
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Graphics	Nov.	388	<i>The Algorithmic Image: Graphic Visions of the Computer Age</i> by Robert Rivlin, with a foreword by Tom DeFanti
Integrated Applications	Oct.	340	<i>Framework II Applications</i> by Richard H. Baker
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Publishing	April	295	<i>Desktop Publishing From A to Z</i> by Bill Grout, Irene Athanasopoulos, and Rebecca Kutlin
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	Oct.	338	<i>Publishing From the Desktop</i> by Jonathan Seybold and Fritz Dressler
Security	Sept.	288	<i>Microcomputer Data Security: Issues and Strategies for Business</i> by Daniel J. Cronin
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Subject	Issue	Page	Description
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	Dec.	366	<i>Supercharging Your PC: A Do-It-Yourself Guide to Expand the PC</i> by Lewis Perdue
	Dec.	369	<i>Power Portable Computing: The IBM PC Convertible</i> by Dick Conklin
Word Processing	Sept.	298	<i>Command Performance: Microsoft Word</i> by Nancy Andrews
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	Nov.	397	<i>A WordStar Survivor's Guide to WordPerfect</i> by "W. S. Farewell and W. P. Forever"

## THE HELP SCREEN

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1-2-3	A Program by Any Other Color	Feb.	321	"Colorize" 1-2-3
	Days of Our Spreadsheet	Mar.	281	A 1-2-3 release 2 formula that derives the day of the week from the serial date
	Lotus and the LaserJet	June	336	Where to find advice about printing 1-2-3 graphs on the HP LaserJet
	Now You See It...	Aug.	306	1-2-3 graph legends don't print as displayed on screen
	1A Days	Nov.	406	A 1-2-3 release 1A macro that derives the day of the week from the serial date
BASIC	Sowing a Random FIELD	Mar.	290	How to FIELD random file records up to 32,768 bytes long
	A Day in the Life	Aug.	310	Determining the day of the week with BASIC
	BASIC Date File	Nov.	412	Reader offers simpler BASIC day-of-the-week routine
	BASIC NumLock	Dec.	404	How to control the state of the lock keys within BASIC, plus a number-guessing game
Communications	A Bit Too Much	Jan.	301	Transmitting Word documents using a 7-bit protocol
	COM Down and Try Again	Jan.	301	A new internal modem may fail to operate due to conflicts with other devices
	AT Tech Ref Errata	Jan.	302	Correction to the IBM Technical Reference manual's COM1/COM2 jumper settings
	Serial Port Interrupts à la MODE	May	319	Why you can't swap COM1 for COM2
	Syncing Suspicion	Sept.	322	Discourse on difference between synchronous and asynchronous protocols
Correction	Mea Culpa	July	344	Correction to March's BASIC fields
	DEFKEYS Redefined	Sept.	330	Comment on April's BASIC program to set function key assignments
	Error in Automatic Partition Changer	Nov.	416	Correction to error in August's "Pick a Partition"



Subject	Title	Issue	Page	Description
DOS	Lost in Space	Jan.	302	How to remove a space from a file name
	Second-Level Prompting	Feb.	321	How to create a two-line DOS prompt
	Thirty More Function Keys	April	302	A BASIC program that sets 40 DOS function key assignments
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	The Color of DOS	June	333	Batch file sets DOS's character and background screen colors
	I've Got a Driver and That's a Start	June	338	How to make copies of floppies when your PC has two different-size drives
	A Request With a Ring	July	336	Put a beep into RESTORE's request for the next backup disk
	Alphabetical Directory	Aug.	303	Sorting a directory listing by file name or file creation (last save) date
	ECHO Lost	Aug.	303	How to get ECHO to display < , > , and ! instead of treating them as redirection and piping symbols
	Pick a Partition	Aug.	314	How to automate rebooting a different operating system located in another partition
	Screen Help	Sept.	326	Effects of different DOS versions on June's SCREEN.BAT, plus modification to brighten character color
	Floppy Copy of Hard Files	Oct.	360	Discourse on the DOS command XCOPY
	Automated MS-DOS 3.20 BACKUP	Oct.	362	BACKUP technique needs to be changed for MS-DOS 3.20
Miscellaneous	Environmental Impact	Dec.	398	How to increase the default size of DOS's environment space
	Zeroing In on Missing Data	Mar.	290	Data base managers' difficulty differentiating between '0' and 'not available'
	Readers Respond	June	338	Response to March's data base problem, BASIC 3.20 and the EGA, plus a 1-2-3 release 2 day-of-the-week formula
Networks	Library BASICS	Dec.	391	How to run BASIC from <i>WordPerfect Library</i> , plus a discussion of the proper organization of a hard disk
	The Corporate Connection	April	302	Ungermann-Bass's single card async/terminal/LAN connectivity solution
	Faster Service	April	302	Improve net performance with disk caching or Santa Clara Systems' Batram
Storage	Hard Disk Casualty	July	335	Warning: Back up hard disks before installing a network
	Parking Problem	Mar.	281	How to simplify parking an IBM XT's or AT's hard disk
	Valet Parking	July	340	Using IBM Diagnostics to park the XT's hard disk won't harm an installed Plus Development Hardcard
	Controlling 3½-Inch Floppy Drives	Sept.	322	Controllers that support 5¼-inch and 3½-inch drives
	The Shrill of Computing	Dec.	399	Why your PC is making that high-pitched scream, and what to do about it
Systems	3½-Inch 360K Format	Dec.	394	How to format a 3½-inch disk to 360K in a 720K drive
	On or Off?	April	299	"Leave the PC on or off?"—that is the question
Utilities	PageMaker Paradox	Sept.	322	Clarification of <i>PageMaker's</i> system requirements
	Printer Port of Call	May	319	Swapping LPT1 and LPT2
	Speed Typing, Dvorak Style	Sept.	319	How to implement the Dvorak layout for your keyboard
	Verdi or Puccini and Not The 101 Strings	Sept.	319	Utility searches files for text phrase or pattern
	AUTOEXEC SideKick	Nov.	403	Have <i>SideKick's</i> appointment calendar pop up automatically when you boot the PC
	Serial Spoolers	Dec.	402	Utilities to spool serial output to a serial plotter



Subject	Title	Issue	Page	Description
Video	RGB to VCR	Jan.	304	Videotaping PC-generated color graphics
	A Word on Tandy Color Colors Word on a Tandy	Feb.	324	Make Tandy 3000s run <i>Word</i> in color
	Miniature Golf's Major Goof	Feb.	327	Why CGA graphics aren't displayed using the 16 colors available in text mode
	Programming the EGA	Feb.	328	A QuickBASIC program displays any 16 colors of the EGA's 64-color palette
	Starflight's EGA Trek Cruisin' With the Windows Down	May July	324 340	Patching Electronic Arts' <i>Starflight</i> to run on the EGA Solving problems between screen blankers and graphics programs or user interfaces
Word Processing	A Quick Word	Mar.	288	Speeding up <i>Word</i>
	LaserJet Text-Mode Screen Printouts	May	322	<i>Word</i> 's nonprinting end mark corrupts screen printouts
	A Matter of Style	July	335	Change <i>Word</i> 's default margins with a style sheet
	Brains Versus Brawn	Oct.	359	Discussion of what affects the time required for a word processor to jump from page <i>x</i> to page <i>y</i>
	WordStar's Whimsical WINSTALL	Oct.	359	Fix for <i>WordStar</i> 's installation program's 'Too little memory' error message
	Perverved Palette	Nov.	404	Quick remedy for <i>Word</i> 's palette when it's perverted by screen-blanker or memory-resident pop-ups
	Modifying NORMAL.STY	Nov.	408	Reader sends advice on modifying NORMAL.STY without disabling speed formatting <Alt>-key commands

## STAR-DOT-STAR

Subject	Title	Issue	Page	Description
1-2-3	Filing 1-2-3 Macros	July	347	Keep commonly used 1-2-3 macros in their own file, ready for importing
	Passwords Without a Trace	July	347	How to put password protection in 1-2-3 macros
	Navigating 1-2-3 Directories	July	349	How to change the current directory within 1-2-3
	Knocking NumLock	Dec.	417	Macro enables numeric keypad entry and pointer movement without toggling <NumLock>
BASIC	Fastest Primes	Jan.	320	Another BASIC prime number generator
	Handful of Keys	April	338	INPUT\$ versus INKEY\$ and simulated multitasking in BASIC
	BASIC File Saver	July	351	Technique eases frequent saving when developing BASIC programs
	Your BASIC Line Generator	Sept.	346	Routines for drawing double lines and boxes in interpreted and compiled BASIC
	BASIC Super Saver	Nov.	437	Another technique to ease frequent saving when developing BASIC programs



Subject	Title	Issue	Page	Description
Batch files	Batch File Bonanza	Feb.	347	A batch file menuing system
	Batch Subroutines	Feb.	354	How to execute a batch file as a subroutine of another batch file
	ECHO Printer Control	Mar.	312	Use the DOS command ECHO to send Escape sequences that control your printer
	More Blank Lines	April	332	How to ECHO a blank line
	One Big Happy Batch	Dec.	426	BASIC program turns all of a directory's batch files into one batch file, saves disk space
Clipper	Turning Clipper's Cursor On and Off	July	351	Undocumented commands turn <i>Clipper's</i> cursor on and off
Communications	Procomm, the Executioner	Dec.	433	Execute any program from within <i>Procomm</i>
Correction	Editor's note	April	329	Resolves 130COLOR.BAS (November 1985) problem for those without a printer
	Squashing an X-MAKER2 Bug	April	329	Correction to X-MAKER2.BAS (December 1986)
	BANNER.BAS Bug Corrected	May	350	Correction to January's banner-printing program
	Correction to an Even Faster Sort	May	350	Correction to January's two-part assembly language Quicksort routines
	FAST!.BAS Fixed	May	350	Correction to January's prime number generator
	FMTPATCH Correction	Aug.	350	Correction to June's patch to DOS 2.10's FORMAT command
dBASE	More Relations in dBASE III	May	341	Simultaneously relate a <i>dBASE</i> data base to more than one lookup file
	A (Word)Perfect dBASE Editor	Sept.	337	Make <i>WordPerfect</i> your <i>dBASE</i> editor
	Keep dBASE III Plus Functioning	Oct.	367	Undocumented function key values returned by <i>dBASE's</i> INKEY( ) function
	dBASE Documenter	Nov.	426	<i>dBASE</i> program to facilitate documenting other <i>dBASE</i> programs' data base structures
DOS	Disk Danger	Jan.	319	The danger of replacing disks in response to 'Abort, Retry, Ignore?'
	Trouble in Texas	Jan.	328	Correction to the flag-of-Texas DOS prompt
	Fast Screen Colors	Feb.	354	A batch file to change DOS's screen colors fast
	Secret File Names	Mar.	309	Create hard-to-access files and directories by using nontypeable characters in their names
	Informative DOS Prompt	Mar.	329	DOS prompt that displays current directory, date, and time on first screen line
	Dot Discoveries	April	332	The use and problems of dot and double-dot in DOS commands
	Put COMMAND.COM Anywhere	May	342	How to boot the PC with a floppy that tells DOS to use the hard disk's COMMAND.COM
	Now for North Carolina Promptly on Time	May	346	Batch file turns DOS prompt into the flag of North Carolina
		July	351	DOS prompt that displays current directory and date over the time in upper right corner
	SUBSTitute RESTORE and BACKUP	Aug.	338	Restoring to a virtual drive (SUBSTituted directory) protects files from being overwritten
	Plural PC Personalities	Sept.	340	Technique to quickly reboot PC with new personality (CONFIG.SYS, memory-resident applications)
	<F7> Defined	Oct.	384	Short discussion of DOS's <F7> key, which produces ASCII 0, the null character



Subject	Title	Issue	Page	Description
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	Changing File Attributes	Nov.	434	Turbo Pascal procedure to change a file's attribute
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	Enhanced Optimization	July	352	Patch enhances compiler's optimization of code to calculate the exponentiation of a function
	Bytes Free in FORTRAN	Nov.	440	FORTRAN program returns number of bytes free
Graphics	Brighten Mono-Graphics Text	Aug.	346	BRIGHT.COM turns up muted monochrome shades
LaserJet	Slap QB2 EGA Screens Onto HP's LaserJet	June	366	How to print QuickBASIC 2 screens on an HP LaserJet
Microsoft Word	Word Envelopes With Style	Aug.	335	Hidden-text style sheet technique uses your <i>Microsoft Word</i> letters to address envelopes
	Word Search Selection	Nov.	432	Technique to quickly mark a block of text that ends in the middle of a sentence
Pascal	Pascal Printer Control	Mar.	314	Turbo Pascal program to control printer
	Don't Clear the Keyboard Buffer	May	341	Patch stops Turbo Pascal from clearing key buffer when you quit a program so that subsequent keystrokes are not lost
	Turbo-Charging Find and Replace	July	351	Tip to speed up the Turbo Pascal editor's search and replace operation
	Get Real, Integer Validation	Sept.	340	Turbo Pascal integer and real-value numeric input validation procedures
	Turbo Pascal Copy	Oct.	367	Turbo Pascal program copies files from one drive to another, making backups without exiting compiler
Printers	Proprinter Pointer	Mar.	329	Switch setting changes wide-carriage Proprinter's 8½-inch factory default
	No Printer? No Problem	Nov.	432	Program that clicks the speaker for each character accidentally sent to a nonexistent printer
Softstrips	Correction	Jan.	331	December 1986 Softstrips reprinted
Symphony	Quick Tempo on Insert and Delete	Aug.	335	Quick way to insert and delete rows in a <i>Symphony</i> worksheet
Utilities	Banner Performance	Jan.	319	BASIC program to print quick, simple banners
	An Even Faster Sort	Jan.	320	Two-part assembly language Quicksort routines for interpreted and compiled BASIC
	Typo Trapper	Feb.	347	BASIC program that catches typos as you enter X-MAKER.DAT file lines
	Format on the Double	Mar.	321	Batch file to implement continuous automatic formatting alternating between drives A: and B:
	Fixing VDISK2.COM	April	334	Patch fixes 360K RAM disk created by VDISK2.COM from <i>The Fully Powered PC</i>
	Faster Memory Check	May	341	Turbo Pascal program quickly reports free memory
	Still More Primes?	May	346	Yet another BASIC primes generator
	Mass Format	June	359	Patch to DOS 2.10's FORMAT command to implement continuous automatic formatting alternating between drives A: and B:
	A Fleeting Memory Checker	June	362	Assembly language program quickly reports free memory
	FORMATAB.BAT's KEYS.DAT	July	354	Report of error in Softstrip version of March's KEYS.BAS; printed listing is correct



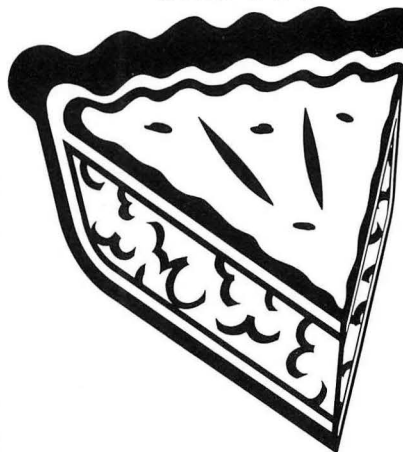
Subject	Title	Issue	Page	Description
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	Patch 'Em Up Easily	Sept.	350	PATCHBIN.BAS eases patching programs for those unfamiliar with DEBUG
	Commas Come to BANNER.BAS	Sept.	352	Enables BANNER.BAS to print commas
	Elegance or Simplicity?	Oct.	367	Another batch file to implement continuous automatic formatting alternating between drives A: and B:
	Printer Status via Errorlevel	Oct.	370	Program sets errorlevel to communicate printer-ready status to batch files
	File Storage Requirements	Oct.	372	Program determines the amount of floppy or hard disk space needed to store a group of files
WordPerfect	WordPerfect Envelopes	Mar.	309	<i>WordPerfect</i> macro to address envelopes using a letter's address
	A Path to WordPerfect Macros	April	332	Give your <i>WordPerfect</i> macros a directory of their own
	Addressing the Larger Issue	July	350	Patch enables March's <i>WordPerfect</i> envelope-addressing macro to handle more than four-line addresses
	A WordPerfect User's Moving Words	July	350	A technique to move blocks in <i>WordPerfect</i> quickly
	Another Perfect Envelope	Aug.	335	Short <i>WordPerfect</i> envelope-addressing macro
	WordPerfect Does Directories	Sept.	337	<i>WordPerfect</i> prints directories quickly
	Tighter Boxes for WordPerfect	Nov.	426	Technique to draw <i>WordPerfect</i> boxes closer to text
	Macro Underscores a Need	Dec.	426	<i>WordPerfect</i> macro underlines small amounts of existing text
	More Perfect WordPerfect Envelopes	Dec.	422	Another <i>WordPerfect</i> envelope-addressing macro

## Name Brands \* Low \$\$

**Expansion Boards**  
**AST** Sixpackplus (384K) ..... \$189  
 Sixpack Premium (1MB) ..... \$289  
 Advantage (1.5MB)..\$459..(3MB)..\$819  
 Rampage (2MB) ..... \$459  
 Rampage 286 (2MB) ..... \$549  
**Intel** Above PC (2MB) ..... \$459  
 Above PC PS (2MB) ..... \$449  
 Above 286 (2MB) ..... \$549  
 Above PS 286 (2MB) ..... \$569  
 Inboard 386 (OK) ..... \$Call  
**Quadboard** (384K) ..... \$189  
**GRAPHICS CARDS**  
**Hercules** Mono...\$189... Color...\$159  
**Quad** Prosync. \$259. VEGA Deluxe. \$259  
**ATI** EGA Wonder ..... \$199  
**HARD DRIVES**  
**Seagate** 20, 30, 40, 80MB Kits. from. \$299  
**Miniscribe** 20, 30, 40MB Kits .... \$Call  
**Plus** Hard card 20MB, 40MB..from..\$599  
**Memory** .. 64K, 256K ..... \$Call  
**FLOPPY DRIVES**  
**Toshiba** for PC:AT:\$109,1.2MB:\$139,3.5":\$139  
**Printers** .. Citizens, Panasonic, Toshiba, NEC  
**Monitors** .. NEC, Amdek, Princeton Gr.,  
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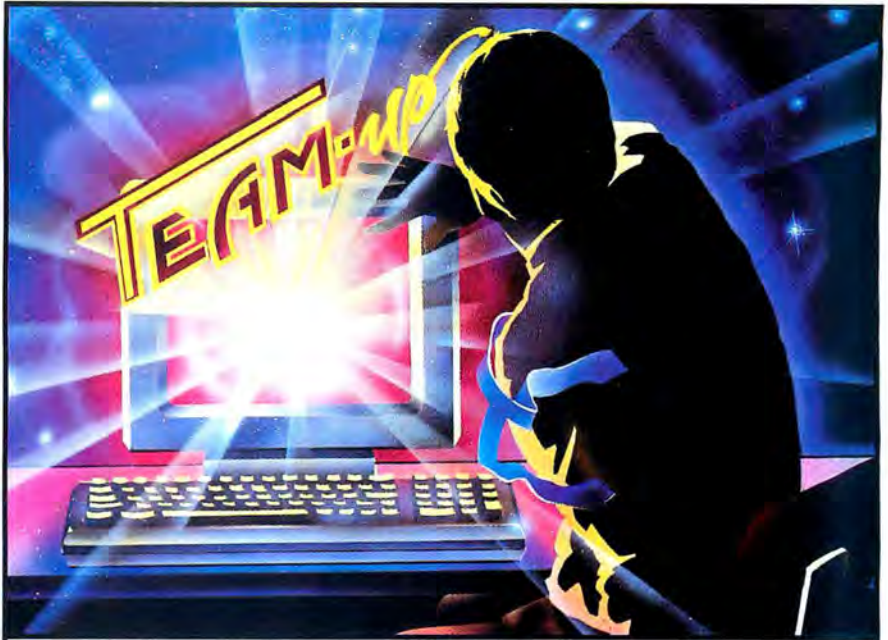
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With a 20-MHz 386 chip and a sophisticated memory-caching system, Compaq's Deskpro 386/20 easily bests IBM's PS/2 Model 80 at the game of high-performance computing. Our in-depth analysis explains how Compaq can achieve this feat while remaining loyal to the AT standard.

Also, cheap 386 systems. For about what you'd spend on an AT clone, you can step into a much higher level of functionality with one of the five 386 systems reviewed.

#### 1-2-3 COMPILERS

How can you share financial information in your office without going broke on 1-2-3? We review two products that offer different ways to beat the high cost of Lotus and maintain control of your worksheets at the same time.

#### MICROSOFT WORD 4.0

Microsoft makes a good thing better with this new version of its popular word processing program. With significantly improved speed plus a host of advanced features like macros and redlining, version 4.0 seems poised to steal the word processing crown from WordPerfect.

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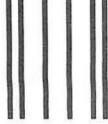
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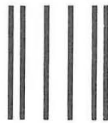
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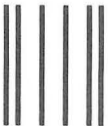
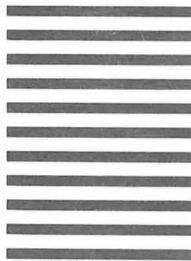
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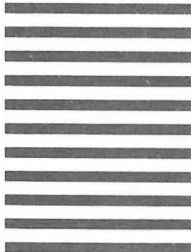
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2. PC World survey
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4. *U.S. News & World Report*
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41. *Airpower* and IBM. Calculations based on a price of \$300 million for the B-1B and \$6995 for the Model 80-041.

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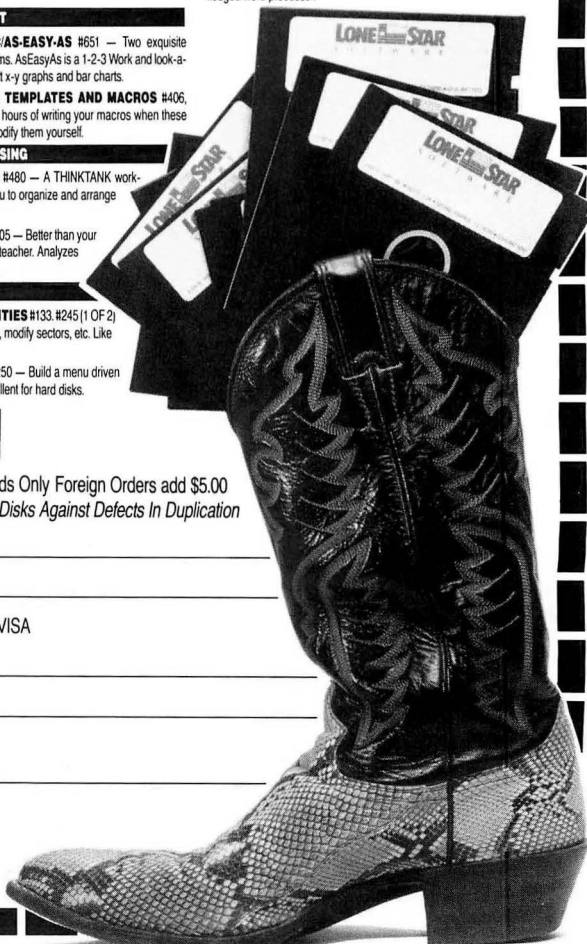
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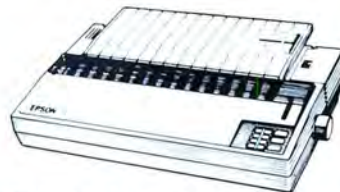
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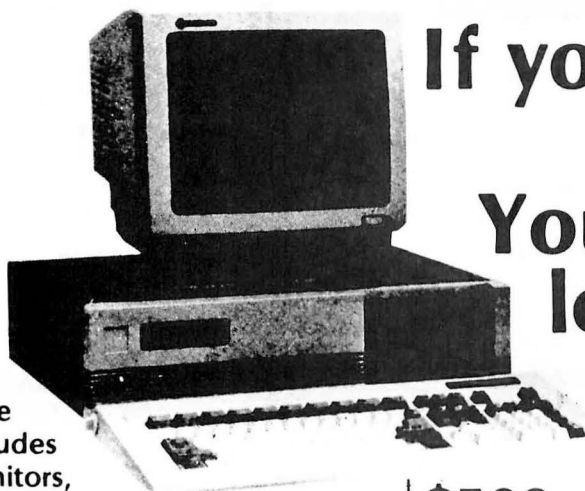
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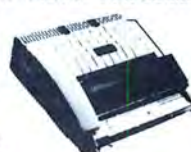
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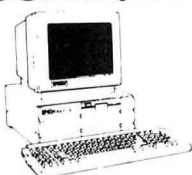
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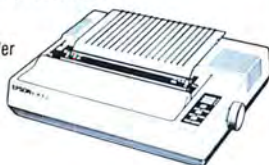


### FX-86e

- 240 cps in draft elite mode
- 48 cps in Near Letter Quality mode
- 8K buffer
- Front panel selectable
- IBM Pro Printer character set

#### Options

- 32K buffer
- Cut Sheet Feeder
- Tractor Feeder



### LX-800

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#### Options

- Cut Sheet Feeder



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- 8K internal buffer

#### Options

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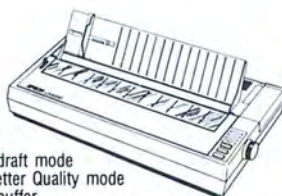


### LQ-1050

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- 73 cps in Letter Quality mode
- 6K internal buffer

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- Cut Sheet Feeder
- 32K buffer

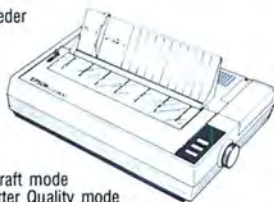


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- 73 cps in Letter Quality mode
- 6K buffer for downloadable characters

#### Options

- Tractor Feed
- Cut Sheet Feeder
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### EX-800

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- 8K internal buffer

#### Options

- Color enhancement
- 32K buffer



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- Tractor Feed
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## VIDEO BOARDS

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Everex EGA Autoswitch .. \$139  
Everex Edge ..... \$199  
Hercules Color Card .... \$145  
Hercules Compatible  
Color Card ..... \$69  
Hercules Compatible  
Graphics Card ..... \$85  
Hercules Graphics Plus .. \$179  
NEC GB1 ..... \$259  
Paradise Autoswitch 480 . \$169  
Quadram Prosync ..... \$239  
Quad EGA ..... \$229  
STB EGA Plus ..... \$239  
Vega Deluxe ..... \$239

## MONITORS

### AMDEK

310A ..... \$129  
410A ..... \$149  
600 ..... \$349  
722 ..... \$439

### PRINCETON

MAX12 ..... \$149  
HX12 ..... \$415  
HX12E ..... \$449

### IBM

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8512 ..... \$469  
8513 ..... \$529

**NEC** Multisync ..... \$549  
**SAMSUNG** Color ..... \$259

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293 w/Module ..... \$589  
393 ..... \$969  
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351 Model II ..... \$899

### NEC

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3550 ..... \$759    P9XL ..... \$1099  
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### PANASONIC

1080 I ..... \$199    1091 I ..... \$265

### IBM

Quietwriter III ..... \$1225  
Proprinter II ..... \$399  
Proprinter X24 ..... \$549  
Proprinter XL ..... \$549  
Proprinter XL24 ..... \$759

### HEWLETT-PACKARD

Laserjet II ..... \$1775

### DICONIX

150 ..... \$325

## SOFTWARE

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D Base III Plus ..... \$389  
Framework ..... \$389  
IBM Displaywrite IV ..... \$309  
Lotus 123 ..... \$309  
Managing Your Money ..... \$115  
Microsoft Word ..... \$209  
Multimate Adv. II ..... \$259  
Norton Utilities ..... \$59  
R Base System V ..... \$409  
Smartcom ..... \$49  
Symphony ..... \$429  
Ventura Desktop Publ. .... \$479  
Volkswriter III ..... \$145  
Word Perfect 4.2 ..... \$205  
Word Perfect Library ..... \$55  
Wordstar 2000+ ..... \$269

## MULTIFUNCTION BOARDS

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AST 6 Pack w/384K ..... \$169  
AST 6 Pack Premium w/512K .. \$219  
AST Advantage ..... \$259  
AST Rampage PC w/256K .... \$239  
AST Rampage AT w/512K .... \$339  
Orchid Tiny Turbo ..... \$279  
Intel Above Board PC ..... \$249  
Intel Above Board PC P/S .... \$279  
Intel Above Board AT ..... \$329  
Intel Above Board AT P/S .... \$349  
Irma Board ..... \$695  
AST 5251-11 ..... \$529  
AST 5251-11 Plus Enhanced .. \$599

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64K Ram Chips ..... 9 for \$11  
256K Chips ..... each \$3.35  
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8087-2 ..... \$149  
80287 ..... \$159  
80287-8MHZ ..... \$249  
80287-10MHZ ..... \$299  
80387 ..... \$499

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### HAYES

1200 ..... \$289  
1200 B Alone ..... \$259  
1200 B w/Software ..... \$289  
2400 ..... \$429  
2400 B ..... \$429  
Everex 300/1200 w/Software .. \$109  
Everex 2400 Internal ..... \$199  
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286 Deskpro w/640K, 40MB ..... \$2799  
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Portable II Model II ..... \$1995  
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### SOFTWARE

Chartmaster ..... \$199  
D Base III Plus ..... \$389  
Framework ..... \$389  
IBM Displaywrite IV ..... \$299  
Lotus 123 ..... \$309  
Managing Your Money ..... \$115  
Microsoft Basic Compiler ..... \$249  
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722 ..... \$445 Ultrasync ..... \$549  
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64K Ram Chips ..... 9 for \$12  
256K Chips ..... each \$3.25  
8087-3/8087-2 ..... \$109/\$149  
80287-6MHZ ..... \$159  
80287-8MHZ ..... \$249  
80287-10MHZ ..... \$299  
80387-16MHZ ..... \$499

### GRAPHICS CARDS

ATI EGA Wonder ..... \$189  
Everex EGA Autoswitch ..... \$139  
Everex Edge ..... \$199  
Hercules Color Card ..... \$145  
Hercules Graphics Plus ..... \$179  
NEC GB-1 ..... \$289  
Paradise Autoswitch 480 ..... \$169  
Quadram EGA Plus ..... \$299  
Quadram ProSync ..... \$275  
Quadram Ultra VGA ..... \$309  
STB EGA Plus ..... \$159  
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### MULTIFUNCTION CARDS

AST 6 Pack Plus 384K ..... \$169  
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AST Advantage ..... \$299  
AST Advantage Premium ..... \$429  
AST Rampage PC w/256K ..... \$249  
AST Rampage AT w/512K ..... \$325  
AST Flashpack ..... \$289  
AST 5251-II Plus Enhanced ..... \$579  
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Intel Above Board PC P/S ..... \$259  
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Microsoft Serial ..... \$129  
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Mouse Systems Serial ..... \$106  
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LQ 800 ..... \$419 EX 800 ..... \$389  
LQ 850 ..... \$479 EX 1000 ..... \$489

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182 ..... \$219 294 Plus ..... \$999

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Proprinter XL24 ..... \$759

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Hayes 1200 ..... \$279  
Hayes 1200B Alone ..... \$244  
Hayes 1200B w/Software ..... \$279  
Hayes 2400 ..... \$419  
Hayes 2400B ..... \$377  
Hayes 2400B w/software ..... \$409  
US Robotics 2400 Int ..... \$179  
US Robotics 1200 ext ..... \$109

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PARADISE Hi Res Card	60.00*	2.50
PARADISE Auto 480	149.00*	2.50
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AMDEK 1280	635.00*	12.70
AMDEK Color 600S	310.00*	6.20
AMDEK Color 22	410.00*	8.20
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MAGNAVOX Color RGB	250.00*	5.00
MAGNAVOX EGA	385.00*	7.30
MAGNAVOX Multi-Mode	435.00*	8.70
NEC Multisync JC-1401	500.00*	10.00
NEC Multisync Plus	872.00*	17.44
NEC Multisync XL	1,895.00*	39.90
PRINCETON MAX-12E	128.00*	2.56
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MICROSTUF Crosstalk IV	117.00*	2.50
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WORDPERFECT 4.2	185.00*	2.50
XEROX Ventura Desktop Publishing	459.00*	3.75

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CITIZEN Premiere 85	440.00*	8.80
EPSON EX800 300 CPS 80 Col.	389.00*	7.78
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EPSON LQ800 180 CPS 24-Pin 80 Col.	365.00*	7.30
EPSON LQ830 284 CPS 24-Pin 80 Col.	479.00*	9.58
EPSON LQ1000 180 CPS 132 Col.	489.00*	9.98
EPSON LQ1050 264 CPS 24-Pin 132 Col.	655.00*	13.10
EPSON LQ2500 324 CPS 24-Pin 132 Col.	889.00*	17.38
EPSON LX800 150 CPS 80 Col.	181.00*	3.62
NEC P8 216/180/65 CPS 80 Col.	399.00*	7.98
NEC P7 216/180/65 CPS 132 Col.	569.00*	11.38
NEC P2200 24-Pin 170/55 CPS 80 Col.	335.00*	6.70
NEC P9XL 400/330/140 CPS 132 Col.	1,089.00*	21.38
OKIDATA 192 200 CPS 80 Col.	289.00*	6.58
OKIDATA 193 200 CPS 132 Col.	419.00*	9.94
OKIDATA 282E 240 CPS 80 Col.	349.00*	6.99
OKIDATA 282E 240 CPS 132 Col.	479.00*	8.99
PANASONIC KX-P10811 160 CPS 80 Col.	175.00*	5.00
PANASONIC KX-P10821 180 CPS 80 Col.	289.00*	5.98
PANASONIC KX-P1582 180 CPS 132 Col.	385.00*	7.70
PANASONIC KX-P1596 240 CPS 132 Col.	419.00*	8.38
TOSHIBA P231SL 216 CPS 80 Col.	449.00*	8.98
TOSHIBA P341E 216 CPS 132 Col.	819.00*	12.38
TOSHIBA P352 Model II 238 CPS 132 Col.	860.00*	17.20

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HEWLETT PACKARD Laser Jet Series II	1,695.00*	55.00
NEC LC850 Silentwriter 8PPM	1,449.80*	55.00
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NEC LC890 Postscript Printer Pw/Ser	3,206.00*	90.00
OKIDATA Laserline 6	1,150.00*	55.00
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INTEL 80287 10MHz Co-Processor	299.89*	2.50
INTEL 80387-16 Co-Processor	475.00*	2.50

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AST 5251-11	589.00*	2.50
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HAYES Smartmodem 2400	389.00*	2.50
HAYES Smartmodem 2400B w/Smartcom	389.00*	2.50
US ROBOTICS Courier 2400	289.00*	2.50
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THE™ Multi 1/0 w/P/S/G/CLK/CAL	69.00*	2.50
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AST Sbx Pack Plus w/84K	139.00*	2.50
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THE™ PC/10 20MB w/640K	735.00*	14.70
THE™ 286/12 40MB w/512K	1,395.00*	27.90
THE™ 286/12 512K 1.2MB Drive	915.00*	18.30
THE™ 286/12 512K No Drives	690.00*	13.80
THE™ 386/16 1.2MB Drive /1 MEG	1,758.00*	35.16
THE™ 386/16 1MB No Drives	1,565.00*	31.90
THE™ 386/16 40MB w/1 MEG	2,250.00*	45.00
AST Model 80	1,339.00*	26.78
AST Model 90	1,625.00*	32.50
AST Model 120	1,969.00*	39.18
AST Model 140	2,285.00*	45.70
AST Model 170	2,589.00*	51.98
AT&T 6300 640K 1 Drive	985.00*	19.70
AT&T 6300 640K 2 Drives	1,175.00*	23.50
COMPAQ Deskpro 286 w/40MB	2,695.00*	53.90
COMPAQ Deskpro 386 w/40MB	4,450.00*	89.00
COMPAQ Deskpro 386 w/70MB	5,510.00*	103.00
COMPAQ Portable II Model 40	3,955.00*	79.50
COMPAQ Portable II Model IV	2,775.00*	55.50
IBM PS/2 Model 30 w/20MB	1,595.00*	31.90
IBM PS/2 Model 50 w/20MB	2,485.00*	49.90
IBM PS/2 Model 60 w/70MB	4,550.00*	91.00
NEC Multi Speed	1,275.00*	25.50
NEC Multi Speed EL	1,550.00*	31.00
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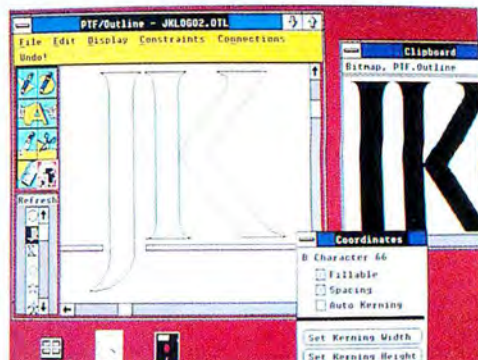
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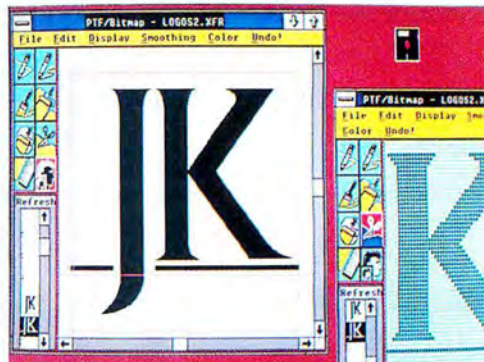
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### 3. Plan to buy:

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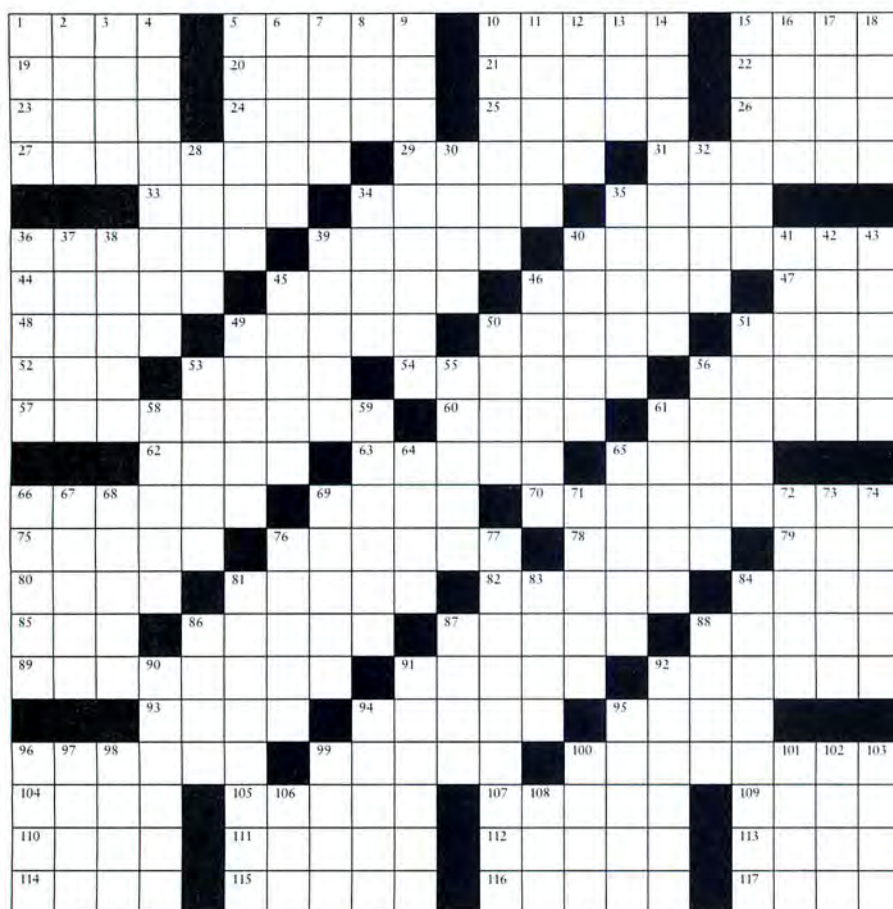
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# PUZZLER

John M. Samson



## Across

1. E precursors
5. "Night Moves" singer
10. Elephant king
15. Burmese rice
19. Kind of package
20. A compatible by any other name
21. What appears on screen
22. A kind of friendly
23. Yalies
24. "Air Music" composer
25. Interconnected workstations
26. Following d or R:
27. External DOS copy command
29. Papal cape

31. Publishes
33. \_\_\_\_\_ communicate
34. Hardware \_\_\_\_\_
35. Hands that do mischief
36. Impressionists formed one; so do fish
39. Devoutness
40. A better way to back up
44. Intel makes them; Fujitsu too
45. Steve Martin plays one
46. Injustice
47. Nice wine
48. Some put these on
49. Book's left-hand page
50. Dean's last film
51. Often with rave

52. Wind dir.
53. Predictable results
54. 1971 Peace Prize winner
56. Palisade
57. Dumb or smart, on a LAN
60. Mahler's "Das Lied von der \_\_\_\_\_"
61. A slave device is under the control of one
62. Like 2 or 4
63. \0 starts this in 1-2-3
65. Yarrowburgh of NASCAR
66. Oodles
69. Evening in Roma
70. Dot commands and ^KD are
75. Shelley and

- Huey
76. Shrimp dish
78. Challenge
79. Sajak or Nixon
80. Altar locale
81. Luminaries
82. Modem killer
84. "Penny \_\_\_\_\_"
85. Neckline shape
86. Phones
87. Hide the loot
88. IBM-like
89. IBM's father of the PC
91. Follows hope or cedar
92. Squandered
93. Olympic sword
94. Comic Martin
95. Ashton's partner
96. Fragrant rose
99. Hacker
100. Part of DOS wild card
104. Bric-a-\_\_\_\_\_

105. Accepted phrase
107. Pseudonym
109. Sculley's one
110. Julep ingredient
111. Olive green
112. Pricey pad
113. Writer Wiesel
114. Simon \_\_\_\_\_
115. Entered or typed
116. Dine at home
117. Hard disks backed up here

## Down

1. Served like Becker
2. Island near Java
3. Receiver Collinsworth
4. Where PC-based publishing happens
5. Move through a file
6. Take flight to unite
7. Sanguinary
8. Suffix for ethyl
9. Part of RJE
10. On or off, digitally speaking
11. Soap plant
12. Commanded
13. Mature
14. Terminate and stay \_\_\_\_\_
15. Captain Nemo's in-crowd
16. Jacob's twin
17. \_\_\_\_\_ majeste
18. Olympian hawk
28. Manzi and Eber
30. Precedes tiller
32. Volcanic dross
34. Transgresses
35. "\_\_\_\_\_ want to set the world...."
36. Skimpy
37. Crepe de \_\_\_\_\_
38. Personnel person
39. Word of mouth
40. Muslim decree
41. Before (Fr.)
42. \_\_\_\_\_-nez
43. Also known as cl
45. Initiated
46. Section of screen

49. Climbers
50. Teri in Tootsie
51. This clears the buffer in BASIC
53. Hands out
55. Summarize
56. Misleading
58. To combine a form letter and data file
59. Slanders
61. Sierra \_\_\_\_\_
64. A Farewell to \_\_\_\_\_
65. Hard disk disaster
66. Helot of 61 across
67. Manages
68. Start
69. Tool of Justice and Weight Watchers
71. Pindar was one
72. Discrete
73. Any rectangular block of worksheet cells
74. Noble mount
76. Put on a play
77. Computerized ecumenism
81. Buttram, Hayes, or Tonto
83. Hops kiln
84. HP's Series II
86. Itty-bitty switches
87. Boot
88. Tardy
90. Pavlov's dog does it
91. Pealed
92. IBM or PGA legend
94. Sandpiper's milieu
95. 18th Hebrew letter
96. Acronym for dBASE and others of its ilk
97. Solo for Sutherland
98. Numerous
99. Shipshape
100. "\_\_\_\_\_ Mis-behavin'"
101. City in south-east Kansas
102. What Windows didn't for two years
103. Kind of jerk
106. Aberdeen river
108. Mauna \_\_\_\_\_

Answers on page 310.



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