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PC WORLD

February 1988 $2.95
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The Business Magazine of PC Products and Solutions

COMPAQ RACES AHEAD

The Deskpro 386/20 runs 35% faster than IBM's Model 80 in NSTL tests. Is Compaq the new performance leader?

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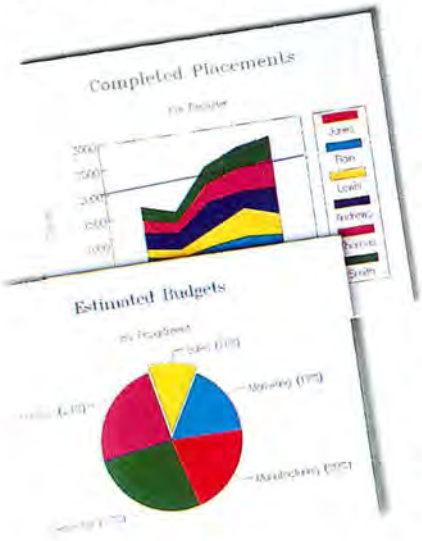
PC WORLD
February 1988
Cheap 386s

With Quattro, S

Quattro,™ our 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.

> "Quattro has features that 1-2-3 users will want—better graphics, easier macros, no copy protection—plus compatibility with the files and keystrokes they already use.
>
> *Michael J. Miller, Infoworld*"

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BI 11428

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—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.

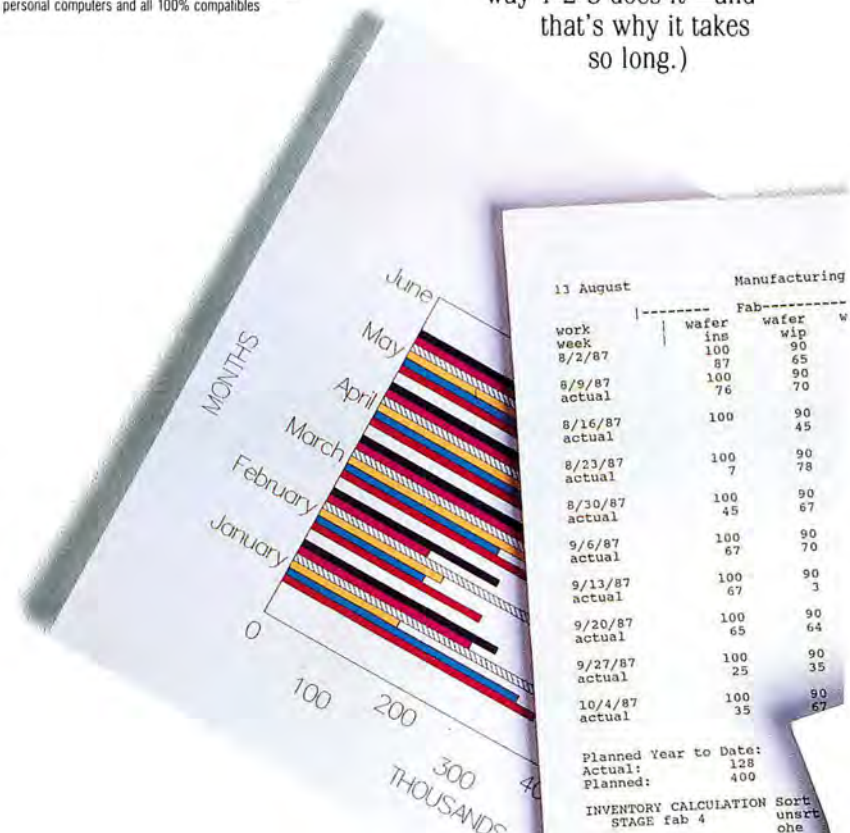
For the IBM PS/2™ and the IBM® and Compaq® families of personal computers and all 100% compatibles

"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 recalc," 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*. 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.)



eeing 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.

Quattro includes SQZ!® Plus data compression

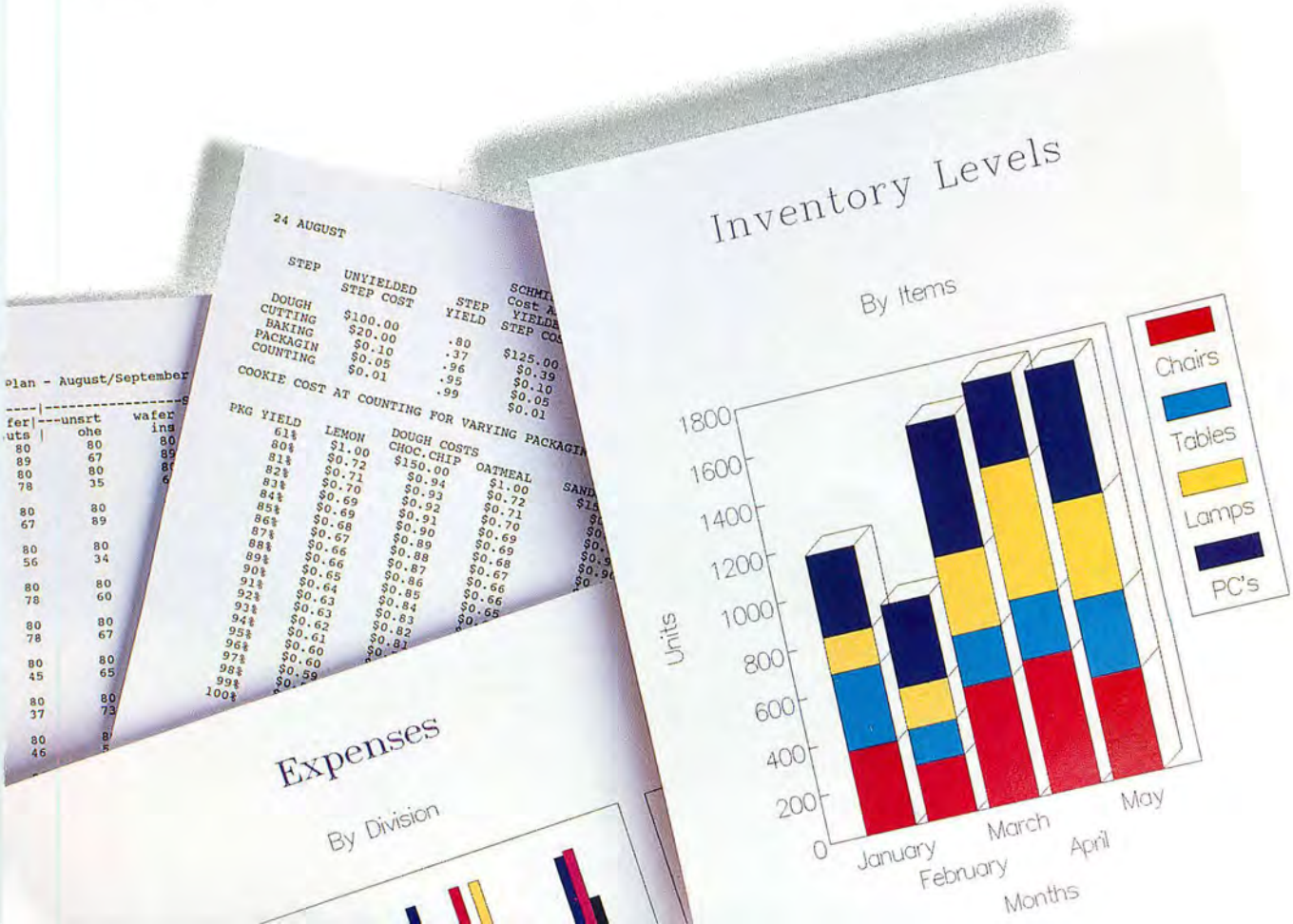
A special implementation of SQZ! Plus, the spreadsheet file compression utility, is built into Quattro and comes to you absolutely free! SQZ! Plus for Quattro automatically compacts and expands Quattro spreadsheets by up to 95% during file saving and retrieving.

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!



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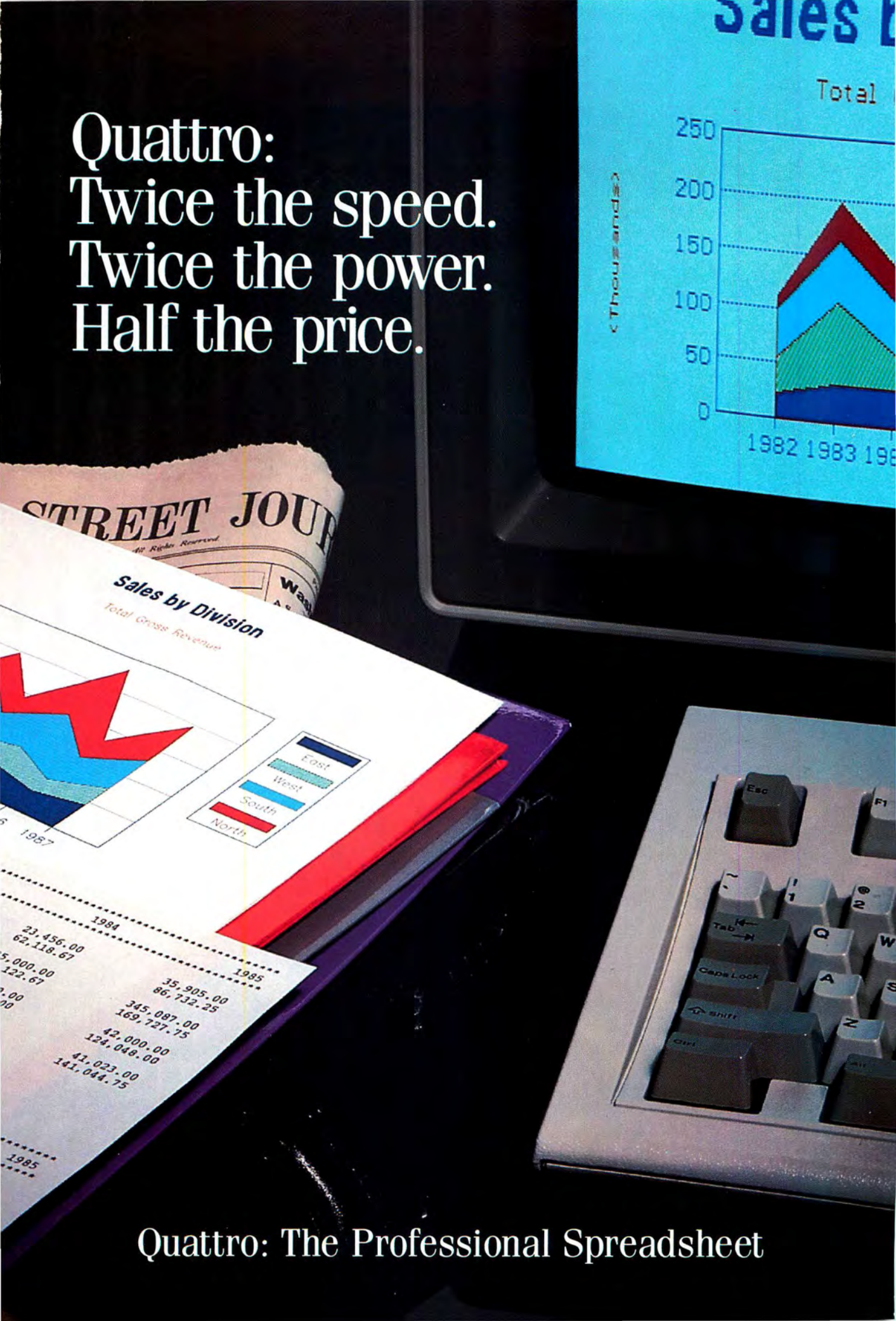
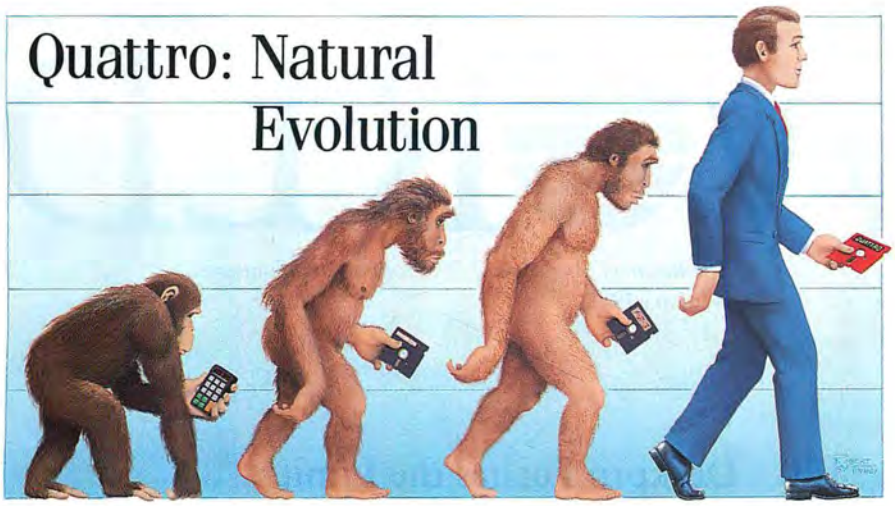
Twice the power.
Half the price.



Quattro: The Professional Spreadsheet

Quattro: Natural Evolution



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Quattro: The Professional Spreadsheet

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SPEED	ReCalc Cash Flow Model (5K cells)	.27	2.90 sec.
	Delete Row 15K cells (Recalc Time)	.76 sec.	2.38 sec.
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	Page Down (A1 to A1000)	12.2 sec.	17.4 sec.
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	Graph Types	10	6
	Integrated Graph Printing	YES	NO
	Full Graph Customization	YES	NO
	On-Screen Font Styles	11	1
	PostScript Support	YES	NO
VERSATILITY	User-modifiable Menus	YES	NO
	Menu Shortcuts	YES	NO
	Pull-down menus	YES	NO
	Point and Press Editing	YES	NO
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PC WORLD

The Business Magazine of PC Products and Solutions
February 1988

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Compaq dethrones the IBM PS/2 Model 80 with the Deskpro 386/20, a 20-MHz speedster that–thanks to disk caching and a new Intel memory cache controller–now reigns as the fastest PC.

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PC WORLD

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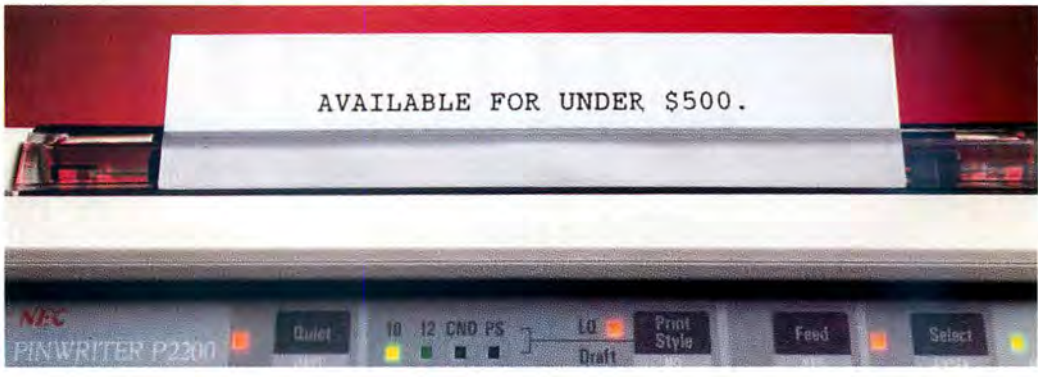

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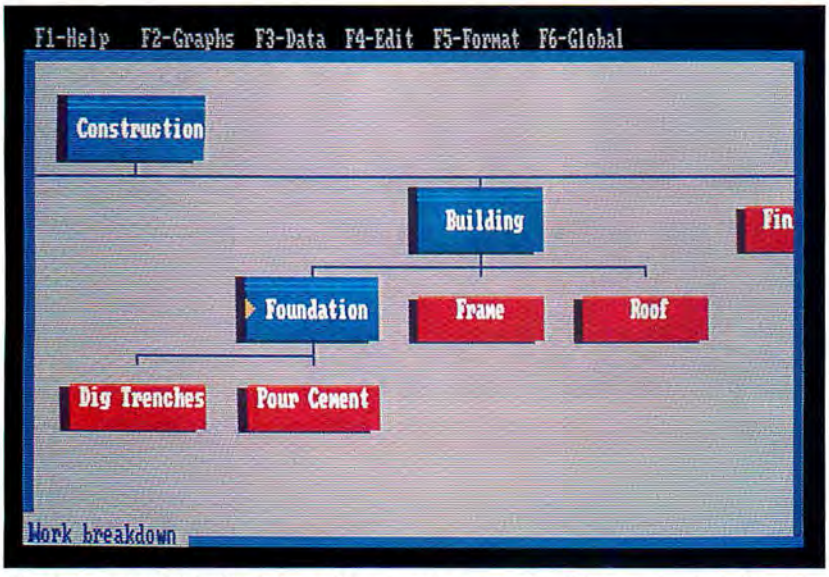

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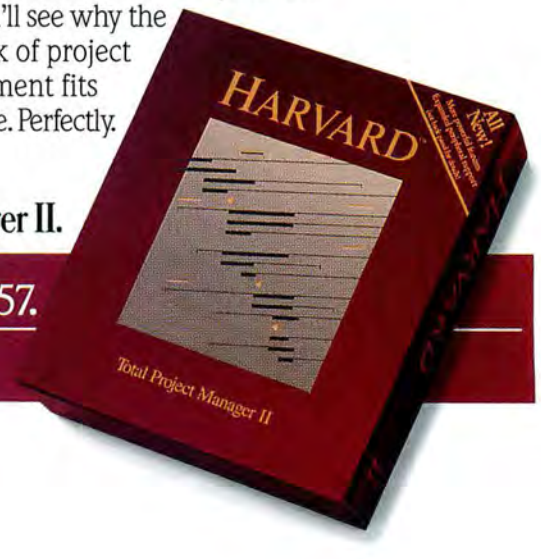

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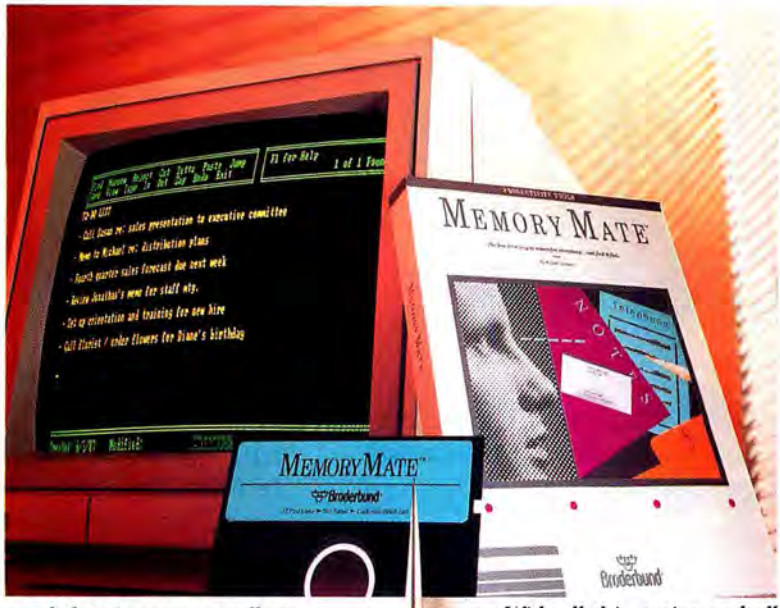

Imagine tossing all your notes and files into a huge desk drawer. Then magically discovering that every time you want something, it's right there on top.

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Unlike structured data bases, MemoryMate is free-form and works intuitively. Once you enter a record (up to 60 lines each) every single word, phrase, and date is automatically indexed. And cross-indexed.

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And since MemoryMate is memory-resident, it's always there. You can access it while other programs are running. You can even cut and paste between MemoryMate and other programs. And vice versa.

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PC Week agrees: *"Once you've unlocked MemoryMate's power, you'll wonder how you ever got by without it."*

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Stanford 386-18 $2058

9/18 MHz Zero Wait State
21 MHz Throughput

- Intel 32 Bit 80386 CPU (18 MHz), 9/18 MHz software (keyboard) switchable clock
- Norton SI: 21 (Processor Speed)
- 200 watt P/S, 110/220V selectable
- CMOS memory, 16 channel Interrupt, 7 DMA channels
- 512K interleaved 32 bit RAM on board
- RAM can be expanded to 16 MB of 32 bit high speed interleaved memory
- 2-32 bit, 4-16 bit & 2-8 bit expansion slots
- Supports 80387 math co-processor
- Award BIOS (Phoenix BIOS optional)
- High capacity floppy contoller card
- 1.2 MB floppy drive
- Serial port (Com 1), optional 2nd serial port (Com 2), parallel port & (optional) game port
- Hardware Reset and Turbo L.E.D.
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- Enhanced keyboard (101 keys)
- Complete documentation included
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Stanford 386-16/1 $1979

6/16 MHz Zero Wait State
19 MHz Throughput

Same configuration as in System 386-18 except,

- Intel 32 Bit 80386 CPU (16 MHz), 6/16 MHz software (keyboard) switchable clock.
- Norton SI: 18.7 (Processor Speed)

Stanford 386-16/2 $1884

Same configuration as in System 386-16/1 except includes socket for 80287 math coprocessor.

Stanford 286-12 $999

6/12 MHz

Same configuration as in System 286-16/1 except,

- 80286-10 CPU, 6/12 MHz Switchable.
- 512KB 100 Nano Seconds, 0 wait state DRAM, installed

Stanford 286-16/1 $1344

10/16 MHz Zero Wait State
16 MHz Throughput

Same configuration as in System 386-18 except,

- Compact size AT main board
- Intel 80286-12 CPU, 10/16 MHz software (keyboard) switchable clock
- Award BIOS
- 1024KB (one megabyte) 80 Nano Seconds, 0 wait state DRAM, installed
- Selectable between zero wait state (10/16 MHz) or one wait state (8/12 MHz)

Stanford 286-16/2 $1169

10/12 MHz Zero Wait State
16 MHz Throughput

Same configuration as in System 386-18 except,

- Intel 80286-12 CPU, 10/12 MHz software (keyboard) switchable clock
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- 4.77/10 MHz, software switchable M/B
- Phoenix BIOS. Norton SI: 3.3
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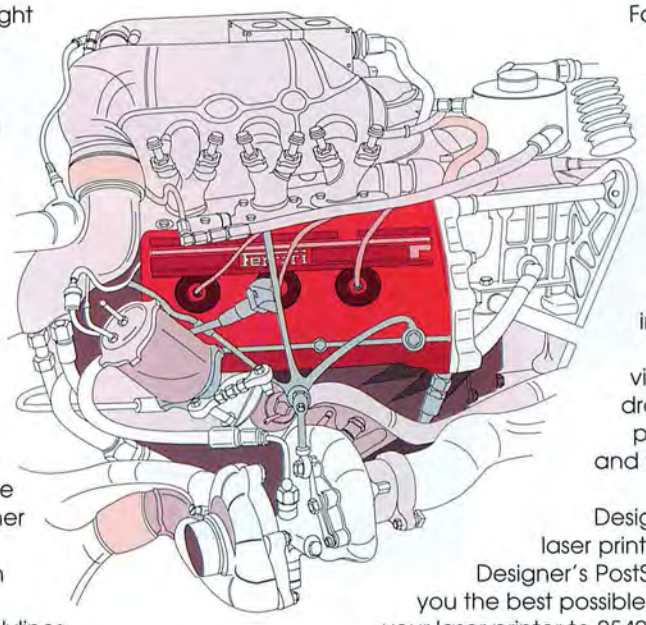

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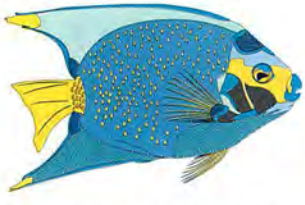

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David Bunnell

IBM: Reality Checks Versus Myths

It's time to find a cure for Big Bluephobia. It's time we recognized IBM's positive contributions to personal computing.

There have been so many myths about IBM that it's time to set the record straight.

I was thinking about the ongoing IBM-bashing fad recently when I attended a book-signing party for Microsoft Press's revised edition of PC iconoclast Ted Nelson's book, *Computer Lib/ Dream Machines.*

Appropriately enough, the party took place at a San Francisco club called DV8. I suppose that's what Nelson has come to symbolize to much of the personal computer industry. Microsoft Press's invitation read: "The Bolsheviks had Marx. Sex had Masters and Johnson. We've got Ted!"

When *Computer Lib* was published in 1974, it became a cult classic of that first computer generation. It was wacky, brilliant, and irreverent, with lots of funky sixties graphics Nelson had culled from clip-art books.

I remember stealing *Computer Lib* from Ed Roberts' desk in 1975. I was working for Ed–the father of personal computing–in Albuquerque at his company, MITS, where the Altair PC was born. I was enthralled by Nelson's way of thinking about the social impact of PCs.

The book remains just as vivid and impressive today, especially when you consider that Nelson predicted such developments as image synthesis, artificial intelligence, and even CD ROM 13 years ago.

As I reread *Computer Lib* now, what shocks me most about the book is the intensity of its anti-IBM sentiment. In the first edition, Nelson had this to say about Big Blue: "Only one company can force hideous complexity down the throats of its customers and the world, and make the victims think it's modernism, progress and 'high technology.'"

In 1975 his tone didn't seem quite so strident to me. I was young, radical, and naive, so of course I agreed with conspiracy theories about the military-industrial complex. IBM was a mega-company out to dominate the world.

(continues)

I'm not so sure about that now. Call me older, call me more conservative, but I don't think Big Blue is the biggest, baddest villain anymore.

By and large, IBM's impact on personal computing has been very positive. It raised the stakes of the personal computer business substantially when it introduced the IBM PC. Consider this:

The IBM PC used a 16-bit processor when every other microcomputer had an 8-bit processor. The IBM PC offered more memory, making sophisticated business software possible. This in turn provided a platform for Lotus *1-2-3* and other programs that revolutionized the personal computer industry and made it grow rapidly.

Now, with the PS/2 line–especially those models that include the Micro Channel Architecture–Big Blue is upping the ante once again. As IBM's top scientists convincingly pointed out in the recent *PC World* article "Why Buy a PS/2?" (December 1987), the Micro Channel offers some long-term advantages we won't see until new software is developed.

When the IBM PC first came out, critics argued that it was no big deal. All it could do, they complained, was run CP/M programs that had been ported over from 8-bit machines. In fact, that was true. Some of the PC's early programs included *WordStar, dBASE,* and *SuperCalc,* all of which had migrated from the CP/M world.

Even if IBM doesn't dominate world markets, no other personal computer company around is capable of selling 1 million PCs in a little over six months.

So the advantages of the PC's 16-bit architecture were not immediately apparent. However, they revealed themselves later.

That's exactly the point Dennis Andrews, IBM's head of PS/2 development, made in the *PC World* article. He predicted that in a few years' time the Micro Channel Architecture would shine even more brightly in "a lot of multiuser environments, which have complex servers and gateways...that require additional processors or complex subsystems."

The moral is: Don't sell IBM short. It didn't become a $50 billion company by hiring bozos.

Recently, *PC World* received an irate letter from a reader who griped, "After reading David Bunnell's poisonous attack on IBM's PS/2 line ['PS/2, OS/2, and You Know Who,' *PCW,* August 1987], I've concluded that he's been listening to Will Zachmann of IDC too long. In other publications, Mr. Zachmann has made it his business to denigrate IBM products....Has *PC World* stooped so low that it can't remain objective?"

Hold on a second. In the first place, Zachmann doesn't have any vendetta against IBM. Neither do I. He is one of the few industry analysts who–back in 1984–accurately predicted that IBM's earnings would decline. He also correctly foresaw that the PC would become increasingly influential while mainframes and minicomputers would become less and less of a force.

That doesn't make Zachmann a doomsayer; it makes him smart. He's one of the savviest analysts in the business. In a way, an industry analyst is like a doctor. As Zachmann explains it, "If a doctor says that his patient's appendix is bad, it should come out. Do we say that the doctor is being 'critical' of that person because a body part is not working right? No, he's merely diagnosing a condition."

I feel the same way. And contrary to what some people may think, I'm not an anti-IBM loudmouth. I happen to be wearing a surgical mask of my own. I'm perfectly capable of cutting the other way, as Apple and many other computer companies can attest.

OK, let's excise a few myths about IBM. Scalpel, please.

(continues)

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Review of Operations

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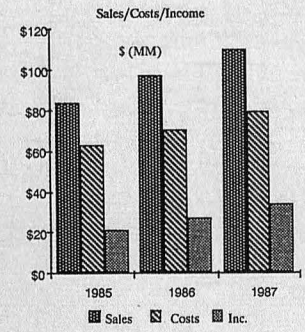
Throughout 1987, employees worked diligently to improve current product quality, control operating costs, and provide outstanding customer service. As a result, LKXS recorded its best profit year ever despite substantial expenditures to develop and introduce the Model NR^2.



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These commitments have already paid off with international sales accounting for 7% of total revenues. Next year, we expect a strong showing as these subsidiaries continue to establish themselves.

1987 Revenues by Area

(Dollars in millions)

REGION	AMOUNT	PERCENT
Northwest	$ 3433	*35%*
Midwest	$ 2885	*29%*
New York	$ 1094	*11%*
New England	$ 1088	*11%*
Southwest	$ 713	*7%*
Int'l	$ 633	*7%*
TOTAL	$9846	100%

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Model NR^2 is a Success

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Review of Operations *page 1*

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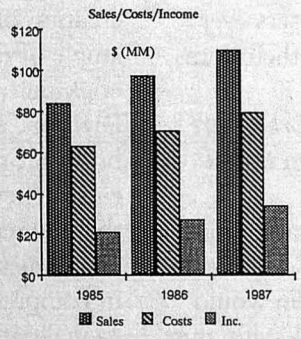

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Myth No. 1: *IBM quests for absolute power (the Evil Empire/ Darth Vader Syndrome).*

Some people are deathly afraid that IBM controls the PC industry and will forever dictate what our technology is going to be.

The fact is, IBM is not that strong. It doesn't dominate the industry now, and it never will.

On the other hand, Compaq, Tandy, AST, Tandem, DEC, and Apple are also going to be very successful. We are living in more of a multivendor world than ever. Before long, all vendors will face the challenge of making their machines communicate with each other–and use common software–if they want to stay in the game.

No single vendor controls the market, which has become too big and much too complex. If anyone is in control, it's the users.

There are too many paths to choose from, and the number of paths is multiplying. For example, Compaq Computer has seized some of the initiative that IBM once had. It's pushing forward with 386 machines based on the old bus structure, thereby proving that there are alternatives to IBM's Micro Channel. Even AST has come out with a 386 machine that has its own multichannel bus architecture.

Back in 1984 or 1985, IBM may have had the chance to dominate the industry. Big Blue did have the momentum then. But I don't think that was ever its goal, and it will certainly never regain that momentum.

At the moment, IBM is playing catch-up with its new machines. But even if IBM doesn't dominate world markets, no other personal computer company around is capable of selling 1 million PCs in a little over six months. That's what IBM has done with the PS/2 line.

As it is, no single vendor controls the market, which has become too big and much too complex. If anyone is in control, it's the users. PC users today have a lot more clout than MIS directors or minicomputer users ever had, simply because of their number and diversity.

Myth No. 2: *IBM workers are brainwashed robots who thrive under authority.*

Like the anonymous assertion Ted Nelson quotes in *Computer Lib* that the Soviet Union would ideally emulate the IBM state, this idea is simply balderdash. I think that IBM people are sincere about their work, and that they are loyal and thrifty to boot.

IBM may have had a hand in creating this myth. After all, IBM president Thomas Watson had his quirks, like fostering the IBM corporate songbook. And there was a stringent dress code: Employees had to wear white shirts, for example. But these kinds of idiosyncrasies have largely disappeared, as IBM now has to compete for talent in the marketplace just like everybody else.

If workers are stifled, if they must conform to some clone image in order to work for Big Blue, they'll eventually quit. They'll work instead for DEC, Apple, Compaq, Texas Instruments, or other companies.

Because it has a head for business, though, it's unfair to say IBM today is some kind of greenhouse for Moonies. *PC World* columnist Stewart Alsop put it most succinctly: "Even IBM puts its pants on one leg at a time."

The pressures of the marketplace are making IBM loosen up as an organization. Even the creation of the PC is a good example of that. IBM set up a maverick outfit, the Entry Systems Division, and permitted its staff to break all the unwritten corporate rules. They built the PC with off-the-shelf components from other companies. IBM then sold the PC in computer stores and didn't try to make it compatible with everything else on the market.

Myth No. 3: *IBM is driven by marketing–not technology.*

While it's true that IBM is particularly sharp at marketing, I think it's equally adept in the technology department. Maybe IBM doesn't always bring the technology to the marketplace as soon as it's been invented, but sometimes smart marketing dic-

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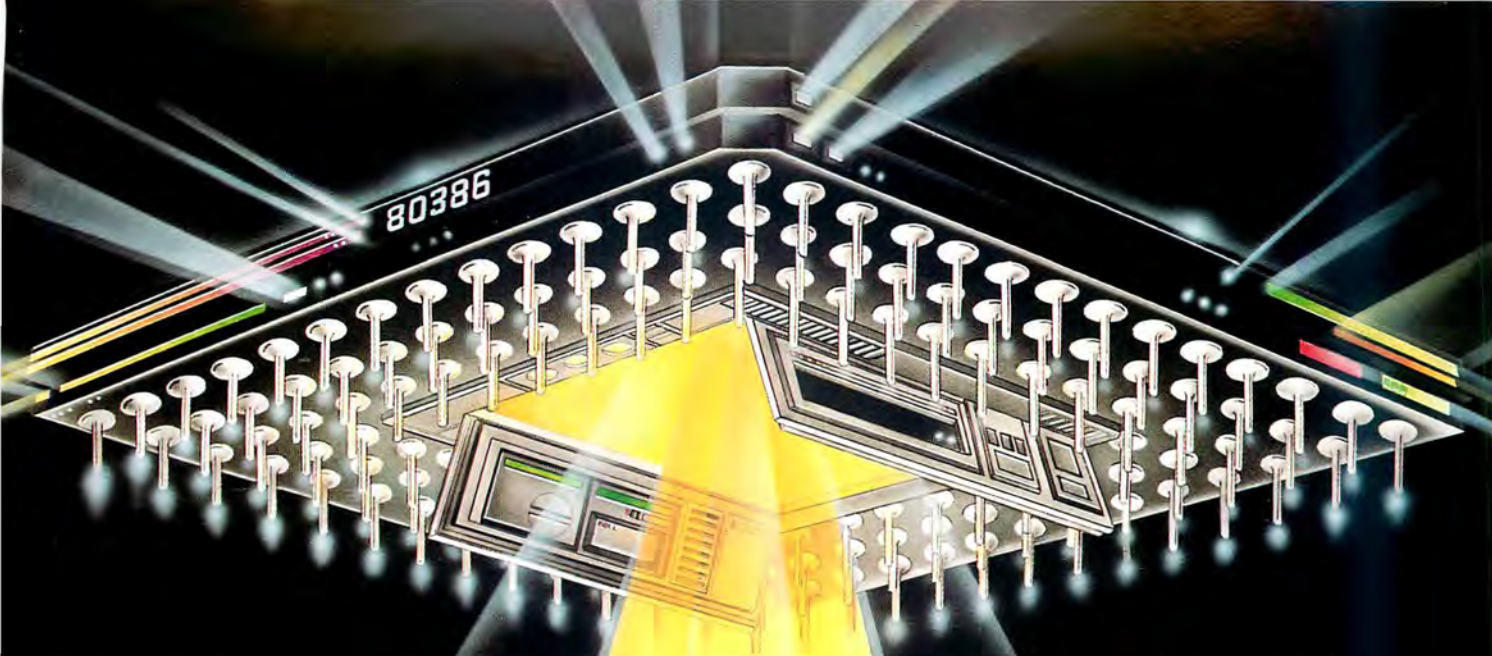

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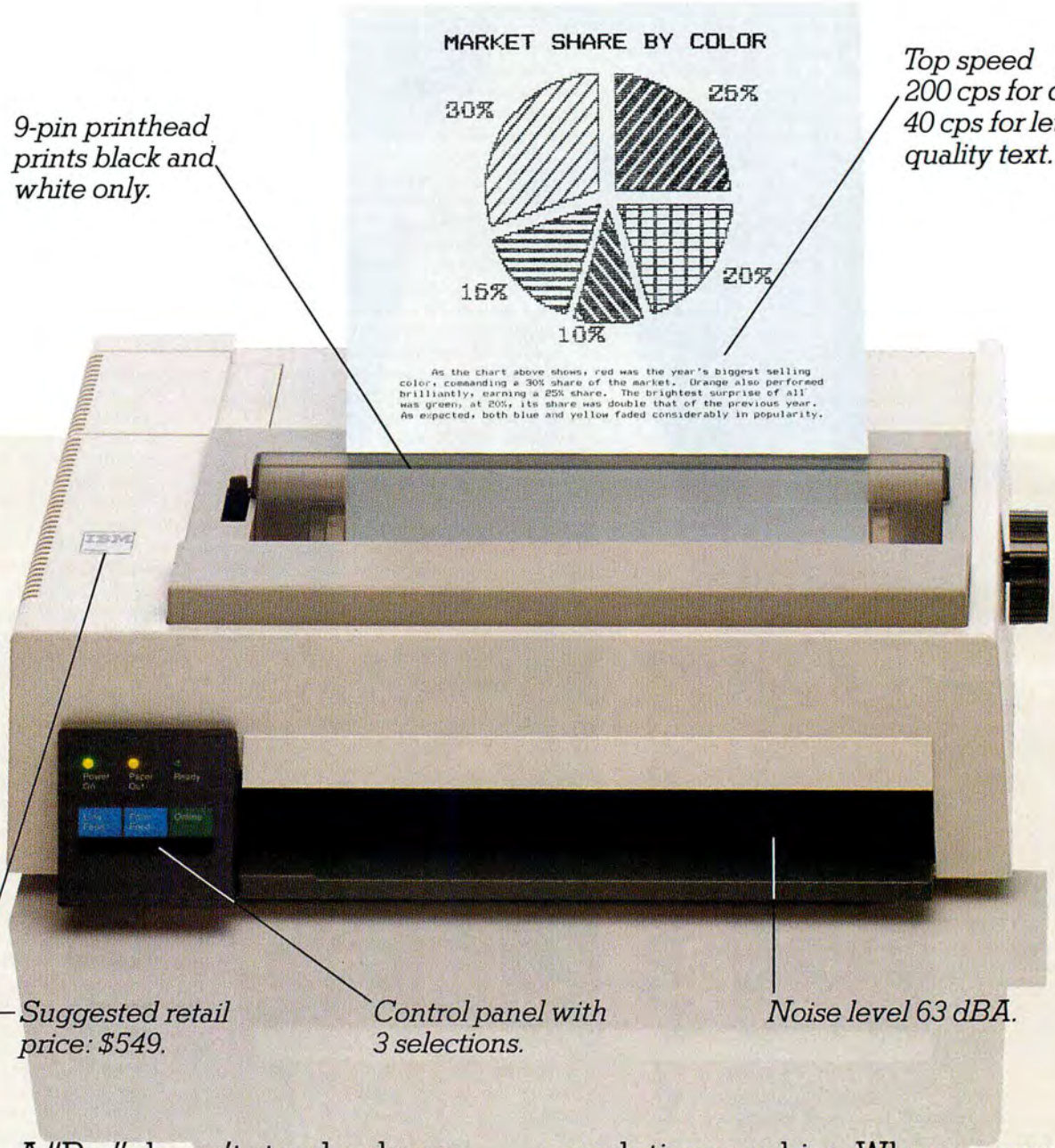

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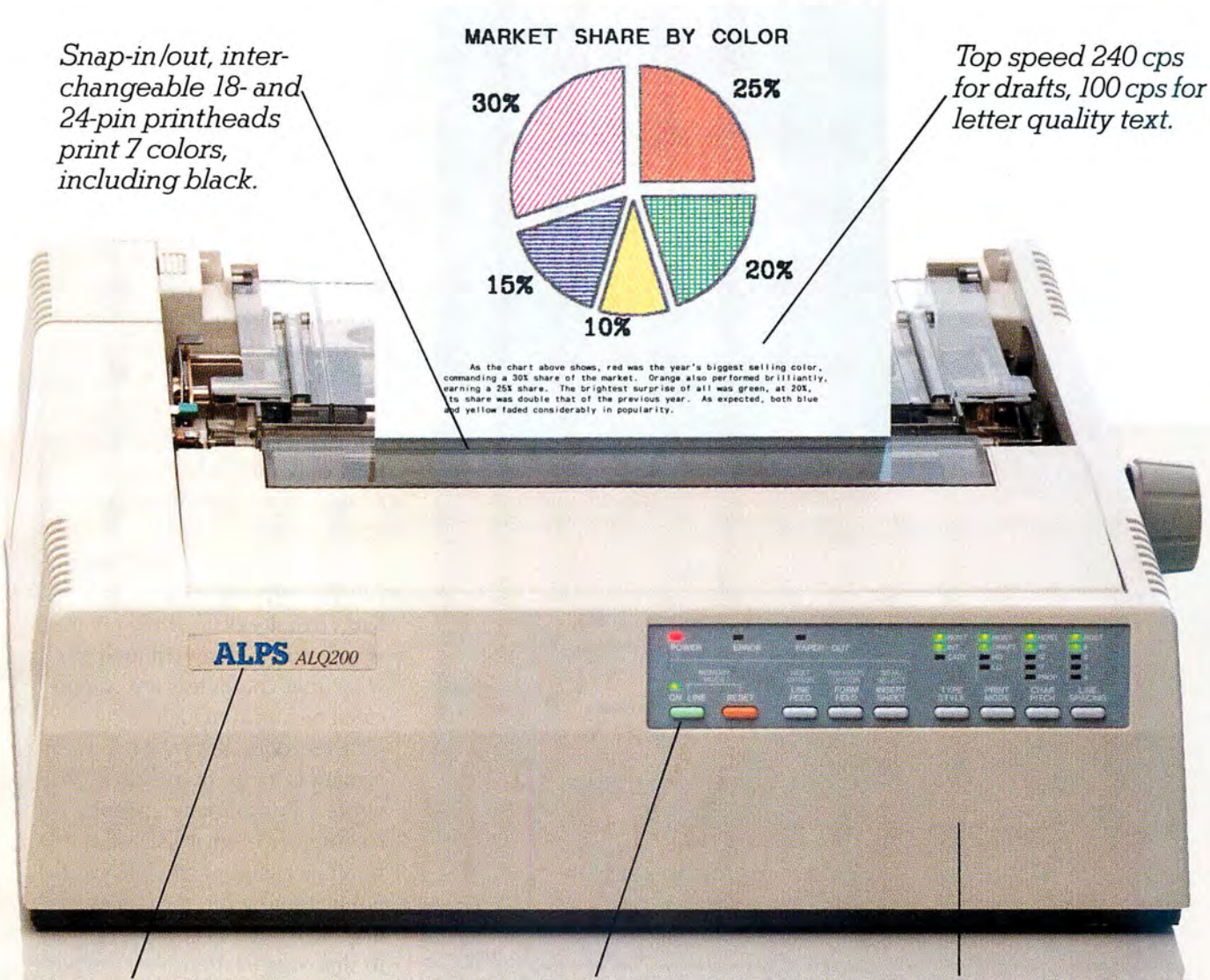

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tates otherwise. The Micro Channel Architecture is certainly an example of introducing new technology that is likely to affect the course of future computing.

As Stewart Alsop notes, "IBM never does technology for technology's sake. It is a technology company that can match any technology that exists in this business. Its research capabilities are tremendous. But those capabilities are dedicated to providing products that people want to buy—not to breaking new ground. When critics go around and say that IBM only does what's good enough—well, the fact is that it *is* good enough."

In the first edition of *Computer Lib*, Ted Nelson wrote that IBM had virtually defined the computer universe and contributed to our sense that computers are complicated technical machines.

"Everybody knows what a camera is, or an automobile," he wrote. "But to many...people, a computer is what IBM says it is....The rigidity associated in the public mind with 'the computer' may be related in some deep way to this organization. As a corporation they are used to designing systems that people have to use in their jobs by fiat, and thus there are few external limitations on the complications to our lives that IBM can create."

Nelson now says he's come to the realization that IBM believes computers really are complicated. Big Blue is not putting on an act. I

(continues)

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think there's a grain of truth to this observation. Maybe IBM's PCs are more complicated than they need to be. Since IBM people can be so technically oriented–I know this from my conversations with William Lowe and his colleagues at Entry Systems Division–it may be difficult for them to understand how technically illiterate the average user is.

This is probably the major point on which Ted Nelson and I agree in his anti-IBM line of thinking. But IBM shouldn't take this too seriously.

Ted Nelson is a revolutionary, not an organization man. He could never work for Big Blue. There are very few companies on the planet that he could work for.

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Computer Lib/Dream Machines
Ted Nelson
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Letters

Reactions and responses from the PC World community

OS/2 Poky? Prove It!

Richard Landry's column "Who Wins With OS/2?" [*PCW*, October 1987] was interesting, but how truthful? He cites Dan Lunt and Philippe Kahn as saying that OS/2 will be woefully slow in multitasking. "Run two tasks, and both function at about half the speed of one alone." I can't believe you printed such a generalization unchallenged. Which two tasks are you talking about? Where's the statistical proof?

A beta version of OS/2 has been available long enough for you to have compiled some data supporting your statement. Where's the beef, Mr. Landry?

Dan Thomas
Placentia, California

In general, simple mathematics dictates that if two tasks (not programs) with the same priority demand the processor at the same time, the speed of execution of each will be halved. However, Microsoft has taken a number of steps with OS/2 to keep performance up, both in the user's eye and in fact. For example, foreground tasks will receive more processor time under OS/2 than background tasks. Also, Microsoft has worked very hard to improve the efficiency of the operating system's screen routines over those of DOS. Further, when running DOS applications, which execute one task at a time, the processor spends a lot of time waiting for user input; under OS/2, it will be able to use that "idle" time to run background programs and other tasks within the foreground program, such as recalculating a spreadsheet between keystrokes. Finally, even critics like Kahn have remarked on the overall improvement in performance of late beta versions of OS/2.

We haven't printed benchmarks on OS/2 for a number of reasons: First, beta versions of software do not perform as well as the finished product; second, PC World *uses real-world programs to test performance. At publication time, there were no examples of commercial OS/2 applications on the market. Kahn's opinions were based on his experience with the operating system and his knowledge as a developer. We'll be examining the issue of OS/2's performance closely in upcoming issues as important applications arrive on the scene. –Ed.*

Opposed on Principle

I enjoyed your piece on OS/2. (I won't be sued for using those characters in my letter, will I?) I, for one, am voting with my dollars and my voice.

Not only will I not buy OS/2, I will not buy a PS/2 machine. I resent the way IBM has abandoned its existing PC hardware and software base. The company does the same thing in the mainframe market–come out with programs that take all your memory and disk space, then sell you more memory and storage, and then come out with more software–ad infinitum.

I bought an XT clone from a mail-order house and advise my friends to do the same. I will not

(continues)

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Stephen Manes, PC Magazine

"...the Breakthru 286 was the card of choice."
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"...Breakthru 286 is a good value and a quality product backed by effective support."
Dan A. Griffin
The Newsletter of the AutoCAD User's Group

"The PCSG Breakthru 286 achieved the best performance results of the caching boards tested."
Ted Mirecki, PC Tech Journal (Rated #1)

"The 12-MHz Breakthru 286-12 speedup board is the fastest of those tested, but not the most expensive. On a dollar per-horsepower basis, it could be called the cheapest boost available for an XT."
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Best of 86 review

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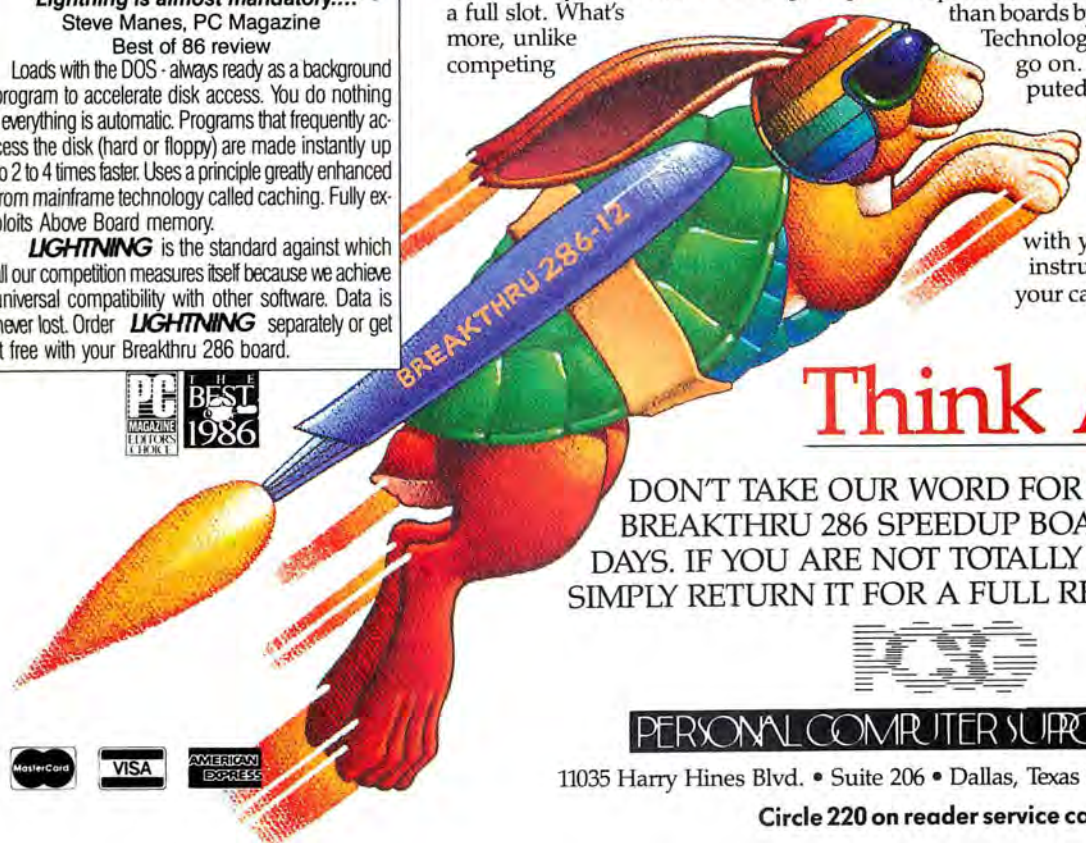
Fourth, these are the best. There are several other boards on the speedup market. We at PCSG have compared them all, but there simply is no comparison. Many cards offer only a marginal speedup in spite of their claims and others are just poorly engineered.

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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recommend Blue machines at work–I just can't justify spending the money IBM wants when I can spend less and get more.

Perhaps I'm acting like a teenager, but I will have to be dragged, kicking and screaming, to OS/2 and PS/2.

Mike Corum
Knoxville, Tennessee

Still Waiting for Virtual Memory

Richard Landry's OS/2 editorial was refreshing. I share many of his concerns.

Multitasking is really useless for a *personal* computer. In the history of operating systems, the primary reason for multitasking was not to allow a single user to exploit the processor more fully but to allow many users to use the machine at once.

If Microsoft came out with an operating system that had the same limited interface, miserable error handling, and inconsistencies as DOS but also offered virtual memory management, the world would beat a path to its door. Virtual memory management will be part of OS/2 thanks to Intel, not Microsoft.

Along with many others, I would much prefer a lean, fast operating system with a few significant improvements (MS-DOS 5.00?) to the behemoth about to be unleashed. Microsoft seems fascinated with features–not with programs people really need.

Christopher Williams
Perrysburg, Ohio

Crosstalk Talks

Unlike other reviewers of *Crosstalk Mk.4*, version 1.00, Eric Brown appears to be unable or unwilling to perceive the product's primary virtue. With *Crosstalk Mk.4*, users can now do a number of things with their modems that were previously impossible–and do them well. Participants in our nationwide series of CASL programming classes have expressed delight in the program's ability to support their communications programming needs.

Contrary to Mr. Brown's opinion, the product was delayed primarily because many *Crosstalk XVI* users who saw the early version of *Mk.4* at PC Expo in 1985 said that it should include 3270 (IRMA) and System/3X terminal emulation. We decided to take our lumps and delay shipment until these capabilities could be developed. Mr. Brown apparently didn't think much of them, as they aren't mentioned anywhere in the review.

Mr. Brown also finds *Mk.4* "shy of advanced features." What do you call multiple-session capability, 3270 or System/3X terminal emulation, and a powerful communications programming language if not advanced features? It's true that *Mk.4* doesn't have the features Mr. Brown mentioned–features that only a fraction of the market may need. But many of these can be created easily with CASL.

In all fairness, criticisms of the performance of several of version 1.00's functions are accurate. It's our opinion that these shortcomings, addressed in version 1.01, are both easily remedied and relatively inconsequential in light of the product's capabilities.

Les Freed
President
Crosstalk Communications
Roswell, Georgia

Why did it take years for Mk.4 *to come to market? My sources indicated that the addition of X.PC multisession support was the main reason. If 3270 and System/3X emulation were the real reasons for the delay, so be it. My apologies for failing to note the presence of these important emulations. The oversight stemmed from the fact that emulation for the 3270 and System/3X were listed under the* hardware *required for emulation (the IRMA and SmartAlec boards, respectively) and were not listed with the other emulation modules.*

One further correction: In the review I criticized Mk.4 *for lacking the ability to globally override settings. Actually, a script called FIXBOOK.XTS does allow you to make global changes, but the script was mentioned nowhere in the manual.*

I look forward to seeing version 1.01; as I indicated in the review, Mk.4 *has a lot of potential. However, I don't agree that many of the advanced features missing from* Mk.4 *can be "created easily with CASL." CASL is the most sophisticated communications programming language on the PC market, but learning it is far from easy, especially with the current state of* Mk.4*'s documentation. Only experienced programmers*

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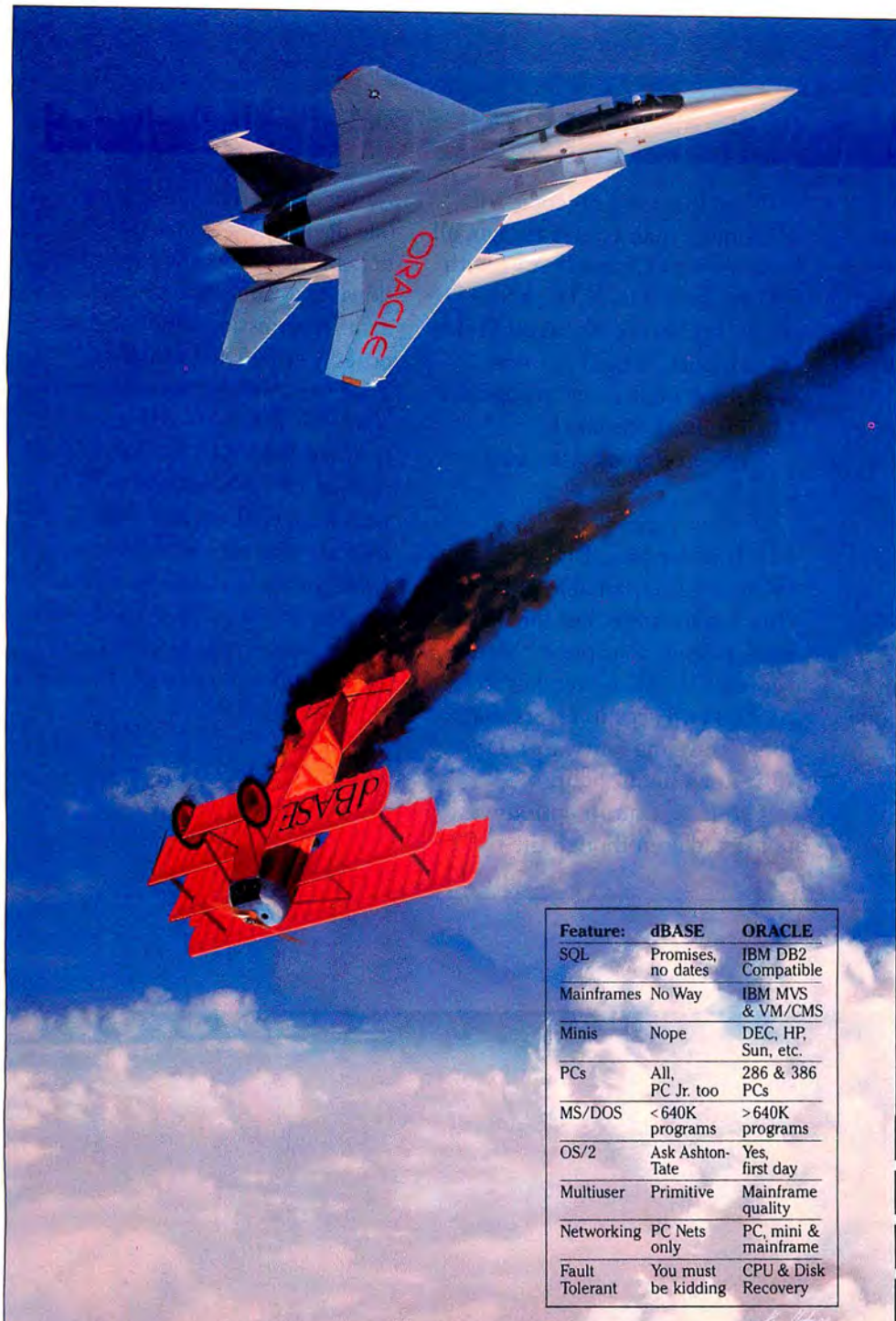

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can master CASL well enough to create advanced features. Communications pros are already beginning to tame the CASL beast, and future articles in PC World *will explore the fascinating possibilities of the language. But CASL's promise does not justify releasing a buggy and confusing program before its time. –Eric Brown*

Backtalk Mk.4

Your review of *Crosstalk Mk.4* ["Crosstalk Misses the Mark," *PCW,* October 1987], was comforting. I don't feel lost and alone anymore–just lost.

When I ordered 30 copies of *Mk.4* more than two years ago, all I wanted was *Crosstalk XVI* with a 25th status line, X.PC, and MNP [Microcom Network Protocol] support. What I got was something I don't even recognize.

Dennis J. Kaminski
Grand Rapids, Michigan

File Transfer Faux Pas

I have always been able to take criticism in stride, but the benchmark tests in your piece "Media Movers" [*PCW,* November 1987] contain two serious errors that show Traveling Software's *Lap-Link* in an unfair light.

Lap-Link's turbo option was not tested even though the reviewer stated that "*Lap-Link* is one of the most expensive products in the group and nearly the slowest, in spite of a proprietary data transmission mode that supposedly speeds file transfers." Your benchmarks also incorrectly state that files were transferred from an IBM AT's 5¼-inch floppy disk to a PS/2 Model 30's 3½-inch floppy. The times obviously indicate that files were transferred from the AT's 20MB hard disk to the Model 30's 20MB hard disk. Either way, we know that *Lap-Link* is without question the fast-

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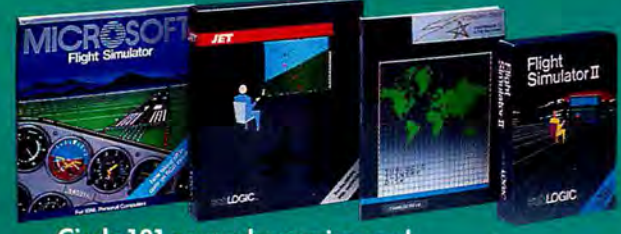

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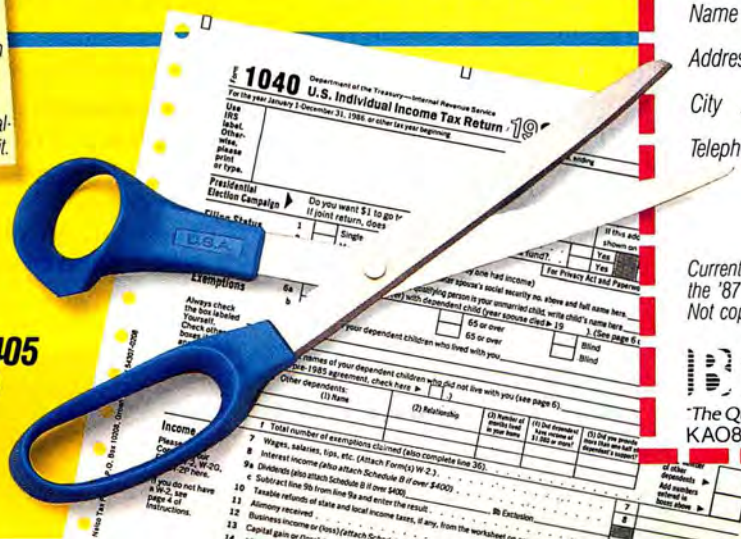

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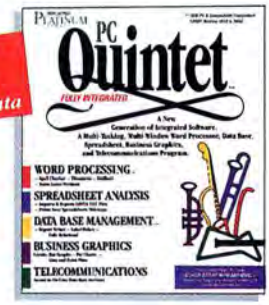

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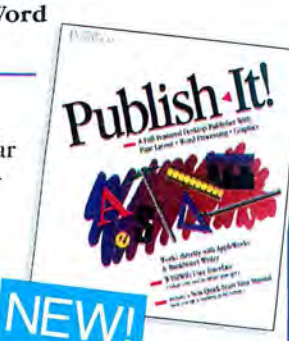

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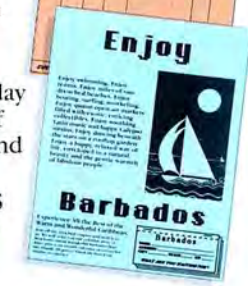

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Mark Eppley
President
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Had National Software Testing Laboratories evaluated Lap-Link *in its fast turbo mode, it would certainly have fared better in the ratings, and we regret this omission. All of the products reviewed in "Media Movers" are being retested, and the results will appear in "Second Look" in the March* Consumer Watch. *We also apologize for incorrectly identifying the benchmark testing as being from floppy to floppy, when in fact it was from hard disk to hard disk.*

Readers should also note that the price given in the text and the features table for Getc's File Shuttle 3.0 *was wrong. The $99.95 price in the Executive Summary was and is correct. Getc has since brought out version 3.1 at the same price.*

We apologize for any inconvenience this may have caused Getc, Traveling Software, or our readers. –Ed.

NewViews Consumer Report

Your review of Q.W. Page Associates' *NewViews* ["NewViews Breaks the Rules," *PCW*, September 1987] is like *Consumer Reports'* rejecting a V8-powered car in favor of a 4-cylinder one that gets better mileage, regardless of the cars' other respective merits. I have been using *NewViews* since December 1986; it took some time and effort to get situated, but boy, do I have a time-saver now!

The release of *1-2-3* is what convinced us to purchase a computer in the first place, and in my opinion, *NewViews* is the *1-2-3* of accounting software–it has cut my company's bookkeeping costs nearly in half. Once the installation difficulties are overcome, the benefits pour in.

Stephen E. Holzel
Montclair, New Jersey

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Source: Spring 1987 MRI.

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For the Business of Computing.
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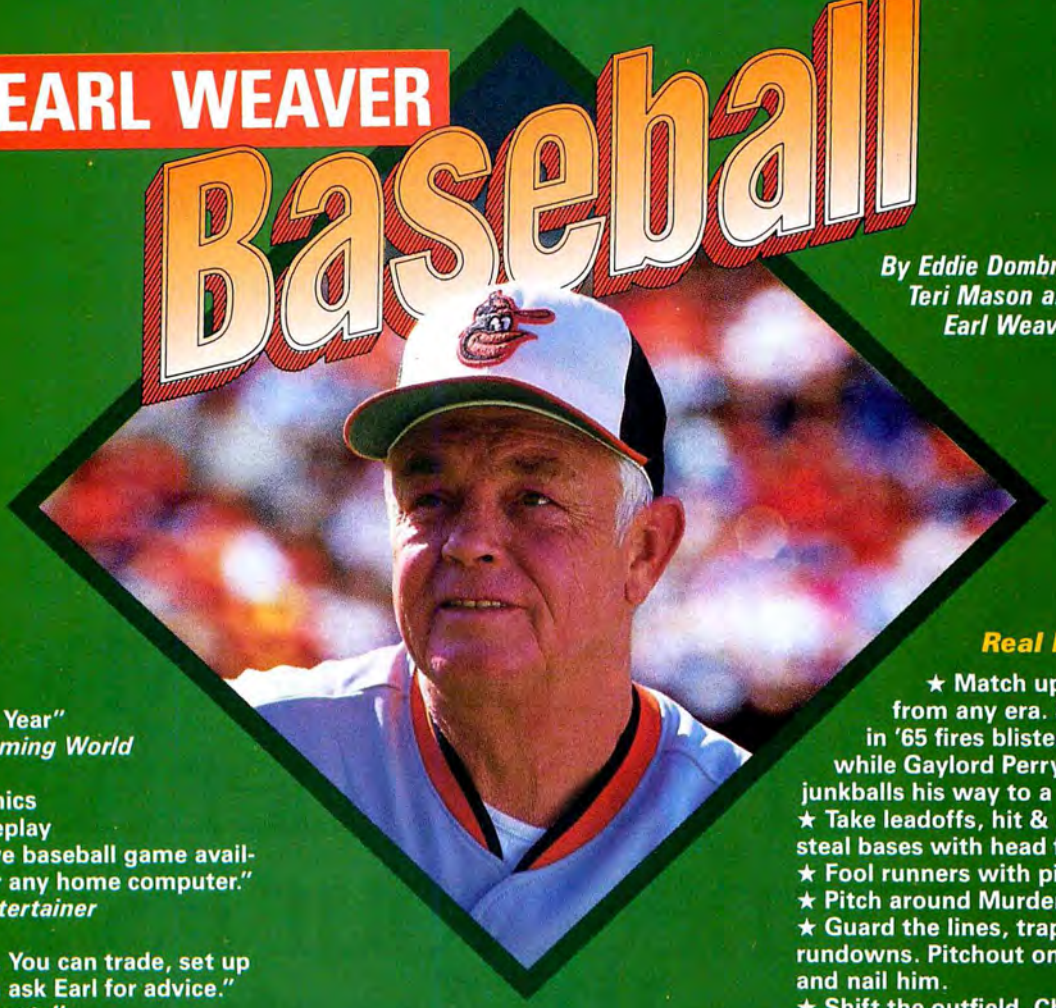

By Eddie Dombrower, Teri Mason and Earl Weaver

The Critics Report . . .

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★★★★ Graphics
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"The definitive baseball game available today for any home computer."
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AmigaWorld

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Circle 840 on reader service card

Another NewViews View

I can understand the authors' cautious approach to *NewViews*, as it's a radical departure from the accounting software that users have had to endure in the past. But where is it carved in stone that all accounting data must be batched?

As for *NewViews*' "needlessly scrambled" ASCII audit trail, if you print that file on a wide-carriage printer, each audit item appears on a separate line, in numbered order.

Finally, I don't understand the reviewers' final evaluation. They tout *NewViews* as an accounting innovation but rate it only fair in overall value. A full set of accounting programs for $600 is more than a fair value to me. This is how I would have rated *NewViews:*

Installation and setup	*Good*
Transaction processing	*Excellent*
Data protection	*Good*
Reporting analysis	*Excellent*
Overall value	*Excellent*

Steven J. Kopischke
Minneapolis, Minnesota

Piracy in Perspective

In his commentary "Who Pays for Piracy?" [*Another Angle, PCW,* September 1987], Don R. Allison rails eloquently against software piracy, saying that it contributes indirectly to lower-quality products in the marketplace. My question: How much software is sitting around unused because it failed to perform as advertised? Piracy is certainly immoral, but I think that it is probably counterbalanced by the many substandard programs promising state-of-the-art features.

Raymond Tekosky
Albertson, New York

More Truth in Advertising

In his letter "Misplaced Trust" [*Letters, PCW,* October 1987], Mitchell Ostrom found it ironic that ADAPSO's *Thou Shalt Not Dupe* brochure talked about mutual trust between software publishers and their customers, when most publishers offer as-is warranties for their products.

Actually, both ADAPSO and the Software Publishers Association sponsor a customer advisory board that works with software publishers. The board's first accomplishment: a set of warranty guidelines, which states, among other things, that publishers should expressly warrant their products to perform as advertised. A number of publishers have adopted these guidelines already.

And let me comfort software buyers with this observation: Most vendors actually support their products to a greater extent than their as-is warranties imply.

Peter Haas
Director of Customer Affairs
PC Connection
Marlow, New Hampshire

(continues)

Framework II. Because changes jobs every

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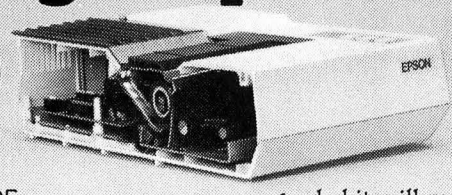

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Circle 61 on reader service card

The opening-spread photo caption in our feature covering PC Connection ["A Model for Mail Order," PCW, November 1987] incorrectly identifies its subjects as Patricia Gallup and David Hall. The gentleman pictured is in fact Peter Haas, to whom we extend our apologies. –Ed.

Fast 4Word

As one of the authors of *4Word*, I'd like to thank you for including our product in Charles Seiter's *1-2-3* word processing roundup ["Letters From Cell A17," PCW, September 1987]. I was disturbed by Mr. Seiter's lack of thoroughness, though.

The few simple tests you ran implied that *4Word* is slower than its competition, when it is actually faster at moving the cursor, paging from screen to screen, and locating the end of a document– none of which was shown.

Mr. Seiter also faulted the program for storing its work in *1-2-3* worksheets instead of in separate files. This approach has the benefits of making the program familiar to *1-2-3* users and its data accessible to other add-in products like *HAL*, *SQZ*, and *Spellin*.

I believe that *4Word*'s speed and coziness to *1-2-3* are two important reasons why Lotus chose it over the competition to sell alongside the Japanese release of *1-2-3*. Your evaluation was disappointing; I expect *PC World* to be more thorough.

Geoffrey T. LeBlond
President
LeBlond Software
Indianapolis, Indiana

(continues)

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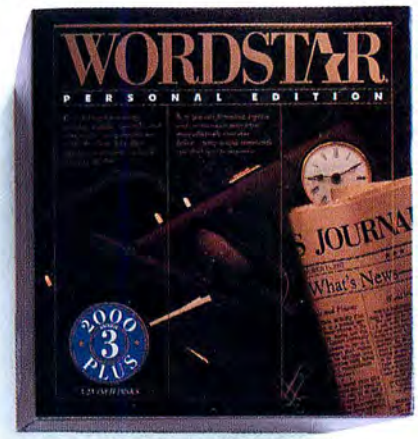
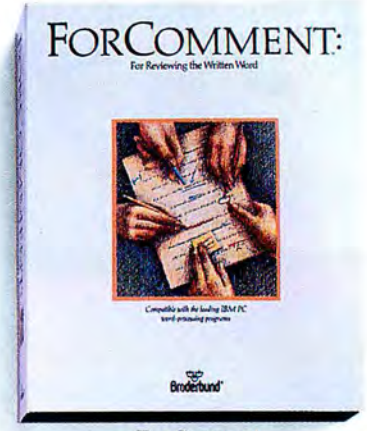
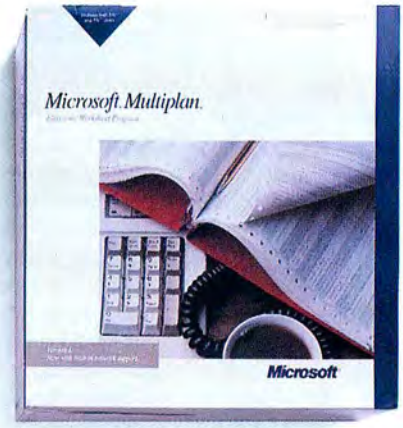


Wordstar 2000 Plus Ver. 3
Display sub/superscripts, italics, boldface, strikethrough.



For Comment
Display more text with no loss of speed.

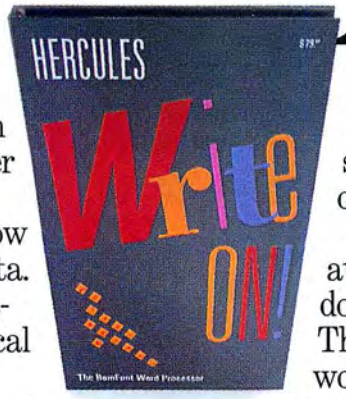
WordMARC
Display foreign characters at text mode speeds.



Microsoft Multiplan
Display more data with no loss of speed.

Symphony
Display more data with no loss of speed.

Now, Here's



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Brief
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Framework II
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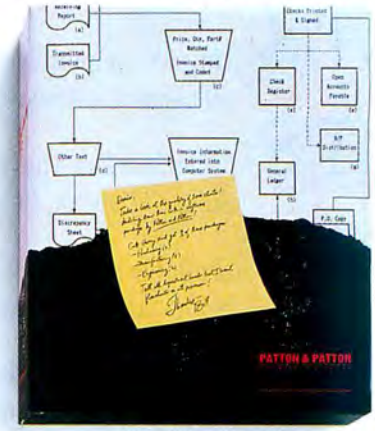

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Nota Bene
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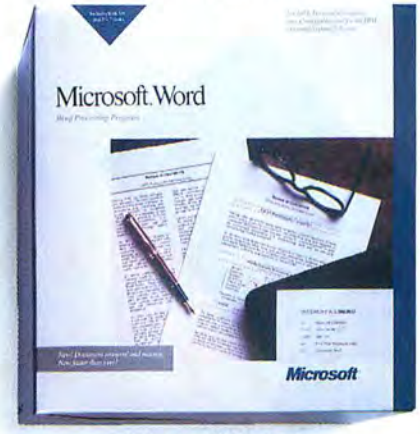

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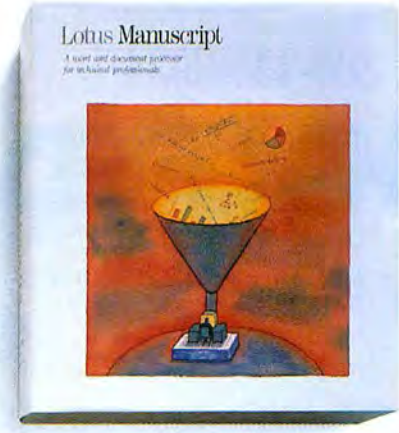

Manuscript
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It's true that because of the way 4Word *stores documents in* 1-2-3 *spreadsheets, it performs some tasks faster than its competitors. We ran many tests that were not included in the review and based our evaluation on those we considered most important to our readers.*

Your point about 4Word's *coziness with* 1-2-3 *is well taken in the case of* Spellin, *a product not available at the time I wrote the review. Because* SQZ *is intended primarily to compact numeric data, it is unlikely that a prospective buyer of* 4Word *would be greatly influenced by the products' compatibility. Finally, it's uncertain that there are any advantages to be gained by using* 4Word *with* HAL. *A call to Lotus technical support revealed that the two programs don't work together in any way. —Charles Seiter*

Professional Insult

Your review of True BASIC version 2.0 [*From the Software Shelf, PCW,* September 1987] did a good job of pointing out many of this language's strengths. Unfortunately, your reviewers seem to think that only those "planning to produce software for distribution" are worthy of being called professionals—quite a slap in the face of engineers and scientists.

Computers share space with electrometers, monochromators, and optical multichannel analyzers in my Electro-Optics Laboratory, and software is just

(continues)

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Now that there's an IRMA put your old ideas about m

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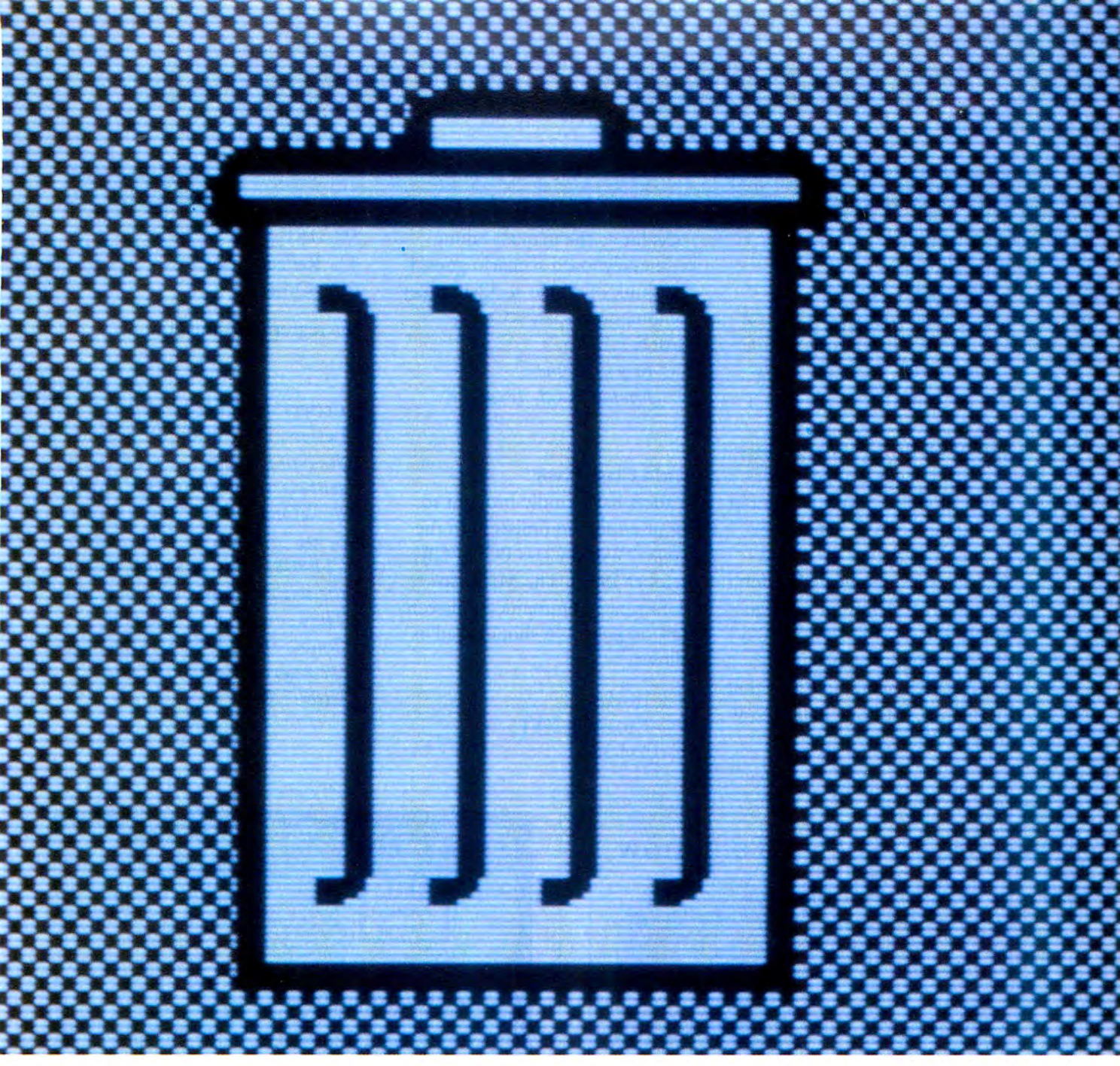

for the Macintosh, you can ainframe links in their place.

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What's more, MacIRMA's 3270 emulation software is a true Macintosh application. It works with a "mouse," pull-down menus, is compatible with Switcher™ and Multifinder™ programs, and supports "copy-and-paste" to incorporate mainframe data into word processing or spreadsheets.

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another laboratory tool—used by professionals.

Clarence R. Krueger
Principal Engineer
Polaroid Corporation
Cambridge, Massachusetts

Happy With the Keyboard Blues

James Glass accuses IBM of forgetting ergonomics ["Déjà Vu, Big Blue," *Letters, PCW,* September 1987] because the <Ctrl> and <Alt> keys are duplicated. I don't know what his definition of *ergonomic* is, but IBM has more than doubled the number of <Ctrl>- and <Alt>-*key* combinations that I can operate with one hand. Now *that's* ergonomics.

As far as the manual-falling-on-the-keyboard scenario goes, I can think of worse accidental key combinations than <Ctrl>-<Alt>-<Del>.

Roy I. Wagner
Friendswood, Texas

World Class Error

Readers have kindly brought to our attention an omission in the article "World Class PC" (*PCW,* October 1987). The Micro-to-Mainframe Communications category on page 246 should read as follows:

14% IRMA
10% Crosstalk XVI
6% IBM 3270
5% AST-5251
4% Reflection 2
61% Others

We regret this omission.

Letters should be mailed to Letters, PC World, *501 Second St., San Francisco, CA 94107, or sent electronically to MCI Mail PCWORLD/179-3813, CompuServe 74055,412, or The Source STE908. All letters must include the writer's name, city, and state. They should not exceed one double-spaced typewritten page. We reserve the right to edit letters.*

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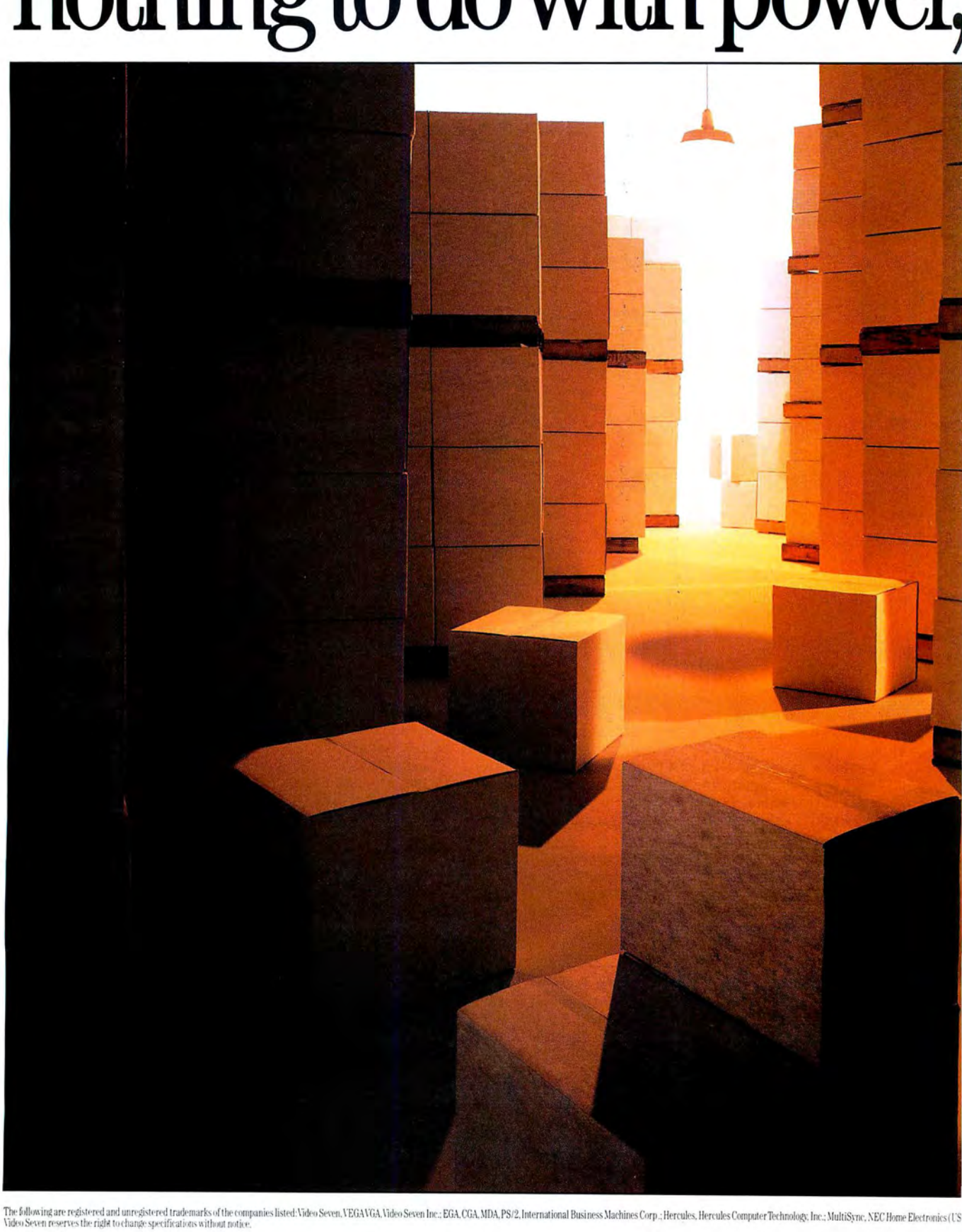

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r needed to support 256 colors. Variable frequency monitor required for greater than 640x350 resolution.

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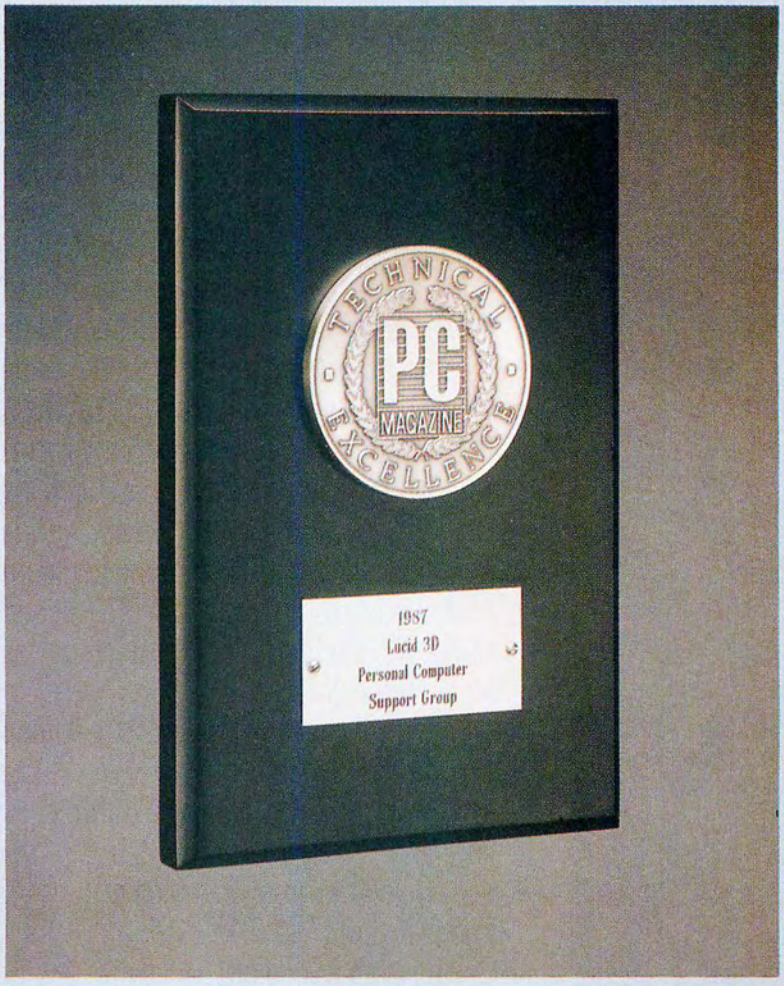
PCSG'S Lucid 3-D and Microsoft Excel



Co-Winners of PC Magazine's 1987 Technical Excellence Award

Everyone says "It's the best there is."

Any cell can contain a complete other spreadsheet that you can access with a single key.

Don't take our word for it. Use Lucid 3-D for 60 days. Return it for a full refund if not completely satisfied. Plus, instead of the $199 list price, an introductory spread-the-word price of $99.

"The Best idea I've seen for a spreadsheet in years"
Jim Seymour, Columnist, PC Magazine, PC Week

Lucid is as simple as the pictures show. And you don't have to write formulas to do that. All you do is look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

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.

Notepad Behind Every Cell

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, filenames, even a calculator. All let you select and insert right 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.

Fig. 1. Let's get the detail on those ad costs, just move the widebar to that cell and press one key (grey +).

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.

Co-Winner of the 1987 PC Magazine Award for Technical Excellence
The other winner: Microsoft's Excel

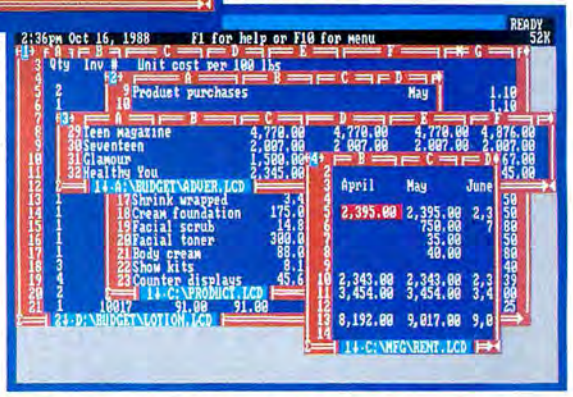


Fig. 3. Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many 3-D levels as you like. No one else can do that.

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 an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D, without having to upset your present systems.

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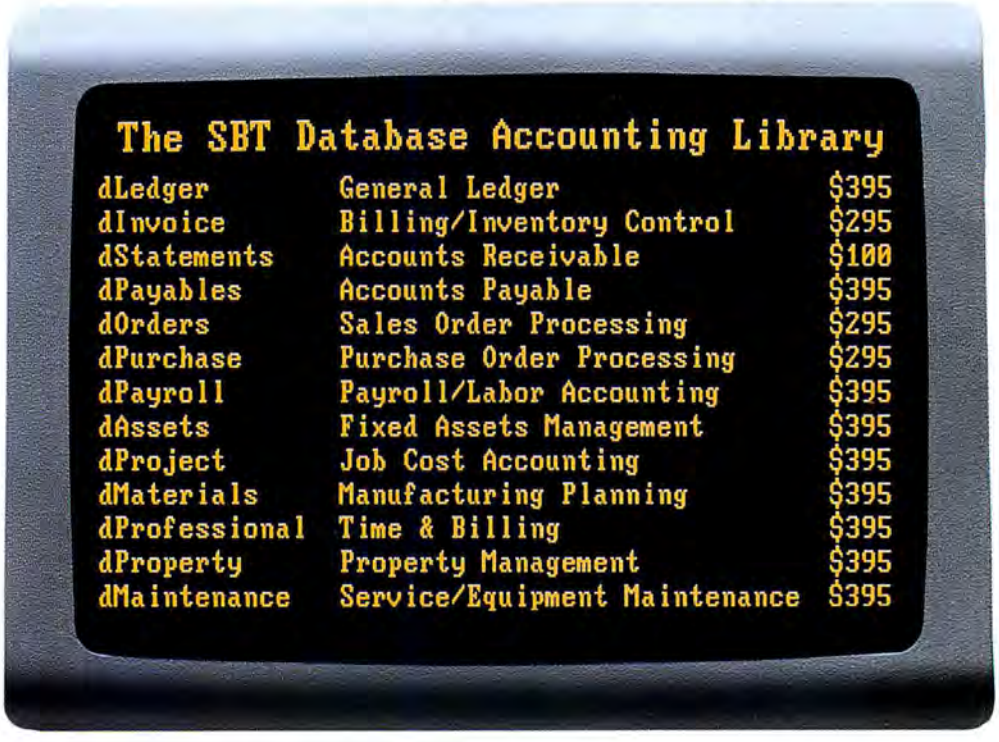

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Circle 163 on reader service card

Richard Landry

Not Newer, but Better

New technology's no substitute for good ideas. Text-data management systems are a case in point.

There's a myth about innovation that industry insiders like to perpetuate. It goes like this: The really new and exciting developments in personal computing are driven by new twists in technology. The Apple II brought *VisiCalc;* the IBM PC ushered in *1-2-3.* OS/2 and the IBM PS/2 are setting the stage for a generation of applications unlike anything seen before. As far as the DOS arena is concerned, innovation is dead.

Although it's true that many of the new software programs scheduled for 1988 release will take advantage of the PS/2's VGA graphics and OS/2's 16MB linear address space, don't automatically assume your favorite business applications will suddenly become far more powerful and easy to use. As always, such improvements depend on the developer's ability to produce software that works the way you do.

And it won't necessarily take OS/2 to make it happen. A case in point is the new family of software called personal information managers or text-data management systems. The idea behind these systems has been around for years in the form of outliners, list managers, and file-indexing programs. But only recently have developers understood enough about the problem they were trying to solve to attack it in a way that makes the most sense for personal computer users. The breakthrough has been a conceptual one, not a technological one.

Two products in particular stand out for the way they grapple with the real world of information management: Lotus's *Agenda* and Valor Software's *Info-XL.* Unlike their predecessors, both programs make a comprehensive attempt to juggle the diverse kinds of information that businesspeople face every day and to make this data accessible at a moment's notice.

Every manager and professional routinely deals with a flood of information–in memos, reports, and other types of correspondence, as well as through meetings and plans made with coworkers. They somehow have to

(continues)

tie all these scattered bits of information into a comprehensive plan of action. Programs like *SideKick* and *Ready* have cut out only a slice of this problem, although in technically innovative ways. But until *Agenda* and *Info-XL* came along, nobody seemed to understand that it's the whole pie, not just a slice of it, that counts.

By making it possible to integrate the day-to-day information normally found on scraps of paper and in appointment books, Agenda *and* Info-XL *represent the latest thinking on how to improve productivity through personal computers.*

Neither of these programs, of course, requires OS/2 or the PS/2. Both were designed to run on character-based, XT-class systems. Yet by making it possible to integrate the day-to-day information normally found on scraps of paper and in appointment books, *Agenda* and *Info-XL* represent the latest thinking on how to improve productivity through personal computers.

So if software developers can perform such feats under DOS, then OS/2 will get the creative juices flowing even more—right? Robert Frankston, developer of *VisiCalc,* says the main benefit of the new operating system is that programmers won't have to spend most of their time worrying about squeezing a program to make it fit inside 640K. Instead, they can start worrying about how best to solve the problem at hand.

More interesting to Frankston is the fact that personal computer users will grow accustomed to working in an environment that has more than one program running at once. Most of these programs won't be big-time applications, but rather add-ons or organizational aids, like text-data management systems. Frankston calls them "trinkets." In essence, they'll have all the benefits and none of the disadvantages of today's terminate-and-stay-resident programs. And contrary to almost every prediction, Frankston thinks that the proliferation of this class of program will cause software prices to drop, so that companies will have to start thinking about alternate ways to market and distribute products. Lotus, where Frankston now works, has already been experimenting with electronic distribution of software upgrades.

With the new style of programming that OS/2 will encourage, many developers are going to be whooping it up like kids in a sandbox. You can expect a lot of sloppy applications to result. Just as under DOS, what will separate the wizards from the run-of-the-mill programmers won't be any special reliance on new technology; it'll be their understanding of the problems they're trying to solve.

Along with sloppy programs, another problem that you're likely to see in 1988 will be a deluge of vaporware. Unfortunately, computer magazines tend to encourage this phenomenon. Because it's in a magazine's best interest to report on the latest developments in hardware and software before its competitors do, some members of the computer press tend to jump the gun and review products before they've even been released. I think that's bad for personal computer users. You won't find such abuses in the pages of *PC World,* but frankly, you will find them elsewhere.

It's probably no surprise to you that computer journalism is a competitive game. Most of the time we play out that game in our respective news sections, where we try to scoop our competition and they try to scoop us. But reviewing products is another story. It's an unwritten industry law not to review a product before it is available in a "shrink-wrapped," or final, version. When you see product "reviews" appear in other magazines at the same time the products are released for sale, then you know that the rules haven't been followed.

(continues)

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(see other side)

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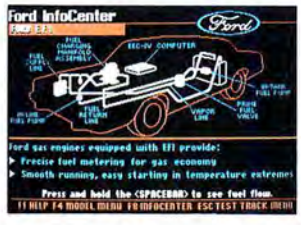

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Richard Landry

I feel that *PC World*'s responsibility to its readers is more important than the false appearance of being first. You can be certain that when a product is reviewed in our pages, we've based our judgment on our experience with the real thing.

Speaking of innovative products that really exist today, this issue takes a look at two of the most significant directions you're likely to see in 1988: on the hardware side, some key performance enhancements to the AT standard; on the software side, the emergence of SQL as a data base standard for the PC. Both trends are likely to be important for the same reason: They make it harder for any proprietary standard to take hold in either arena. What does that mean in practical terms? Most likely, the pressure exerted by companies like Compaq will make IBM wink at any Micro Channel clones that arrive this year, if only because Big Blue wants to drive a stake through the heart of the AT standard once and for all. Likewise with SQL—despite IBM's intention to make OS/2 Extended Edition the ultimate SQL engine, the standard is finding its way into everything from high-end relational data bases to flat-file managers. So much for a lock on that market.

As always, please feel free to write to me about these or any other subjects at *PC World*, 501 Second St., San Francisco, CA 94107, or send an MCI message to Richard Landry/301-3685.

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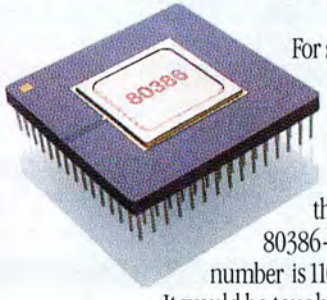

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Next in PC World

March

MICROSOFT EXCEL

It's bigger, flashier, and more powerful than *1-2-3*, but it's also slower and has a more expensive hardware appetite. Should current *1-2-3* users make the switch? *PC World* takes a comprehensive look at this new spreadsheet powerhouse.

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With powerful software like *Smartcom III*, new error-correcting modems, and the rapid growth in electronic mail and information services, PC communications is assuming a more important place among business applications than ever before. Our coverage of this expanding market includes special guides to E-mail and on-line services.

PS/2 CLONES ARE COMING!

Despite Big Blue's claims that its new computers can't be cloned—and dark warnings for those who might try—several big-time manufacturers are at work on PS/2 compatibles. We take a look at who is cloning the PS/2 and how they're doing it—legally.

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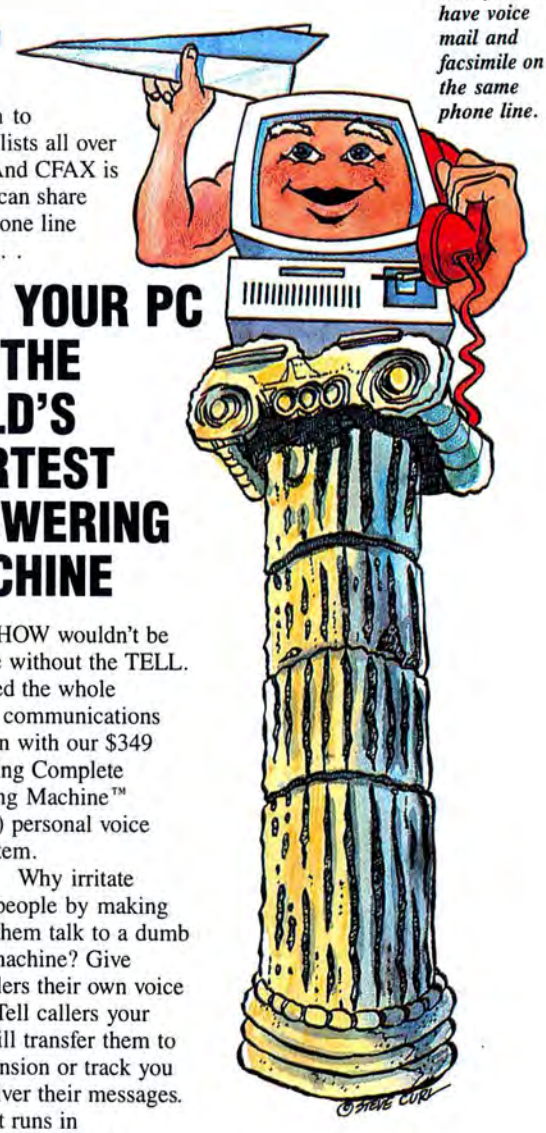

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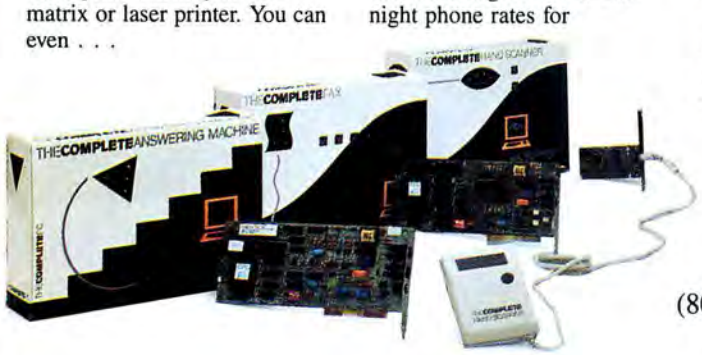

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TRBA

Stewart Alsop

The Real Reason You Want OS/2

Can OS/2 rescue IBM-style personal computing from the doldrums?

A lot of experts are running around making cynical comments about OS/2. At an industry conference last fall (before the first version of OS/2 shipped in December), one chief executive asked how many OS/2 users were in the audience. The question generated lots of snickers because, of course, there were none.

All this skepticism finds a receptive audience among industry executives and users alike. After all, who really *wants* to switch to a new operating system? The old one is bad enough. Most of us never expected to have to learn what a command-line interface is, never dreamed of writing batch files, and wish we had never heard the terms *extended, enhanced,* or *expanded* when it comes to computer memory. But this new operating system requires three times as much memory as the old one, demands that you buy new versions of your favorite software, works quite differently from the old system (which took long enough to master as it was), and requires that you understand new concepts such as threads, pipes, and interprocess communications.

Let me be the first to tell you that while OS/2 may make great material for one-liners, you want this new operating system, and you want it badly. The reason you want OS/2 is that it's the first development in the world of IBM-style computing to hold out any hope of real innovation and progress since developers first figured out how to plumb the shallow depths of MS-DOS back in 1983. It is, in other words, the first thing to come along in several years that might cure the personal computer business of the raging lack of vision it has been afflicted with since about the fall of 1985.

I don't know about you, but one reason I became interested in personal computers six years ago was the sense of adventure about them. When I first got involved with the infernal machines in May 1981, IBM was not in the PC business. The leading business computer was the Apple II, which had been turned into a

(continues)

business computer 18 months earlier by a program called *VisiCalc.*

At that time, there was an overwhelming feeling of discovery as each week went by. Every Monday, *InfoWorld* would show up in the mailbox with some amazing new product featured on the front page. Trade shows were rife with rumors of startling new innovations just about to be unveiled. Everyone was as fascinated by the philosophical implications of a people's information machine as we were by the productivity enhancements such computers could provide.

OS/2 is the first thing to come along in years that might cure the personal computer business of a raging lack of vision.

The IBM PC (and its many derivatives, including the 386 and PS/2 machines) has lost that sense of adventure. I can't tell you how bored I was to hear about IBM's second 80386-based computer. Then Compaq introduced the 20-MHz versions of its 80386 machines, and the things have 25 percent more clock speed: Now that's revolutionary!

Meanwhile, most PC users I know are pretty jealous of Macintosh owners. They're not jealous because they want a Macintosh but because all the really neat stuff–desktop publishing, image processing, illustration programs, graphical hypertext, even fancy E-mail and work-group software–comes out on the Macintosh first, and they have to wait until the developers port it over to the PC. Last fall, Macworld Expo (in Boston) and PC Expo (in New York) took place about two weeks apart. The Mac show was packed with heavy-breathing enthusiasts straining to see the latest and greatest software. The PC show was quiet, sober, and boring.

This isn't a treatise about the Macintosh. My point is that the Macintosh's operating software and underlying hardware is a newer set of technology than the basic PC architecture and lets software developers do things they didn't think they could do on a PC.

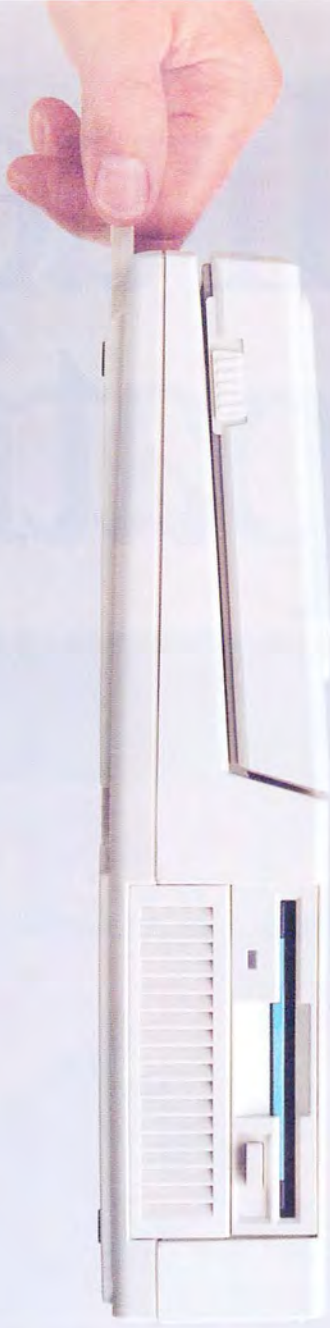
And that's why you want OS/2. The only way you're going to get new software before Macintosh users do is if software developers think that the OS/2 development environment gives them more resources to work with. Even at the big software companies, it's a fact of life that programmers are turned on by machinery and system software that let them blow the minds of their peers.

Sure, OS/2 is a big operating system. Sure, it requires lots of memory. Sure, it's incompatible with the previous operating system. And yes, it probably is full of spaghetti code. But what better challenge for your basic genius programmer than to figure out how to create a hot piece of software out of that mess that nobody else would even think of? Remember that with OS/2, programmers can access what's called the 286 *protected mode,* which is a whole section of the microprocessor that programmers haven't even been able to look at through DOS (since DOS works in real mode, which basically functions like the same old 8086 processor that's been around for years). That's like letting a 5-year-old loose at Disney World for the first time.

I can hear in my columnist's ears vendors and information executives groaning as they read this. "That Alsop must have flaked out since he moved to California," they are saying. "He's actually saying that OS/2 is important just because it gives programmers a big new playground to mess around in." But that's just the point. If the personal computer business were run by managers and bureaucrats, it never would have become as exciting or as important as it is.

So I can't wait for the new OS/2 applications to arrive. I don't mean the simple ports of DOS programs that we'll see this year. I mean the brand-new approaches to old applications and the brand-new applications that we'll begin to see by the end of this year and the beginning of next. Maybe then it will be fun to go to PC shows again. And we'll be able to thumb our noses at Macintosh users as they get yet another boring desktop publishing program.

Stewart Alsop is editor and publisher of P.C. Letter *and a contributing editor for* PC World.



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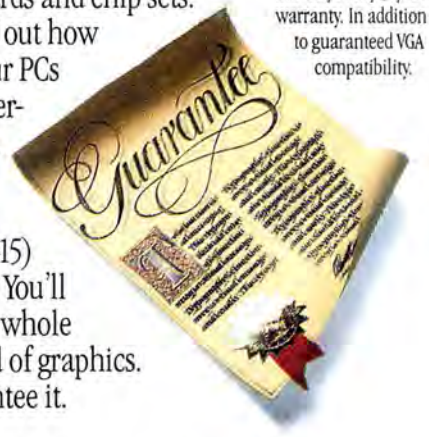

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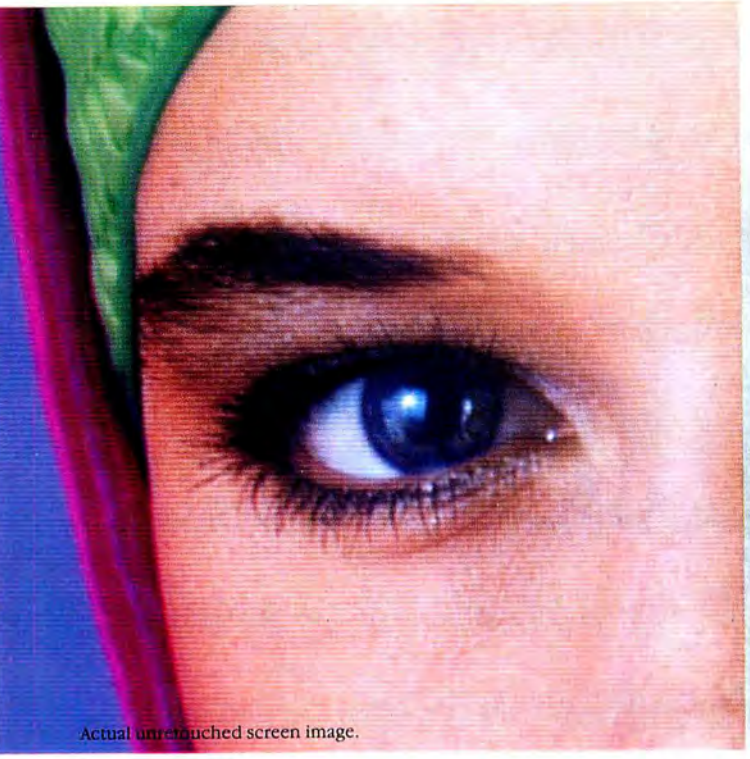

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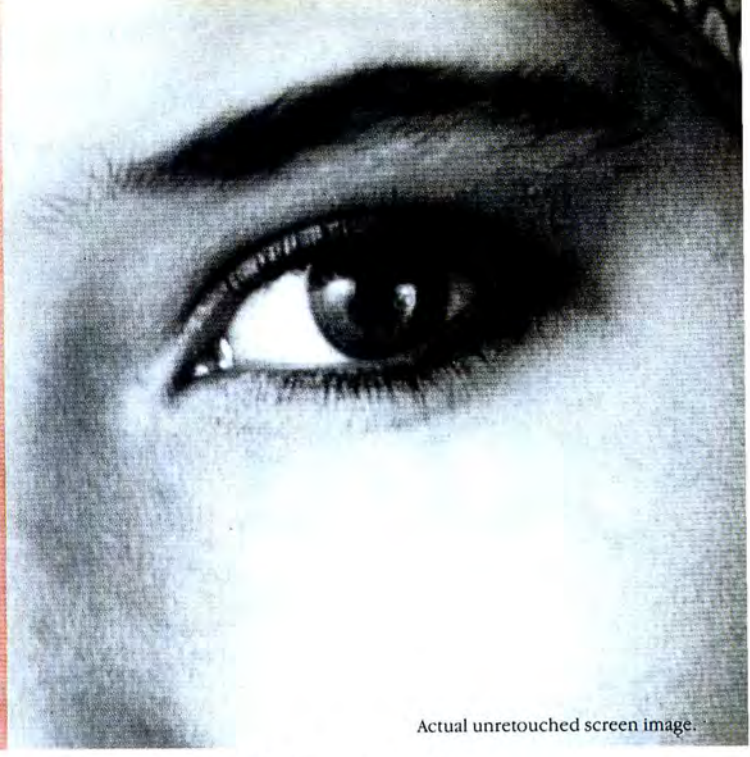

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William F. Zachmann

On IBM: SQL and OS/2 Extended Edition

As Structured Query Language matures into a relational data base system standard, what will IBM do to maintain its market share? Or more to the point, can it do anything to stem the competition?

The OS/2 Data Base Manager, a relational data base management application using the SQL language interface, is a key element in IBM's OS/2 Extended Edition. (The other is the Communications Manager, discussed in December's column.) IBM hopes to give users a reason to go with an all-Blue solution by linking OS/2 Extended Edition's data base capabilities to its relational Data Base2 (DB2) mainframe data base management system.

Fundamentally, data base management systems look at information in terms of data structures; DBMS's provide a means for creating, updating, retrieving, and reporting from structured collections of information. In the late 1960s, systems required portions of the data structure to be related hierarchically. Somewhat later alternatives defined data bases in terms of an explicitly linked network of related record types.

By the early 1970s, however, researchers at IBM determined that relational algebra and the calculus of relations offered a far more general and potentially far more useful schema for defining structured collections of data. The result was the development, toward the end of the decade, of the first workable relational data base management systems.

Unlike earlier hierarchical and network data models, the relational model did not require that connections between portions of the overall data model be specifically spelled out. With a relational data base management system, individual record types could, in effect, be linked dynamically, based on their content.

Several alternative implementations of the relational data model were tried. The one that proved most robust and useful was embodied in what is called Structured Query Language (SQL–commonly pronounced like the word *sequel*).

It was readily apparent that SQL offered, in principle, a tool that was greatly superior to earlier

(continues)

data base management systems. It not only offered more powerful facilities but was much more straightforward and logical than anything that preceded it.

There was a problem, however. With a relational DBMS it was extremely difficult to achieve performance that could match that of the more restrictive (and therefore easier to implement) hierarchical and network data models. The problem was solved only gradually by a combination of first-rate software development talent and increasingly powerful, much cheaper hardware.

The result is that today, SQL-based relational data base management systems stand ready to provide the foundation for information storage for the new era of information systems that will come into their own over the next few years. SQL is on its way to becoming an ANSI standard and will almost certainly become the dominant data base management interface for the 1990s.

Despite having funded the research to develop SQL, IBM was initially rather slow to develop relational DBMS technology. The company has, however, made SQL a cornerstone of its future software efforts. IBM's SQL-based DB2 DBMS for larger systems will be joined in the IBM OS/2 Extended Edition Data Base Manager by IBM's own SQL-based personal computer product.

What's more, in making SQL an essential element of the data base portion of the common programming interface of IBM's Systems Application Architecture (SAA), Big Blue has made SQL a key part of its strategy to unify software across the company's different hardware architectures.

Minicomputer software vendors like Oracle and Relational Technologies, of course, offered SQL-based DBMS software well before IBM did and have moved rapidly to provide personal computer versions as well (see "Tomorrow's Data Bases Today" in this issue). Fox Research has long sold a version of SQL for personal computers. Nearly every major personal computer software vendor has already introduced, or is about to introduce, a relational DBMS product based on or compatible with SQL.

The bottom line is that over the next few years we are all likely to be moving to relational data base management systems built around SQL. Whether we do it IBM's way or select from among the growing range of alternatives, we are all headed toward what will almost certainly emerge as the dominant standard for data base management systems in the 1990s.

IBM would obviously prefer that users automatically move to OS/2 Extended Edition. By bundling data base capabilities with OS/2 Extended Edition, IBM is aiming to lay claim to dominant market share in personal computer DBMS software. If successful, IBM would gain greater control of the personal computer market and have a better chance of establishing the more proprietary PS/2 models using the Micro Channel Architecture (MCA) as a new standard that other vendors will have difficulty competing against.

Despite having funded the research to develop SQL, IBM was initially rather slow to develop relational DBMS technology.

That does not necessarily mean, of course, that we will all be using SQL directly to manipulate information. On the contrary, it is probable that only a small number of users will actually use SQL. True, SQL was meant to be an easy way for nontechnical users to use language. But just to keep it in perspective, let's recall that COBOL's developers had similar ambitions for it. SQL is far more likely to provide a lower-level interface that will be used primarily by programmers. Users will more typically choose higher-level facilities like Ansa's *Paradox* for relational data base management access.

SQL will be very important, however, in providing the common interface among different DBMS implementations as well as the standard programming interface that all DBMS systems will need to remain competitive in the 1990s. Like all really good standards, SQL will create a common

(continues)

ground for creative diversity rather than a dull, homogeneous lowest common denominator.

By defining the common language that all future DBMS software will need to be able to speak, SQL will ensure users a continued flow of ever more capable DBMS software at intensely competitive prices well into the future. SQL will also help make it possible to build even very large applications on the incredibly low-cost platforms that personal computers and other microprocessor-based systems provide.

IBM's OS/2 Extended Edition will certainly give users an important SQL-based relational data base management system option. Large organizations with a big investment in IBM mainframe systems and in DB2 may find this a very attractive alternative indeed.

Users should certainly consider IBM's product. They will also be well advised to evaluate the wide spectrum of products available from other vendors. There is no reason to automatically assume that IBM's OS/2 Extended Edition Data Base Manager will offer more functionality, greater reliability, faster processing, or lower cost than competitive offerings.

Users will require IBM's product to prove itself in practice, just as they would any other vendor's product. Based on IBM's previous efforts to sell personal computer software, a certain amount of skepticism concerning OS/2 Extended Edition Data Base Manager is probably justified.

Ultimately, it is not the brand name on the label but what is in the box that counts. There is no reason to use the OS/2 Extended Edition Data Base Manager unless it proves itself to be better than comparable products from other vendors. If it can't pass that test, OS/2 Extended Edition Data Base Manager will go the way of *TopView* and the PCjr.

William F. Zachmann is senior vice president at International Data Corporation.

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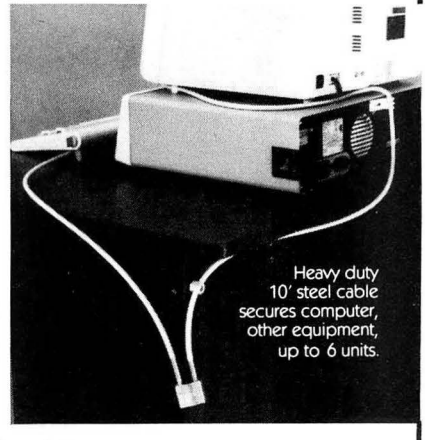

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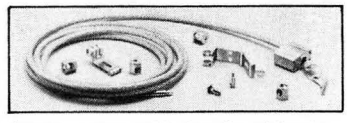

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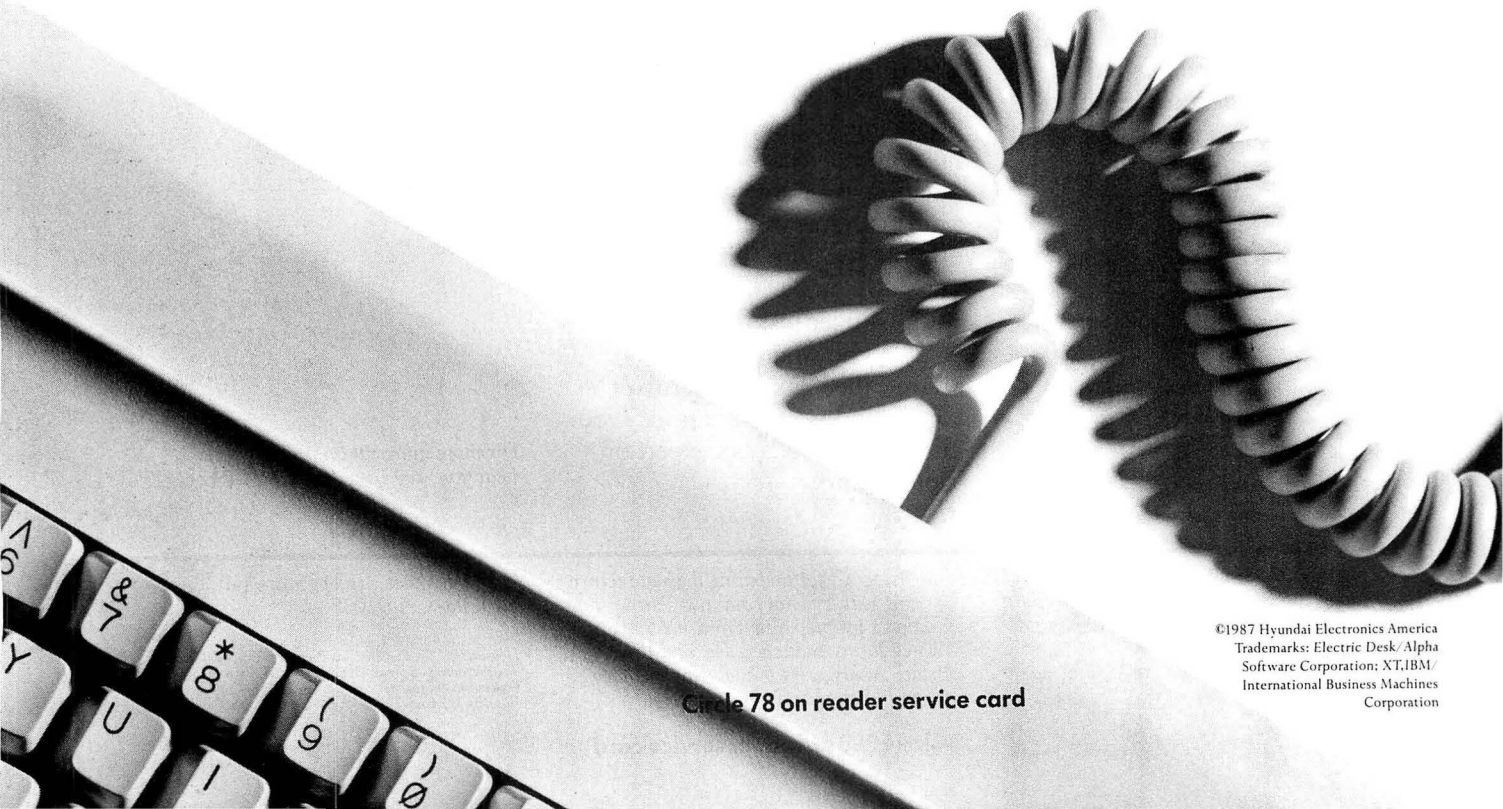

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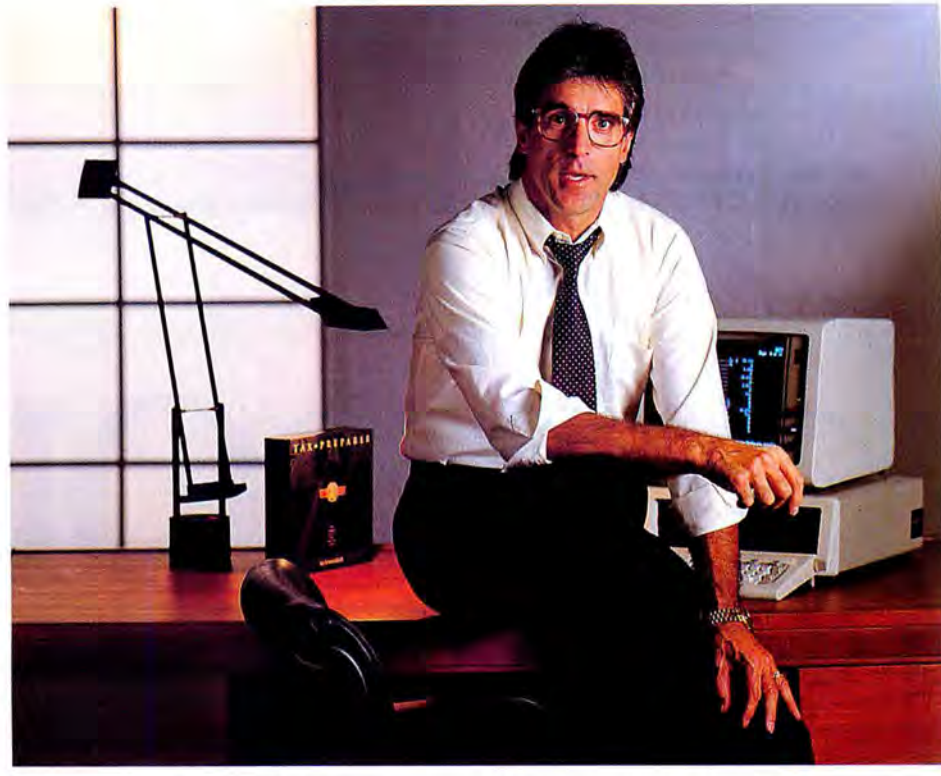

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Top of the News

Mike Hogan

Lotus Readies 1-2-3 Release 3

Lotus Development is putting the final touches on *1-2-3* release 3, its answer to spreadsheet challenges from competitors like Microsoft and Borland International. Available in the second quarter, release 3 will add a worksheet-linking capability, a relational data base module, and graphing enhancements such as the ability to show and print charts from within a worksheet. Most strikingly, release 3 will be able to hold either multiple worksheets or a three-dimensional worksheet in memory and to array worksheets behind one another like files in a file cabinet. They then can be linked dynamically with only two keystrokes, making possible tasks such as the consolidation of departmental budgets. The new release has been sped up with minimal and background recalc. Also included is an undo function and an automatic keystroke recorder to help build macros and to prevent data loss during power failures. Release 3 will sell for $495; upgrades from release 1A and release 2.*x* will cost $200 and $150, respectively. Each package will contain both an OS/2 version and a DOS version compatible with the Lotus/Intel/Microsoft Expanded Memory Specification 4.0. Both versions will share files and macros with one another and with release 2.*x*. Release 3 will be character based. Lotus's *1-2-3/G,* which exploits the graphic user interface in OS/2's Presentation Manager, will ship by year's end.

QMS Colors in PostScript

QMS probably will be the first vendor to show Adobe Systems's color PostScript page description language, and may also be the first to cross the line with a color laser printer. The Mobile, Alabama, firm's ColorScript 100 thermal-transfer printer is expected to ship in March for between $20,000 and $25,000. Targeted toward computer-aided design, engineering, and presentation graphics applications, ColorScript 100 supports the standard 35 Adobe fonts and is built around the 300-dpi Mitsubishi G650 color thermal-transfer marking engine. The printer sits atop an external controller with 12MB of RAM and serial, parallel, and AppleTalk interfaces. QMS also hopes to ship a color laser printer this summer. The 300-dpi device will combine a QMS controller with an engine from Atlanta-based Colorocs and will be built by Sharp Electronics. Selling for between $30,000 and $40,000, it will churn out 22 pages per minute in monochrome and 4 to 6 ppm in color. Color capabilities extend to 11-by-17-inch full-page bit-mapped graphics. The QMS controller will rely on a 32-bit Texas Instruments 34010 graphics processor and at least 12MB of memory for the difficult task of laying down four colors together.

Borland Ships SideKick Plus

Borland International has just begun shipping a new version of its popular desktop utility bundle, this one called *SideKick Plus.* The product that initiated the desktop utility category and started the rush to RAM-resident programming, *SideKick* has been among the ten best-selling programs for almost three years and boasts more than 1.5 million users. As its name suggests, *SideKick Plus* offers more notepads, more phone books, and more calculator types than its predecessor. The $150 program is also equipped with a form generator, a file manager for naming and moving files, a data communications script writer, and an outliner. *SideKick Plus* is compatible with the LIM 4.0 Expanded Memory Specification, so that all but 64K of its 384K worth of modules can sit in high memory, solving the increasingly common RAMcram problem. *SideKick Plus* users can redefine its hot keys to reduce conflicts with other terminate-and-stay-resident programs. The current *SideKick* will remain on sale for $85. An OS/2 version of *SideKick Plus* is planned.

IBM Sets OS/2 Schedule

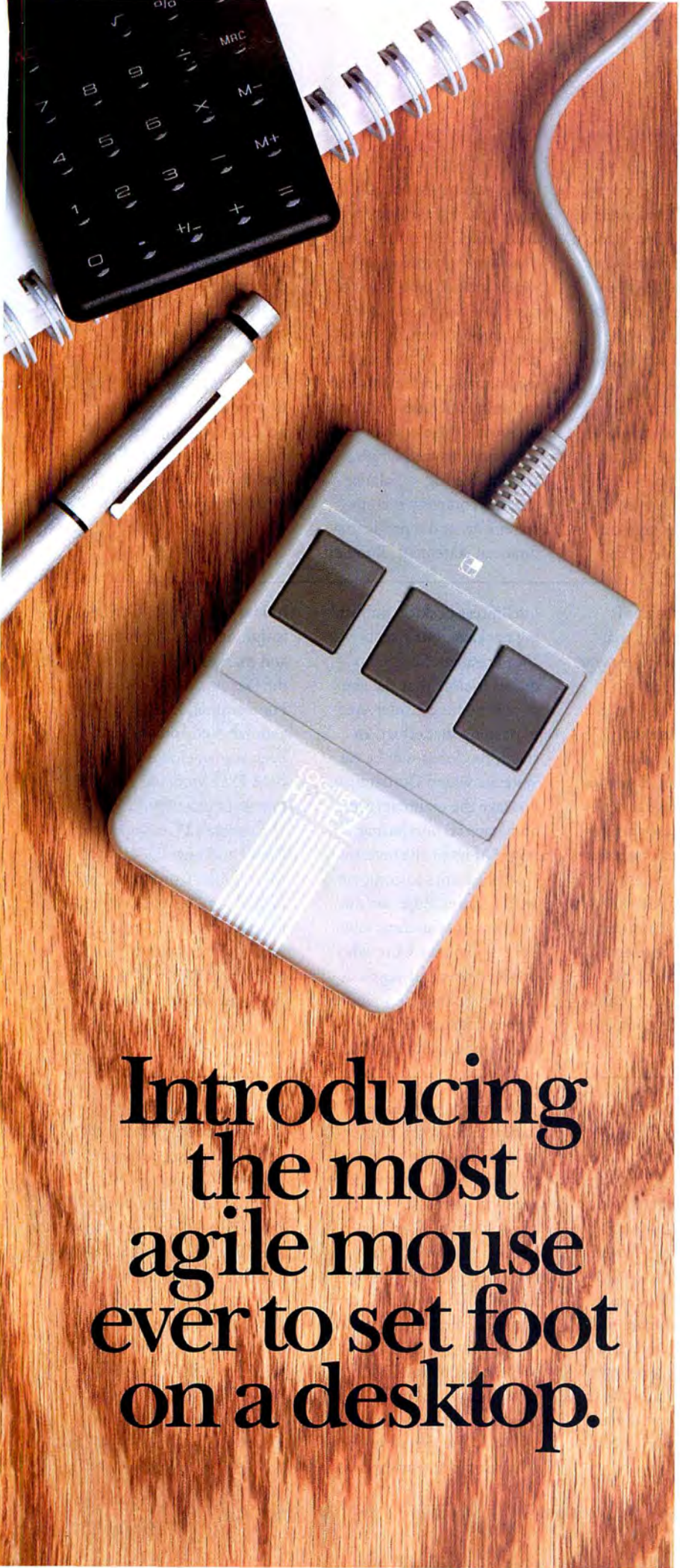
IBM has shipped OS/2 Standard Edition 1.0 early (in December) and firmed up shipment dates for its other OS/2 editions (see "IBM Tells a PS/2 Success Story" in this issue). Originally scheduled to appear this quarter, the $325 operating system offers multitasking and breaks the DOS 640K memory barrier, addressing up to 16MB of RAM. Upgrades from DOS 3.00 and later versions will cost $200 until July. OS/2 Extended Edition 1.0, which adds a relational data base manager, a communications manager, and terminal emulation, is priced at $795 and scheduled for July release. The upgrade from Standard Edition 1.0 is $645. OS/2 Standard Edition 1.1 adds the graphics-oriented capabilities of Presentation Manager. IBM plans to ship it in October, with the same pricing as Standard Edition 1.0 and a free upgrade from 1.0. OS/2 Extended Edition 1.1, slated for November, will feature Presentation Manager and support for IBM Token-Ring and PC Network LANs and will raise the storage limit on files and partitions from 32MB to 314MB. The license fee is $795, and the upgrade from Extended Edition 1.0 to Extended Edition 1.1 is free. Both of them require at least 3MB of RAM and a 20MB hard disk. Also announced are a $225 PC LAN Program version 1.3 for DOS users, scheduled for July release, and a $995 OS/2 LAN Server version 1.0, planned for November.

Kaypro Refocuses Product Line

No more transportables for Kaypro Corporation. The company, whose annual revenues jumped from $6 million to $250 million in 1982 on the strength of a CP/M portable, has abandoned the genre to concentrate on a line of passive-backplane desktops. Now a $105-million-a-year manufacturer of IBM compatibles, Kaypro has discontinued both its remaining CP/M and IBM-compatible transportables and introduced an 80286-based desktop with a passive-backplane slot technology. The $2995 Kaypro 286 features a 6/12-MHz replaceable processor board. Kaypro's entire line will be converted to this easily upgraded architecture, says Product Marketing Manager Jeffrey Brown. Next out, around the end of this quarter, will be a 10/20-MHz 80386-based machine that Kaypro was showing in a back room at the COMDEX/Fall show. The company promises to provide technical support and spare parts for the discontinued models, whose sales had slipped to less than 5 percent of Kaypro revenues. Kaypro will continue to sell its 2000+ laptop, whose sales are rising. Brown thinks that improvements in laptop screens may signal the end of the transportable era.

Microrim Updates R:base

Microrim has extensively revised *R:base System V*, the second most popular relational data base on the market. Now known simply as *R:base*, the new program is much faster, includes Structured Query Language (SQL) commands, and will be available in both DOS and OS/2 versions. Stealing a march on market-leading Ashton-Tate in providing new data base features, Microrim's ANSI-compatible SQL includes several IBM DB2-like extensions. A friendlier interface, dominated by Microrim's long-standing Prompt By Example interactive menu, lets the user choose English-language options via a point-and-pick method. Programming techniques such as heuristic query optimization make *R:base* run two to three times faster overall, claims Product Manager Jim Culbertson. The new *R:base* still features the Express program generator and adds Developer's Express, a pseudocompiler that compresses and encrypts program code, enabling applications to run two to three times faster directly off the *R:base* engine. *R:base* for DOS supports the LIM 4.0 Expanded Memory Specification, thus minimizing disk accesses and speeding throughput. *R:base* for OS/2 has the same capability since the new operating system directly addresses 16MB of memory. With an estimated 150,000 copies of *R:base* installed, Microrim claims about 15 percent of the market for relational data base managers, says Culbertson. *R:base* for DOS has just begun shipping, and *R:base* for OS/2 will arrive this quarter.



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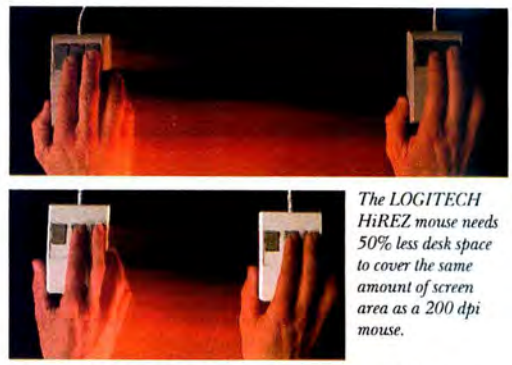

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LOGITECH

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Small Businesses Get 1-2-3 Kit

Firmly entrenched in corporations, Lotus Development is out to win the hearts and PCs of small businesses as well with a Small Business Kit of nine *1-2-3* templates plus accompanying seminars. Lotus research shows a potential market of 4.1 million small firms, only one-quarter of which own computers. Fewer still understand spreadsheet applications; many are even unfamiliar with common financial statements. The Lotus seminar series is intended to help businesses make quick use of the Small Business Kit templates, which include two kinds of cash flow analyses, a group of common financial ratios, identification of sources and uses of cash, and analysis of the impact of sales volume on profits. Also contained are templates for planning cash budgeting, a balance sheet, a company income statement, and a pro forma financial statement. Bundled with *1-2-3*, the kit costs $595, $100 more than the spreadsheet alone. The kit includes six months of unlimited toll-free telephone support and a directory of local Small Business Administration centers and *1-2-3*-compatible third-party products. The regional seminars, cosponsored by SBA centers and local retailers, will be held in major cities starting in late March.

Cordata Goes Korean

Cordata Technologies is changing its product marketing emphasis and moving much closer to Daewoo Electronics, the Korean giant that owns more than 70 percent of the company. Cordata is scaling down its unsuccessful effort at desktop publishing/laser printer sales in order to concentrate on its inexpensive desktop systems, adding both 8088- and 80386-based systems to complement the current XT- and AT-compatible lines. Cordata will continue to offer its $8995 turnkey Intellipress desktop publishing package, but Executive Vice President Sung Cho makes it clear that the supplier is no longer interested in pushing that effort. Instead, the focus will be on systems, where Cordata can leverage the manufacturing and material purchasing might of its prime investor. Cordata wants to compete with Leading Edge for the business of cost-conscious buyers, explains Cho, who presided over last year's departure of Cordata founder Robert Harp under less-than-friendly circumstances. In Harp's absence, Cordata is tightening its operational and marketing links with the Daewoo conglomerate. For example, Daewoo's private-label customers have been shown clones of the IBM PS/2 Models 25 and 30 that were reconfigurations of Cordata's PC-compatible CS 40 and new CS 45. Meanwhile, Cordata has attached the Daewoo name to its logo, says Cho, in order to assure customers of the financial stability of the often-troubled enterprise.

Daybreak Technologies Goes Chapter 11

Unable to secure further private financing, *Silk* spreadsheet publisher Daybreak Technologies has filed for Chapter 11 bankruptcy. The Torrance, California, software house has frozen its plans for *Satin*, a 4-D financial modeling package. But Daybreak founder and president Gus Tsao hopes to find either a buyer or investor within a few months so that he can roll out the already completed *Silk* version 1.1, which has speed enhancements, more printer drivers, and the ability to translate *1-2-3* macros. Also ready to go is a keystroke-logging utility that Daybreak has spun off from *Silk*. The package was released in January 1987, and Daybreak began seeking a $3 million private placement last summer. Tsao cites his own marketing mistakes, the pervasiveness of *1-2-3*, and the advent of Microsoft's spreadsheet as the causes of Daybreak's cool reception within the venture funding community. Daybreak, operating with a skeleton staff, still claims that 2000 dealers are selling *Silk*. The company's 800 number for customer support has been suspended, but Daybreak will still support the 8000 current *Silk* users from the company's new address: 21311 Hawthorne Blvd., Hawthorne, CA 90503; 213/543-5433.

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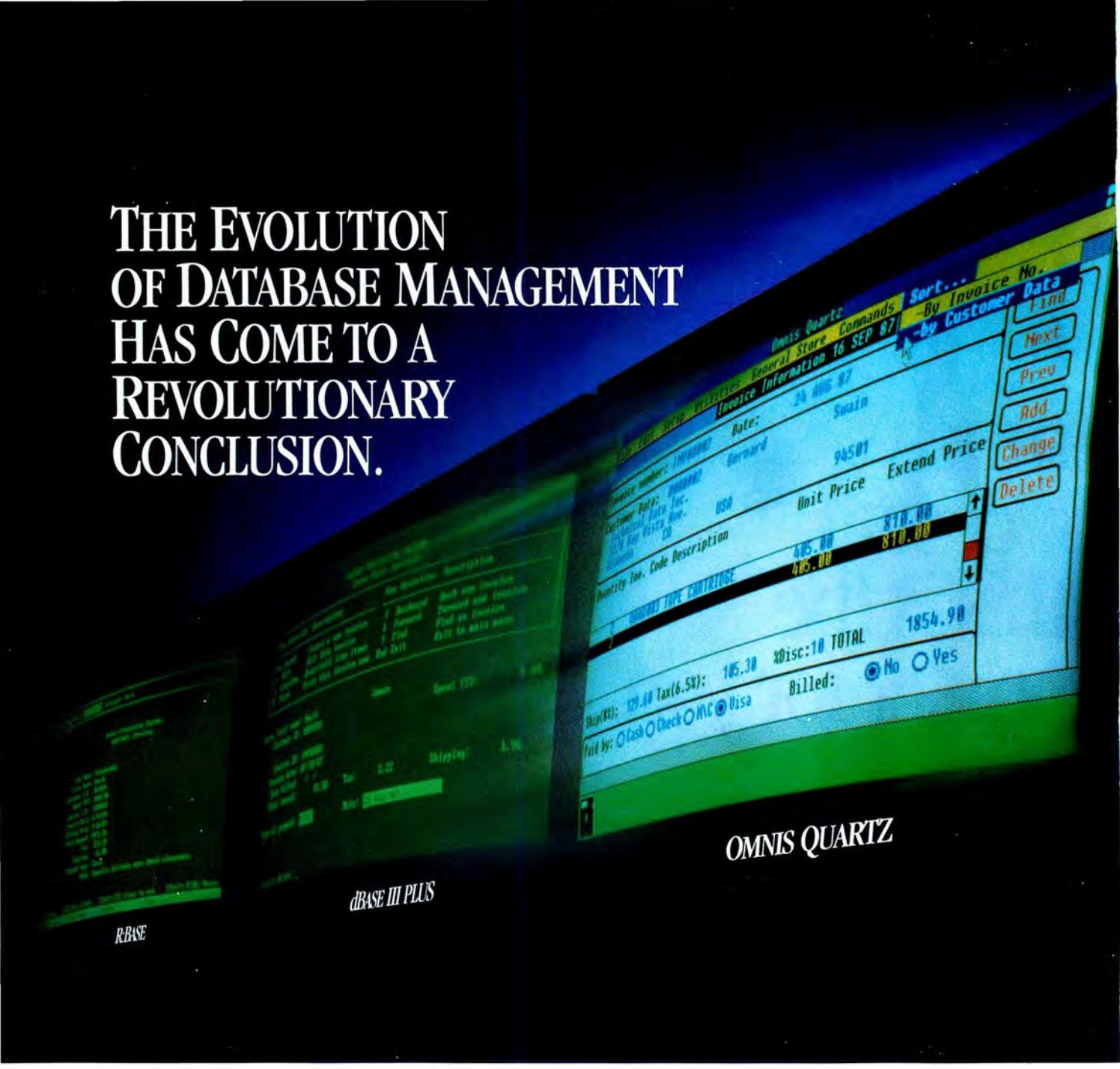
THE EVOLUTION OF DATABASE MANAGEMENT HAS COME TO A REVOLUTIONARY CONCLUSION.



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Circle 279 on reader service card

Industry Outlook

Edited by Eric Bender

BUILDING FROM DBASE

Cynthia Moore

Ashton-Tate still owns the standard, Esber declares.

No wonder Ed Esber gets testy in public sometimes.

His company collected $68 million in sales and $11 million in income during the most recent quarter. It's successfully diversifying into word processing and other applications. And it still takes three-quarters of the PC data base market, by Infocorp's estimate.

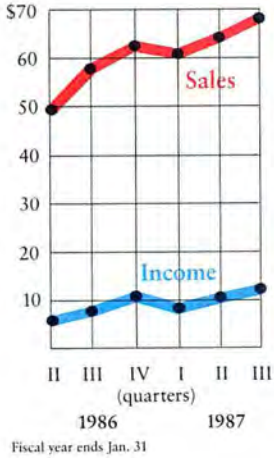
But the industry keeps telling Esber that Ashton-Tate's in trouble, with its immobile *dBASE* flagship under heavy attack.

Never mind the vaporware contenders. As *dBASE III Plus* has languished without a serious update for more than two years, vendors of *dBASE* clones and compilers are increasingly difficult for Ashton-Tate to

dBASE," acknowledges Roy Folk, Ashton-Tate executive vice president. "Some of those niches are big." Other vendors say the results have been not just a few lost sales

Ashton-Tate Financials

(millions)



Fiscal year ends Jan. 31

(like the Social Security Administration's buy of 5000 copies of WordTech Systems's *dBXL*) but a visible drop in support among experienced users.

"We're seeing an erosion of Ashton-Tate's stranglehold," suggests Bart Van Voorhis, WordTech's marketing vice president. "They seem to be increasingly

(continued)

WAITING FOR SQL

Developed by IBM as a uniform way to find information held in massive mainframe data bases, Structured Query Language (SQL) is being groomed to offer consistent ways for PCs to grab data from other machines of all shapes and sizes. As Roy Folk, executive vice president at Ashton-Tate, grandly describes it, "Machines are destined to talk to each other through SQL."

Seeking to achieve this destiny, an unending stream of PC data base management software vendors have announced plans for SQL (see "Tomorrow's Data Bases Today" in this issue). But the suppliers caution that SQL implementations mean different things to different authors.

"SQL is still not defined well enough for a standard," Folk remarks, although an industry standards group is trying to hammer out complete specs. That leaves people still discussing the way things work in IBM's DB2 mainframe relational data base manager, which staked out the original SQL claims a long way from PC concerns.

Today with SQL, "all you can do is ask questions," comments Fred Gray, senior vice president for research and development at Microrim. "SQL doesn't mean that you can understand the answers, and it doesn't mean that you have a mechanism to get the answers to the right place."

"Implemented without a great deal of attention to performance and ease of use, SQL is going to be a disaster on the PC," adds Microrim president David Hull. He warns against some of the expectations for instant access via SQL: "You'd need greater power on the network server than anything known to man."

"Most people don't know what they're getting into with SQL," agrees another software executive, who says that early SQL products seem to gobble up memory and disk storage. Oracle's SQL package comes with almost enough disks to repay the purchase price, he remarks. *–E. B.*

BUILDING FROM DBASE

(continued)

more arrogant, increasingly less responsive."

The *dBASE* followers compete on performance, pricing, ease of use, and various bells and whistles. Sales of Fox Software's speedy *Foxbase* have zoomed. And Ashton-Tate doesn't yet market a compiler, leaving an opening for Fox, WordTech, Nantucket, and others. Additional sales are being lost because of *dBASE III Plus*'s clumsy footwork on local area networks.

Last year Ashton-Tate's lack of technical leadership was dramatized when competitors joined to standardize extensions to the *dBASE* language. (Esber fired off a verbal barrage against the effort, speculating about antitrust action against companies a fraction of Ashton-Tate's size, but soon backed off from the threat.)

Ashton-Tate's habit of treating any upgrade as a major event comes directly from its sheer size and success. "A smaller company is lighter on its feet; we don't have to update 2 million people," Van Voorhis says.

In the long run, Ashton-Tate is more concerned with $100-million-plus heavyweights like Oracle and Information Builders, whose territories increasingly overlap Ashton-Tate's. Lurking in the distance are Lotus and Microsoft, both of which are readying high-end network-oriented products for this strategic arena.

Mark Farbin

WordTech's Van Voorhis

Then, of course, there's the $50-billion computer supplier that will start bundling data base functions into its personal computer system software this summer.

But Esber and Folk argue that Ashton-Tate owns the data base standard in the DOS market and has been aggressively planning to move upscale to OS/2. In the next few months, the company is expected to reveal *dBASE* versions for both DOS and the character-based OS/2 Standard Edition. Another release that exploits the 80386-specific DOS extensions may be in the works. Much more critical, Esber remarks, is the upcoming *dBASE* for OS/2 release 1.1, exploiting the Presentation Manager interface and "combining the clout of a mainframe with the comfort of a Macintosh."

Despite the flurry of speculation about IBM's OS/2 Extended Edition, "nothing in IBM's announcement suggests that it is aiming to compete with a full data base management system," Folk says. Instead, he expects IBM to lay a foundation that Ashton-Tate and others can build upon.

Beyond that, the two executives say, the next release of *dBASE* will tackle speed issues head-on, offering a compiler and major performance improvements. Ashton-Tate will respond to what Folk calls "unceasing requests to make the product easier to learn and use," offering a choice of interfaces for various users and tasks. Enhancing connectivity, the new version "will talk to a new generation of data base servers provided by Ashton-Tate and others," Esber says.

The language also will get a major face-lift. "We have the power and position to do that and to do it better than a committee of vendors," Folk claims.

"We have a sense of urgency about this. The next release of *dBASE* will be the biggest step we've ever taken," Folk sums up. *–E. B.*

CHIPS FOR THE MAINSTREAM

Although prices are plummeting for PCs built around the 80386 microprocessor, the powerful new machines still make many of us a little wistful because they seem far too expensive to take home (see "Surprise! Cheap 386s Deliver" in this issue). But this year Intel begins churning out a chip aimed at PCs that sell for $1000 or less.

While the giant chipmaker drops no further hints, the entry is rumored to combine the 80386's 32-bit internal processing with 80286-style connections to surrounding circuitry. That could mean that manufacturers will be able to slide the new processor straight into their AT compatibles, without significant modifications in design. It also might herald the arrival of near-instant upgrades for existing AT compatibles.

Intel has ramped up production of the existing 386 chip very quickly, much more quickly than with the 80286. Well over half a million of the chips shipped last year. Compaq Computer, an interested party, predicts that within two years, more machines will be shipping with the 386 than the 286.

Intel also is busy plotting ambitious high-end 386s. A version operating at 25 MHz will go out to computer manufacturers late this year, and a 30-MHz model waits in the wings.

Meanwhile, the silicon foundry is drawing up plans for a 386 successor: the 80486, which will offer three to four times the horsepower. This sliver of silicon will hold a million transistors, roughly four times the number in the 386. It's not clear even to Intel what functions will be built into that tortured real estate, but graphics, memory management, and communications are among the contenders. Intel predicts that machines based on this dynamo will crop up around 1990. *–E. B.*

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Circle 281 on reader service card

ADDING POSTSCRIPTS

PostScript, Adobe's powerful page description language, has faced relatively little competition since it first appeared in 1984. But no successful product enjoys solitude for long.

Offering a robust combination of text fonts and graphics-handling facilities, PostScript demonstrated a unique ability to fill in the missing link between the dazzling new laser printers and the emerging desktop publishing packages.

"If you wanted to do complex graphics and text, you had to use PostScript," says Charles LeCompte, editor of *Printout Newsletter* in Newtonville, Massachusetts. "It became a standard because it was the only one available."

Even IBM bestowed its cherished endorsement on PostScript. But lately, printer manufacturers have begun to back alternatives as well, many of which they themselves are developing in-house.

More worrisome for Adobe are the so-called PostScript-compatible offerings that are plowing into the printer market. These provide various subsets and supersets of PostScript performance and address various complaints about Adobe's language, the loudest being that it is slow.

Customers hope that PostScript clones will help lower printer prices, but LeCompte discounts that scenario. PostScript laser printers seem to carry a premium of $2000 or more, but license fees for the page description language contribute relatively little to that cost. "We've heard of a $200 maximum, although that may have been higher in the past," LeCompte says.

Instead, customers should see the best results from the entry of numerous large vendors like Canon, which licenses a "PostScript-compatible" language from Phoenix Technologies.

Late last year, the cheapest PostScript printers you actually could buy listed at a hair under $4000. Cost of the laser engine won't drop much in a year, particularly as the dollar wavers against the yen, LeCompte says. He doubts that PostScript devices will sell for less than $3000 by year's end.

The legal issues surrounding PostScript work-alikes are far from clear. Adobe encourages people to write programs, drivers, and interpreters for PostScript, but says it will enforce its trademarks and copyrights, which include the list of commands. And the Mountain View, California, firm is making PostScript a moving target by adding color and other enhancements.

With a list of tricky commands, fonts, and other components to consider, "the technical obstacles to PostScript cloning are not minor," LeCompte points out. Neither are the risks of incompatibility. "If I were a customer, I'd be real careful; I wouldn't leap toward a clone."

However, he forecasts healthy growth for the market. About 470,000 low-end page printers (a category that also includes a few nonlaser devices) shipped in 1987, 93,000 of them in the PostScript camp, LeCompte estimates. He expects the totals to rise to 639,000 and 150,000, respectively.
–E. B.

VOLKS POPULAR

In 1981, computer consultant Camilo Wilson purchased a PC, loaded up the only available word processing package, and sat down to write a book on the PC's promise. "There was one snag," recalls Wilson. "The program didn't work. So I decided to design a word processor that did."

Once he'd written the program, though, software houses weren't interested in selling it. So Wilson started a company by himself, with less than $100 in start-up funds. He named the product *Volkswriter* and the company Lifetree.

Today the Monterey, California, firm employs about 30 people, and it posted sales of roughly $6 million last year. The product line offers two versions of *Volkswriter: Total Word*, a word processing and publishing package; and *Words & Figures*, a spreadsheet/word processing combo.

A software company must focus its design philosophy, Wilson says, and one of *Volkswriter*'s prime selling points is ease of use. "I consider myself a typical computer klutz," Wilson remarks. "If a program's too difficult, I'll give up."

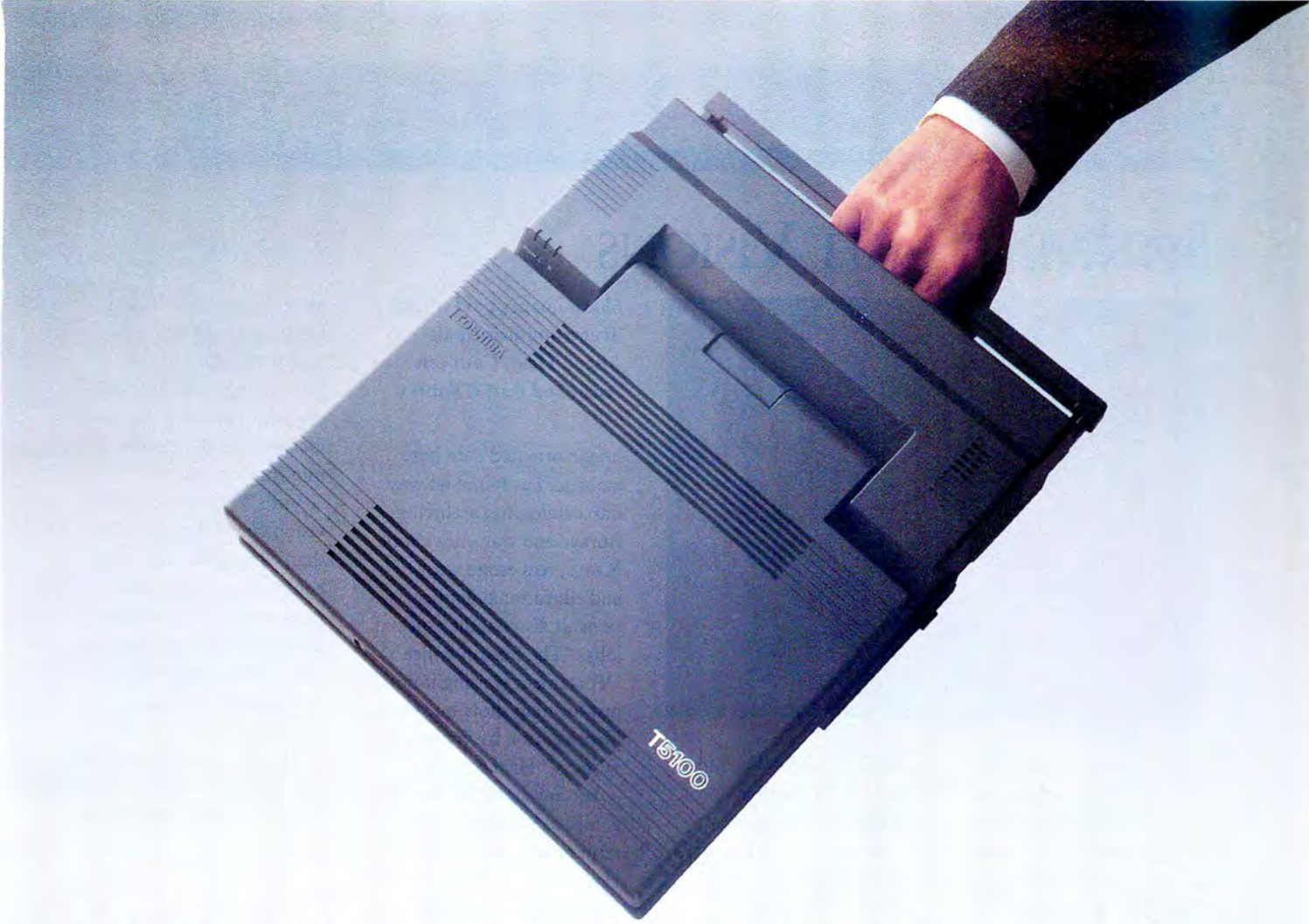
Lifetree took a similar tack with *Net Results*, the work management package that debuted late last year. The local area network software acts as a group appointment book that handles time and calendar management, electronic mail, and meeting and facilities scheduling. It aims,

Craig Morey

Lifetree's Wilson focused on ease of use.

Wilson says, to strike a balance between privacy and collectivity.

Beginning early this year, all Lifetree products will work in "family applications mode," so the same disks will run under either DOS or OS/2. "While I do



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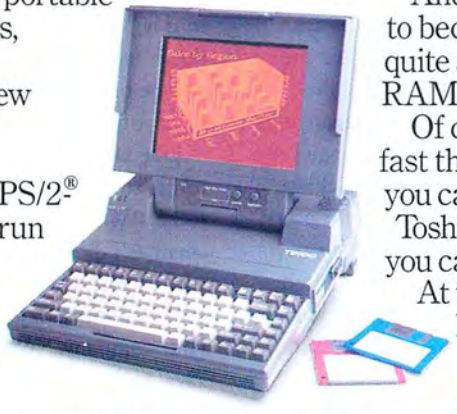

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SPINNING OUT VISIONS

Mary Ann Carter

Sharp images paid off for Truevision principals Joseph Haaf, Cathleen Asch, and Carl Calabria.

Truevision, the AT&T subsidiary whose innovative imaging products are the most dramatic example of what the communication giant's technological prowess could mean for personal computer hardware, has spun free from its parent.

Founded in June 1984, the month of AT&T's first PC launch, Truevision found quick success in high-resolution color imaging. Beginning with eight people at AT&T's Indianapolis Consumer Products Laboratory, the intrapreneurial group unleashed its first products only four months after start-up and was in the black within a year.

Joseph Haaf, director of sales and marketing, notes that the outfit started by shipping the first video-capture and display product to offer 256-by-240-pixel resolution, with almost instantaneous image capturing, on a single board. (The board achieved its speed by tapping AT&T memory-addressing techniques.)

"When we first introduced the product, there was no software base at all," Haaf notes. Selling to sophisticated resellers and developers of graphics equipment who wrote their own software, Truevision still made more than $1 million in the first quarter.

The company followed up with the popular TARGA (Truevision Advanced Raster Graphics Adapter) boards, with which, says Haaf, "we quadrupled the number of pixels on the screen." The accompanying TIPS (Truevision Image Processing Software) package was designed both for users who lacked technical smarts and for those who wanted to push the technology, and product reviews said it succeeded.

Truevision recently upped the ante with VISTA boards, which incorporate a dedicated graphics processor and 4MB of video memory. And its *Picture Power* image-oriented data base manager has found its way into cataloging, archiving, storage and transmission of X rays, real estate work, and educational applications. It also handles special jobs: "The Boston Police Department is using it not just for mug shots but for identification by victim or witness," Haaf reports.

For any start-up, the time comes to establish a long-term organization plan, Haaf notes. Early last year, the subsidiary's management decided it was time to talk with AT&T about independence. The two groups signed an amicable divorce agreement last October. AT&T retains a minority interest.

With 29 employees, Truevision currently sells more than $15 million of image equipment a year. Haaf sees prospects for "tremendous growth," with opportunities arising in computer-aided design, teleconferencing, and other areas. "In the PC world," he says, "people are just finding out what high-resolution color images can do." *–E. B.*

VOLKS POPULAR

(continued)

believe OS/2 will become a standard over time, a lot of people won't be able to afford it," Wilson says. "So these 'family' applications will be bread and butter for most software houses."

Like DOS, careful customer support will remain basic. "When you start out small as I did, with no venture capital, you can't afford to do anything to jeopardize your company," Wilson says. "I decided to make customers happy no matter what the cost, and that policy has paid off in spades." Lifetree still offers unlimited technical assistance and a 60-day money-back guarantee. Wilson, a native of Chile, keeps a watchful eye on markets outside the U.S.

Although Wilson admits that today he'd rather not start a software company on a shoestring, he says the door's still open. "I still believe that every once in a while some technological change–such as IBM's PS/2, local area networks, 386s, or the Mac–creates opportunities."

So what are the benefits of forming your own firm? "An ability to make money in vast quantities," asserts Wilson cheerfully, "and to feel that you're having some socially significant impact. When I read letters from customers, it's very rewarding." *–Marina Hirsch*

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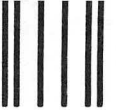

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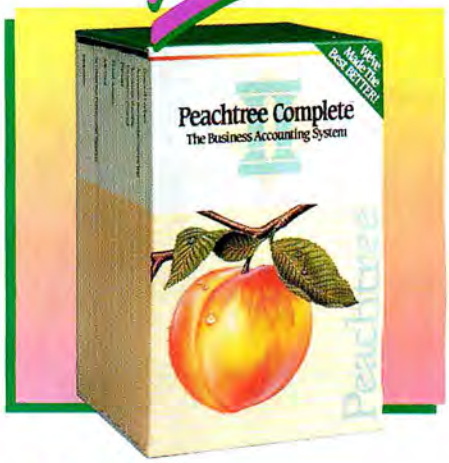

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Hardware Specifications
Requires PC/MS-DOS version 2.0 or higher with 384K of usable memory with a minimum 10 MB hard disk. For use with the IBM® PC, PC XT, PC AT, Personal System/2™ and compatibles. 3½" media optionally available. *IBM is a registered trademark and Personal System/2 is a trademark of International Business Machines. Not copy protected.*

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Product Outlook

News you can use about recent PC product announcements and upcoming releases

Mike Hogan

This Month

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Power Users Go Home

The irony of PCs is that they increase your productivity but never seem to lighten your work load. You can do more with a computer's help, and so you do. But why not spend those overtime hours in the comfort of your own home where you can at least catch an occasional glimpse of your significant other and the kids?

No reason, say Toshiba officials. Homeward-bound power users have bought so many copies of their high-end portable hit, the T3100, that Toshiba has decided to offer an even more powerful (and expensive) way to carry around pieces of the paper pile. The **T5100** has the same sleek, black, Porsche-like looks as the T3100 and about the same dimensions. At 15 pounds it's just as light and has the same orange gas-plasma display (80 columns by 25 lines).

But the T5100's 80386 processor zooms ahead at 16 MHz, and the portable also sports 2MB of 32-bit dynamic RAM on the system board, expandable to 4MB. Other standard equipment includes an 80387 coprocessor

socket, a single 1.44MB 3½-inch disk drive, and a 29ms 40MB hard disk (compared to 20MB on the T3100).

Naturally, the T5100's price is higher as well, at $6499, but then, Toshiba has spared no expense. The gas-plasma display provides an EGA-compatible resolution of 640 by 350, as well as an AT&T-compatible 640-by-400 mode, for bit-mapped graphics. The laptop also features one port for an optional EGA monitor and another so you can add a 101-key keyboard.

The standard 82-key keyboard includes an embedded numeric keypad and dedicated cursor control keys, and the T5100 comes with parallel, serial, and 5¼-inch floppy drive ports. Additionally, Toshiba offers an expansion slot for either a $399 1200-bps modem card or a $199 interface card that supports a $999 expansion chassis, which holds five XT-standard cards.

Toshiba also tosses in an expanded memory driver and a version of Lotus Development's *Metro* memory-resident desktop accessory. Toshiba America, Inc., Information Systems Division, 9740 Irvine Blvd., Irvine, CA 92718; 800/457-7777.

Fresh From the Spreadsheet Oven

Start with a price half that of the industry standard, throw in far greater functionality, double the speed, and top it all off with a choice of user interfaces. Borland International hopes that's the recipe for a modern spreadsheet.

But over the years the market has taken on the look and feel of Lotus's backyard, so Borland also plays by the first rule of good spreadsheeting–complete *1-2-3* file compatibility. Its first spreadsheet, ***Quattro,*** directly reads and writes *1-2-3* and *Symphony* worksheet files, graphs, and macros. *Quattro* also supports 256 columns by 8192 rows, like *1-2-3*.

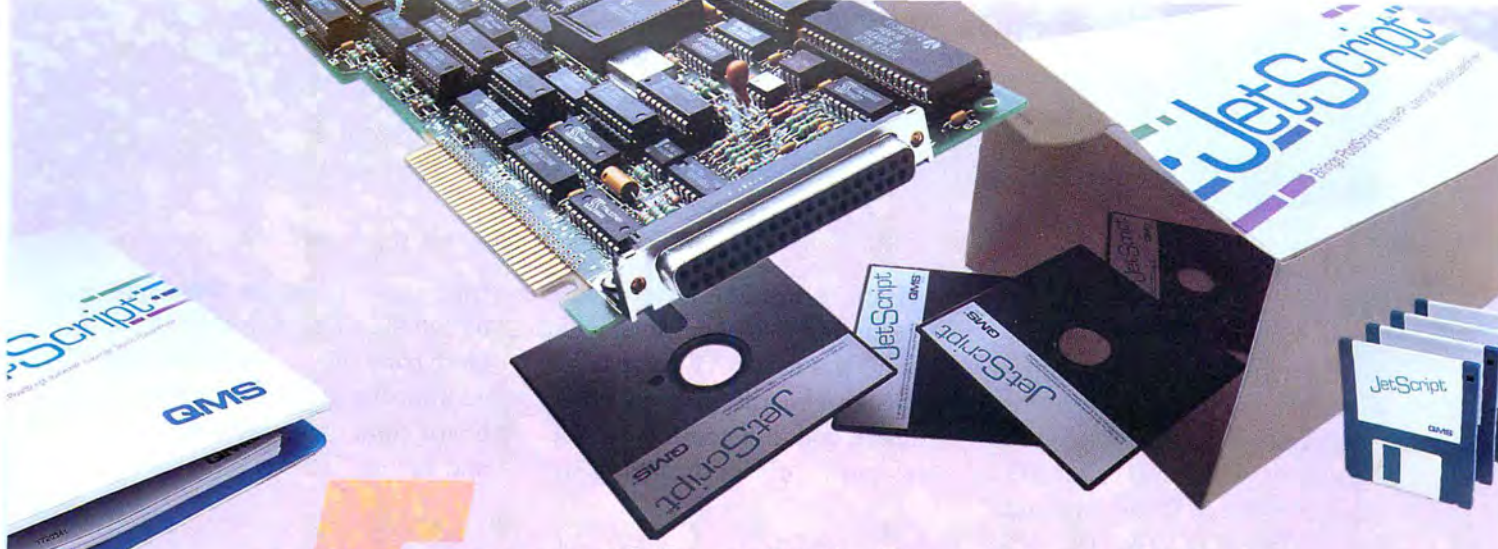
Then *Quattro* starts piling on the toppings. Borland president Philippe Kahn claims that *Quattro* is twice as fast as *1-2-3*, thanks to the way it approaches screen refresh, paging through big worksheets, inserting and deleting rows and columns, and recalculating algorithms. *Quattro* also saves memory by storing only worksheet cells that hold data, and it automatically saves your work in case of a power failure. The data-compression utility *SQZ Plus* from Turner Hall Publishing is built in.

The new spreadsheet completely integrates graphs and worksheets, letting you mix graph types (such as line and bar charts); control their colors, patterns, and labels on screen; as well as print graphs from within your spreadsheet.

One important ingredient that must await future versions is the ability to link spreadsheets the way that Microsoft *Excel* and Surpass Software's *Surpass* can. (Kahn explains that he is waiting to be sure that this critical feature is compatible with the upcoming release of *1-2-3*.)

But *Quattro* is extensively programmable, with a soft interface that lets you choose among the standard *1-2-3* slash commands, preset pop-up menus, and menus that you customize. Its application programs interface accepts cus-

Toshiba's T5100 is for the increasing number of hard-pressed office workers who want to tote the paper pile home in style.



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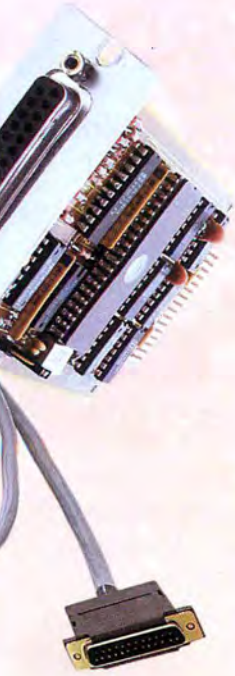

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tom add-ins from developers. A macro recorder aids in building quick macros, and you can call 27 of them with <Alt>-*key* sequences.

Quattro, which retails for $195, requires 384K of RAM. Borland Int'l, 4585 Scotts Valley Dr., Scotts Valley, CA 95066; 408/438-8400.

Buy Now, Pay for an Upgrade Later

Should you buy a new computer today or wait a few months until manufacturers drop prices and push memory and processor speeds to new plateaus? That's the perennial problem computer shoppers face, but one that AST Research hopes to alleviate by introducing two enhancement boards for classic PCs.

The **Xformer/286** and the **Fastboard/386** are intended to relieve the pressure of buying decisions by offering new buyers an upgrade path and current owners a way to extend the working lives of the 13 million PC, XT, and AT compatibles already installed.

AST's Xformer/286 is an $845 motherboard replacement that will turn your serviceable, if somewhat slow, IBM PC or XT compatible into an 80286-based machine for less than the price of an IBM AT. The Xformer/286 boosts processing speed from the XT's 4.77 MHz to 10 MHz with zero wait states, has 512K of RAM with room for up to 1MB on the system board, and will run OS/2.

The Xformer/286 includes four 8-bit and four 8/16-bit slots, which permit you to use AT-compatible expansion boards, graphics controllers, and disk controllers. You also can stick with the boards in your current system. Installation is straightforward. You need only remove current expansion boards and two screws, and, AST claims, the system board will slide out.

AST has introduced a still more powerful upgrade for owners of the more than 50,000 AST Premium/286 computers it has sold. Proprietary features in its Premium Fastboard/386 turn these AT compatibles into efficient 16-MHz 80386-based computers. Unlike other turbo boards, the Fastboard/386 doesn't need cabling to plug into the 80286 processor socket, because the Premium/286's proprietary Fastslots form a more direct link to the motherboard.

Fastslots cut installation time, speed up memory access, and heighten reliability. You still keep your 286 processor for running slower software or, perhaps, for future coprocessing tasks (just flip the external toggle switch on the board bracket). The board also has 64K of high-speed 45-nanosecond static cache RAM and supports both 80287 and 80387 coprocessors. The Premium Fastboard/386 ships with 1MB of 32-bit dynamic RAM for $1995. An additional piggyback daughterboard comes with 4MB for $1995 and can hold another 4MB. AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992; 714/863-1333.

Over the years the market has taken on the look and feel of Lotus's backyard, so Borland plays by the first rule of good spreadsheeting–complete 1-2-3 *file compatibility.*

The Linebacker Approach

Write once, read many (WORM) optical drives generally have been assigned to archival use rather than everyday work. But Micro Designs International has put together an optical drive system resembling an NFL linebacker–both big and fast–combining the speed and convenience of magnetic storage with the gargantuan capacity of optical drives.

Laserbank 800 can boast of disk access times comparable to Winchester drives (25ms to 65ms), precisely because its front end is a sub-25ms 40MB Winchester from Conner Peripherals. That's backed up by an 800MB 5¼-inch WORM disk cartridge, making it ideal for disk-intensive applications like

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computer-aided design (CAD) and data base management.

At $9995, Laserbank 800 is not the cheapest subsystem on the block. But it helps conserve your $150 optical storage cartridges, in part by using the Winchester as a buffer to reduce the number of writes to the WORM disk. MDI's proprietary software limits optical disk writes to new files and changed sectors of existing files while providing a transparent user interface for all storage devices.

Laserbank 800 supports standard DOS commands and off-the-shelf software applications. The Laserbank software asks only that you install the drive before each computing session with a Mount command and that you end the day with Unmount. The software also can handle logical devices larger than the DOS limit of 32MB.

Weighing 22 pounds, the Laserbank 800 connects to IBM PCs and compatibles via the Small Computer System Interface (SCSI) and supports PC Net, IBM Token-Ring, and Ethernet, but not Novell LANs. It requires an IBM classic PC or compatible with 384K of RAM and DOS version 3.00 or higher. Micro Design Int'l, 6985 University Blvd., Winter Park, FL 32792; 305/677-8333.

The Laserbank 800 tackles memory-intensive applications like data base management with the size and speed of an NFL linebacker.

Fancy Windows Dressing

As applications written specifically for *Microsoft Windows* begin to trickle in, we're getting a better view of the operating environment's power and flexibility.

One package that stretches the window metaphor to its limits is ***Designer,*** a full-color graphic arts and technical illustration program from longtime *Windows* developer Micrografx.

Designer is a tool for graphic artists, technical illustrators, professional draftspeople, and those who want to do two-dimensional CAD or desktop publishing. *Designer* brings graphics functions to the PC that were previously found only on a mini or mainframe, like quadratic spline curve-editing with a mouse. It also has CAD-like features such as polygonal pathing, which permits you to create irregularly shaped objects and then fill them with a color or pattern.

Like most high-end graphics applications, *Designer* is a high-resolution vector-oriented program, but it also lets you import bit-mapped images from scanners or graphics "paint" programs that can be saved individually or merged with others. By tracing these scanned images, you can construct complicated mechanical drawings, electrical schematics, and engineering specifications and then stretch, color, crop, or zoom them. Text and labels are edited within a text window using standard word processing formatting plus multiple fonts and point sizes.

Designer also maintains up to 64 overlays (say, for electrical and plumbing schematics in architectural drawings), and it will lock the layers to prevent accidental changes. You can mix up to 3.6 million colors on the on-screen palette, using either a hue, lightness, and shade approach or an RGB printing color wheel. *De-*

Disk Optimizer™. The original un-fragment software now has un-format. Un-believable!

It's still the safest, most effective way to put the zip back in hard disk performance.

For more than two years now, Disk Optimizer has helped PC users everywhere safely restore and maintain the smooth, slick, fast performance of their hard disks.

And now there's a new and improved Disk Optimizer that un-fragments files even more effectively. And includes enough additional disk management tools to make it one of the best software values anywhere.

So, who needs Disk Optimizer, anyway?

Simply everyone who owns a hard disk and relies on the speed and convenience it gives them.

That's because DOS is constantly slowing your hard disk down. It does it by breaking files up into pieces. Storing different chunks in different places. And that makes everything slower – loading, sorting, retrieving, backing up – because your hard disk has to chase all around to read and write different pieces of your file.

Disk Optimizer restores the speed of your hard disk by putting files back together in one contiguous piece – where they belong.

Disk Optimizer is absolutely, positively "disaster proof."

It's sad but true. Some other un-fragmenting software could lose your data if something goes wrong in the process. Like a routine reading or writing error. Or even a power failure.

But have no fear with Disk Optimizer. Nothing will go wrong because nothing *can* go wrong. Even if you yank the plug from the wall in the middle of the program. It's because only Disk Optimizer copies each file, piece by piece, then checks the newly un-fragmented version for completeness. Only then does it go back and erase the fragmented version. Not power spikes, disk failures or DOS errors – not even earthquakes – can cause data loss. And only Disk Optimizer makes you that promise. So why trust your disk to anyone else?

It's like a precision tune-up for your disk.

In addition to un-fragmenting, Disk Optimizer also lets you quickly choose the optimum layout for your disk. So your most-used files have the fastest access. And program and other unchanging files can be permanently un-fragmented and set aside on their own area on the disk.

The simple menu makes it a snap.

Un-format – one of the powerful new reasons to buy Disk Optimizer

Oops! Make a simple mistake at the keyboard and you could wipe out your hard disk with a DOS Format command. But don't worry. "Un-format" will recover your entire disk, and all your data, in just moments. It's included with your new Disk Optimizer.

Plus, you get the new "Analyze" program with a graphical display that shows your disk's condition so you'll always know when it's time to optimize again. You also get "Sorts" for organizing directories for the best appearance and sequence. "Findfile" for searching out hard to find files. "Delfile" for locating and erasing unwanted files. "Lock" and "Unlock" for file security. And more.

You could spend hundreds on other utilities and still not get all the functionality packed into Disk Optimizer at no extra charge.

Use it once and you'll discover what nearly 200,000 users already know – $69.95 is a small price to pay for the speed, convenience and safety you get only with Disk Optimizer.

Look for the new Disk Optimizer at software dealers everywhere. Or order directly from SoftLogic Solutions by calling us toll-free.

Just a few of Disk Optimizer's rave reviews:

Selected PC Magazine's "Best Of The Best" utilities.
–June 1987

"I find Disk Optimizer excellent. Disk access, even at 4.77MHz, is much faster. And loading 100 Fontasy fonts now takes seconds."
–Elizabeth Joan Doyle, Indiana

"I feel this is essential software for anyone with a hard drive."
–D. Sorenson, Texaco, California

"Easy to install, use, and most importantly, it works!"
–Dan Neilsen, General Electric Information Systems, NY

Disk & Optimizer $69.95

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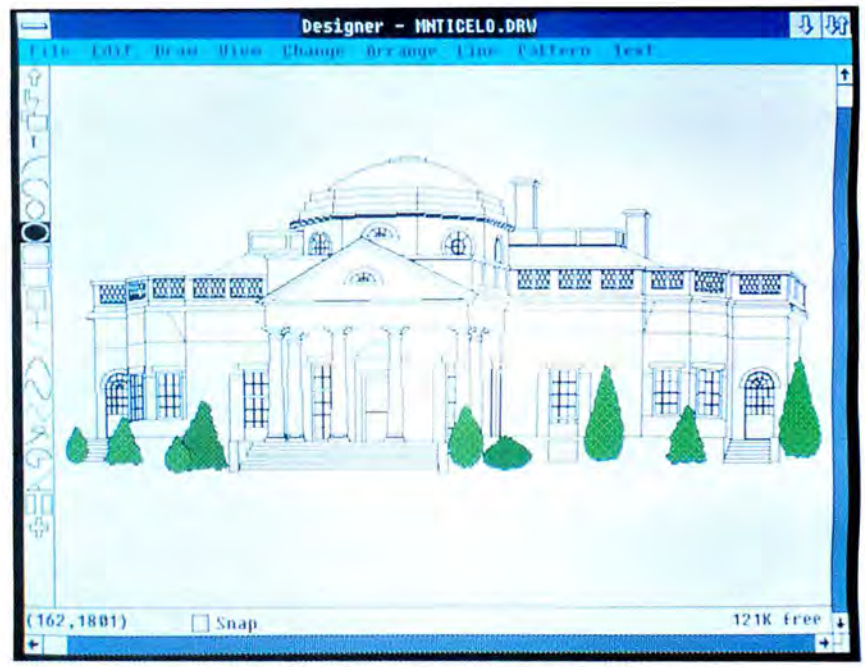
signer also can display up to 100 shades of gray.

Designer's toolbox contains 14 drawing primitives to assist the freehand artist, including parabolic curves, squares rectangles, circles, pies, and ellipses. *Designer* lines can be set to a thousandth of a millimeter and will increase proportionately when the screen is zoomed. The program has 5 line styles and 15 end-of-line styles, including arrow, box, and circle end.

With *Designer,* you can produce drawings as large as 160 square inches and subdivide them into grids to be output a page at a time. The program ships with the *AutoCAD* translation utility *Windows Convert* and a collection of 300 business and art symbols in the *General Clip Art Library.* You also can create your own symbol libraries.

Designer, which retails for $695, requires an IBM AT or compatible with 640K of RAM. A hard disk, a mouse, and an EGA are recommended. *In-a-Vision* users can upgrade for $99. Micrografx, Inc., 1820 N. Greenville Ave., Richardson, TX 75081; 214/234-1769.



Designer stretches the Windows metaphor to the limit, offering quality help to graphic artists and illustrators.

GOfer It

You're writing a letter, a report, a proposal. Suddenly you recall that several references to your topic are languishing somewhere on your 40MB hard disk. But with hundreds of files to investigate, how much chance do you have of finding the passages you want this year? Microlytics suggests you send your ***GOfer,*** which makes quick text-string searches across a hard disk of any size.

The memory-resident helpmate leaps into action at your <Alt>-G command, combing multiple directories for occurrences of up to eight 20-character text strings. *GOfer* goes for it without prior indexing and will search across incompatible file formats on an AT compatible at a pace of about 1MB per minute. It then arrays the sought-after references on the screen for viewing or sends them to a file or printer.

You can send *GOfer* on its way using Boolean AND/OR/NOT statements as well as its own unique qualifier, *nearby.* The last condition narrows a search by requiring that two or more of the parameters be within a certain number of lines of one another. *GOfer* relies on a "fuzzy logic" algorithm to find similar as well as precise spellings.

For all its ability, *GOfer* has a diminutive appetite, requiring no hard disk space for an index and only 79K of RAM when stripped down to its core functions (106K if it's not). If memory really is a problem, load and unload it as you would any other application.

GOfer's added attractions include delete, copy, rename, compress, and decompress functions. The compression algorithm reduces an ASCII file by half and a *WordStar* file by 20 to 30 percent; it automatically decompresses files when you find them.

GOfer has context-sensitive help and is entirely menu-driven with on-screen user key prompts, so there is no need to read the manual to get going. Compatible with all popular word processors and many data bases, the program freely imports and exports text.

The biggest surprise with this $79.95 pop-up is the number of

When you need to move quickly among programs and files, Software Carousel™ carries the load for you.

Why get dragged down by that old PC technology?

Despite the sophistication of today's PCs, there's one thing they still don't do. And that's work the way people work. Jumping from one task to another—from budgets to memos to phone calls and back. Consolidating, cross-referencing, copying and combining.

So every time you need to change programs—or just look at another file—it's the same old, tiresome routine—saving, exiting, loading, retrieving. Not very convenient. Not very human.

But now you have a choice. Either wait for the "next generation" of PC software. Or use Software Carousel, and get the speed and convenience you need today, with the software you already own.

Here's how to make Software Carousel work for you.

Software Carousel is the amazingly easy way to switch almost instantly from WordPerfect to 1-2-3 to dBASE to DOS to whatever else you want. Or go from one file to another in the same program. All without saving or retrieving—or wasting a precious moment of your time. Or your computer's memory.

Software Carousel works by creating a number of independent software slots to load your programs into. You get up to ten of these software slots, so you can load up to ten programs.

Need to crunch numbers? Hit a key and there's your spreadsheet. Need your word processor? Don't bother saving your spreadsheet file. Just whip over to your document and do your work. Snap back to your spreadsheet and it's just like you left it. It's like all your programs are "pop-ups," just a hotkey away.

Or load the same program into three different slots, each with a different file. Now go from one to another in a tenth the time it would take any other way. And with the wonderful feeling that, suddenly, your computer is working right along with you, not against you.

Here's the best part of all.

You may have heard about some other "environment" programs out there that claim to do something similar to Software Carousel. But there are several important differences.

First, they make you split your memory up among the programs you want to use. Software Carousel lets you use all available memory in each and every program, each and every file. It even supports expanded and extended memory.

Other environment programs work with only some software. Software Carousel works with everything. Period. It even resolves conflicts among memory resident programs.

Other software creates a memory intensive working environment that's complex, unfamiliar, with cramped little windows and strange commands. Software Carousel takes minutes to set-up exactly the way you want it. All your software looks and acts exactly as it always did, so you can concentrate on your job, instead of high technology.

It's so downright useful, even IBM® recommends it.

Even as you read this page, there are tens of thousands of Software Carousel users out there zipping through their work without laborious and repetitive commands. And without the usual 640K limit imposed by DOS. In fact, even IBM recommends Software Carousel for use with their most popular mainframe-to-PC communications package.

We think you'll agree, that with this kind of speed, convenience, and next-generation performance, $59.95 is a small price to pay.

Look for Software Carousel at software dealers everywhere. Or order direct from SoftLogic Solutions by calling us toll-free. If, after thirty days, you're not satisfied that Software Carousel is the right way to get old PC technology off your back, we'll gladly arrange for a refund of your purchase price.

Here's what people are saying about Software Carousel:

"Can't believe how well it works. Who needs 80386?"
–Ralph Evans, Attorney, Fullerton, CA

"Unlike other attempts (e.g. MS Windows, DesqView) yours works, is not fragile and does not intrude its "personality" on everything that we do."
–Colin Ralph, Ralph & Panzer, Inc., Seattle, WA

"Fantastic program. Great book. Saves me an hour a day! Thanks."
–Larry Pearsal, Rolling Hills Covenant Church, Rolling Hills Estates, CA

"Solved all my problems with resident software."
–Walter Affouritt, West Islip, NY

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Software Carousel $79.95

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chestnuts you'll find lingering, all but forgotten, on your hard disk. Microlytics, Inc., 300 Main St., East Rochester, NY 14445; 716/248-9150.

Have It Your Way

Self-serve salad bars, build your own hamburgers—Americans like to make their own menu selections and configure their own computers. So Epson America brings freedom of choice to laptops as well. Known for giving plenty of cluck for the buck, Epson is offering a modular laptop that lets you choose processor speed, screen type, and disk configuration as well as add expansion boards.

The **Equity LT** is a 12-pound laptop based on the 80286-like NEC V30, running at user-selectable speeds of 4.77 MHz and 10 MHz. The standard configuration includes 640K of RAM on the system board, an 85-key keyboard with a separate numeric key/cursor pad, a parallel port, and a serial port. The laptop also offers two proprietary expansion slots for a 1200-bps Epson modem and other future boards and an interface for an external 5¼-inch floppy drive. It ships with an AC adapter and a rechargeable nickel-cadmium battery pack, providing up to 7 hours of uninterrupted use, depending on screen and storage configurations.

The base system is priced at $1895 and comes with two 3½-inch floppy drives. Another model with a single floppy drive and a 78ms, 20MB hard disk sells for $2995.

Choose your own display—either a $500 backlit LCD for the lowest of lighting conditions or a $300 Supertwist LCD that is reflective and consumes 35 percent less power. The backlit LCD has a $99 electroluminescent element with a 500-hour life; when it burns out you replace it rather than the entire screen. The Equity LT also can connect with an RGB color display.

To help with those laptop-to-desktop transfers, Equity LT will be bundled with *Lap-Link*, Traveling Software's hardware/software file transfer utility. Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505; 800/421-5426.

Soft LANning

Take local area network (LAN) system security, protection from the rigors of DOS, and a full line of desktop accessories—put them all together—and you have ***Command Performance,*** a LAN management program and menu builder from Spectre Software.

The heart of *Command Performance* is a menu and desktop-accessory builder for local area network members. It enables the LAN administrator to build each user a custom menu that facilitates toggling between applications and also shields users from the obtuseness of DOS. The package supports up to 200 users per network server.

Each network member receives a calendar, appointment scheduler and to-do list, telephone directory with auto-dialer, notepad, calculator, and action-item list for long-range projects. Each user can send E-mail to others on the network and schedule meetings on the appointment calendars of LAN peers as appropriate.

Like any roadway, a LAN needs traffic signs to control the flow. *Command Performance* provides different levels of access to files, programs, and its 30 DOS commands—all regulated by the LAN administrator. DOS and program usage logs let the administrator track exactly how much individual applications get used and provide an audit trail of file and program use to preserve security and licensing agreements.

The heart of Command Performance *is a menu and desktop-accessory builder for local area network members.*

For $495, *Command Performance* comes with one manual for the LAN administrator and six user manuals. Additional manuals are $5 each. The program uses 100K of memory on each user's machine and 400K on the file server. *Command Performance* is not memory resident. It works with IBM Token-Ring, PC Network, MS-Net-compatible nets, Ethernet, and Novell nets. Spectre Software, P.O. Box 4211, Greensboro, NC 27404; 800/426-7305; 919/272-9984.

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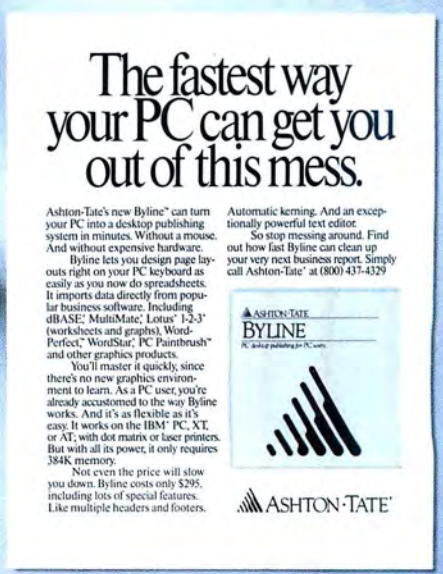

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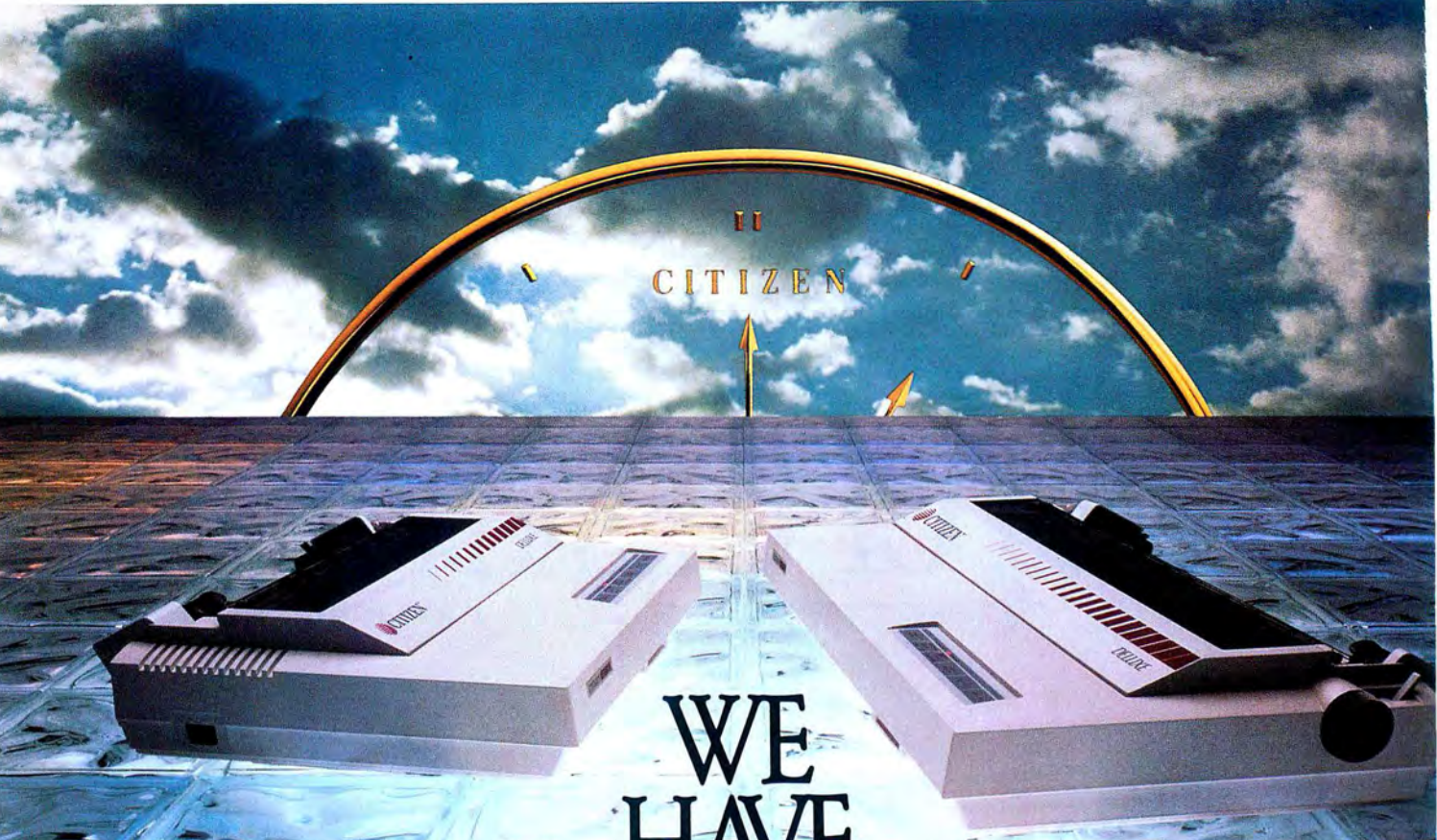
Circle 16 on reader service card



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For more information call 1-800-556-1234, Ext. 34. In California call 1-800-441-2345, Ext. 34.

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Briefly Noted

IDEAmax/MC, IDEA Supermax/MC, IDEA Supermax 30, IDEA Supermax/EMS

IDEAssociates has introduced a line of memory and multifunction boards with expanded memory for both IBM PS/2 models and classic PCs. For the Micro Channel Architecture-equipped PS/2 Models 50, 60, and 80, IDEAssociates offers the **IDEAmax/MC** and **IDEA Supermax/MC** boards, expandable to 12MB and 8MB of memory, respectively. Both boards support up to 8MB of Lotus/Intel/Microsoft Expanded Memory Specification (EMS) memory; the remaining 4MB in the IDEAmax/MC are available as extended memory for use in disk caching or to create virtual disks. The IDEA Supermax/MC also includes a serial and a parallel port.

IDEAssociates also markets the **IDEA Supermax 30** for IBM PCs, XTs, compatibles, and the PS/2 Model 30; and the **IDEA Supermax/EMS** for IBM ATs and compatibles. Both boards are equipped with two serial ports and a parallel port and support up to 8MB of expanded memory. The IDEA Supermax/EMS can take up to 16MB of memory, including up to 14MB of extended memory.

All the boards come with 512K of memory and software that supports print spooling and the creation of RAM disks. All four use single in-line memory modules and surface-mount technology to save space and permit expansion in increments of either 256K or 1MB. Base prices are $495 for the IDEAmax/MC, $645 for the IDEA Supermax/MC, $635 for the IDEA Supermax 30, and $545 for the IDEA Supermax/EMS. IDEAssociates, Inc., 29 Dunham Rd., Billerica, MA 01821; 617/663-6878.

Silverado

Computer Associates' data base add-in for *SuperCalc 4* and *1-2-3* combines full relational search capability with quick ad hoc reporting and data analysis. Designed to be a powerful but easy-to-use personal tool, ***Silverado*** operates as a window within a worksheet and uses familiar spreadsheet commands. You can generate sophisticated reports on sales results or financial trends using the column and row totals of your worksheet, or create things as simple as mailing labels.

Silverado adds 60 formulas to the spreadsheet repertoire and offers several ways to look at data, including the standard spreadsheet view, a record-by-record report view, or a cross-tab view that breaks down worksheet data by range or category. You can link several data bases or create a quick data base outline with different levels showing varying degrees of detail for better visualization.

Compatible with *1-2-3* release 2.0 or later, *Silverado* can read .WK1 and .PRN files, but not .WKS. It also reads *dBASE III* files. *Silverado* uses overlays and takes advantage of its host's graphing, screen-writing, and other services so that only 110K of its 275K worth of code must be memory resident at any one time. It costs $149 and requires 512K of memory. Computer Associates International, Inc., 2195 Fortune Dr., San Jose, CA 95131-1820; 408/432-1727.

Compaq Video Graphics Controller Board, Video Graphics Monitors

Compaq Computer has unveiled its own VGA-compatible controller board and monitors for its Deskpro and Portable lines. Compaq claims its **Video Graphics**

Controller Board can run software 50 percent faster than IBM's PS/2 VGA, due to its 16-bit data transfer, improved bus arbitration, and display memory buffering. It also has the capability to support higher graphics resolutions when they become available.

When used with this controller, both the **Compaq Video Graphics Color Monitor** and **Compaq Video Graphics Monochrome Monitor** display 640-by-480 graphics and 720-by-400 text resolution. The color monitor's 14-inch (diagonal) screen can display up to 256 colors on screen simultaneously, while the 12-inch white phosphor monochrome monitor offers 64 shades of gray. Both analog monitors include noninterlaced scanning to reduce flicker, an antiglare screen, a diagnostic self-test, a tilt-and-swivel base, an internal power supply, and brightness and contrast controls.

The Compaq Video Graphics Controller Board, the Compaq Video Graphics Color Monitor, and the Compaq Video Graphics Monochrome Monitor retail for $599, $699, and $255, respectively. Compaq Computer Corp., 20555 FM 149, Houston, TX 77070.

The Compaq Video Graphics Color Monitor displays up to 256 colors simultaneously and has an antiglare screen.

WH 5900

Copal U.S.A., manufacturer of 9-pin and 24-pin dot matrix printers, has rounded out its offerings with an 18-pin wide-carriage printer, the **WH 5900.** In addition to its 240-cps draft mode, the WH 5900 offers letter quality printing at 120 cps, about twice the speed of the IBM Proprinter XL. The printer has a convenient front feed for cut sheets and envelopes and an intelligent front panel that lets you reprogram basic functions. You can choose 10-, 12-, and 17-cpi pitch, as well as double-wide and double-height printing. Plug-in font accessories with Courier, Italic, or Gothic typeface families are available.

The WH 5900 comes equipped with Epson FX and IBM Proprinter XL emulation and accommodates the graphics drivers in software written for 9-pin printers. Accessories include a single-bin, automatic cut-sheet feeder and a 64K buffer. The device ships with an 8K buffer and has a mean time between failures of 120,000 double-spaced pages. The printer retails for $795. Copal U.S.A., 2291 205th St. #105, Torrance, CA 90501; 213/618-0225.

Dac-Easy Light

Dac-Easy Light provides multilevel, double-entry accounting for individuals and sole proprietorships. A two-in-one product, *Dac-Easy Light* writes checks, prepares invoices and statements, sets up budgets, and prints financial statements for small businesses. The same interface is used in the Home Setup mode, in which you can manage most aspects of your personal finances: print checks, reconcile bank statements, automatically pay recurring bills, track expenses, and create budgets. *Dac-Easy Light* retails for $69.95 and requires DOS version 2.00 or later and 256K of RAM. Dac Software, Inc., 4801 Spring Valley Rd., Bldg. 110B, Dallas, TX 75244; 214/458-0038.

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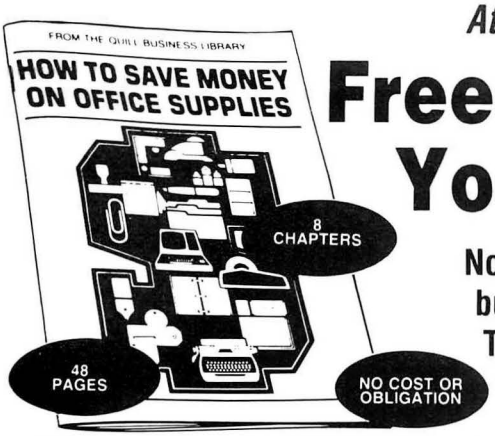

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Update

Fastback Plus

Fastback Plus, a new version of Fifth Generation's hard disk backup software, is faster and needs only half as many floppies as *Fastback* to back up your disk. Fifth Generation claims that in as little as 3 minutes, *Fastback Plus* can back up a 10MB hard disk on 2MB to 5MB worth of floppies, depending on the type of data. For $189 you get a program with a simplified "pop-down" help menu that can be customized for beginning, experienced, and advanced users. The program also now features a keystroke macro recorder, so that you can completely automate your backup sessions. The *Fastback Plus* visual directory will show you all files on any hard disk and let you point to and select the files, directories, and subdirectories for backup. Selections can be made by name, extension, wild card, or date range, or you can back up only those files that have been changed. *Fastback Plus* reads *Fastback* files and provides for backup between any two logical devices, such as tape cartridges and external hard disks. Registered *Fastback* users can get *Fastback Plus* for $45. Fifth Generation Systems, 2691 Richter Ave. #107, Irvine, CA 92714; 714/553-0111.

Direc-Link

Micro-Z has upgraded its ***Direc-Link*** file transfer system to speed up the file copying between IBM-compatible computers over either serial or parallel ports. Version 2 of *Direc-Link* comes with updated file-transfer software for $59.50 and a choice of cabling. You can select either a 5-foot serial cable with a 25-pin adapter and two 9-pin adapters for $32.50, or, for $45, a cable with parallel adapter added. *Direc-Link* presents a tree-like menu showing up to 92 files per screen for easy scrolling, tagging, and transfer of highlighted files. Version 2 lets you toggle between views of each computer's screen and control the transfer process from either keyboard. You can search by a variety of parameters–including by last update–and use wild cards during transfers. You also can create, rename, or delete subdirectories just by pointing and entering a name. *Direc-Link* accomplishes serial transfers at 115,200 bps and is 20 to 30 percent faster during parallel transfers. Micro-Z Company, 4 Santa Bella Rd., Rolling Hills, CA 90274; 213/377-1640.

Fifth Generation's Fastback Plus needs half the floppies and half the time of previous versions to back up a 10MB hard disk.

Quicken

Writing checks and reconciling bank statements are tasks that may seem better suited to a pocket calculator than a computer, but the latest version of Intuit Software's ***Quicken*** renders these personal and small business chores almost automatic. *Quicken* version 2 is a small, slick memory-resident program that you can use simply by following its few straightforward menus. Filling in the blanks of *Quicken*'s on-screen checks automatically creates a permanent record that simplifies the reconciliation of your bank statement. *Quicken* version 2

prints not only your checks but also the following reports: income and payroll tax, budget by category, accounts payable and receivable, cash flow, and profit and loss statements appropriate for either individuals or small businesses. For recurring checks, only the dollar amount need be changed; the program automatically fills in the script equivalent and the payee. The bill-minder feature of the memory-resident program automatically tracks bills and gives you an on-screen reminder when it's time to pay. *Quicken* sells for $49.95; current users can upgrade for $25. Intuit Software, 540 University Ave., Palo Alto, CA 94301; 415/322-0573.

MultiMate Advantage II LAN

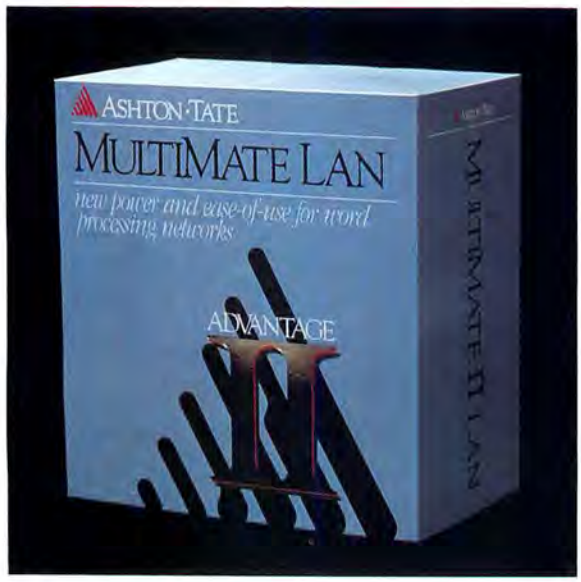
Ashton-Tate has created a LAN version of its *MultiMate Advantage II* word processor. ***MultiMate Advantage II LAN*** offers all the features of the stand-alone product as well as LAN features such as file locking, document sharing, and individual customization of system defaults. You can also generate personalized form letters by merging data from *dBASE* records. *MultiMate Advantage II LAN* requires 350K of RAM and operates on IBM PC NET and Token-Ring LANs, Novell *Netware,* 3COM 3+, and other networks that are 100 percent compatible with DOS 3.10. The $1495 *MultiMate Advantage II LAN* Pack includes one file server program plus five workstation modules. Additional modules are $150 each. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319; 213/329-8000.

PC Paintbrush Plus and Publisher's Paintbrush

ZSoft Corporation has launched versions 1.5 of both its ***PC Paintbrush Plus*** and its ***Publisher's Paintbrush*** programs, which accept gray-scale input from scanners and reproduce up to 256 shades. Both programs support EGA boards and a wider range of printers, plotters, monitors, and display adapters than did previous versions. They also double their previous printing speeds. *PC Paintbrush Plus* costs $149; an upgrade is $40. *Publisher's Paintbrush* sells for $285, or $55 for an upgrade. ZSoft Corp., 450 Franklin Rd. #100, Marietta, GA 30067; 404/428-0008.

Bookmark

A "do not disturb" feature in ***Bookmark*** version 1.2 makes the automatic keystroke recorder wait until you pause in your work before writing your keystrokes to disk. *Bookmark* is intended to save your work as you go along to prevent data loss due to a power failure, frozen keyboard, or accidental power down. A designated restore key enables you to resume where you left off when your system powers up again. Other new features include a quick-install option in which common defaults are preselected unless you change them, and an audible indication at the end of each *Bookmark* save. The program is no longer copy protected and is now available in 3½-inch format. It retails for $99.95. Intellisoft Int'l, 70 Digital Dr., Novato, CA 94948; 415/883-1188.



The MultiMate Advantage II LAN retains all the features of Ashton-Tate's stand-alone word processor but adds LAN capabilities.

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PC MAGAZINE

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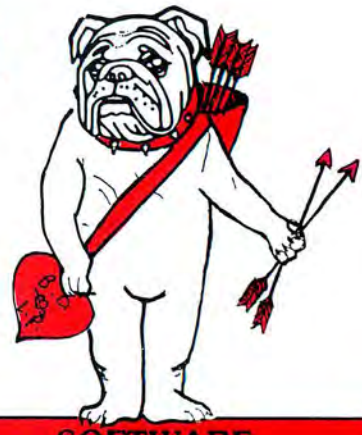

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FX 86E 240 CPS, 40 NLQ	299
FX 286E 240 CPS, 40 NLQ	439
LQ 800 180 CPS, 60 NLQ	429
LQ 850	479
LQ 1050	659
LQ 2500 324 CPS, 108 NLQ	849
EX 800 300 CPS, 60 NLQ	399
EX 1000	469

OKIDATA

182 120 CPS	229
192 Plus 200 CPS	305
193 Plus 200 CPS	439
292 Plus 200 CPS, 100 NLQ	439
293 Plus 200 CPS, 100 NLQ	575
294 Plus 400 CPS	809
393 0450 CPS	925
Laser Line 6	1450

TOSHIBA

321 SL 180 CPS, 60 NLQ	499
351 II 300 CPS, 100 NLQ	859
341SL 180 CPS, 72 NLQ	659
351 Color 240 CPS, 100 NLQ	1025

NEC

2200	359
P6/P7	435/619
P5XL/P9XL	850/1030
3550/8850	725/1020

PANASONIC

1080i Model II	185
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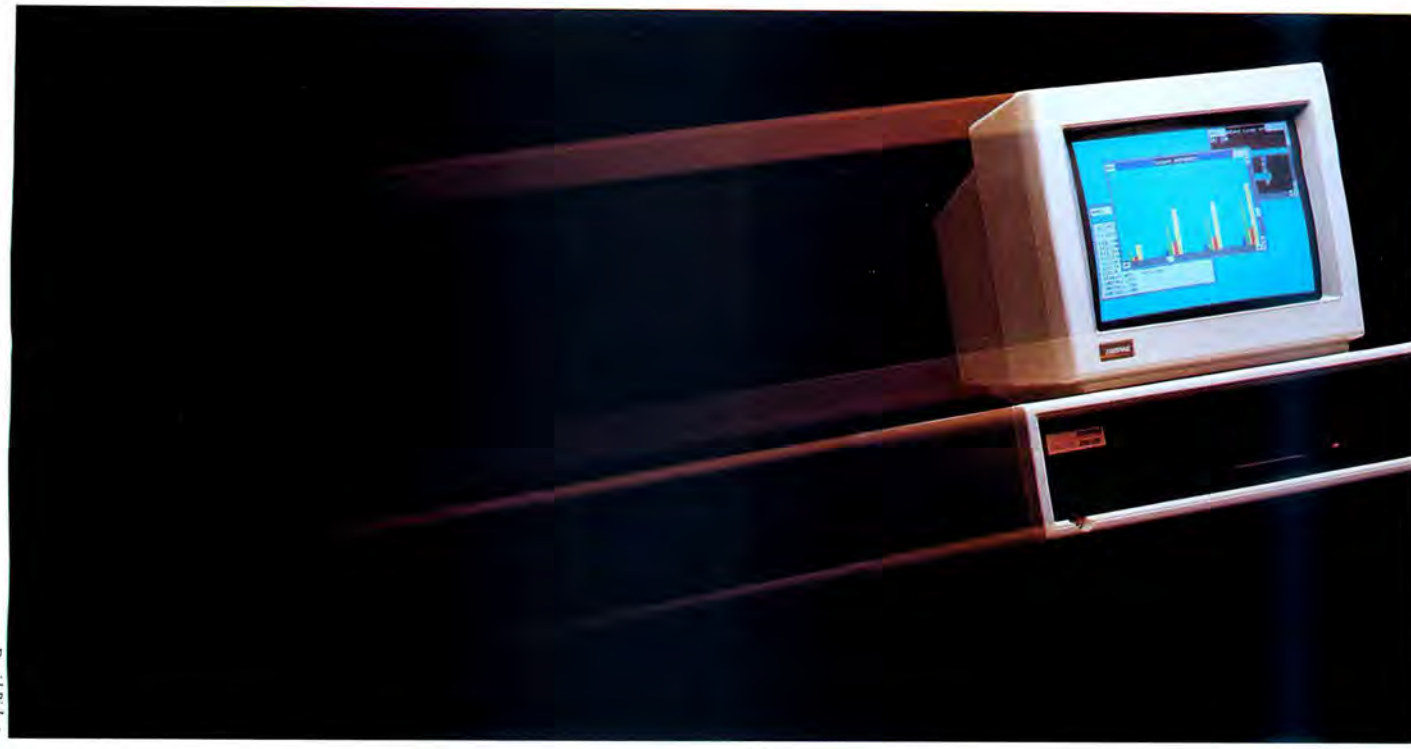
Deskpro Pushes the Limit

Compaq flexes its engineering muscle with the Deskpro 386/20, a 20-MHz barnstormer with a CPU copilot, two kinds of caching, and a high ceiling on 32-bit RAM.

Eric Knorr

Compaq and IBM are playing a high-performance game of leapfrog–and Compaq is one leap ahead. The Texas firm's first 80386-based computer, the 16-MHz Deskpro 386, shipped eight months before IBM unleashed its 16-MHz PS/2 Model 80, and the Model 80 proved faster. Now Compaq has bounded over Big Blue again with the



David Bishop

fastest PC on earth: the 20-MHz Deskpro 386/20.

The 386/20 has more going for it than a 25 percent increase in clock speed. Using a cunning combination of memory caching and disk caching, the machine is over 40 percent speedier than either the Deskpro 386 or the PS/2 Model 80. Clearly, Compaq has thrown down the gauntlet, daring IBM (or anyone else) to top this one.

The key to the 386/20's superb performance is its Intel 82385 cache controller. The 82385 shuttles frequently accessed data and memory read/write requests in and out of a 32K cache of 35-nanosecond (ns) static RAM, creating a buffer between the swift CPU and the relatively slow dynamic RAM chips that make up main memory. The ultrafast cache RAM enables the CPU to whiz along at top speed with no wait states.

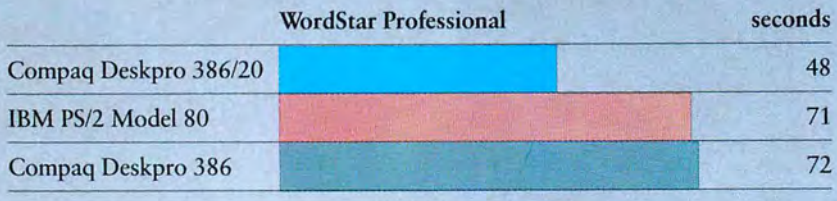
Aside from the 82385 and some architectural changes, the differences between the 386/20 and the original Deskpro 386 are largely incremental. For instance, the 386/20 can now address up to 16MB of 32-bit RAM, compared to the Deskpro 386's 10MB limit. And like IBM, Compaq is now including an ESDI (enhanced small device interface) controller with its high-capacity drives to provide faster throughput.

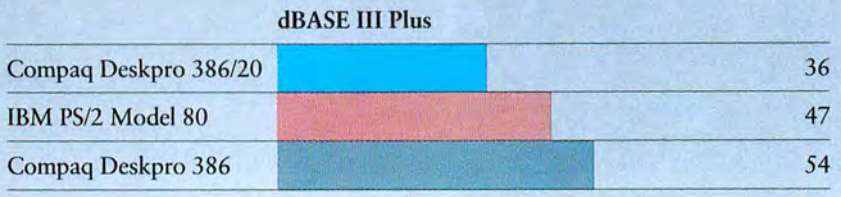
In short, Compaq's entry may be speedier than the current PS/2 Model 80, but even with the 82385, the 386/20's bus architecture can't match the traffic-management finesse of the Micro Channel (see "A Model for the '80s," *PCW*, December 1987). Furthermore, the 386/20 provides a single 32-bit slot for memory only; IBM's Model 80 can accommodate other types of expansion boards in any of three 32-bit slots, raising the prospect of a system with multiple 32-bit processors.

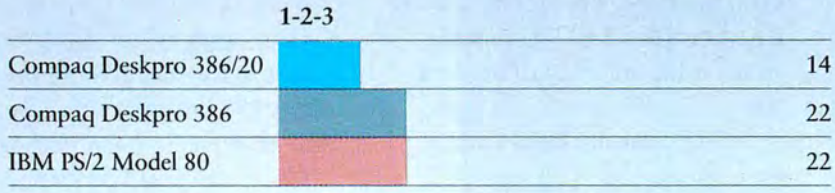
Compaq would probably dismiss the Model 80's potential as pie-in-the-sky stuff. One of Compaq's biggest commitments is to maintain compatibility with industry standards, as demonstrated by the 386/20's five 8/16-bit and two 8-bit expansion slots, which accommodate AT, XT, and PC boards—square pegs to the Micro Channel's round holes. The company is also quick to point out that applications needn't be rewritten to take advantage of the 82385 cache controller, and that the machine is fully compatible with existing software, a claim

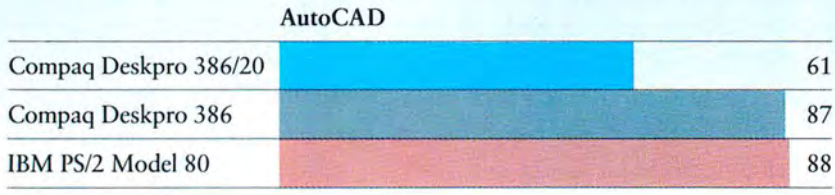
PC World Evaluation

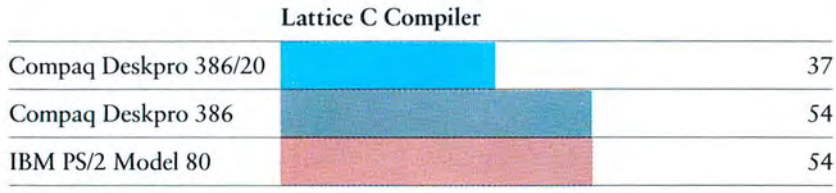
Compaq Deskpro 386/20











Thanks to memory and disk caching and 20-MHz speed, the Deskpro 386/20 is more than 30 percent faster than either the IBM PS/2 Model 80 or the original Deskpro 386.

WordStar Professional Although disk access plays a small part in the *WordStar* benchmark, processing and memory access speeds are the most significant factors.

The benchmark measures the time required to perform four operations on a 15,364-word document. All occurrences of the word *tomorrow* are replaced with *today*. A 13-line paragraph is copied from the beginning to the end of the document. The spelling checker is used to check the document for spelling errors (the file contains no errors, so the program does not stop for incorrect words). Finally, the first page of the document is printed.

dBASE III Plus Disk access speed is the most significant performance factor for the *dBASE III Plus* benchmark.

This benchmark measures the time required to produce a report based on a three-file join, select, and sort. The report includes calculated fields and subtotals. The benchmark uses a data base consisting of a customer file, an invoice file, and an item file. The customer file contains 500 customer records. The invoice file contains 1000 records, with one item record per invoice, or 1000 records in the item file.

The benchmark produces a report showing the companies delinquent in payment. For all invoices with merchandise shipped before a specified date and for which payment status is *N*, the company name, part number, quantity, price, and total cost (a calculated field that is the product of quantity times price) are printed. The report is sorted by state, with quantity and total cost subtotaled for each state and totaled for the entire report. All systems were tested with a math coprocessor installed.

1-2-3 Because no disk access is required, the *1-2-3* benchmark depends almost entirely on the pro-

cessing and memory access speeds of the systems.

In this benchmark, a *1-2-3* macro executes a series of recalculations within a 50-by-50-cell matrix. The macro enters a number into the first cell of the matrix, enters into the adjacent cell a formula that performs a calculation using that number, and copies the formula to the rest of the matrix. The spreadsheet is recalculated three times, each time with a different number entered in the first cell of the matrix. This procedure is repeated using five different formulas: one each for addition, subtraction, multiplication, division, and exponentiation. After the mathematical operations are performed, the macro executes a block move and then erases the entire matrix.

AutoCAD Disk access, processing speed, and memory access all contribute to the performance of the *AutoCAD* benchmark. However, the speed and type of math coprocessor used by the system are the most important determining factors.

The benchmark uses the sample office drawing provided with the program and measures the time required to perform four functions: retrieving and displaying the sample drawing; zooming in on a small detail within the drawing; zooming out to reveal the entire drawing; and printing the entire drawing. The office drawing contains six two-dimensional and seven three-dimensional predefined views, all of which are displayed during the third step of the benchmark. All systems were tested with a math coprocessor installed.

Lattice C Compiler In the Lattice C Compiler test, the sequential disk access rate is the most important determining factor. Applications such as file managers commonly rely on this type of disk access.

The benchmark measures the time required to compile and link two 1000-line programs. The test is performed automatically using a DOS batch file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Philadelphia, PA. All rights reserved.

confirmed by National Software Testing Labs (NSTL) in comprehensive tests using *1-2-3, Crosstalk, SideKick, Microsoft Word,* and PC-DOS 3.30 (the Model 80, on the other hand, had considerable difficulties with *Word*). Compaq prides itself on supplying quality, high-performance computing for today's needs, and the 386/20 is a stellar example.

Pricey Performance

With hand-holding support, generous service agreements, and legendary, high-quality construction, Compaq has cultivated a kind of snob appeal. Not surprisingly, high price is part of the idea. The midrange Deskpro 386 Model 70 (with a 70MB hard disk) weighed in at a hefty $7299; the low-end 386/20 Model 60 (with a 60MB hard disk) retails for $200 more. The 386/20's next step up, the Model 130, sells for $9499–$700 more than the Deskpro 386 Model 130. The top-of-the-line 386/20 Model 300 (the first Compaq machine to offer a 300MB hard disk) is $12,499. These prices include 1MB of RAM, a 1.2MB disk drive, a 101-key keyboard, and one serial and one parallel port, but no video board or monitor.

Both 386/20 Models 130 and 300 include an ESDI controller. Standard AT-style controllers—used by almost all clones as well as the low-end Model 60—offer data transfer rates of 5 megabits per second. The ESDI controller doubles this speed. In addition, both the 130MB and 300MB hard disks have an interleave factor of 1:1 and a state-of-the-art average access time of less than 20 milliseconds.

To further speed things along, the ESDI controller reads data requested by the CPU into a 16K on-board buffer. Anticipating future requests, the controller continues to load successive data until the buffer is filled. The 1:1 interleave means that data is stored contiguously on disk; thus, the controller can read an entire track into the buffer with a single revolution of the platter, drastically reducing the amount of time spent on disk reads and writes.

Furthermore, all models in the 386/20 line come with extended-memory disk-caching software. Compaq began including disk caching with the Deskpro 386 series some months after the introduction of the PS/2 line, probably because caching was largely responsible for the PS/2 Model 80's victory over the Deskpro 386 in speed tests. Now, as evinced by NSTL's disk-intensive *dBASE III Plus* and Lattice C benchmarks, the combination of caching, buffering, 1:1 interleave, and ESDI throughput results in blazing disk speeds.

At this writing IBM has announced—but not yet shipped—two 20-MHz versions of the Model 80, so no head-to-head performance comparisons are possible. Price comparisons, however, go begging. At first glance, Compaq's 386/20 Model 130 (with 2MB RAM and a 130MB hard disk) seems to undercut IBM's 20-MHz Model 8580-111 (with 2MB of RAM and a 115MB hard disk) by about $900. But add roughly equivalent video setups to each

Executive Summary

Compaq Deskpro 386/20

80386-based computer

The fastest PC yet, Compaq's 20-MHz Deskpro 386/20 offers a modified AT-style architecture that incorporates sophisticated memory caching, managed by Intel's 82385 cache controller. High Compaq prices and somewhat limited expandability are the only significant drawbacks.

Compaq Computer Corp.
20555 FM 149
Houston, TX 77070
800/231-0900
List price: Model 60 with 1MB, 1.2MB floppy disk drive, 60MB hard disk, 101-key keyboard, one parallel and one serial port $7499; Model 130 with 1MB, 1.2MB floppy disk drive, 130MB hard disk, ESDI controller, 101-key keyboard, one parallel and one serial port $9499; Model 300 with 1MB, 1.2MB floppy disk drive, 300MB hard disk, ESDI controller, 101-key keyboard, one parallel and one serial port $12,499; 1MB 32-bit memory module $549, 4MB 32-bit memory module $2099, 4MB memory board $2999; VGA monitor $699, EGA monitor $799, paper-white VGA monitor $255, monochrome monitor $255; VGA board $599, EGA board $399, monochrome board $199; 1.44MB 3½-inch disk drive $245; 40MB internal tape backup $799, 130MB internal tape backup $1999; 20-MHz 80387 numeric coprocessor $1199, Weitek coprocessor board $1199; I/O board with one parallel and one serial port $149; MS-DOS 3.30 and BASIC 3.30 $120.

system—a 14-inch Video Graphics Array (VGA) color monitor to the IBM entry and an EGA board and monitor to the 386/20—and the difference is reduced to $300.

Compaq recently jumped on IBM's bandwagon by introducing its own VGA board and monitor, which together sell for $100 more than the EGA pairing. Like the IBM VGA, the Compaq VGA can display 16 simultaneous colors with a resolution of 640 by 480 pixels, or 256 colors with a resolution of 320 by 200 pixels. The board also performs the IBM VGA's trick of emulating the MDA, CGA, and EGA, ensuring graphics compatibility with virtually any software package. Compaq further imitates Big Blue by offering a choice between a color display and a paper-white monochrome monitor, both of which are mounted on tilt-and-swivel stands.

Compaq's VGA even includes a special connector on board to support future upgrades, presumably in preparation for a clone of the (as yet unreleased) IBM Model 8514/A graphics adapter, which combines the maximum resolution and palette from the two VGA modes into one. However, Compaq offers one enhancement right now—faster screen updates. IBM likes to tout the high performance of its VGA, brought about by building the video circuitry onto the motherboard. Compaq claims that its VGA, mounted on a 16-bit expansion board, is 50 percent faster than IBM's. Because the board was unavailable for review at press time, NSTL was unable to test this assertion.

Thanks for the Memory

A dilemma that's dogged engineers ever since the AT crept up to 8 MHz is that expansion boards bomb out at high clock rates. Tweak a standard AT up to 12 or even 10 MHz, and you'll probably make the residents of your expansion bus very unhappy.

To solve this problem, Compaq, Chips and Technologies (maker of the most popular AT and 80386 chipsets), and others pioneered the *bifurcated* bus. This is actually two buses combined: one for memory and one for expansion cards. The memory bus (which handles about 90 percent of data traffic) runs at full clock speed, whereas the expansion bus operates at a speed safe enough for peripherals.

Compaq's memory bus runs at 20 MHz, while the expansion bus pokes along at a benign 8 MHz. With the 386/20, however, 20 MHz is not only too fast for peripherals, it's also too fast for the system's main memory. In a case like this, an engineer could add a *wait state* (a cycle in which the CPU doesn't process data) to allow the memory to catch up, but this reduces performance significantly. A memory *interleaving* scheme would be another option, whereby the CPU alternates between two banks of RAM to provide the necessary catch-up time, but this requires twice the chips—an expensive proposition.

Compaq's solution is the 32K cache of 35ns RAM, the fastest RAM currently available. The cache keeps up with the CPU and, with the aid of the 82385, provides the functional equivalent of a wait state for main memory—without reducing system performance.

The 82385 has other talents. Occasionally, a peripheral will write to an area of main memory through one of the direct memory access (DMA) channels, bypassing the cache. The 82385 monitors this activity and intervenes if the cache holds a copy of that memory location's previous contents. It invalidates that portion of the cache so DOS doesn't use the old data in the cache but instead retrieves the data from main memory. These and other arbitration functions ensure efficient, harmonious cooperation between the two halves of the bifurcated bus.

Don't, however, confuse this 82385-based architecture with the sophistication of the Micro Channel—particularly as it's implemented in the PS/2 Model 80. Although the Model 80 Micro Channel fixes the speed for its four 16-bit slots at 10 MHz and its three 32-bit slots at the speed of the CPU, the bus is not bifurcated; there's far more integration between I/O and memory-bus operations, with a slim performance penalty. The Model 80 could not only theoretically accommodate multiple 32-bit processors on expansion boards, its arbitration talents make it ideal for bus-heavy functions such as serving a network, providing a gateway to a mainframe, or acting as a multiuser host. Moreover, the Model 80 can hold 6MB more 32-bit RAM than the 386/20.

The memory options for the 386/20 are nearly as complicated as those for the Model 80. The 386/20 comes with 1MB of 32-bit RAM on a memory board, which plugs into the sole 32-bit slot. Three sockets on the board accommodate either 1MB memory-expansion modules (at $549 each) or 4MB modules (at $2099 each), for a total of 13MB of 32-bit RAM. You can also purchase a 4MB memory board ($2999) with the same array of sockets. Fully loaded with 4MB plug-in modules, the board holds 16MB—the maximum for the system as well as the maximum that OS/2 can directly address.

A Familiar Face

The 386/20 looks like any other Deskpro. You won't see any flashing "on" or clock-speed indicators, just the usual brown plastic frontispiece with a keyboard connector, speaker baffle, and four externally accessible half-height device bays. *PC World*'s test unit included a 130MB full-height drive (which took up two of the bays), a 135MB internal tape backup unit, and the obligatory 1.2MB floppy drive.

With all four bays filled in this configuration, the expansion bus of the 386/20 gets pretty crowded. The multifunction floppy/hard disk and tape backup controller, which includes one parallel and one serial port, can handle only hard drives up to 60MB and tape backups up to 40MB. Thus, a separate controller was installed for each of the review unit's monster mass storage devices.

Setting up a Compaq machine consists of turning it on, since the dealer configures it for you. However, when you need to get into the chassis and have to use a special tool (which Compaq supplies) to unscrew the bolts, you may yearn for the easy entry offered by the PS/2 line. The configuration and diagnostics software are also far less elegant than IBM's. The Deskpro's greatest added value comes in Compaq's version of DOS 3.30: A utility enables you to create a logical drive as big as the physical drive, breaking the 32MB barrier. In other words, drive C: can be up to 512MB.

Another extra stands out: support not only for the 20-MHz 80387 coprocessor but also for the Weitek coprocessor board. Only a handful of computer-aided design and engineering applications support the Weitek, but those that do run two to three times faster than with the 80387. This may make the 386/20 one of the most sought-after machines in certain areas of CAD and CAE.

There's little question that Compaq has gone the extra mile in accommodating the needs of today's most power-hungry users. Although it's made some significant modifications, Compaq has essentially stretched conventional AT architecture to the limit, enabling the 386/20 to maintain compatibility with current hardware. The IBM Model 80 may be the computer for tomorrow, but the Compaq Deskpro 3986/20 is the machine of the hour.

Eric Knorr is a senior editor for PC World.

Surprise! Cheap 386s Deliver

Five entry-level systems offer power-hungry users solid 80386 performance at bargain-basement prices.

TJ Byers

Maybe there *is* such a thing as a free lunch. A cheap lunch, anyway. True, you can still spend $7000 and up for an 80386 computer. But with technology advancing and prices dropping, it's now possible to sit in on the 80386 banquet for a mere $3000 tab—hard disk and monochrome monitor included.

Recently, *PC World* took a long, hard look at a group of low-priced 80386 machines and found several strong values (see "Beware the Cutting Edge," *PC World*, November 1987). Now we turn the spotlight on five newcomers that are even more competitively priced: the American Micro Technology AMT-386, the PC Designs GV-386, the Value PC-386, the Blackship 386, and the Fivestar FS-386.

The five 80386 machines were purposely set up in money-saving, minimal configurations; each machine included 1MB of 32-bit RAM, one parallel and one serial port, a 40MB hard disk, a 1.2MB floppy drive, a 101-key keyboard, and a monochrome video board and monitor. Exceptions to the rule were the Fivestar FS-386 (which comes with 2MB of 32-bit memory, minimum) and PC Designs' GV-386 (which has two serial ports built in). Unlike the IBM Model 80 and the Compaq Deskpro 386 and 386/20, none of the machines reviewed included disk caching software, and only the Value and Blackship systems came with an expanded memory driver.

Aside from the speed of the processor (all these systems run at 16 MHz), the most important factor in the performance of a 386 PC is the presence of a 32-bit memory bus. Without a 32-bit data path, a computer with an 80386 CPU is just a souped-up AT. Despite their low cost, all five machines provide 32-bit memory access. The AMT-386 and the PC Designs GV-386 place their 32-bit memory on the motherboard, while the Value PC 386, the Blackship 386, and the Fivestar FS-386 use a 32-bit memory board connected to the 80386 via a proprietary 32-bit slot.

Diane Padys

The manufacturers of all five machines claim their systems are compatible with Microsoft's new operating system, OS/2, but as OS/2 hadn't been released at press time, we were unable to test these claims. And while compatibility with existing software is seldom an issue any more, National Software Testing Laboratories (NSTL) tested every function of *Microsoft Word, 1-2-3, Crosstalk XVI, SideKick,* and MS-DOS 3.30 and uncovered no compatibility problems with any of the machines.

Although each of these computers sells for about $3500 less than a similarly configured Compaq Deskpro 386, our tests indicate that the user sacrifices very little—except for intangibles like brand-name confidence and unknowns like long-term reliability. Four out of the five systems performed flawlessly (the AMT-386 was the exception). Furthermore, unlike many clones of the past, all the 386 PCs in this roundup carry a one-year warranty (the Value PC-386 actually carries a two-year warranty), a 30-day return policy, and limited field service.

AMT-386: If Speed Were All

A high-speed static RAM memory cache makes American Micro Technology's 386 system look like a winner; a low 4MB limit on 32-bit RAM makes it look like a loser. The truth lies somewhere in between, of course, but the fact is that this speed demon scored top speed ratings in three out of five software categories. Configured with 1MB of 32-bit memory; a 1.2MB floppy disk drive; a 23-millisecond (ms), 44.3MB Priam hard disk; a monochrome display;

Executive Summary

AMT-386

80386-based computer

The fast AMT-386 is built around the respectable American Megatrends motherboard, but a very slow 1.2MB floppy drive plus hardware problems like lack of 80387 support and failure of the ROM BIOS to boot properly make the AMT-386 a problematic purchase.

American Micro Technology
14751-B Franklin Ave.
Tustin, CA 92680
714/731-6800
List price: with 1MB 32-bit RAM, 101-key keyboard, one parallel and one serial port, 1.2MB floppy disk drive, 44.3MB Priam hard disk and controller, monochrome graphics display, monochrome monitor, and one-year warranty $3300; Genoa EGA $199; EGA-compatible monitor $495; 71MB Miniscribe hard disk $1095; 32-bit memory upgrade to 4MB $1499

Diane Padys

The AMT-386 is based on American Megatrends' motherboard. Its high-speed static memory cache puts it in first place in three out of five speed tests.

and an AT-style serial/parallel adapter, the AMT-386 comes to $3300.

The AMT is housed in a slightly modified AT cabinet; a keylock, a reset button, a power-on indicator, and a hard disk drive lamp (which didn't work) adorn the front panel. CPU clock speed can be toggled between 16 MHz and 8 MHz from the keyboard; a front panel LED glows yellow when the system is running at full speed.

The AMT's Megatrends motherboard uses dynamic RAM as main memory but speeds memory access by placing a 64K data cache populated by fast, static RAM chips between system RAM and the 80386 processor. Unlike most 80386 machines, which accommodate 32-bit RAM in a special slot, the AMT-386 places all its 32-bit RAM on the motherboard. The company offers only two 32-bit RAM configurations: 1MB (using 256-kilobit chips) and 4MB (using 1-megabit chips). If you want the 4MB option, you can have it installed when you buy the machine, or return the unit to American Megatrends for an upgrade (installing the new chips requires modification to the motherboard). In either case, you'll pay $1499 for the privilege.

Currently, the motherboard supports only the 10-MHz, 16-bit 80287 math coprocessor, and Megatrends has no plans to support the more powerful 16-MHz, 32-bit 80387. This means math-intensive applications that benefit from the math coprocessor, such as CAD programs or spreadsheets, run at a disadvantage.

The motherboard includes eight expansion slots: two 8 bit and six 8/16 bit. If you install memory in any of these, it is serviced by the 64K static RAM cache. The cabinet also contains five half-height disk drive bays, three of which are externally accessible. In the back, plates cover holes for mounting two 9-pin D-shell and three 25-

Executive Summary

PC Designs GV-386

80386-based computer

The GV-386 closely resembles the AMT, but it seems more trouble-free. Based on the same American Megatrends motherboard, it offers excellent speed and 64K of fast cache memory. Drawbacks include the motherboard's 4MB 32-bit memory limit and lack of support for the 80387 math coprocessor.

PC Designs
2500 N. Hemlock Circle
Broken Arrow, OK 74012
918/251-5550
List price: with 1MB 32-bit RAM, 101-key keyboard, one parallel and two serial ports, 1.2MB floppy disk drive, 42.6MB Priam hard disk, Western Digital controller, monochrome graphics display adapter, Princeton MAX-12 monochrome monitor, and one-year warranty $3402; Everex EGA $150; NEC MultiSync monitor $599; 80MB Seagate hard disk $975; 32-bit memory upgrade to 4MB $870

Diane Padys

PC Designs' speed-demon GV-386 uses Megatrends' motherboard and tops out at 4MB of 32-bit RAM. Memory upgrade from 1MB costs $870.

pin D-shell port connectors (as do all the systems reviewed here, save the Fivestar, which has a single covered rectangular opening).

The AT-style keyboard is by Advanced Input Devices; its bulbous connector makes fitting the keyboard on a desk keyboard-extension shelf impossible. There's no IBM "snap-through," but the feel is acceptable. Indicator lamps for <CapsLock>, <NumLock>, and <ScrollLock> are built into their respective keys.

If you upgrade from monochrome to an EGA display, you'll notice that screen drawing is extremely fast. That's because AMT uses version 2B of the American Megatrends motherboard, which copies an installed EGA's BIOS into 32-bit extended RAM, allowing faster access to and execution of video functions. There's no need to relocate the system's BIOS because it is contained in fast 32-bit ROM. A DIP switch allows you to disable this feature (presumably to save memory), but unfortunately, with EGA relocation disabled, the system refused to cold boot nine times out of ten.

Laudably, the Megatrends ROM includes setup and diagnostic routines normally supplied on disk. These routines set the system clock/calendar, identify installed options, and diagnose potential or existing system problems. Priam's InnerSpace software, which enables you to partition the 44MB disk into several smaller volumes, is also provided.

System documentation is well rounded; most of the information comes from AMT's various suppliers. Reference manuals cover the Priam InnerSpace drive, the Hercules-compatible video card, and, of course, AMT's hardware.

AMT advises that the warranty covers parts and labor for one year, although the included contract stipulates only 90 days; all repairs and warranty replacements must be made through the Tustin, California, office. If you have any quibbles with the system

PC World Evaluation

386 Systems

WordStar Professional	seconds
IBM PS/2 Model 80/71[1]	70
Compaq Deskpro 386/40[1]	72
AMT-386	73
Blackship 386	73
PC Designs GV-386	74
Value PC-386	80
Fivestar FS-386	87

dBASE III Plus	seconds
IBM PS/2 Model 80/71[1]	46
Compaq Deskpro 386/40[1]	54
PC Designs GV-386	122
AMT-386	126
Fivestar FS-386	132
Value PC-386	148
Blackship 386	156

1-2-3	seconds
AMT-386	19
PC Designs GV-386	19
Value PC-386[2]	19
Blackship 386	22
Compaq Deskpro 386/40	22
IBM PS/2 Model 80/71	22
Fivestar FS-386	25

AutoCAD	seconds
IBM PS/2 Model 80/71[1]	85
Compaq Deskpro 386/40[1]	87
Value PC-386	101
Blackship 386	134
AMT-386	145
Fivestar FS-386	147
PC Designs GV-386	158

Lattice C Compiler	seconds
Compaq Deskpro 386/40[1]	54
IBM PS/2 Model 80/71[1]	55
AMT-386	69
PC Designs GV-386	69
Blackship 386	71
Value PC-386	71
Fivestar FS-386	75

[1] Tests performed with disk caching.
[2] The 80387 coprocessor board could not be removed from the system.

Bargain basement 80386s go up against the big guys. The roundup winner is the Value PC-386, with the PC Designs GV-386 in second place–but all the low-end machines do remarkably well. For WordStar and 1-2-3 benchmarks, the range from fastest to slowest is almost negligible.

WordStar Professional Although disk access plays a small part in the *WordStar* benchmark, processing and memory access speeds are the most significant factors.

The benchmark measures the time required to perform four operations on a 15,364-word document. All occurrences of the word *tomorrow* are replaced with *today*. A 13-line paragraph is copied from the beginning to the end of the document. The spelling checker is used to check the document for spelling errors (the file contains no errors, so the program does not stop for incorrect words). Finally, the first page of the document is printed.

dBASE III Plus Disk access speed is the most significant performance factor for the *dBASE III Plus* benchmark.

This benchmark measures the time required to produce a report based on a three-file join, select, and sort. The report includes calculated fields and subtotals. The benchmark uses a data base consisting of a customer file, an invoice file, and an item file. The customer file contains 500 customer records. The invoice file contains 1000 records, with one item record per invoice, or 1000 records in the item file.

The benchmark produces a report showing the companies delinquent in payment. For all invoices with merchandise shipped before a specified date and for which payment status is *N*, the company name, part number, quantity, price, and total cost (a calculated field that is the product of quantity times price) are printed. The report is sorted by state, with quantity and total cost subtotaled for

each state and totaled for the entire report. All systems were tested with a math coprocessor installed.

1-2-3 Because no disk access is required, the *1-2-3* benchmark depends almost entirely on the processing and memory access speeds of the systems.

In this benchmark, a *1-2-3* macro executes a series of recalculations within a 50-by-50-cell matrix. The macro enters a number into the first cell of the matrix, enters into the adjacent cell a formula that performs a calculation using that number, and copies the formula to the rest of the matrix. The spreadsheet is recalculated three times, each time with a different number entered in the first cell of the matrix. This procedure is repeated using five different formulas: one each for addition, subtraction, multiplication, division, and exponentiation. After the mathematical operations are performed, the macro executes a block move and then erases the entire matrix.

AutoCAD Disk access, processing speed, and memory access all contribute to the performance of the *AutoCAD* benchmark. However, the speed and type of math coprocessor used by the system are the most important determining factors.

The benchmark uses the sample office drawing provided with the program and measures the time required to perform four functions: retrieving and displaying the sample drawing; zooming in on a small detail within the drawing; zooming out to reveal the entire drawing; and printing the entire drawing. The office drawing contains six two-dimensional and seven three-dimensional predefined views, all of which are displayed during the third step of the benchmark. All systems were tested with a math coprocessor installed.

Lattice C Compiler In the Lattice C Compiler test, the sequential disk access rate is the most important determining factor. Applications such as file managers commonly rely on this type of disk access.

The benchmark measures the time required to compile and link two 1000-line programs. The test is performed automatically using a DOS batch file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Philadelphia, PA. All rights reserved.

within 30 days of purchase, you can return it, but be prepared to pay a 15 percent restocking fee. An optional service agreement with TRW provides for house calls within 100 miles of any of TRW's 12 service centers.

AMT has put together a fast machine—one of the fastest available—but it doesn't have the right stuff. The miserly 4MB limit on 32-bit memory and the lack of 80387 support are serious drawbacks. Boot problems and hardware glitches like the broken disk drive indicator make you wonder whether other problems are lurking under the hood. Better quality control might squash the hardware bugs, but it wouldn't compensate for the system's inherent limitations. To overcome those, AMT will have to go to another motherboard. If you have any qualms about investing in a low-priced 386 machine, stay away from this one.

PC Designs' GV-386: Where Have You Seen This Computer Before?

The GV-386 is virtually the same computer as the AMT-386; it gets the same good grades for speed, the same poor grades for low-ceiling 32-bit RAM. Like AMT's entry, the GV-386 uses the American Megatrends motherboard with 1MB of 32-bit memory, a 1.2MB floppy disk drive, and a 23ms, 44.3MB Priam hard disk. With a monochrome display and an AT-style serial/parallel adapter, the unit comes to $3402, $100 more than a similarly configured AMT-386.

Given their near-twin motherboards, it should come as no surprise that the AMT and the PC Designs have many features in common—same dynamic RAM, same 64K static memory cache, and so on. Like the AMT-386, the GV-386 requires major motherboard surgery to upgrade to a stingy maximum of 4MB of 32-bit RAM. However, while AMT requires you to send your machine back to American Megatrends (and charges $1499 for the upgrade), PC Designs will do the job itself for only $870. Another small but important distinction is that PC Designs uses a slightly different version of the motherboard; while it too has a 32-bit ROM BIOS, no EGA BIOS relocation is permitted. Hence, EGA screen updates will be slightly slower. On the other hand, the system boots every time.

The PC Designs GV-386 is housed in a modified AT-style cabinet nearly identical to the AMT's, along with a hefty 200-watt power supply and the familiar complement of front panel controls. The only real difference between the PC Designs' chassis and the AMT's is that the disk drive indicator on the GV-386 works.

Included in one of the GV-386's 8-bit slots is an Everex I/O board with two RS-232C serial ports (one 9 pin, one 25 pin) and a parallel printer port. A 9-pin to 25-pin serial adapter cable is included with the system.

The AT keyboard, made in Mexico by Maxi-Switch, seems rather mushy. On the other hand, the <Enter> key is pleasantly

large, and replaceable, half-height key caps for <CapsLock> and <Ctrl> reduce the possibility of <Shift>-*key* errors.

The GV-386's attractively packaged user manual is considerably more extensive than the AMT's, even though each describes the same motherboard. Additional documentation includes manuals for the Hercules-compatible video card, the Priam hard disk, and the Everex Magic I/O serial/parallel board.

PC Designs' no-risk guarantee warrants the GV-386 to be "as compatible as Compaq" or your money back. The standard equipment warranty is limited to one year, parts and labor. All repairs are made through the Broken Arrow, Oklahoma, office. Should you require a replacement part overnight, PC Designs will ship it the same day.

Like the AMT-386, the PC Designs GV-386 is one of the fastest personal computers available today. Also (and unfortunately) like the AMT, it is limited to 4MB of 32-bit RAM–and there's no 80387 coprocessor support. Nonetheless, reliable hardware, good technical phone support, and a no-risk compatibility clause appear to make this system a lower risk than the AMT.

Diane Padys

The Blackship 386 uses high-speed static RAM to maximize system performance and can accommodate up to a generous 10MB of 32-bit RAM.

Blackship 386: Sailing on a 10MB Sea of 32-Bit RAM

The Blackship 386 is built around the Micronics Computers motherboard, which enjoys several advantages over its American Megatrends counterpart. With the usual goodies in our standard system configuration–which in this case includes a 40MB Miniscribe hard disk and a 1.2MB Teac floppy drive–the Blackship 386 sells for $3695. Due to temporary disk shortages, our review unit was configured with a full-height 32MB Seagate hard disk instead of the Miniscribe.

The Blackship uses high-speed static RAM chips throughout to improve system performance. In the bargain, its Micronics motherboard accommodates much more 32-bit memory than American Megatrends' 4MB maximum via a 32-bit memory board that fits in a proprietary slot. (The motherboard itself holds no memory.)

The memory board comes with enough sockets for 2MB of RAM in 256K-bit chips. An additional 1MB of static expansion RAM costs $286. A 2MB daughterboard ($765, fully populated with static RAM) expands the 32-bit memory to 4MB total; an 8MB daughterboard, fully populated, costs $2700. Total 32-bit system memory can rise as high as 10MB.

The Micronics motherboard also contains two 8-bit and five 8/16-bit expansion slots. The latter may be stuffed with 16-bit memory to bring the system up to the OS/2 total of 16MB. However, although 32-bit memory is accessed

at 16 MHz, memory placed in 8/16-bit slots is accessed at only 10 MHz, which (along with a narrower data path) limits performance.

At start-up, all memory above 1MB is allocated as extended memory, but a Micronics software driver (bundled with the system) allows you to treat all or part of the extended memory as Lotus/Intel/Microsoft expanded memory. Another software utility can relocate the ROM BIOS and EGA BIOS to a block of fast, 32-bit memory. Micronics uses the Award 386 BIOS; several program developers have confirmed that it supports OS/2.

The Micronics motherboard comes socketed for a 10-MHz 80287 math coprocessor. Serious number crunchers can substitute an $830 Micronics 16-MHz 80387-16B coprocessor daughterboard (featuring Intel's revision of the trouble-plagued 80387-16B chip) as an option. Installing the daughterboard involves opening the system unit, removing the 80386 processor from the motherboard, and mounting it atop a small 3-by-4-inch slab of fiberglass, next to the 80387-16B math coprocessor. You then plug the daughterboard into the 80386 socket.

The Blackship can be throttled down from 16 MHz to 8 MHz, 6 MHz, or 4.77 MHz to maintain full compatibility with older software. Clock speed changes are accomplished via software that adds wait states into the 80386 processing cycle.

The cabinet affords room for one full-height and three half-height drives; only two of the half-height bays are externally accessible. Both hard and floppy drives performed briskly under the Western Digital controller.

Blackship provides a Behavior Technology Computer (BTC) keyboard with a layout similar to the 101-key IBM Enhanced Keyboard, but with enough differences to produce plenty of typing errors initially. The backslash key has moved to the far right of the <Space> bar row, and a macro key (which BTC has reserved for future use) has been added to the far left of the same row, pushing both left and right <Ctrl> keys out of their familiar positions. Typing on the keyboard is a bit disconcerting; there's no snap-through tactile or audio feedback.

Documentation is barely adequate, even for a knowledgeable user. The user manual totals just 13 pages (plus the specification appendix) and covers little more than setting DIP switches and installing the speed-setting and expanded-memory utilities.

The meager documentation, however, is balanced by Blackship's excellent field support and warranty policy. While its one-year limited warranty on products, parts, and labor is not unusual, systems returned to the factory for warranty service will be repaired within 24 hours of receipt—or a new system will be issued in replacement. Overnight parts-replacement service is also available.

It's worth noting that a 20-MHz version of the Blackship 386 (containing the same Micronics motherboard but with a 40-MHz clock and an 80386-20 processor) is available for a mere $180 extra.

The Blackship 386 is a well-conceived machine. The company's choice of the capable Micronics motherboard, with support for a full 10MB of 32-bit static RAM,

Executive Summary

Blackship 386

80386-based computer

The Blackship 386 is virtually a twin of the highly rated Value Plus—except that it runs slower and costs $400 more. The higher price is offset somewhat by better field service.

Blackship Trading Co.
385 Oyster Point Blvd. #110
South San Francisco, CA 94080
800/431-6249, 800/654-7955 California, 415/952-1994
List price: with 1MB 32-bit RAM, 101-key keyboard, one parallel and one serial port, 1.2MB Teac floppy disk drive, 40MB Miniscribe hard disk, Western Digital controller, Hercules-compatible monochrome graphics display adapter, monochrome monitor, and one-year warranty $3499; Boca EGA display adapter $139; Quimax 14-inch EGA-compatible monitor $489; 77MB Miniscribe hard disk $1025; 1MB expansion static RAM $286; 2MB 32-bit memory expansion board (fully populated with static RAM) $765; 8MB 32-bit memory expansion board (fully populated with static RAM) $2700; 80387 math coprocessor daughterboard $830

Executive Summary

Value PC-386

80386-based computer

With the highest speed and lowest price, the Value PC system is the clear winner of *PC World*'s roundup. Boasting a full 10MB of static RAM as the 32-bit memory limit, 80287 and 80387 math coprocessor support, a fast Priam hard disk, and a two-year warranty, its only failing is the awkward layout of its BTC keyboard.

Value Plus Distributing
900 Larkspur Landing Circle #165
Larkspur, CA 94939
415/461-0811
List price: with 1MB 32-bit RAM, 101-key keyboard, one parallel and one serial port, 1.2MB floppy disk drive, 44.3MB Priam hard disk, Western Digital controller, Hercules-compatible monochrome graphics display adapter, Samsung monochrome monitor, and two-year warranty $3095; Boca EGA $169; Samsung EGA-compatible monitor $399; 70MB Miniscribe hard disk $950; 2MB 32-bit piggyback memory board (fully populated) $749; 8MB 32-bit piggyback memory board (with 4MB of RAM) $1599; 8MB 32-bit piggyback memory board (with 8MB of RAM) $2599; 80387 math coprocessor daughterboard $749

Diane Fadys

The Value PC-386 boasts the fastest speed (and lowest price) in the roundup. It uses the same Micronics motherboard as the Blackship 386.

suggests a commitment to excellence. While the Blackship 386 is hardly a radical departure from established PC architecture, its liberal service policy implies a high degree of reliability.

Value PC-386: Where Have You Seen *This* System Before?

Value Plus's SPC-386, the fastest system in our roundup, looks like a 3-D photocopy of the Blackship. The uncanny similarity of these two PCs surfaces in every detail—same Micronics motherboard, same 80387 daughterboard, same AT-style cabinet, same BTC keyboard, same EGA BIOS and ROM BIOS relocation capability. Even the substitute 32MB Seagate was duplicated! If you removed the logos, you wouldn't be able to tell these two machines apart, until you compared speed—and prices.

Base price of the PC-386 in the standard configuration (40MB Priam hard disk, 1.2MB floppy, 1MB of 32-bit static RAM, monochrome graphics) is $3095—a full $400 less than the Blackship 386.

The Value PC's Micronics motherboard is mainly software configurable. Like most clones, however, the PC-386 has a bank of DIP switches at the rear that you must configure for the math coprocessor and video monitor—a chore the Blackship 386 also requires. Furthermore, documenta-

Executive Summary

Fivestar FS-386

80386-based computer

The passive backplane design of the Fivestar FS-386 provides greater system flexibility than you can get from a standard motherboard—plus painless expandability. While the FS-386 is the slowest system of the roundup, it is the only one to accommodate a full 16MB of 32-bit memory and to support the 80387 math coprocessor without an adapter.

Fivestar Computers
3220 Commander Dr. #102
Carrollton, TX 75006
214/733-4100
List price: with 2MB 32-bit RAM, 101-key keyboard, one parallel and one serial port, 1.2MB floppy disk, 44.3MB Priam hard disk, Western Digital controller, Hercules-compatible monochrome graphics display adapter, Samsung monochrome monitor, and one-year warranty $3495; Boca EGA adapter $150; Samsung EGA monitor $450; 75MB Priam hard disk $900; 2MB 32-bit memory board (fully populated) $500; prices unavailable for 8MB and 16MB 32-bit memory boards; 80387 math coprocessor daughterboard $550

Diane Radys

The Fivestar FS-386 uses a backplane design, with memory chips and CPU placed on expansion boards. 16MB of 32-bit RAM can be accessed.

tion supplied with the Value Plus is only marginally better than the Blackship 386's. The succinct 40-page user manual covers every aspect of system operation, including hard drives, serial/parallel ports, keyboard, and video options. Bundled with the system is the much-praised menu-driven Disk Manager from Ontrack Computer Systems, which allows you to configure hard drives larger than 32MB as several smaller drives.

Value Plus's warranty covers the system for two years, parts and labor included. This warranty is limited to the base system, meaning motherboard and selected peripherals (I/O, EGA, and so on); it does not extend to hard disk drives or adapters, which are covered by another manufacturer's warranty. Should anything go wrong during the two-year period, you can return the unit (at your own expense). Value Plus claims that if it cannot repair the unit in "a reasonable amount of time," a replacement unit will be returned in its place. The system also carries a no-questions-asked, 30-day return policy; Value Plus will pick up the freight tab should you decide to return it.

The Value PC-386 is a very fast, very powerful machine. The use of high-speed static RAM throughout, the generous 10MB

upper limit on 32-bit RAM, and support for either an 80287 or 80387 math coprocessor add to the value of the system. When you throw in a two-year warranty, plus the lowest price *and* the highest speed of any 386 PC in this roundup, you have a solid winner.

Fivestar FS-386: No Motherboard Required

If unique design intrigues you, then you have to give Fivestar a five-star rating. FS-386 PC does not contain a motherboard at all; instead, the 8/16-MHz CPU and its support chips are located on an expansion board. The CPU board plugs into a *passive backplane*, that is, a 8/16-bit bus with slots and little else.

The base price of the FS-386, including a minimum 2MB of 32-bit memory (there is no 1MB option), a 44.3MB Priam drive (including InnerSpace software), a 1.2MB floppy drive, a monochrome display, plus the usual ports and MS-DOS (with GW BASIC), is $3495.

Because a passive backplane is little more than an array of slots, a system that uses one need never become obsolete. As the technology advances, boards can be replaced with updated versions so there's no need to trash the whole system. In fact, the original Fivestar FS machines used an 80286 CPU board, which has simply been replaced by a new CPU board to create the FS-386. The FS-386's CPU board even has a socket for the 80387-16B, with no adapter required.

(Note: Fivestar has another 80386 machine, the Fivestar 386, which is not part of the FS series and uses the American Megatrends motherboard discussed earlier. Be sure you know which machine you're buying.)

The Value PC-386 is a very fast, very powerful machine, featuring high-speed static RAM throughout and a generous 10MB upper limit on 32-bit RAM.

The memory arrangement for the FS-386 is quite unusual. With two memory boards, the CPU can access a full 16MB of 32-bit RAM—yet the boards plug into 16-bit backplane slots. In fact, the CPU does not access memory through the bus at all, but through 32-bit "bridges" that plug into either side of the CPU board. Naturally, the 32-bit memory boards must be in slots adjacent to the CPU board for the bridges to hook up. The machine comes with a 2MB memory board; additional 2MB boards, fully populated, cost $500. Supposedly, 8MB boards are available, but prices are not yet finalized. With the memory, 16-bit CPU, and disk controller boards occupying three full-length slots, two 8-bit and three 8/16-bit full-length slots remain free. Plus, there are two 8-bit and two 8/16-bit short slots behind the drive bays (however, 16-bit boards will not fit in those two slots because disk drive electronics and cabling obstruct the 16-bit connectors). The Fivestar uses the same Award 386 BIOS used in the Value PC-386 and the Blackship 386, but trying to relocate the EGA BIOS in 32-bit memory (using a bundled utility) sends this machine directly to the land of locked keyboards. Fivestar explains that this utility has a bug and maintains that a corrected version now comes with the system. The corrected version, however, was unavailable. The ROM BIOS relocates without a hitch.

The FS-386 system is housed in an attractive AT-style cabinet with provision for six half-height disk drives. The drive bays are divided into columns of three each, with the top two drives in each column externally accessible. While the Priam hard disk provided with the system zips along with 23ms access time, the floppy drive drags its heels. Unfortunately, the Western Digital controller and 220-watt power supply can handle only two floppy drives and two hard disks.

The Key Tronic Advanced Keyboard is a far cry from the mushy

keyboards found in the other systems reviewed here. It emulates an IBM keyboard in every detail but one: It requires a little too much pressure to cause a key to snap through.

Documentation for the FS-386 is unimpressive; you'll have to be a PC veteran to understand what the manual is talking about. Fortunately, the machine's warranty is for one year, parts and labor, and includes a 30-day return policy if you are not completely satisfied. Fivestar is presently negotiating with Momentum Services, which has more than 150 service centers worldwide, for optional house-call servicing of the system to the tune of $350 per year.

While uniqueness of design shouldn't necessarily influence your choice in selecting a 386 PC, the advantages of a backplane system are worth considering. Extremely flexible, such a system is virtually guaranteed not to become obsolete. Backplane design also reduces maintenance time to a minimum. Should the system fail, repair is only a board-swap away. If you change your system configuration a lot, the Fivestar FS-386 may be just the ticket.

The Way to Go 386

Speed is the primary reason for investing in an 80386 system. Are these bargain-basement computers as fast as the high-priced, name-brand machines?

Surprisingly, the answer is (mostly) yes. IBM's speed-demon Model 80 takes 277 seconds to complete all five NSTL benchmarks; the 16-MHz Compaq Deskpro 386 (without disk caching) needs 477 seconds. The fastest system tested for our roundup, the Value PC-386, took only 419 seconds. The slowest system, the Fivestar FS-386, came in at 463 seconds. Considering differences in memory architecture, disk caching, and hard disk access times, the range of these scores is amazingly narrow.

With performance like this, picking a winner is anything but easy. Two machines can be knocked out of the running at the start: The AMT can be eliminated due to its hardware problems. And since PC Designs' GV-386 does not support the 80387 math coprocessor and is limited to 4MB of 32-bit RAM, it will find itself at an increasing disadvantage as math-intensive, memory-hungry OS/2 applications begin to appear. That leaves three machines as serious contenders: the Fivestar FS-386, the Blackship 386, and the Value PC-386.

Speed is the primary reason for investing in an 80386 system. Are these bargain-basement computers as fast as the high-priced, name-brand machines?

The Fivestar has a lot to offer. It's got the highest capacity for 32-bit RAM of all three machines—a full 16MB—and its flexible backplane design makes for easy maintenance and upgrades. It also supports the 80387. Its only minus is its relatively slow speed.

The two remaining systems, the Value PC-386 and the Blackship 386, are both excellent computers. They share the same Micronics motherboard, which accommodates up to 10MB of 32-bit RAM. That's not quite as much as the Fivestar's 16MB, but it's plenty for most applications, even when OS/2 comes on line. They also share 80387 math coprocessor capability.

Despite the similarities, however, it's easy to pick the winner between these two. The Value PC is the fastest system in the roundup, while the Blackship is the next-to-slowest. And happily, the Value PC is not only the fastest system, it's the cheapest. At a cool $3095, this high-speed performer is the clear winner, *PC World*'s best-value system.

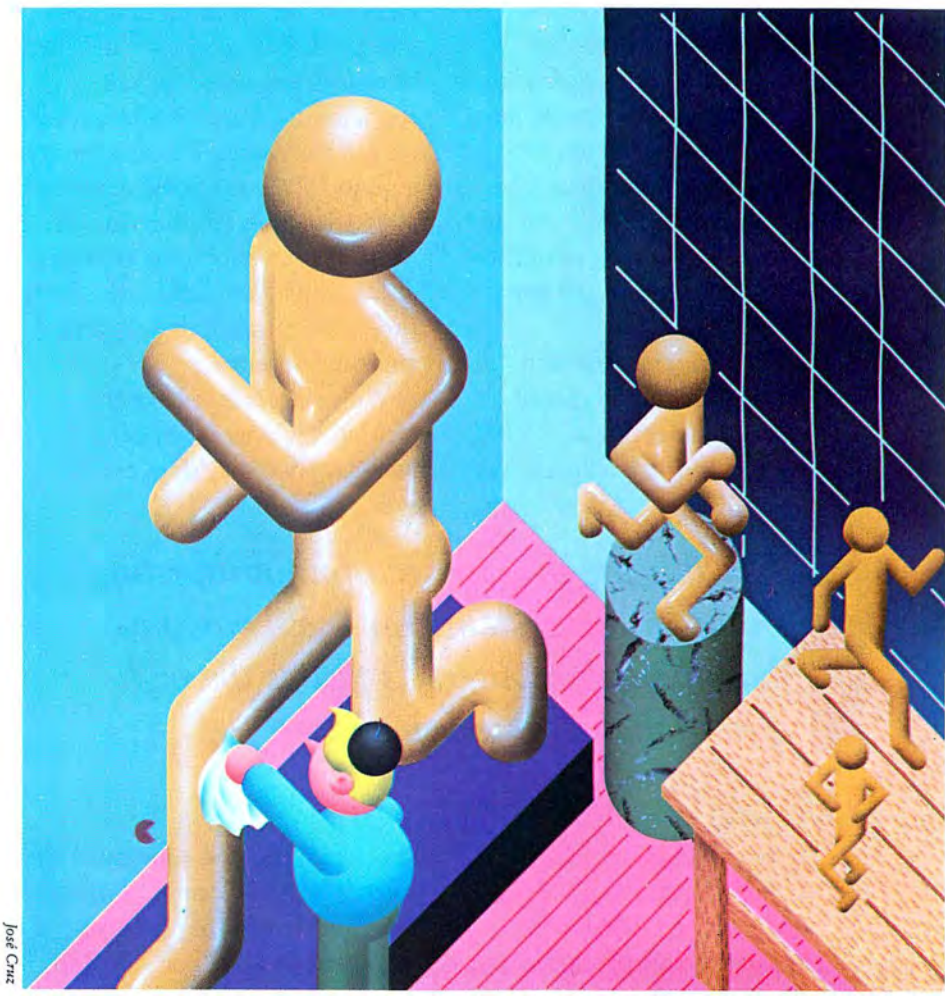
It's worth underscoring that (AMT aside) the price/performance ratio of these systems is immensely impressive. If you've got a burger budget but crave boeuf bourguignon, you've come to the right place.

TJ Byers is a contributing editor for PC World.

Word 4.0: Fast at Last

With Word 4.0, Microsoft augments its distinguished word processor with faster performance, a redlining feature, and a powerful macro language.

Eric Alderman



José Cruz

Until recently, if you asked PC users what they thought of *Microsoft Word*, you'd likely get the response: "*Word?* Sure, it's a great formatting program, but it's slow as Heinz catsup, the screen's cluttered, and without a macro facility, you're stuck with cumbersome menus and editing commands. Not only that..."

Hold it right there. Such complaints did not fall on deaf ears at Microsoft; *Word 4.0*, the most significant upgrade in the product's history, addresses these problems and more. This latest version assaults the high-volume, production-oriented office environment that *WordPerfect* and *MultiMate* have thus far dominated.

Word 4.0's most important improvement is its macro feature, which not only allows users to bypass the program's many menus but offers advanced programming for automating any feature (see the sidebar "Praise Microsoft: Macros at Last!"). Microsoft has also added both a document-retrieval function for multiple-document text searches and a powerful redlining feature for tracking document revisions.

Perhaps the most gratifying change is increased speed. *Word 4.0* is significantly faster than previous versions at search and replace, repagination, <Backspace> deletions, and cursor movement. Cursor speedup is the most noticeable acceleration; when you set the cursor to maximum speed, the text scrolls past in a blur.

Other impressive new features include the abilities to import and update spreadsheet data, draw lines and boxes, and hide screen borders. Microsoft has also added features that fortify the program's elaborate style sheet component. Not only can you search for and replace formats and styles, you can automatically generate a style by "recording" a document's manual formatting.

Cleaning Up Word's Act

In overhauling *Word*, Microsoft made some subtle yet significant alterations to the user interface. One oft-stated complaint about *Word* is that its double-line screen borders are distracting and take up editing space. *Word 4.0* enables you to suppress these borders and obtain a clean, blank screen similar to that of *WordPerfect*.

Several other aspects of the user interface have been streamlined. You no longer use the annoying Alpha command to return to editing a document; instead, the <Esc> key acts as a toggle between menu and document. Furthermore, you can now move within menus and between command fields via the cursor (for diehards, the old, awkward <Tab> and <Shift>-<Tab> form of locomotion remains). And if you get lost in the menus, you'll find that the Help function now has an index, making it easier to find a specific topic.

Like its predecessor, *Word 4.0* has a graphics mode (for previewing formatting and character attributes) as well as a standard text mode. Instead of having to select the desired mode at start-up, you can now switch between text and graphics modes from within the program, simplifying document preview. However, *Word* still can't display different fonts, text columns, or headers and footers as they will look when printed.

Praise Microsoft: Macros at Last!

Word 4.0's most impressive new feature is its macro facility. Macros provide a way to record a series of keystrokes and then play it back with one or two keys. While *Word*'s Glossary function could always insert boilerplate text, macros can also execute often-used command sequences, freeing you from having to thread your way through *Word*'s labyrinthine menus. By adding statements and variables from the powerful command vocabulary, you can automate the program to a degree impossible with most built-in macro functions.

In assigning keys that execute macros, you can use all 40 function key combinations, plus <Ctrl> together with any letter or number. You can also specify two-letter <Ctrl> codes, such as <Ctrl>-BU to make selected text bold and underlined. You can view your list of defined macros on screen, but because macros are stored along with Glossary entries, the display can get a little confusing. Microsoft suggests adding a .MAC extension to macro names.

You can create a macro either by recording keystrokes or by typing out key designations (for example, <Esc>*Transfer Load* a:<F1> to list files on a disk in the A: drive) and copying them to the Glossary. Recording keystrokes is easier, but you can include more sophisticated commands if you type them directly. Often a combination of these methods makes sense: Record the macro on the fly, and then edit it manually to add refinements.

You can use all of *Word*'s editing features when modifying macros. To make a macro more readable, you can break lines, insert blank lines, or indent selected lines. The Comment command allows you to add a brief description to each step of a macro.

Word provides a powerful BASIC-like language for creating sophisticated macro routines. Control structures such as IF...ELSE...ENDIF, WHILE...ENDWHILE, and REPEAT...ENDREPEAT provide the tools a macro needs to make decisions and perform repeating tasks. For example, you can write a macro that searches for a centered line, applies a style, and then repeats itself a specified number of times.

Unfortunately, the macro language specifically does not support recursive macros until a condition is fulfilled.

Word's variables work very much like those in BASIC. You can use the Set command to put a value into a variable, whether that value is a constant such as a number or text string, or an expression such as a math formula. Or you can use the Ask command to fill in the variable by presenting a prompt to the user.

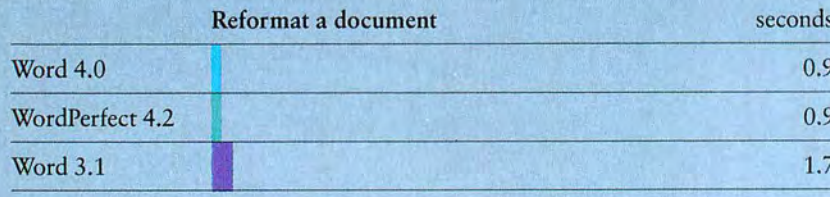
The language contains several reserved variables that specifically link macros with the word processing environment. For example, the Selection variable equals the text currently selected in the document, while Scrap equals the current contents of the scrap (*Word*'s temporary holding space for text). Field, one of the most important reserved variables, adopts the value of the command field on which the highlight is resting.

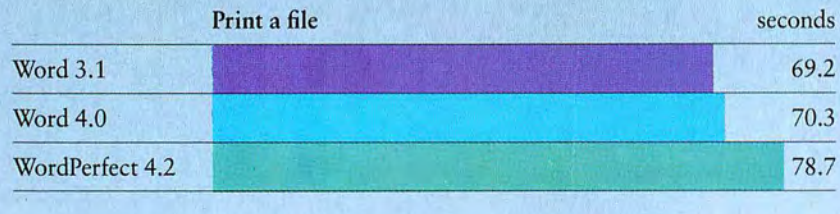
Macros can also be nested so that one macro can call another, allowing you to build a library of subroutines for use in other macros. To debug macros, *Word* has a Macro Step feature that lets you execute a macro one step at a time.

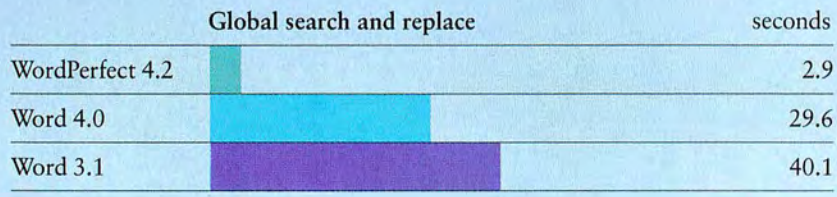
When you start *Word*, it looks for a macro called Autoexec in the default Glossary file. By creating an Autoexec macro, you can customize the way *Word* starts up. For example, you can have the macro make two or three windows, retrieve specific documents, and position the highlight within each.

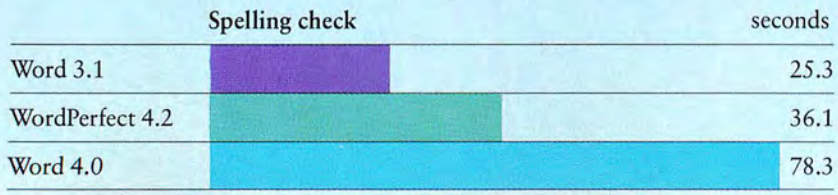
Because of its great flexibility, *Word 4.0*'s macro language is extensively customizable. Macros can help you convert documents to other formats, apply character and paragraph styles, or even make *Word* work more like other programs. The 15 sample macros included with the program point to other potential uses. The selection includes simple indexing and table of contents utilities, macros that save true ASCII files, and Wang-emulation routines. Although long overdue, the macro facility should play a key role in placing *Word* at the forefront of word processing. *–E. A.*

PC World Evaluation
Word 4.0









Word 4.0 is so much faster than previous versions, you might think someone's snuck a turbo board into your PC.

All benchmarks were performed on an IBM PC XT with 640K RAM using a 10MB hard disk. The file created for all tests except the spelling check was an 8-page (480-line) text file consisting of groups of four characters separated by spaces (e.g., *aaaa bbbb cccc*). The file was formatted with 60 lines per page and with margins set at 1 and 60. A carriage return and a blank line followed every 9 lines of text. This pattern was repeated throughout the document.

Reformat document Two times were taken for each tested program and then averaged together: the time to change the right margin from 60 to 50 and the time to change the right margin from 50 to 60. The program also had to fill spaces created by lengthening the lines (when reformatting from 50 to 60). Times were counted from the start of the reformat until control was returned to the user.

Print a file This benchmark used a device that simulates an infinitely fast printer, one not slowed down by paper or printhead movement. The performance text file was "printed" to the device at the maximum speed supported by the program. Times with an actual printer would be greater.

Global search and replace With the cursor positioned at the beginning of the text file, the program was instructed to automatically replace 240 instances of the string *aaaa* with the string *AAAA*.

Spelling check This benchmark recorded the amount of time each program's spelling checker required to run through an ASCII file with 30 paragraphs of 14 lines each (a total of 28,051 characters). The file had been read into each program and saved in that program's format. Times were measured from the keystroke initiating the check until control was returned to the user.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Philadelphia, PA. All rights reserved.

The new *Word* makes some of the most common operations easier to perform. In addition to using <F7> and <F8> to move one word at a time, you can now use the industry-standard method of pressing <Ctrl> along with a cursor key. Moreover, this version of *Word* enables you to use all ten function keys in combination with <Alt>, <Shift>, and <Ctrl> to perform common tasks, such as switching to a new font or setting tabs. All 40 key assignments are preprogrammed with commands but can be customized with the macro feature.

Other improvements sprinkled about the program range from new math functions to support for additional printers and displays. A line and column counter now appears at the bottom of the screen, and you can generate a word count when you repaginate. Legal professionals will appreciate the ability to print line numbers. In addition, you can generate a table of contents directly from outline headings and check spellings within a specific section of a document. All these new features have a cost, however: Minimum required memory has increased from 256K to 320K.

Despite these increased RAM requirements, however, *Word* retains some annoying memory-management problems. When you're working with long documents, an operation such as search and replace may still require you to save the document before continuing.

Order on the Disk

Word's new document-retrieval function offers a rudimentary type of text-data management. When you save a document, *Word* pops up a summary sheet that contains fields for a title, keywords, the last revision date, the author, the operator, and general comments. Using the new Query command, you can search for values within any of these fields; *Word* will list all documents that meet the criteria.

Word 4.0 can search for documents in several directories at once and enables you to use most of the summary sheet items to specify complex search criteria. For example, you can locate documents that were revised within the last two weeks and are labeled with the keyword *Jones* but do not contain the keyword *deposition*. You can also search for any text within multiple *Word* or ASCII documents using the same types of logical operators. And although you can't execute proximity searches (look for two words that are a specified distance from one another), you can use wild-card variables.

Word 4.0 *can search for documents in several directories at once and enables you to use most of the summary sheet items to specify complex search criteria.*

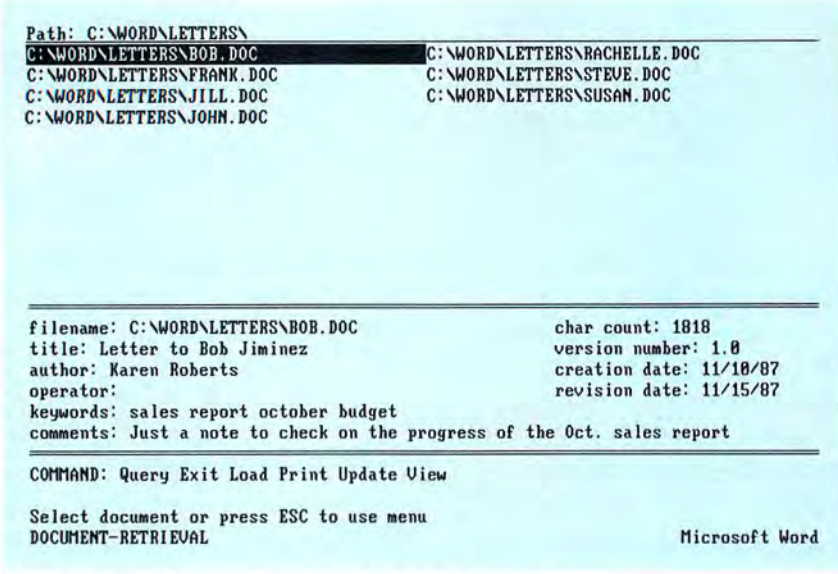
Executive Summary

Microsoft Word 4.0

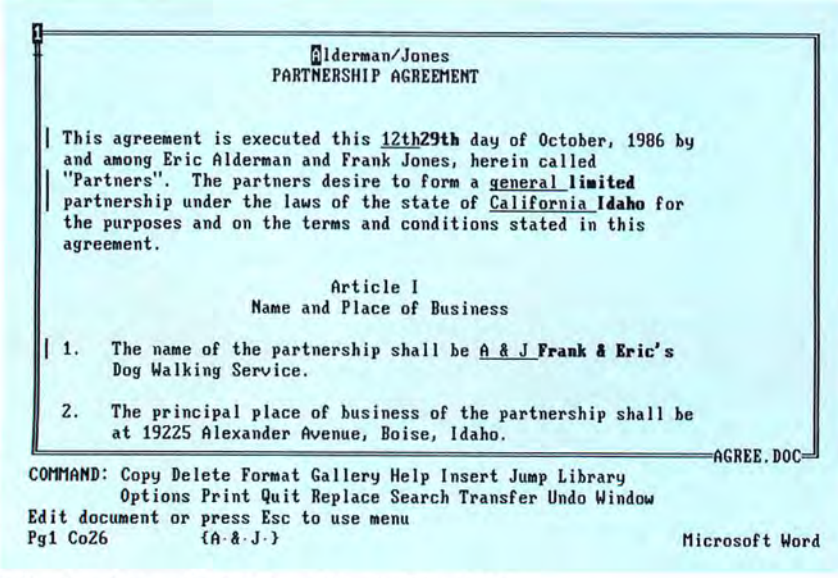
Word processing software

Microsoft Word 4.0 is a substantial update with features aimed at the production-oriented office world. The macro facility, redlining, and document-retrieval functions will please advanced users, and just about anyone will welcome the increased speed and streamlined user interface. A wide variety of other new features and improvements keeps *Word* among the top word processing programs on the market.

Microsoft Corp.
16011 N.E. 36th Way
#97017
Redmond, WA 98073
206/882-8088
List price: $450, upgrade from previous versions $75 (free for users registered after July 1, 1987)
Requirements: 320K, two disk drives, DOS 2.00 or later version
Not copy protected



Word 4.0 enables you to search for a character string in all .DOC files and quickly obtain a list of documents containing that string. The new document summary window appears at screen bottom.



The Revision Marks function in Word 4.0 automatically marks inserted text with boldface and deleted text with underlining. As an option, a vertical bar will mark changed lines.

Once you've determined what files you need, you can display them by title, file size, or last revision date. Oddly, though the summary sheet accommodates long titles, the document list does not, so most titles are unceremoniously chopped off in the middle. A more serious limitation is the lack of file-management tools to manipulate the documents once they've been found, such as the ability to copy, delete, or view the documents without loading them into the work area.

Tracking Revisions

Word 4.0 joins the latest word processing craze with a redlining feature that keeps an audit trail of additions and deletions. When you activate *Word*'s Revision Marks function, the program automatically flags inserted text with a selected attribute, such as boldface, and strikes over deleted text. Even search and replace changes are marked.

Later, *Word* will locate each occurrence of changed text and wait for your decision. With one keystroke you can accept the changes by deleting struck-out text and removing the new text attribute, or you can reject the changes by deleting the new text and removing the strikeout. *Word* can also place a revision bar in either margin alongside changed text.

Instant Style Sheets

Word 4.0 offers several new formatting features designed to make style sheets easier to create. In previous versions, you defined styles by entering and selecting data in the style sheet window. Since you couldn't view the document during this process, it was

difficult to see how the changes affected your text. With the new version you can format characters, paragraphs, and divisions directly and define or update a style by recording an example from the text.

You can also search and replace formats and styles, greatly easing the formatting process. For example, you can quickly change all underlined text to italics or convert fully justified paragraphs to ragged right. Or, using macros, you can ease the conversion of files imported from other word processors by searching for centered text and applying a heading style.

Another formatting improvement is borrowed from the Macintosh version of *Word*. You can now place boxes around paragraphs or place lines anywhere on the screen. The lines and boxes, available with single, double, or bold rules, are treated as a paragraph format, so you can include them in the definition of a style. If you change the length of a paragraph, *Word* adjusts the box or lines automatically. Another useful feature is the ability to draw lines and boxes with the cursor keys, enabling you to create organizational charts on the fly.

Spreadsheet Linking

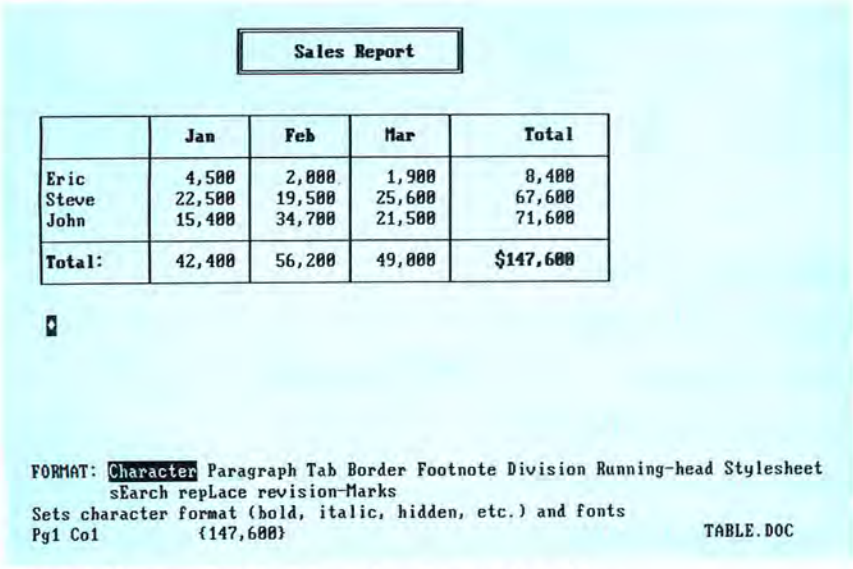
A new feature called Link allows you to import spreadsheet data directly from *1-2-3*, *Multiplan*, or the PC version of *Excel*. You can bring in a selected range of cells using a list of available range names, or you can import the entire worksheet. *Word* inserts a hidden code in front of the data, identifying its origin, to make it easier to update the information when you change the spreadsheet itself.

Word automatically places tabs between the columns of an imported worksheet, so it's easy to reposition the columns by changing the tabs. When you update information, *Word* sticks to your original paragraph format.

A related feature enables you to embed a print file within a *Word* document. For example, you could include a PostScript file for the Apple LaserWriter or a printer-ready file from a graphics package. To insert a print file, you embed a special code along with the file name and the amount of space needed. When *Word* encounters the code during printing, it stops and sends the file to the printer.

New Life for a Classic

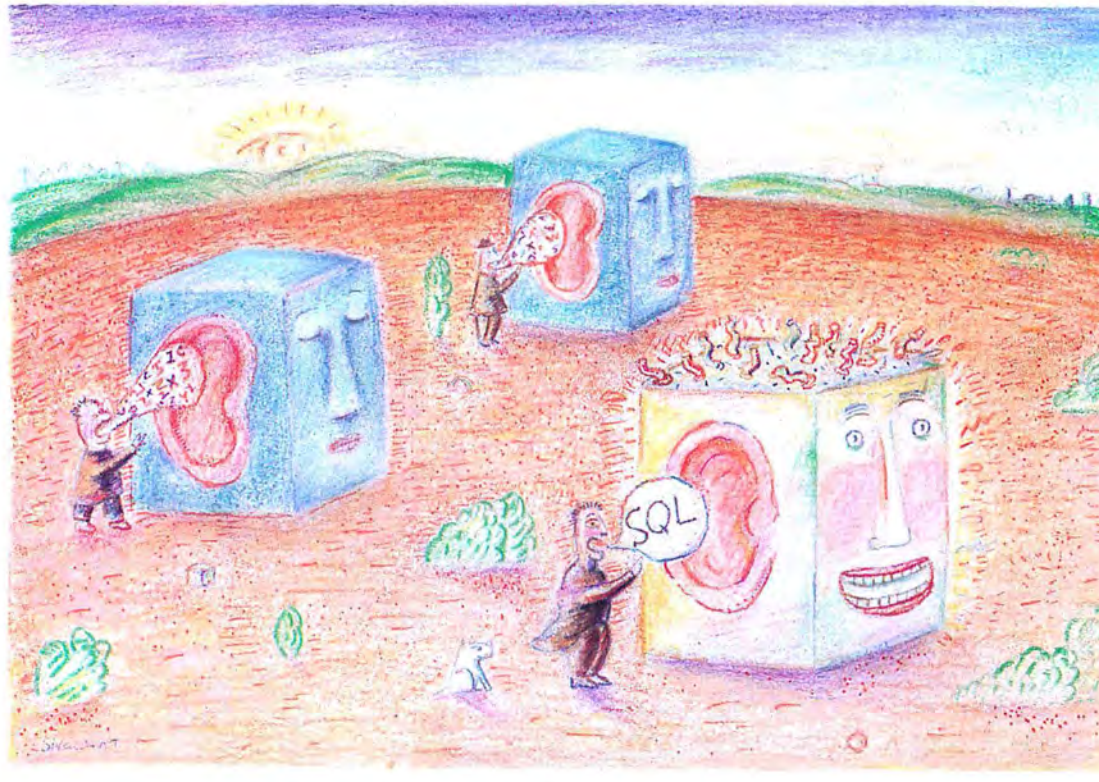
With *Word 4.0*, Microsoft has taken an already strong package and injected it with robust new features. *Word* has always enjoyed superior laser printer control and powerful style sheets. Now with macros, document retrieval, redlining, and speed improvements added to the program, Microsoft has significantly upped the ante in the cutthroat word processing market. Meanwhile, *WordPerfect 5.0*—*Word*'s principal competitor—is due out soon. As the competition heats up, the user can only stand to win.



Word 4.0's new drawing function can make tables and charts more attractive. Note that you can also eliminate screen borders, leaving two extra columns and two extra lines for text.

Eric Alderman is the author of Microsoft Word: The Complete Reference *and coauthor of* Advanced WordPerfect: Features and Techniques, *both published by Osborne/McGraw-Hill (Berkeley, California, 1987).*

Tomorrow's Data Bases Today



Andrew Shachat

IBM says it will build OS/2's future data manager around SQL. But PC implementations of this powerful query language exist now. PC World looks at three: Informix, Ingres, and Xdb.

William Urschel

Like the rumble of distant thunder, the letters *SQL* have made many of us look up from our terminals and peer off uneasily toward the horizon. We've heard rumors that this new technology was going to make our familiar copies of *R:base* and *dBASE* obsolete. But the SQL tempest has turned into a healthy spring shower of new PC data base technology.

SQL stands for Structured Query Language, a very high-level language developed by IBM in 1976 and used extensively on mainframes and minicomputers—and now on micros. Not an application package itself, SQL functions like interpretive BASIC: SQL statements pass through an SQL "engine" to the underlying data base, where they are executed.

You needn't learn SQL commands and syntax to benefit from the language's power and connective potential. A growing number of data-management programs use SQL behind familiar-looking menu systems. In this roundup you'll find three recently released PC implementations of SQL: Relational Technology's *Ingres,* Informix's *Informix-SQL,* and Software Systems' *Xdb.* While they differ sharply in their ease of use, retrieval speeds, and connectivity features, each has at its core a powerful SQL engine for handling data queries.

The Big Deal

Before discussing the products, it's worth examining the reasons for SQL's growing popularity. First, SQL is a nonprocedural language. This means it's smart: The SQL engine knows where data is, which indexes to use, and the most effective sequence of operations. You don't need to specify such details when you query the data base. By contrast, a procedural language like *dBASE* must be told not only what data you want but where it is and how to get it—step by step. (See the sidebar "Query Comparison" for a look at how efficient a nonprocedural language can be.)

Another significant advantage to SQL is its potential as a standard data base query language. Already well established in the mainframe and minicomputer markets (both *Ingres* and *Informix* began as large-system implementations), SQL is likely to become standard for micros. IBM is certainly pushing for that with its product announcements: OS/2 Extended Edition's data manager, based on SQL, will enable PCs to share data with IBM's DB2 mainframe software. Moreover, SQL versions of *R:base* and *dBASE* are rumored to be in the works; Microsoft has apparently struck a deal with SQL data base vendor Sybase; and Lotus is working with Umang Gupta, developer of *SQLBase.*

Most important, with SQL it's possible for a single inquiry from one user to draw data from files stored on a micro in Maine, a mini in Minnesota, and a mainframe in Michigan. Thus access to a data base can be *distributed* across various locations and computer sizes—an especially important advantage for many corporate users.

But Does It Share Data?

Distributed SQL systems that can share data files among mainframes, minicomputers, and microcomputers exist now in such product families as *Ingres* and *Oracle.* But the ability to share data files across product lines is many quibbles away. For example, the American National Standards Institute (ANSI) recognizes two lev-

Query Comparison

To give you an idea of just how concisely SQL can query, here's a comparison showing how *dBASE III Plus* and SQL handle a typical request—to display a set of five fields from three files, each with an index on the key field. Notice that the query takes three times the number of lines with *dBASE III Plus*'s procedural command language as it does with SQL's nonprocedural equivalent.

Keep in mind that the *dBASE* language is much more than just a query language. While you can't write a full program in SQL because it lacks conditional statements, variables, and branching, you can program using SQL commands in conjunction with *Ingres* or *Informix* or with their 4GLs. You can also program using SQL with *Xdb* or by using a standard language like C or Pascal and embedding SQL commands in the source code. —*W. U.*

```
clear all
set talk off
use grades index gindex1
select 2
use roster index rindex1
select 3
use salary index sindex1
select 1
set relation to emp_num into B
select 2
set relation to ss_num into C
select 1
display all EMP_NUM, B-> LNAME, B-> FNAME, C-> SALARY, GRADE
clear all
set talk on
```

```
select emp_num, lname, fname, salary, grade
from grades, roster, salary
where roster.emp_num = grades.emp_num and roster.ss_num = salary.ss_num
order by emp_num
```

dBASE III Plus (top) and SQL (bottom) compared

els of SQL but doesn't require the ALTER TABLE command for either. And there are unanswered questions about how IBM's DB2 standard, which does use the ALTER TABLE command, will be optimized for PCs; vendors who want to follow IBM's lead are hard-pressed to reckon how.

Moreover, SQL has some inherent limits. By itself, SQL isn't a complete data base programming language. It has no conditional statements (to build branching menus, for instance); no I/O routines for generating screen or printed reports; and no functions for control logic, loops, or variables.

Each SQL vendor, then, packages SQL differently—designing its own engine to optimize the basic SQL command set, and adding programming features and whatever user interface it deems appropriate. SQL might promise transparent data sharing across vendors, but that's not yet the reality.

In the meantime, all is not lost. Programmers today can write SQL applications that run without modification on mainframes, minis, and micros—and they can do it cheaply on an AT without tying up the mainframe. End users of one SQL system can sit down at another SQL vendor's system and use the same basic commands and syntax to query it, *with no* training.

Lowered development and training costs and a data base built for distributed architectures are major benefits of an SQL standard. Moreover, each of the prod-

ucts reviewed here offers a fuller and more complete set of relational operators than *dBASE III*. On the downside, most SQL products don't speak PC yet, and their complex, command-driven formats may be intimidating.

Product Overview

Built around a common core of SQL commands, *Xdb, Informix,* and *Ingres* all perform familiar DBMS tasks: table setup, forms creation, query and data retrieval, reporting, application building, and so on. From there, the products have quite distinct approaches.

Xdb's developers built their package for PC users. The program needs less than 640K; uses color, graphics, and a clear menu structure; and runs fast–all for $395. Moreover, since its screen-painting routines run twice as quickly as those in the other programs, *Xdb* feels even faster than the numbers indicate.

Informix and *Ingres,* on the other hand, offer a depth of features and large-system integration missing from *Xdb*. But their large-system origins also make them difficult to use.

Ingres proper, for example, is command-driven and offers few default possibilities for table and forms creation. If you want to customize forms or build menus in *Ingres,* you need its fourth-generation language (4GL) add-on.

Ingres's built-in Report Writer, however, offers handsome default formats and a command language for customizing reports. So if you need to do more than simply create reports, you'll want to use *Ingres-4GL* (at $500 extra) for sophisticated forms or applications.

You will get further with *Informix*'s mix of menu-driven options and outside text editors. The product's basic data manager turns out great default or custom forms and reports without its 4GL add-on. The *Informix-4GL* option adds a powerful Pascal-like programming language with many more features for creating tables, menus, forms, and reports; but linking these to the data manager is unnecessarily complex. After you write the code using *4GL,* it has to be compiled twice–once by the *4GL* package and a second time by a separate C compiler (*Informix* supports two, Microsoft C and Lattice C). Moreover, the resulting code–admittedly faster and more secure–results in a .4GE file, not an executable .EXE file, so you can't run it as a stand-alone product without the SQL engine.

Building Tables

With *Paradox, R:base,* and *dBASE III Plus* on the market, users of high-end PC data bases expect savvy menus and graphics to help them with the fundamental task of building tables. *Xdb* isn't quite up to that standard, but its menu-driven format does offer the quickest table creation of our three SQL products. It is also less flexible than *Ingres* and *Informix: Xdb* doesn't allow you to change a field type once you've designated it on a table.

Informix offers some menu direction and flexible table creation. Of special interest to those developing large transactional applications is its numeric data type, the *serial* field. If you designate a serial field, *Informix* automatically assigns it the next available number during data entry. This feature would be handy for numbering invoices or customer accounts. As performance tests performed by National Software Testing Laboratories (NSTL) show, *Informix*'s retrieval speed also makes it a good choice for transactional and accounting applications.

Executive Summary

Informix-SQL

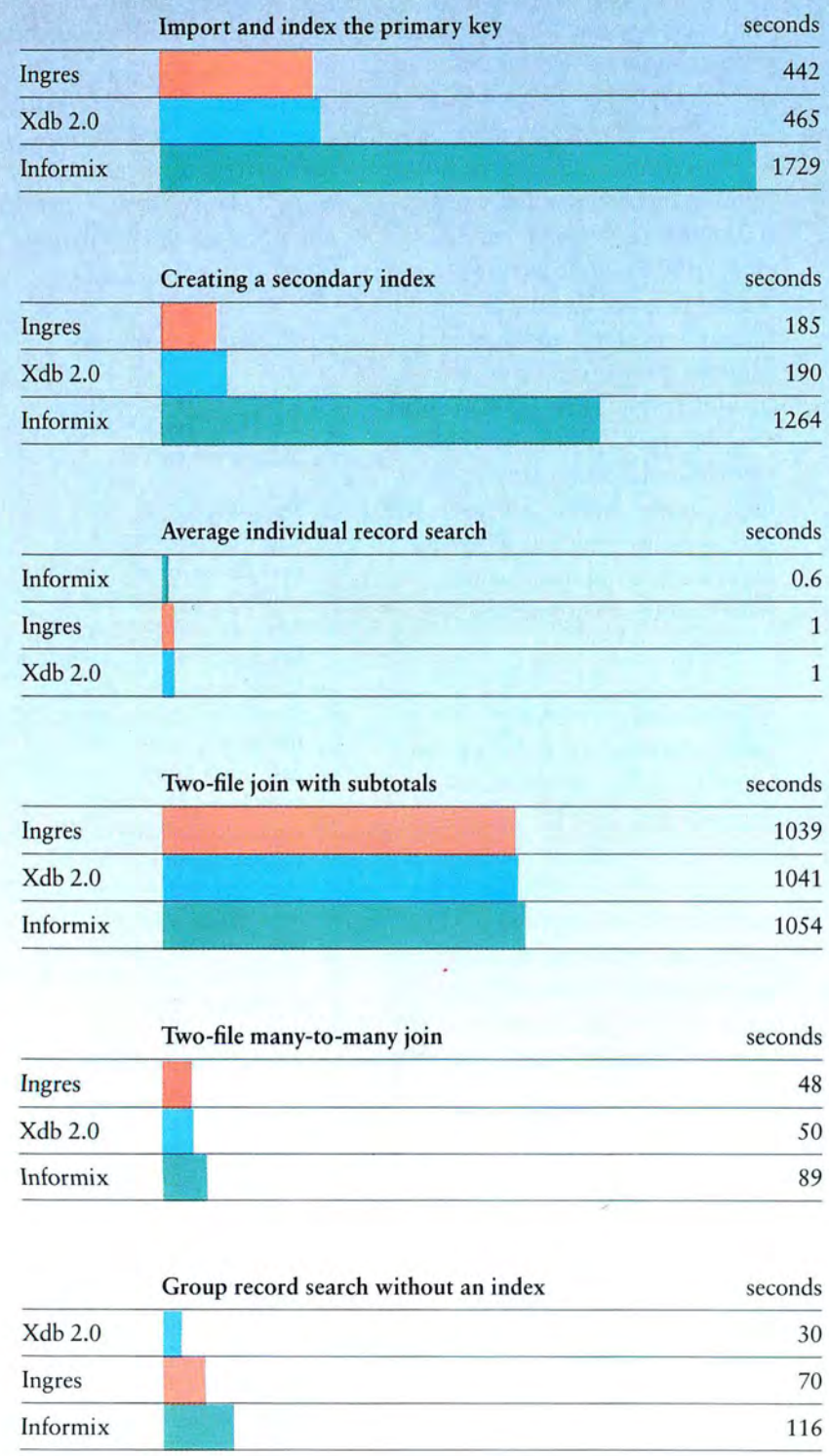
SQL data base

More sophisticated than *Xdb, Informix-SQL* has superb documentation and the ability to create complex forms and reports without having to resort to its 4GL. It builds indexes more slowly than the other two programs, but since it retrieves indexed data much faster, it's an excellent choice for stable-structure applications that do customer inquiries and the like. Versions are available for a wide variety of computer systems; an application designed on one can be run on any other.

Informix Software, Inc.
4100 Bohannon Dr.
Menlo Park, CA 94025
415/322-4100
List price: SQL $795, 4GL $995
Requirements: 640K, hard disk, DOS 2.10 or a later version
Not copy protected
Technical support: Informix $220/year, 4GL $275/year

PC World Evaluation

SQL data bases



Xdb whizzes through unindexed searches, and Informix can pull up a single record quicker; otherwise, Ingres wins the speed derby.

All benchmarks were performed on an 8-MHz IBM AT with 2.5MB RAM using a 30MB hard disk. Testing was timed from the last keystroke of the command sequence until program control was returned to the user. Times for all processes, unless otherwise indicated, were accumulated, recorded, and averaged.

Import and index the primary key A 10,000-record file was imported and indexed on its primary key.

Creating a secondary index A secondary index was created on the 10,000-record file.

Average individual record search Records at different locations in a 10,000-record file were selected one at a time.

Two-file join with subtotals A short text field from a 1000-record file and a numeric field from a 10,000-record file were joined using the indexes of the 1000-record file. The text field was grouped and sorted in ascending order, the numeric field was subtotaled for each group, and the results were output to a null printer.

The benchmark was also performed on the clustered files of those programs that provide clustering, linking, or a similar function. For these programs, the best score is provided.

Two-file many-to-many join Two 1000-record files were joined on an indexed field. Records were selected on the basis of indexes and relational operators, and the resulting report was output to a null printer.

Group record search without an index From different locations in a 10,000-record file, groups of 100 records were selected on a nonindexed field (using relational operators to establish the selection criteria). The records were sorted in ascending order, and a long field was output to a null printer.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Philadelphia, PA. All rights reserved.

Ingres reveals special touches, too–and a couple of significant omissions. An undo key makes data entry mistakes less painful, and a handy find-text key allows you to quickly find something in a listing. But *Ingres* cannot accept null values in a field (unlike the other two programs). This could skew data when field values are averaged and the distinction between a numeric zero value and no value at all becomes crucial.

Forms Creation

Once you've built tables, defined data types, and specified the lengths or sizes of fields, you can create data entry forms and link them to your tables. Here again, although far from matching *Paradox*'s graphics prowess, *Xdb*'s forms manager is functional and easy to use. On the other hand, you'll hit the wall with it sooner than you would with *Ingres*'s 4GL add-on or even the basic *Informix*.

Ingres has only a rudimentary forms generator without its 4GL. You can locate fields on the screen, define margins and lengths, type in ornamentation (although it isn't mentioned in the manual, you can produce a graphics character by holding down the <Alt> key, entering its ASCII code on the numeric keypad, and releasing the <Alt> key), and declare default values–and that's about it.

With *Informix* proper, you can create forms that are as sophisticated as any *Xdb* forms, but the process isn't menu-driven and requires the use of an outside text editor. *Informix* automatically calls up your favorite text editor or word processor; you type in *Informix* commands to define the form. Then *Informix* packs the resulting ASCII file into a binary format to protect against accidental (and potentially far-reaching) changes.

All three programs enable you to relate different tables, which represent separate files in the data base, by linking them through a single form. *Xdb* joins fields from up to 50 tables. *Ingres* allows you to link up to 10 open files on a form. And *Informix* works with the number of open files permitted by the DOS version you're using–up to 15 standard user files in DOS 3.*xx*.

Querying via Forms

Query-by-example (QBE) wasn't introduced by Ansa Software's *Paradox*. *Paradox* just does it more smoothly and completely than most other programs. The idea has been around mainframe software for years, and all three SQL data bases offer a subset of QBE: forms query.

It works this way: To query a data base using a form as an example, you call up an entry form, place the cursor in the field you want to test, type in criteria (if the cursor were in the AGE field you might type > 65), and the program shows you each qualifying record, one after the other.

Xdb has the easiest and quickest forms-query feature of the three SQL programs, but it's fairly limited, restricting you to the most basic operators–<, >, <=, >=, and <>–and a matching function, which accepts simple wild-card characters. You can't join criteria with AND or OR keywords, nor can you use EXISTS or FAILS to test whether a field contains data or is blank. As *R:base* did before the addition of its natural-language front end, *Xdb* forces you out of the menu mode and onto the command line –to SQL statements.

Ingres' more complete query-by-forms capability provides AND/OR functions and a UNIX-like array of wild cards: [*] replaces any string, [?] replaces a single character, [xyz] replaces the characters within the brackets, and [a-b] replaces the range of

Executive Summary

Ingres

SQL data base

With the exception of its excellent built-in Report Writer, *Ingres* is a painfully limited product. When combined with its well-designed 4GL package, it shines, being both eminently flexible and very fast. *Ingres* with *Ingres/Star* is the only one of the three products examined here that offers a true distributed data base; an application running on your micro can transparently pass and receive data from your mainframe and/or minicomputer.

Relational Technology, Inc.
1080 Marina Village Pkwy.
Alameda, CA 94501
800/446-4737
List price: Ingres $950, 4GL $500, embedded SQL $400
Requirements: 640K, hard disk, DOS 2.10 or a later version
Not copy protected
Technical support: $2000/year for telephone support, $250/year for updates and maintenance

The Mighty Fourteen

Gary Baker

For all its conciseness and power, IBM's DB2 SQL standard uses only 14 commands.

SELECT: Roughly equivalent to *dBASE*'s LIST, SELECT is SQL's most-used command. SELECT can be nested into subqueries, where a single statement has many levels and retrieves a complex set of data from a variety of different tables. Most data base languages require many separate queries to retrieve the data SQL obtains in a single nested statement.

INSERT: This command inserts new data records, or rows, into a data base. Equivalent to the *dBASE* APPEND command.

UPDATE: Allows a user to modify field values for single or multiple records. Equivalent to *dBASE*'s REPLACE command.

DELETE: Deletes one or more data records, or rows, from a data base. *dBASE*'s DELETE and PACK commands perform equivalent operations.

CREATE TABLE: Given field names and simple data type specifications, CREATE TABLE creates a new data base table. Works like the *dBASE* CREATE command.

CREATE INDEX: Given a specified field name or column, CREATE INDEX creates a new index for a given data base table and attaches it to the system catalog.

DROP TABLE: Deletes a specified data base table from the system.

DROP INDEX: Deletes a specified index from the system.

ALTER TABLE: Under DB2, ALTER TABLE allows a user to add new fields or columns to an existing data base table. Some other vendors have expanded the command to delete, rename, or lengthen fields. The ANSI standard does not support ALTER TABLE.

CREATE VIEW: A view is a way of creating virtual data base tables. Virtual tables can be composed of selected fields from one table or of fields from a variety of tables. After issuing a CREATE VIEW command, the selected fields have a table name and look to the user like a regular table on disk. But a view is only a logical table; it doesn't physically exist as an entity on disk.

GRANT: Used by a system supervisor, this important security command grants users the right to access a specified data base or table. It can also be used to grant users access to specified fields within certain tables and to grant them the right to use specified SQL commands on those tables and fields.

REVOKE: The opposite of GRANT, REVOKE is used by the data

base supervisor to take away a user's access rights to a data base, a table, or a field, as well as the rights to perform certain SQL commands on them.

COMMIT: A powerful data integrity command, COMMIT allows a group of SQL statements to be grouped into a single transaction. With COMMIT, all the updates involved in the transaction are written to the data base at once.

ROLLBACK: Another data integrity command, ROLLBACK works with COMMIT. In case of a system crash or other problem, it allows a transaction to be completely rolled back, returning the data base to the exact state it was in before the transaction began.

Gary Baker is editor of LAN *magazine in New York City.*

characters indicated within the brackets. You must be careful not to enter any blank spaces in your criteria, however; and since searches are case-sensitive, you must also watch capitalization.

Informix's query-by-forms method offers a unique output function. You can send all (or just currently displayed) records from a forms search to an ASCII file. The data is written as though it were a series of captured screens, showing the whole form rather than one record per line. Use this option with care on large files, though, because once you start to output a file, you can't stop until it's done.

An irritating feature of all three programs is that they search the entire data base in a forms query before displaying the first qualifying record. If only one qualifying record exists, and it happens to be the fifth of 500,000 records, you still have to wait for the program to search all 500,000–a sequential, nonindexed search that can take a long, long time. Pity the poor soul who enters a mistaken criterion and then realizes the program won't find any qualifying records. Once a search is begun, there is no way to interrupt it, short of rebooting.

Reporting

Any high-end data manager worth its salt recognizes that comprehensive, timely reports are the real object of most data base management activity. *Xdb* is especially easy to use in this regard, while *Ingres* offers the fullest set of features–including lots of mathematical operators.

Xdb's menu-driven reporting function is quick and produces sophisticated results without programming. From the menus, you select fields to sort on, group by, compute, and format. You're limited to the four basic mathematical functions, but all the standard relational operators can be used. You can underline headings, set margins, and select 20 different fonts. If you need more flexibility than the menus provide, write your own report specification file using the *Xdb* command language.

Ingres's Report Writer–completely separate from its 4GL –offers far and away the best reporting ability of the three programs. It gives you the option of running one of three types of quick reports. A fourth option, Default, selects the most appropriate of the three types based on the length of the lines. Or you can program your own report. All three quick reports include the data, a title, column heads, and page numbers. These off-the-shelf formats actually look good enough to hand to your supervisor or a client.

If you want to customize reports, *Ingres*'s Report Writer commands give you a high degree of control over data placement and display formats. Moreover, they open up a substantial battery of spreadsheetlike functions. Besides the basic arithmetic and relational operations, Report Writer offers exponentiation, nine numeric functions, six conversion functions, and ten string-handling functions.

Something of a compromise, *Informix*'s report system includes a default report format that produces either a simple matrix sans headers and dates or a record-by-

record block listing with the field names on the left and the data on the right. Neither of these formats is as useful as the *Ingres* default formats.

ACE, *Informix*'s report language, is similar in structure to *Ingres*'s language, though not as comprehensive. It skimps on math functions and lacks obvious formatting options, such as the ability to underline column heads or control pitch and font. Functionally, it is on a par with the *Xdb* report menus.

Naked SQL

No, you don't actually have to learn SQL to use the language, but it's worth a try. Anyone with a logical mind could pick up the basics in a few minutes, and in an hour or two (with a manual open on the desk) you could be fairly proficient.

If your main goal is to learn SQL, buy *Xdb*. Its Interactive SQL option on the main menu takes you to a simple text editor where word wrap, insert, and delete functions are available. If you select an SQL word from a menu at the bottom of the screen, a brief description of its syntax appears. You type in a line of SQL, press <Enter>, and–assuming you formulated the statement correctly–the command executes, clearing the screen and bringing up the selected data. You can also read in SQL statements from ASCII text files and create and store macros–complete with run-time variables and simple branching.

You supply your own text editor to construct SQL queries in *Ingres*. You can call up the outside program from within *Ingres*, and when you've finished typing and saved the command file, *Ingres* returns you to the main menu. Massaging data, changing display formats, and rearranging columns is quick with *Ingres*, and the results can be dumped to an ASCII fixed-field file that other programs can pick up from the disk.

Though it doesn't provide much help with inputting SQL queries, *Informix* displays results in an interesting way. If all fields are requested, or the asterisk is used, data appears in the default entry form. If you request a subset of fields, the data appears in tabular format.

Executive Summary

Xdb

SQL data base

Sporting a PC mentality, *Xdb* is easy to use, inexpensive, quick to respond to most queries and tasks, mostly menu-driven, and fully relational. It's a good choice among SQL powerhouses if you're setting up single-user data bases or if you just want to learn SQL. It's a superb choice for experienced C, Pascal, or COBOL programmers who want to include SQL in their own programs.

Software Systems Technology
7100 Baltimore Ave. #204
College Park, MD 20740
301/779-5486
List price: $395, Xdb/Net 2.0 $995
Requirements: 512K, two floppy drives (hard disk recommended), DOS 2.00 through 3.30 or UNIX System V
Not copy protected
Technical support: $200/year; site support $2000

Performance Please

SQL statements are only as efficient as the engine that executes them. There are some instructive differences between the three products in that regard (see the PC World Evaluation for details) and some implications for their use. *Xdb,* for instance, cooks when asked to search unindexed fields, making it–like *R:base*–an excellent performer in ad hoc query situations. When an SQL query involves individual records, *Informix* retrieves it almost twice as fast as either *Xdb* or *Ingres;* this is a crucial measure for systems that involve customer inquiries.

Both *Xdb* and *Ingres* import and create indexes quickly. With applications that require frequent restructuring of data–such as mailing or membership lists–rapid indexing is important. Unlike the notoriously slow *dBASE,* none of our SQL heavyweights balks at complex JOIN operations, making them adept at subtotaled quarterly reports and the like.

Building Applications

Most likely, if you're looking at relational heavyweights–SQL or otherwise–you're thinking of developing custom applications. In addition to the performance features and limits just described, menu-building functions, data verification and security features, and the ability to access procedures from other languages are important considerations.

Xdb and *Informix* include very good utilities for creating menus. A menu from either can call other

menus, SQL command files, and ordinary .EXE, .COM, and .BAT files, then return to the menu when the foreign programs finish. To create menus (or a complex, custom entry form) with *Ingres*, you need the *Ingres-4GL* package.

Xdb's built-in application language is simple but effective. It understands all the SQL commands and offers the conditional and unconditional statements familiar to every BASIC or Pascal programmer: GOTO, IF...ELSE, WHILE, and so on. Extensive debugging tools are available, and any .EXE or .COM program can be run from within the *Xdb* program.

Entry verification in *Xdb* includes all the basics: testing for minimum and maximum values, correct data types (no characters in an integer field, for example), mandatory fields (no nulls allowed), and default values. Beyond the basics, there are lookup fields, which can be chained (one field looks up another, which looks up another, and so on), multiple (where one field looks up several), or recursive (where a field uses its own name in the lookup definition). With *Xdb*, you can even specify limited-choice fields where an entry must match one of a list of acceptable values, such as blood types. The program also includes the most complete list of security features for DOS and multiuser environments.

Entry validation in *Ingres* is limited to the basic relational operators <, >, =, and so on. If you want more, you have to program it yourself using *Ingres-4GL*.

Informix, like *Xdb*, provides basic entry validation rules. You can define default values, specify

The Relational Heavyweights' Data Base Features

	Informix	Ingres	Xdb
Maximum records per table	A	A	B
Maximum fields per record	C	127	400
Maximum characters per record	32K	2000	32K
Maximum characters per alphanumeric field	32K	2000	1500
Maximum tables per data base	A	A	A
Number of tables per operation	D	10	360
Number of tables per outer join	D	0	0
Maximum B-tree (VSAM) indexes	A	A	400
Maximum multikey B-tree (VSAM) indexes	A	A	1
Maximum hash indexes	0	0	0
Maximum multikey hash indexes	0	0	0
Number of users	1	1	A
Run-time-only module available	E	◆	F
Maximum tables in a single form	D	10	50
Maximum lines per form	G	255	84
Maximum columns	80	175	80
Virtual calculated fields	◆	H	◆
Default calculated fields	H	◆	◆
Virtual lookup fields	◆	H	◆
Default lookup fields	H	H	◆
Underlining in forms	H	◆	
Boldface in forms	H	◆	
Inverse video in forms	◆	◆	
Subroutines/subprograms	H	H	◆
Integer variables	H	H	◆
Call procedure from DOS batch file	H	H	◆
Query result to new table		◆	◆
Outer joins	◆		
Standard deviation			◆
Variance			◆
IS NULL	◆		◆
IS NOT NULL	◆		◆
Modulo	H	◆	
Exponentiation	H	◆	◆
Square root		◆	◆
Absolute value		◆	◆
IF/NULL/THEN value	H		
IF/BOOLEAN/THEN value ELSE other value	H		
Maximum report width	A	A	1500
Maximum mailing labels	A	A	A
Escape codes to printer	◆		◆
Interrupt and resume printing			◆
Conditional printing (IF/THEN)	◆	◆	
Matrix reports	◆	◆	

Legend Information

◆ = *Yes;* an empty space means *no.*
A = Unlimited, or not limited by software but by hardware constraints.
B = 2 billion.
C = Depends on the amount of data in each field. A maximum of 32,000 fields assuming one byte of data per field or one field with 32,000 bytes.
D = Number is restricted by operating system. Specifically, the number of files that can be open at once is the restriction. The number of files that can be used by application software concurrently in DOS 2.10, for example, is 15.
E = Run-time versions available for Informix SQL ($295), 4GL ($395), and ESQL/C ($195).
F = Run-time version of SQL Engine and tools available at extra cost ($145).
G = Depends upon application. User has 64K of RAM available per form.
H = Programmable with package's Fourth Generation Language or Host Language Interface modules.

limited choices, create lookup-verify joins to check the entry against data in another table, and set up masks. You can even specify that a field convert text to all upper- or all lowercase–handy for state-abbreviation fields.

If you want real control and flexibility in designing your applications, you might consider writing applications in another language–like C or Pascal–and embedding SQL statements within it. *Informix* offers a package that allows you to write applications in C and COBOL and still use all its SQL statements. *Ingres* sells a similar package for C programs, and with *Xdb* you can get packages for C, Pascal, and COBOL.

You might consider writing applications in another language–like C or Pascal–and embedding SQL statements within it.

Sorting It Out

Looking at these three programs simply as single-user relational data base managers for the PC, it would be hard to recommend any of them over the excellent, finely tuned relational data base products already on the market.

But that is not the issue. The issue is SQL and whether these products are bringing something to the party that *R:base, dBASE,* and *Paradox* don't offer right now. The two basic advantages of SQL are the superiority of a non-procedural query language and the benefits of standardization. If you want to learn SQL–and you should, since it will be around for a long time–*Xdb* is an excellent bargain at $395. It's fast, it works, and it looks and operates like a PC program.

Oddly, given its PC orientation, *Xdb*'s manual is the worst of the lot. It assumes that you know all about the relationship between fields, records, tables, and indexes.

Informix offers the best documentation of the bunch, with clear explanations of how to perform almost all the basic *Informix* functions using direct SQL statements. These examples make a useful library of routines for your own applications. And it provides capabilities missing from *Ingres* that can be important for particular data base applications, such as larger record sizes, null values, and the quickest single-record retrieval of the three.

If standardization across machines (and across programmers) is your main goal, *Ingres* is the logical choice. With a significant share of the DEC VAX market; IBM-compatible mainframe versions running MVS, VM/CMS, and UTS; Sun and Apollo workstations; and a couple of dozen UNIX systems, *Ingres* covers the field. Every one of those installations can run the *Ingres* application you develop on your MS-DOS PC as well as read the same *Ingres* data files, no matter where that application or data file was created.

Informix also runs on a host of UNIX, VMS, MVS, and DOS machines. But what gives *Ingres* the edge for most users looking at SQL products is its ability, with the help of a communications product called *Ingres/Star,* to link all these systems in a distributed data base system.

Don't expect SQL compatibility to come cheap. A basic *Ingres* package for the PC (data base manager and the unavoidable 4GL) costs $1450. Add *Ingres/Star* for a distributed setup and routines for embedding SQL in your C programs, and the cost on the PC end will top $3000. Still, that's not much compared to the $40,000 to $80,000 in license fees you'd pay for a DEC VAX and the $100,000 to $140,000 in license fees required for IBM's SQL mainframe software.

With any luck, we'll soon see SQL-like data sharing between PC data bases. With OS/2 and many data base programs running SQL, we might even reach the point where one SQL program can pick up and use SQL data files generated by another.

William Urschel is president of Arc Tangent, a software development and marketing firm in Santa Barbara, California.

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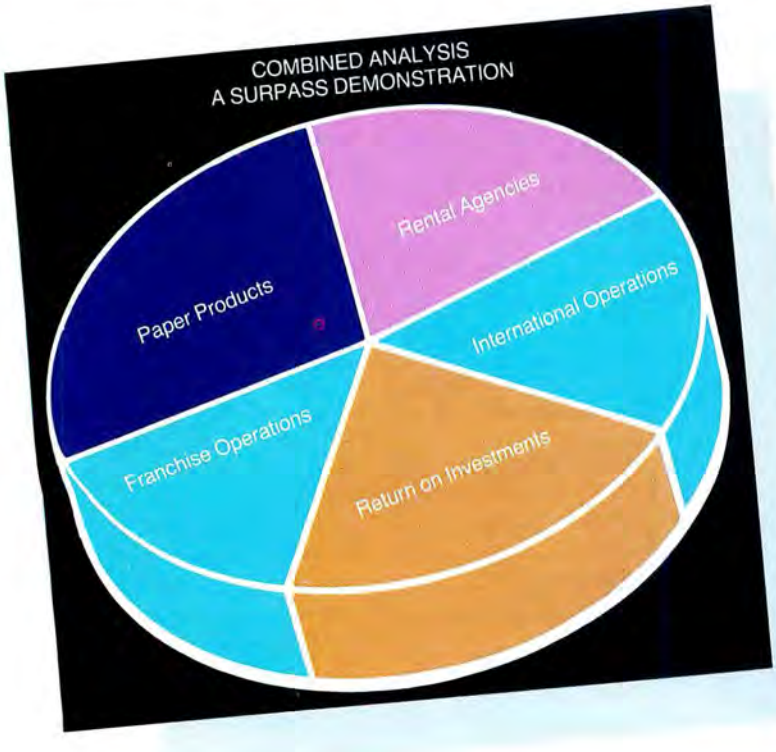

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Hot Links in Commands	✓	NO	NO	✓
Hot Links in Macros	✓	NO	NO	✓
Hot Links to Unloaded Files	✓	NO	NO	NO
Hot Links in Extended POINT Mode	✓	NO	NO	NO
View Multiple Spreadsheets in Multiple Windows	✓	NO	NO	✓
Macro Recorder	✓	NO	NO	✓
Macro Library	✓	NO	NO	✓
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 in 512K RAM	✓	✓	✓	NO

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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

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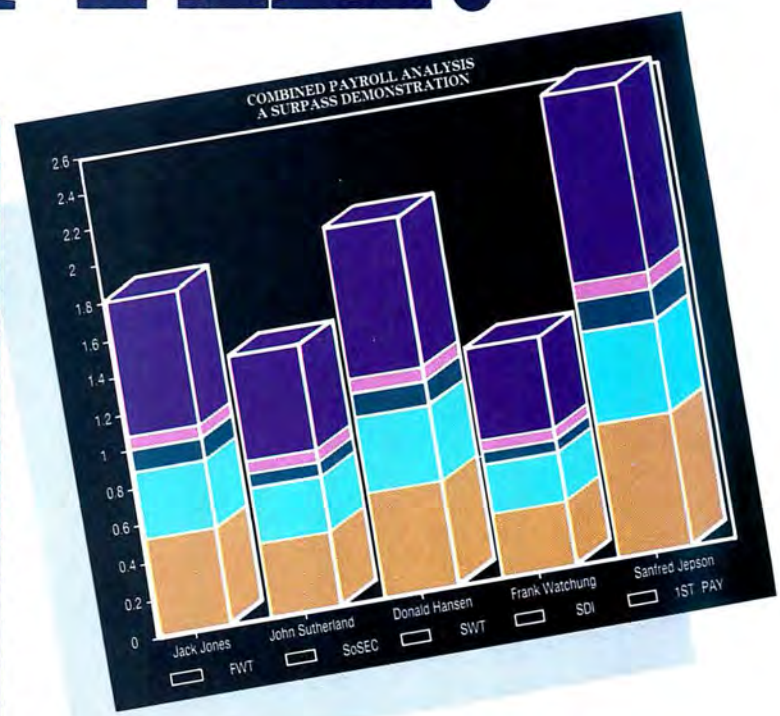

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THE HARDWARE SHELF

Edited by Michael Goodwin

This Month

THE HARDWARE SHELF

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John Greenleigh

IBM's Model 25 combines system unit and monitor in one svelte body. Aimed at the college market, it comes with DOS 3.30 and Windows.

When IBM introduced the PS/2 family of computers last spring, it was also serving notice that the Boss was back. The PS/2 family proved that IBM still had the power to set the industry standard. But Big Blue's new Model 25 may be the company's biggest faux pas since the PS/2s made their first appearance.

Clearly aimed at the lucrative (and low-end) college market, the Model 25, with its CPU and monitor sveltely packed into one small body, seems carefully calculated to resemble the Macintosh. But if comparisons must be made, the 8-MHz, 8086-based machine (with no hard disk and very limited expandability) actually resonates with the sad echo of IBM's biggest commercial flop, the PCjr—a stunted computer with limited growth capacity.

Despite Multi-Color Graphics Array (MCGA) capability, the Model 25 seems designed to dwell at the bottom of the PS/2 heap, slipping beneath the Model 30, a

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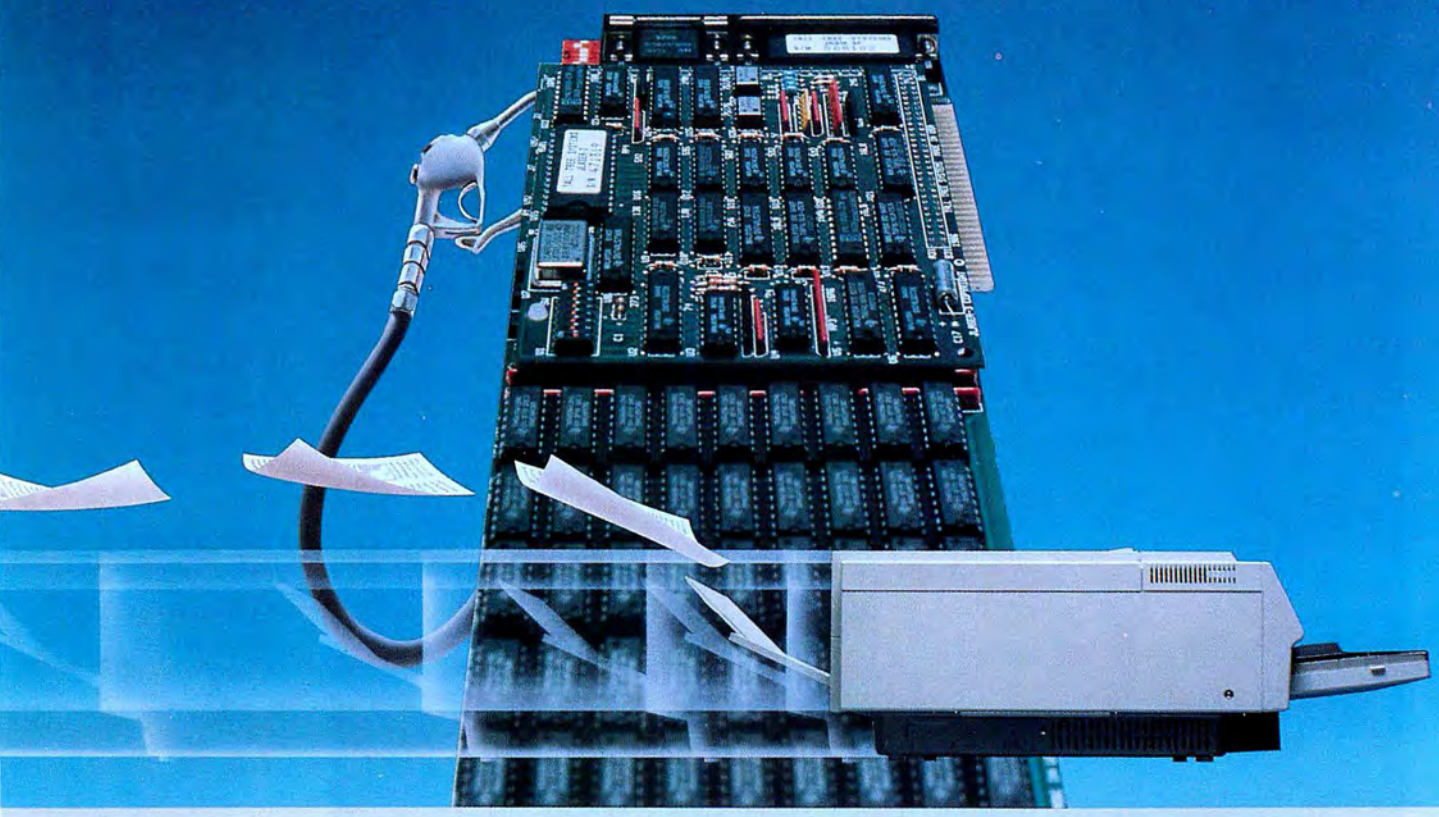

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Circle 115 on reader service card

machine best known for its slow speed (at least compared to similarly priced AT clones), low memory capacity, and painfully limited expandability. IBM has retained these undesirable qualities in the Model 25 and added more: no hard disk (nor any IBM way of adding one), plus a grand total of only two expansion slots, with uncertain support for third-party boards.

The Model 25 is a small (15-by-13-by-15-inch) 8086-based computer with a single-unit CPU and monitor. It comes out of the box with one 3½-inch 720K disk drive, 512K of RAM, a keyboard, and a 12-inch monochrome display for $1350. Upgrades include a second disk drive ($170) and a 128K memory package ($49), which brings maximum RAM to 640K. An MCGA color display and an enhanced keyboard are also available.

At the pricier end of the spectrum ($1883) is the Model 25 Collegiate package, which comes standard with 640K of RAM, two disk drives, and an IBM mouse. Add a color display and an enhanced keyboard, and the Collegiate matriculates at a cool $2273.

The Collegiate is bundled with an integrated, two-disk program that combines abridged versions of *Microsoft Windows* and DOS 3.30. Why IBM has gone to this trouble is something of a mystery, as the full-blown versions of both programs are also included in the Collegiate package. Does Big Blue think college students are too dumb to use the stand-alone programs?

What's worse is the miserly provision of only two expansion slots. To add anything to your

PC World Evaluation
IBM PS/2 Model 25

Running its 8086 CPU at a swift 8 MHz, IBM's PS/2 Model 25 leaves a "vanilla" PC far behind. WordStar performance is unimpressive, partly because of slow floppy disk access; neither machine has a hard disk.

WordStar Professional This benchmark is run from a single floppy disk. Once *WordStar Professional* version 3.31 is loaded and the benchmark file is opened, a global search and replace is performed replacing all occurrences of the word *tomorrow* with *today*. Then the cursor is returned to the beginning of the document.

1-2-3 Because no disk access is required, the *1-2-3* benchmark depends almost entirely on the processing and memory access speeds of the system. In this benchmark, a *1-2-3* macro executes a series of recalculations within a 50-by-50-cell matrix.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Philadelphia, PA. All rights reserved.

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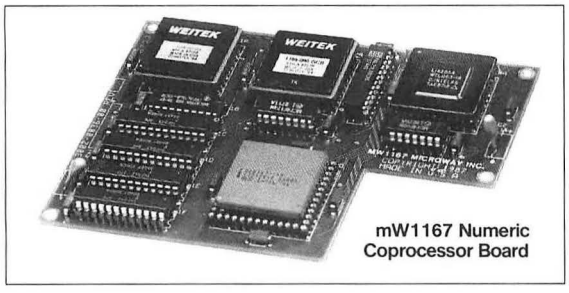

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MicroWay® 80386 Support

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NDP Fortran-386 and **NDP C-386** are globally optimizing 80386 native code compilers that support a number of Numeric Data Processors, including the 80287, 80387 and mW1167. They generate mainframe quality optimized code and are syntactically and operationally compatible to the Berkeley 4.2 Unix f77 and PCC compilers. MS-DOS specific extensions have been added where necessary to make it easy to port programs written with Microsoft C or Fortran and R/M Fortran.

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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Model 25, you must choose between two 8-bit XT-style expansion slots—one full-length, the other 8 inches long. Like the PS/2 Model 30, the Model 25 supports most, but not all, XT expansion boards. IBM offers a mixed bag of expansion boards for the Model 25, ranging from music and voice adapters to 3270 emulators—but no memory expansion or accelerator boards are available. Furthermore, IBM refuses to guarantee that *any* third-party expansion boards will work in either slot. So much for open architecture. The situation is reminiscent of the Model 30, which IBM initially declared "not expandable," only to admit later that it would accept third-party boards after all.

IBM continues its laudable policy of using the 3½-inch 720K disk as its storage medium of choice, but the lack of a hard disk for the Model 25 is a truly unfortunate design decision. Hard-disk-hungry users will have to look to third-party vendors.

Mandatory floppy disk operation not only requires the constant and annoying reinsertion of disks but also slows the Model 25 to a crawl despite its fast processing speed. *Windows* takes well over a minute just to load, and the Collegiate tutorial takes even longer. This may be carrying the Mac similarity too far; is Big Blue planning to provide a clock face to watch while the user waits for programs to load?

The Model 25 is hardly an unmitigated disaster. It offers the impressive MCGA display, which shines in 64 shades of eye-pleasing gray or, in the more expensive color version, displays 640-by-480 graphics in 2 colors and 320-by-200 graphics in 256 simultaneous colors out of a possible 262,144. And—let's face it—nobody has been able to match the quality of a genuine IBM keyboard.

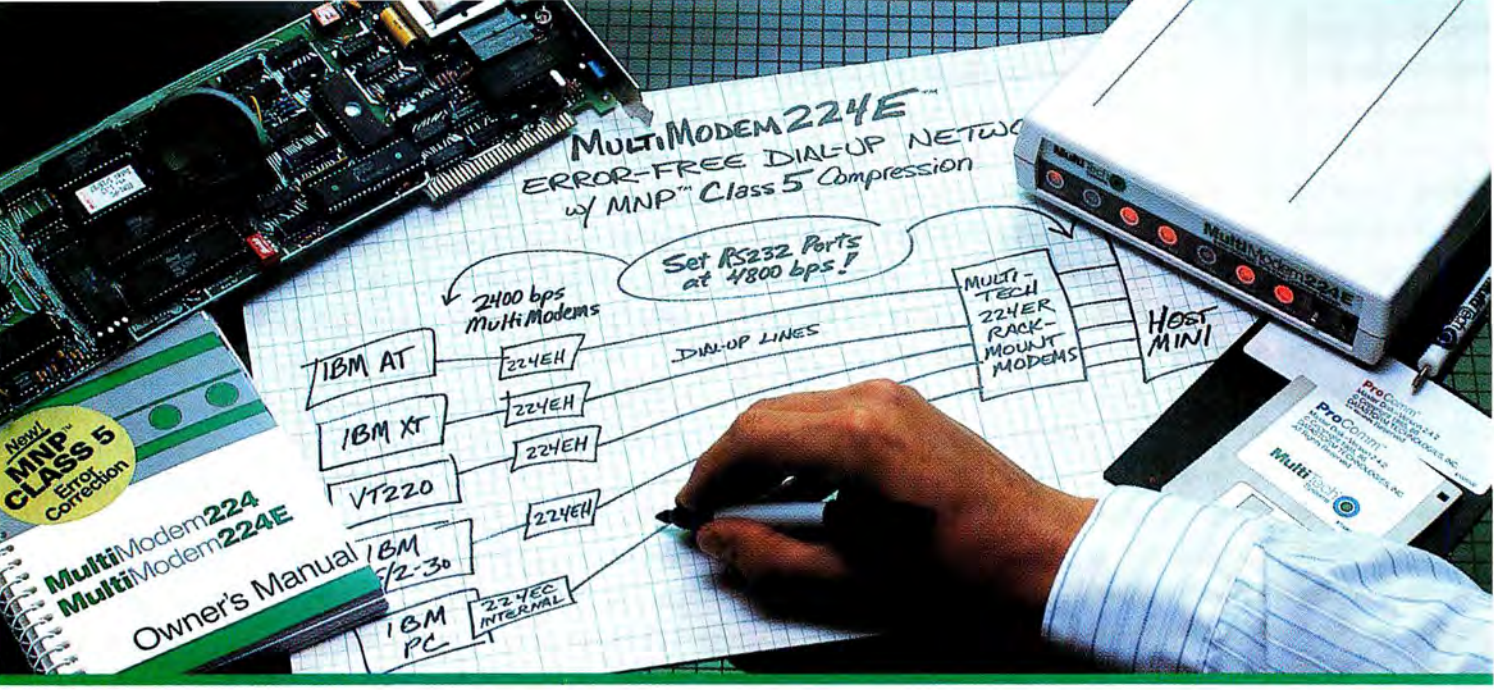
Big Blue's new Model 25 may be the company's biggest faux pas since the PS/2s made their first appearance.

Two keyboards are offered for the Model 25. A space-saving model (16 by 7½ inches) includes a cursor control pad but no real numeric keypad; you have to use the alpha keys for numeric entries. An enhanced, 101-key keyboard (19 by 8⅓ inches) incorporates separate cursor control and numeric keypads, a large <Enter> key, and a row of function keys strung across the top. The solid feel and sound of these keyboards are a real pleasure, even after long hours of typing.

The Model 25 also gets high marks for its ease of assembly—or, more accurately, nonassembly. Beginning a trend that should be sustained by the rest of the industry, IBM has made it possible to put this computer together without first getting a degree in engineering. Just plug in the keyboard and power cord, and you're ready to go. IBM has made things even easier by building in serial, parallel, and mouse ports and conveniently mounting the power switch on the front of the Model 25, as it does on all PS/2s. Documentation is easy to read, with simple setup instructions and some well-written tutorials.

It doesn't take a Rhodes scholar to see that a fully equipped Collegiate Model 25 compares quite poorly with a similarly priced AT compatible possessing a hard drive, more memory, and greater expandability. And while the tiny footprint is nice, desk space isn't *that* big an issue; most college students are smart enough to create a zero-footprint option by picking up a couple of long cables and stashing an AT system unit under their desks.

Some members of the PS/2 family have garnered well-deserved praise for their achievements. Unfortunately, the Model 25 isn't likely to join them on the dean's list. Plenty of incoming freshmen may be interested in a small, simple, powerful computer with a handy batch of bundled software, but the Model 25 just doesn't make the grade. *—Paul Meyers*



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In the May 12, 1987 edition of PC Magazine where 87 modems were reviewed, only three were awarded *Editors Choice*: "For a high-performing 2,400-bps modem with a slew of extras, check out Multi-Tech Systems' MultiModem224E... with [its] high immunity to line noise and the extra advantage of MNP error correction, [this modem] should do a fine job of managing fast, error-free data communications."

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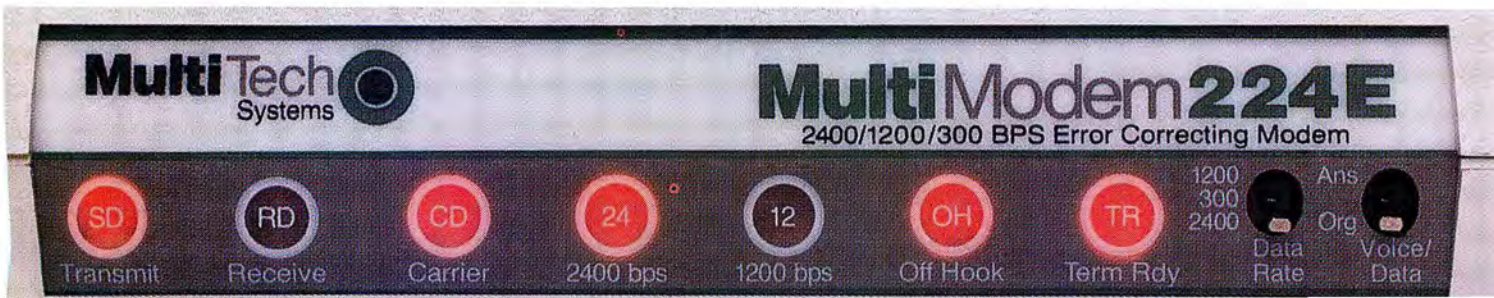

Zenith Z-386 Model 40

386 system

Pros: *Built-in VGA graphics, three open 32-bit slots*
Cons: *Mediocre keyboard, inconvenient internal design*

Zenith Data Systems
1000 Milwaukee Ave.
Glenview, IL 60025
312/391-8860

List price: Model 40 (with MS-DOS 3.21, 1MB RAM, 40MB hard disk, one 1.2MB floppy drive, and parallel and serial ports) $6499, Model 80 (with MS-DOS 3.21, 1MB RAM, 80MB hard disk, one 1.2MB floppy drive, and parallel and serial ports) $7499; 40MB hard disk $1699, 80MB hard disk $1999; 1.2MB floppy drive $250; 64K high-speed cache memory board $599; 1MB expansion memory board $699, 4MB expansion memory board $2199; 10-MHz 80287 math coprocessor chip $525, 16-MHz 80387 math coprocessor chip $1199

John Greenleigh

Zenith's Z-386 Model 40, with no fewer than six 32-bit expansion slots, is not cheap. But thanks to advanced design features like page mode memory access, it outpaces the Compaq Deskpro 386 at 1-2-3.

Zenith's new 16-MHz (one-speed-only) system doesn't emulate IBM's 32-bit Micro Channel, but in its own way it's just as committed to a 32-bit future. The simple fact that it provides six 32-bit expansion slots–more than any other 80386 machine–delivers an unmistakable message. Zenith has even mounted the CPU on a 32-bit board that slips into one of those slots.

Some vendors argue that right now there's little use for 32-bit slots beyond holding 32-bit memory boards with direct access to an 80386 CPU. But Zenith, like IBM, seems to be gambling that within the life span of its products there will be dual-processor boards, fiber-optic network boards, and an increasing company of other new-age expansion boards to take advantage of the 32-bit bus. The 32-bit slots are nonproprietary and accept standard 8-, 16-, and 32-bit expansion boards. When a 32-bit board is present, the system runs that slot at 16-MHz no-wait-state speed.

The Z-386 is sold in two models, and neither one is cheap: The Model 40 costs $6499, with one 40MB hard disk drive and one 5¼-inch 1.2MB floppy disk drive; the Model 80 runs $7499 and substitutes an 80MB hard disk for the 40MB. Like IBM's PS/2 line (but unlike its competitors), the Z-386 comes standard with a 31-kHz graphics adapter capable of MDA, CGA, HGC, and EGA modes, as well as the 640-by-480 16-color VGA mode. A parallel port and serial port are standard as well, along with 1MB of RAM.

Improvements in system architecture create additional time savings. Zenith has lightened the CPU's work load with page mode memory access–reading and writing to memory in large, 2K pages –thus cutting down on time-consuming memory-address calculations. Another innovation is burst mode refresh, a similar approach that refreshes one full 4K page of

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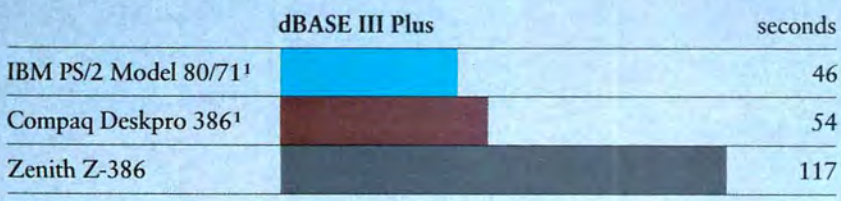
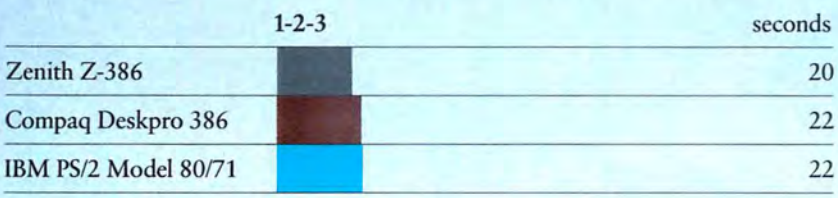
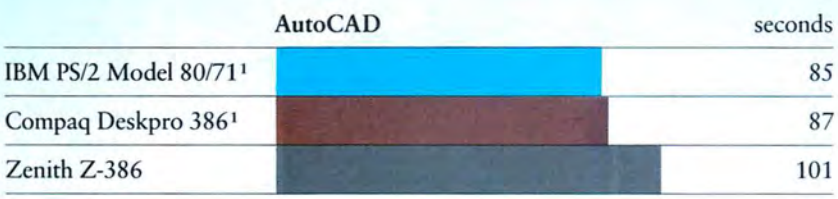
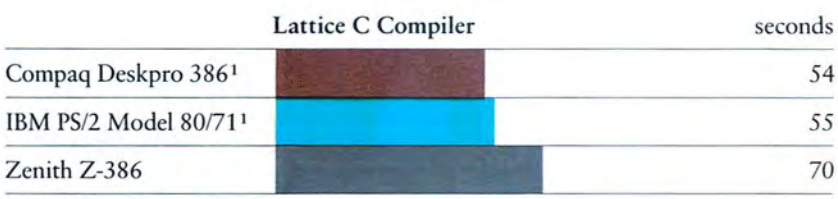
PC World Evaluation

Zenith Z-386 Model 40









[1]Tests performed with disk caching.

The Zenith Z-386 performs well in WordStar and 1-2-3 but falls behind the Deskpro 386 and the Model 80 on other benchmarks.

WordStar Professional Although disk access plays a small part in the *WordStar* benchmark, processing and memory access speeds are the most significant factors. The benchmark measures the time required to perform four operations on a 15,364-word document.

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dynamic RAM at a time instead of the usual (and slower) one-row-at-a-time method.

For an extra $599 you can add a 64K high-speed cache memory board to speed access to slower system memory. In addition, the DOS bundled with the system includes a disk-caching driver that boosts hard disk throughput even further.

The Z-386's heavy, AT-size box is identical to that of Zenith's 286 machine. The front of the unit contains the usual keylock and indicator lights. Regrettably, the power switch is small and located on the back.

When you open the system unit, you'll notice that most of the horizontal backplane is taken up by an enormous 10-slot bus. The only electronics on the passive backplane are a clock/calendar and battery, keyboard circuitry, and a power connector; the rest of the computer dwells on expansion boards. This modular approach should ease maintenance hassles and offer a smoother path for future upgrades.

The bus is home to two 8-bit slots, two 8/16-bit slots, and the six 8/16/32-bit slots. Five slots are filled by a video board, a 32-bit I/O board, the 32-bit CPU board, a 16-bit floppy/hard disk controller, and a 32-bit memory board. An optional memory cache board, which doesn't add to the RAM tally, takes up another 8/16/32-bit slot. The remaining 8/16/32-bit slots are intended for 32-bit memory boards but accept PC and AT boards as well. Memory expansion is available in 1MB and 4MB increments; you can go as high as 16MB of 32-bit RAM. An expanded memory manager that supports EMS programs is contained in the system BIOS. However, each memory card must be set to be exclusively system RAM or expanded RAM.

The CPU board provides two math coprocessor sockets, one for an 80287 and one for an 80387.

Zenith has lightened the CPU's work load with page mode memory access—reading and writing to memory in large, 2K pages.

The Z-386 has room for two floppy drives and two hard drives; with two 80MB drives installed, you can get 160MB of internal hard disk storage. The controller can handle up to 300MB if you want to use larger third-party drives. The system comes with a switchable, 195-watt power supply cooled by a relatively quiet fan. No internal tape drive is offered.

The weighty 101-key keyboard follows the standard IBM layout with a few exceptions. The <Backspace> key has expanded while the right <Shift> key has shrunk, sharing its space with a transplanted backslash key. The <Enter> key has been chopped down to enlarge the right bracket key. LED status lights are built into the appropriate keys. The touch of the keys is wobbly but sufficient.

Working inside the Z-386 is somewhat perilous. Sliding the cover on or off disconnects crucial cables almost every time, bending the connector pins in the process. Zenith warns you about this problem, but warnings are not the same as good design.

DIP-switch banks on the CPU and memory boards are difficult to get at without first pulling the boards, but fortunately a ROM-based setup program called Monitor duplicates many of the switch functions. Monitor also provides a setting that lets you throttle down to 8 MHz for timing-sensitive applications. The manual does a good job of explaining Monitor as well as explaining the peculiarities of the Z-386 itself; there are plenty of illustrations. MS-DOS 3.21 and *Microsoft Windows* are tossed in gratis.

As one of the better established brand names, Zenith should do well with the Z-386 system, especially given the system's built-in VGA-compatible graphics and generous complement of 32-bit expansion slots. But the company may run into trouble if it fails to fix some of its (admittedly minor) design flaws. Although the Z-386 is a solid contender, Zenith should remember that even the tiniest thorn can bring down the mightiest lion. *–Eric Brown*

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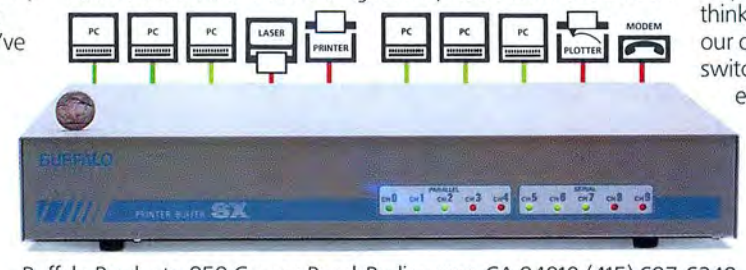

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Silent Partner BIOS 286 AT

AT-compatible system

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Cons: *Slow hard disk, no display adapter or monitor, a bit pricey*

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John Greenleigh

Silent Partner's BIOS 286 AT seems a bit pricey at $2395, especially without display adapter, monitor, or hard disk.

It wasn't so long ago that ATs were the baddest machines on the block. But nowadays, with 386s and the PS/2 family garnering all the headlines, you could get the mistaken idea that ATs and their clones have been banished to silicon Siberia.

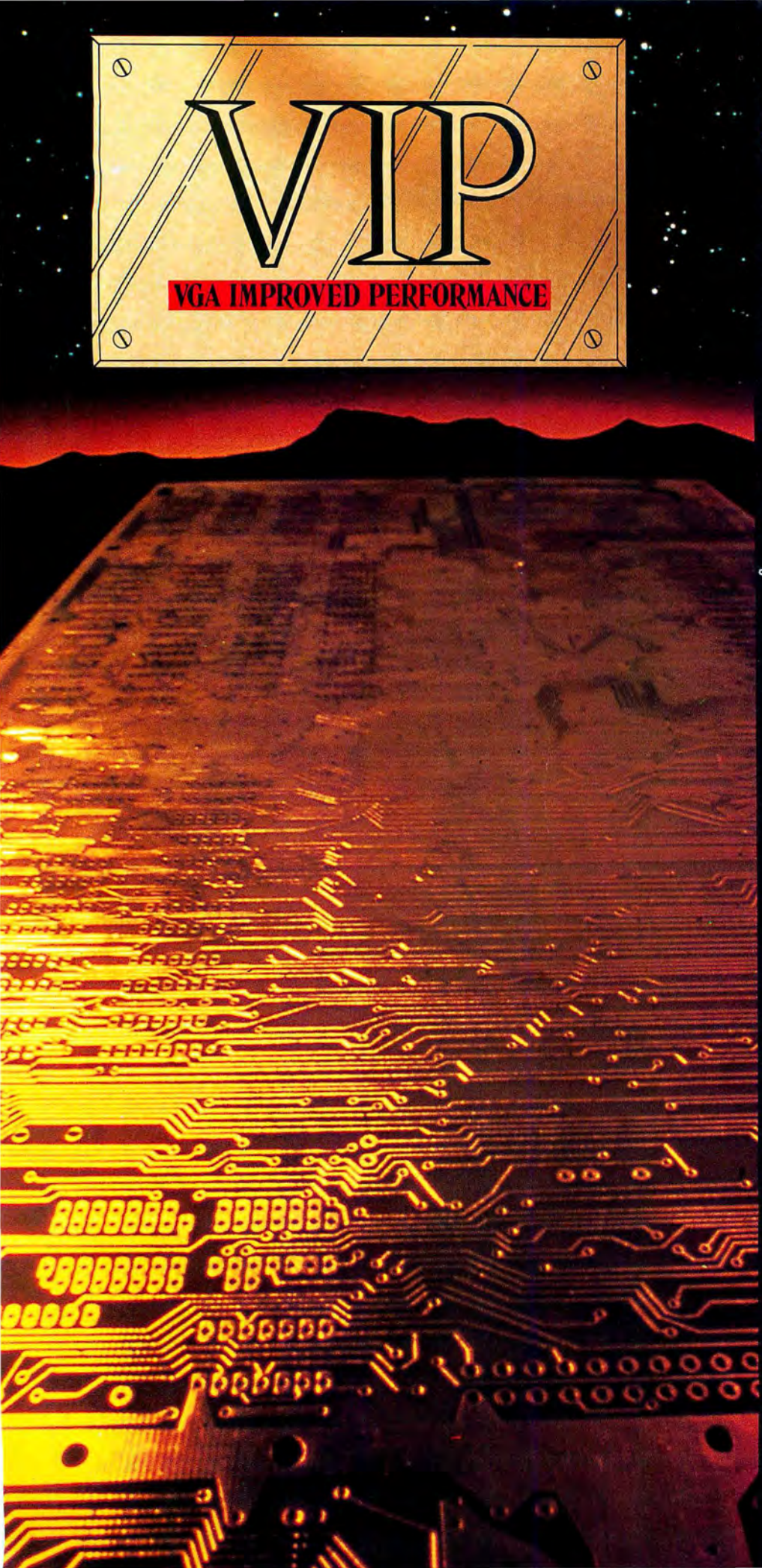
A computer like the $2395 Silent Partner BIOS 286 AT proves that at least some people think there is still a healthy market for fairly pricey AT compatibles. Designed and manufactured almost entirely by the Japanese electronics giant Mitsui (the silent partner?), the BIOS 286 AT boasts an Intel 80286 processor, which runs at a rapid zero-wait-state 8 MHz or an externally switchable one-wait-state 6 MHz.

The system comes with 640K of fast 120-nanosecond RAM and 32K of ROM (which holds a nice set of power-on diagnostics and Mitsui's own BIOS), plus a single Panasonic 1.2MB floppy drive and a 16-bit drive controller card. No hard disk, display card, or monitor is included. For an extra $300 you can get the same system equipped with an NEC half-height 20MB hard drive. While the price for the hard disk upgrade is right, the particular model is an unfortunate choice, as the hard disk's sluggish 68-millisecond access time slows an otherwise quick machine.

Even so, in most of NSTL's speed tests, the BIOS 286 AT beats the IBM AT; poor performance on the *dBASE* benchmark reflects the BIOS 286 AT's slow disk access time. The BIOS 286 also passed NSTL's battery of software compatibility tests with flying colors.

Externally, the Silent Partner looks like a slightly smaller AT. Its low-slung, slightly rounded frame sports a front-mounted lock and a power indicator light. A ventilator grille runs the length of the case, making it look like the front end of a '57 Buick.

The BIOS 286's interior reveals a number of clever design touches indicative of a high-quality machine. For instance, whereas in most machines, keyboards plug directly into the motherboard, in



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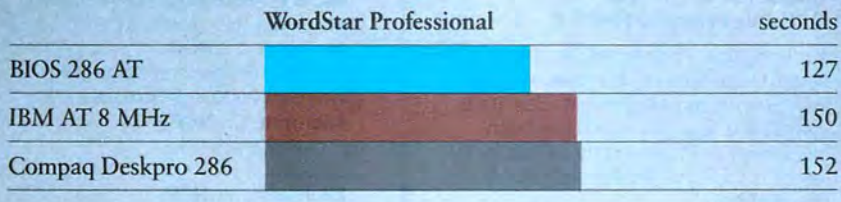
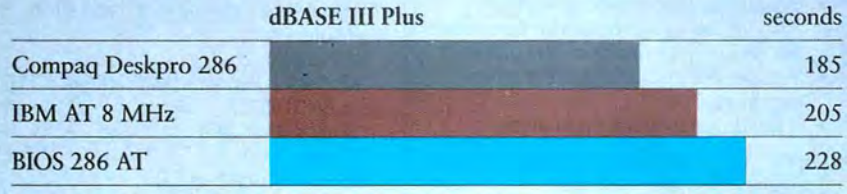
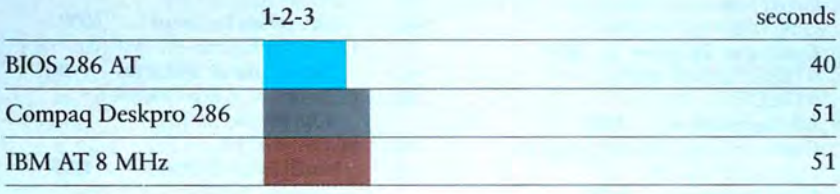
PC World Evaluation

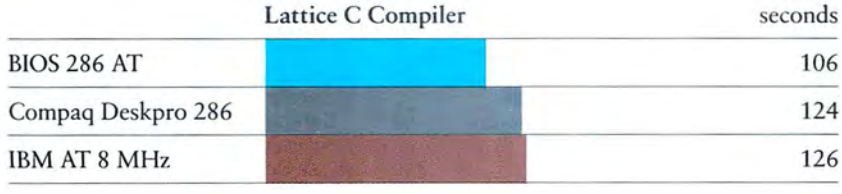
Silent Partner BIOS 286 AT

Silent Partner's BIOS 286 beats IBM's 8-MHz AT and Compaq's Deskpro 286 in four out of five tests.









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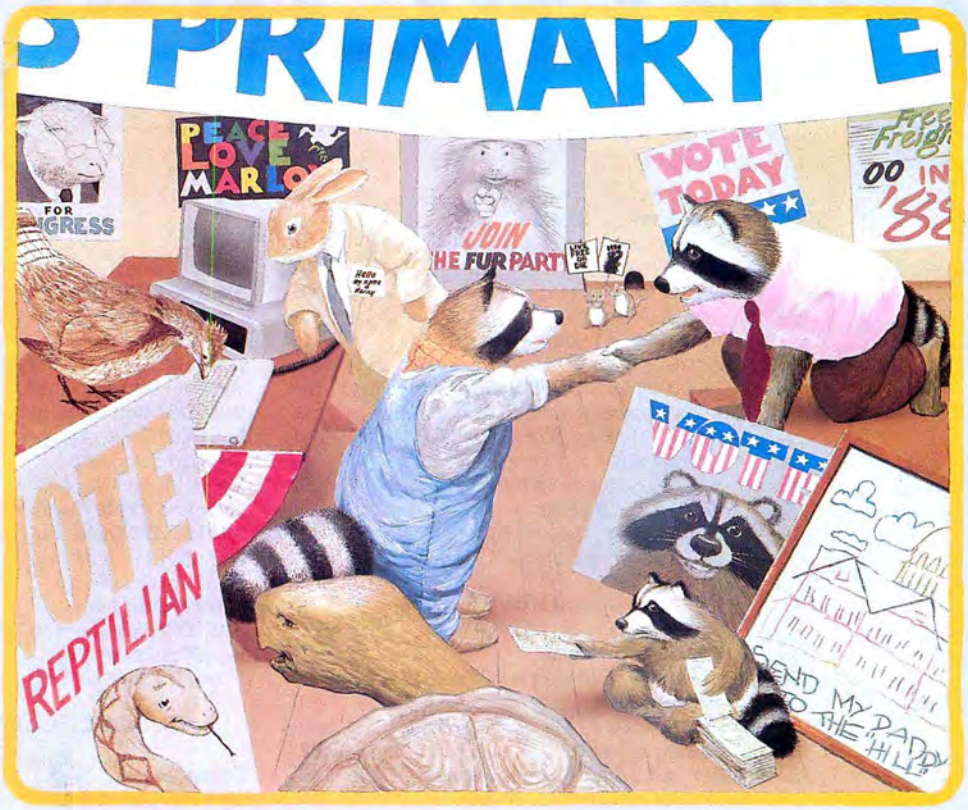

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after the sale! Ca

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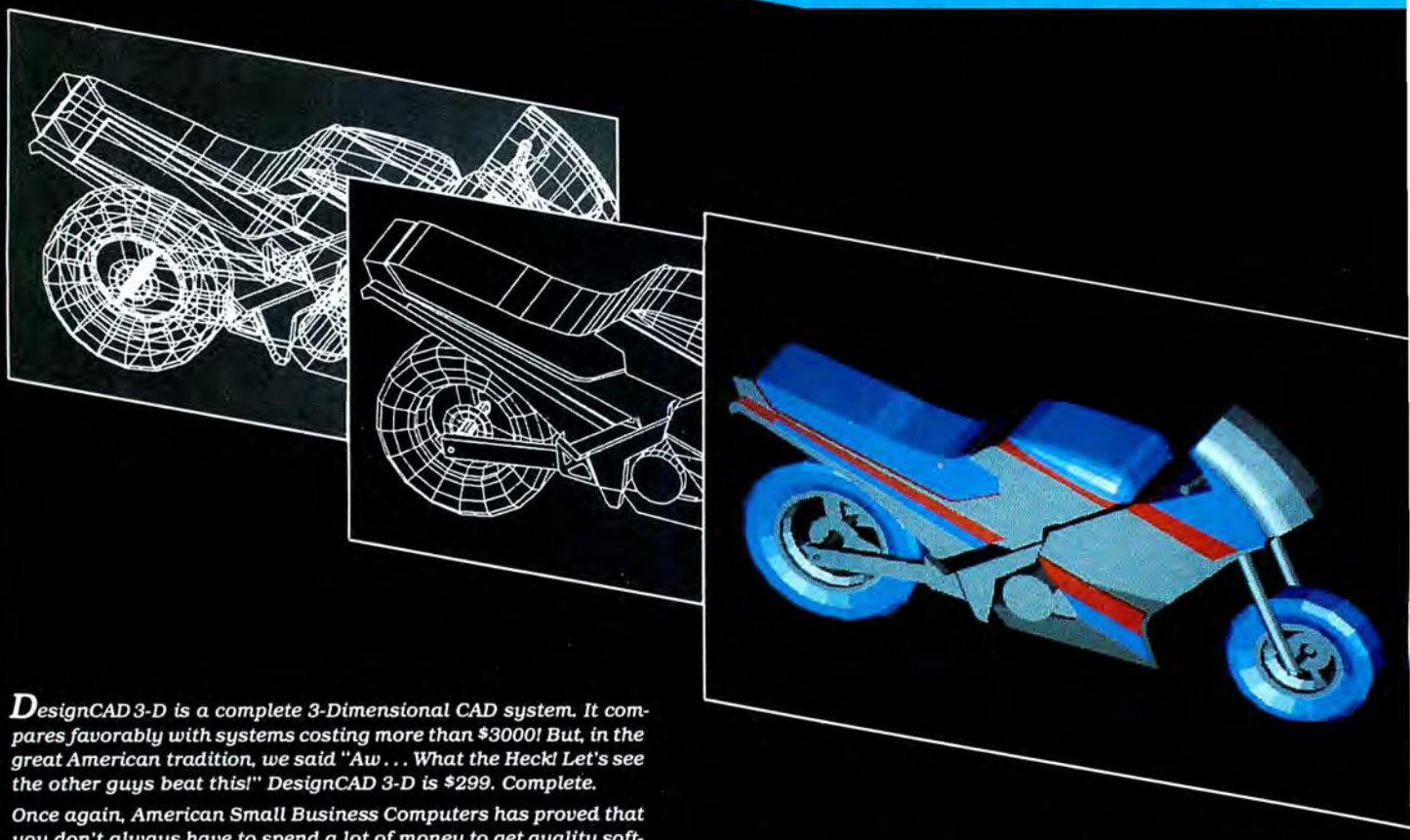
DesignCAD 3-D

3-D CAD You Can Afford



DesignCAD 3-D is a complete 3-Dimensional CAD system. It compares favorably with systems costing more than $3000! But, in the great American tradition, we said "Aw . . . What the Heck! Let's see the other guys beat this!" DesignCAD 3-D is $299. Complete.

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DesignCAD 3-D does not require expensive graphics adapters and monitors - even shading can be done on ordinary displays such as the Enhanced Graphics Adapter (EGA), Color Graphics Adapter, or Hercules monochrome adapter.

However, the best reason to buy DesignCAD 3-D is not the low price. It's not the outstanding performance. It's not the extensive hardware compatibility. The best reason to buy DesignCAD 3-D is for its amazing ease of use!

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118 South Mill Street
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Circle 306 on reader service card

the BIOS 286 AT the connection is made via cable, avoiding undue strain on the motherboard. Standard parallel and serial ports, a dual-battery-powered clock/calendar, and an 80287 coprocessor slot round out the well-organized interior.

The case has room for four half-height drives. The machine provides two 8-bit expansion slots and six 8/16-bit slots as well, one of which is occupied by the drive controller board. An enormous 192-watt power supply hogs nearly one-quarter of the available room and accounts for the bulk of the system unit's 44 pounds. Two fans, one built into the power supply and the other mounted on the machine's front, guarantee cool (though not necessarily quiet) operation.

Like many AT compatibles on the market, the Silent Partner's 84-key AT-style keyboard feels a bit mushy to the touch. An extra-large <Enter> key and the familiar side-slung function keys keep typing simple. A 6-foot-long keyboard cable is another nice touch.

MS-DOS 3.20 is bundled with the BIOS 286 AT, along with GW BASIC, a set of well-written menu-driven diagnostics, and three better-than-average manuals. If you choose to install a faster hard disk, the folks at Silent Partner have made your job easier by equipping the diagnostics with a utility that allows you to perform a low-level format on virtually any hard drive. In addition to this relatively rare feature, the diagnostics perform system checks, park hard drive heads, and handle a variety of helpful tasks. Many other clone makers could learn a lot from the diagnostic disk that comes with the BIOS 286 AT.

Silent Partner offers a one-year parts-and-labor guarantee and 90 days of on-site service nationwide. A service contract is also available for this computer, which has been approved for Class B use by the FCC.

On the whole, the Silent Partner BIOS 286 AT seems a bit pricey at $2395, especially given its lack of a display adapter, monitor, and hard disk. The slowness of its optional hard drive is another negative factor. Still, with plenty of power and room for expansion, the Silent Partner offers a mid-range alternative to today's high-priced glamour machines. *–Paul Meyers*

Brother M-1709

Dot matrix printer

Pros: *Good print quality, reliable paper handling*
Cons: *Slow, can't set paper-mode default*

Brother International Corp.
8 Corporate Pl.
Piscataway, NJ 08854
201/981-0300

List price: including tractor and 24K print buffer $699, SF-40 + single-bin sheet feeder $179, LQ 100 font board $99.95, LQ 200 font board (includes 16K buffer) $149.95, fabric ribbon $15.95

Brother's M-1709 isn't a flashy printer. It doesn't offer state-of-the-art features, blinding speed, or

John Greenleigh

Brother's M-1709 9-wire printer doesn't offer state-of-the-art features or blinding speed. But its print quality is excellent, and its optional sheet feeder works like a champ.

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breakthrough technology. But sometimes a steady, reliable performer is just the ticket—and the Brother is clearly a no-nonsense, solid citizen.

The M-1709's print quality is excellent, considering that the machine employs a 9-pin printhead, but there's a heavy trade-off in speed. The printer takes 23 seconds to print a standard 250-word page in high-speed draft mode. The same page requires a full minute in double-strike, near letter quality mode. You'll have time for *two* cups of coffee while you wait for your printout.

The Brother includes several handy features that many printers offer only as costly add-ons, if at all. A fanfold tractor, for instance, is provided at no extra cost, as is a 24K print buffer. Another nice design feature places the printer cable on the side instead of the back, to keep it from getting tangled in the paper path. The printer shifts easily between various type pitches and line-spacing options, taking its commands from either the control panel or an application. Font cards are available to provide alternate typefaces.

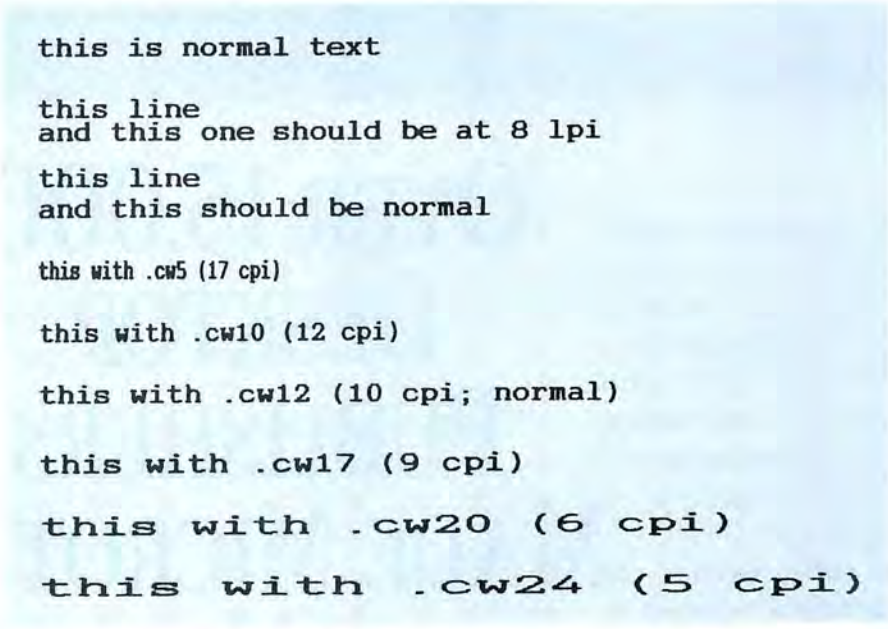
Given the improvements in printhead technology, paper handling is becoming one of the most important features users look at when buying a printer. The Brother offers several nice paper-handling features, but it has some problems too.

The Brother handles both fanfold paper and single sheets, and it seems to do so very reliably. Even the SF-40+ sheet feeder worked like a champ. Most sheet feeders are Rube Goldberg contraptions, extremely prone to jamming and misalignment; Brother's sheet feeder is slow, but during testing it did not fail once to feed a sheet into the printer and align it correctly for printing.

The downside to this broad paper-handling capability is that there's no way to set the paper-mode default (single sheet, fanfold, and so on) when the machine is turned on. Even if you habitually use fanfold paper or have a sheet feeder permanently attached, the printer powers-on in single-sheet mode only. You have to reset it manually every time. You'd think a DIP-switch setting would have been provided to set this critical function.

Like several other new printers, the Brother is designed to switch painlessly from forms to single sheets by "parking" the fanfold paper—rolling it almost all the way out of the printer so a sheet can be loaded. Unfortunately, the command sequence to make this happen is immensely complicated, with far too many button-pushes and double-clutch gear changes for daily use.

Additional design goofs: There's no handle on the paper bail, making it hard to lift. And unless you pull the single-sheet feeder forward and hold it there, you can't get single sheets into the printer.



Here is a variety of pitches and line spacings from Brother's M-1709. While not the fastest dot matrix printer on the block, the M-1709 provides highly reliable paper-handling and a super sheet feeder.

OVER 15,000 DESKTOP PUBLISHERS MADE MICROTEK #1.

More sophisticated desktop publishers are using Microtek desktop scanners with their IBM-PCs and Macintoshs than any other. This was true in 1985, 1986, and is still true in 1987! Several independent surveys have verified this.* Over 15,000 have chosen Microtek manufactured scanners.

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End Users circle 49 on reader service card

At $699 ($878 with the sheet feeder), the Brother M-1709 is hardly a bargain-basement item (although when you factor in the free tractor feed, the bottom line looks a bit better). If your printer profile includes both high print quality and a reliable sheet feeder, this unit could be just what you're looking for. On the other hand, the Brother is neither remarkably cheap nor remarkably capable. It's a decent compromise machine, but many users will prefer a low-priced workhorse or a high-end super printer. *–M. G.*

Saba PageReader

Full-page optical scanner

Pros: *Low price, recognizes formatting information, compatible with six word processors*

Cons: *Doesn't recognize proportionally spaced fonts or typeset letters*

Saba Technologies
9300 S.W. Gemini Dr.
Beaverton, OR 97005
800/654-5274

List price: $1299
Requirements: 384K, MS-DOS 2.10 or higher, hard disk with at least 2.5MB of available disk space

It's discouraging to realize how little some business practices have changed since the advent of the personal computing revolution. Despite the advances made in word processing, many secretaries, editors, and midlevel executives still spend hours retyping documents from the printed page into their PCs.

This is 1988, not 1888; keying in text more than once is time-consuming, boring, and unnecessary. With PageReader, an optical page scanner that converts most printed text into a computer file, Saba Technologies is helping to bring a solution within easy reach.

This is 1988, not 1888; keying in text more than once is time-consuming, boring, and unnecessary.

The Saba PageReader ($1299) recognizes alphanumeric characters and converts them into a text file capable of being used by most major word processors. (It also converts scanned text to a bit-mapped graphics file if desired.) The Saba uses proprietary optical character recognition (OCR) software that reads word spacing and document formatting as well as letters and numbers.

The software, which uses 270K of RAM, loads easily and remains memory-resident. To use the PageReader once it is loaded, you press a hot key to call the menu. Menu choices allow you to start and stop the scanner, select word processor or spreadsheet compatibility, change screen colors, and override automatic font selection.

The PageReader measures a mere 13 inches wide by 11 inches deep by 3½ inches high and rests comfortably on a normal desktop. A 4-foot cable connects to the PC through a half-length adapter board that can be slipped into any vacant slot.

Paper feeds in through the front of the unit, travels over a bed of rollers, and emerges from the back into a plastic recovery tray. Up to five pages may be queued for sequential scanning. (If you are very careful, you can add pages to the input stack as it dwindles.)

Scanning speed depends on the speed of your computer. It takes about 3 minutes to convert a full page to ASCII text using a PC; this drops to 1 minute per page with an AT. The PageReader can run in the background with nearly all applications; *Microsoft Word* is a notable exception. Hence, you can load the scanner with a stack of papers and start the scanning process, then exit the PageReader menu and continue to use the PC for other applications while PageReader shuffles pages in the background.

You adjust the size of the scan area using the OCR software. You can set the Saba to scan an entire page or selected portions of it. This handy feature allows the PageReader to avoid sad attempts at converting letterheads, signatures, or margins.

Like its predecessor, the Saba Handscan (see *The Hardware Shelf, PCW,* October 1987), the PageReader's OCR software uses

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pattern recognition to figure out what character it's looking at. The PageReader software includes an automatic font-finder technique to analyze the scanned text and determine which font style to use—a clever feature that saves you from having to know the difference between Pica 10 and Courier 12.

The PageReader also supports *1-2-3*, *Symphony*, *Framework*, and any other application that makes use of .WKS files. Not only does the OCR software recognize columns of numbers, but it can also strip commas, percent signs, and dollar signs from numerical strings; interpret the value as a credit or debit, using conventional accounting symbols; then enter the figures into the spreadsheet cells according to their position on the page. It even skips cells if the page layout so dictates. Scanned character strings (words) are entered as left-justified labels.

The Brother handles both fanfold paper and single sheets. Even the sheet feeder worked like a champ.

When the PageReader detects a printed character, it compares the input to previously stored patterns for the font and sends the appropriate ASCII code to the PC. If it is not sure about a scanned character, it guesses. Hence, the text file may include some garbage mixed in with good text, requiring a light massage with your word processor.

What sets the PageReader apart from the Handscan (and most other page scanners) is its ability to decipher formatting information. White areas and word spacing are measured and converted into margins, spaces, and tabs that your word processor can use to recreate the layout of the original. The PageReader's formatting ability even extends to columns, and it supports six word processors, including *Microsoft Word*, *DisplayWrite 3*, *MultiMate*, two releases of *WordStar* (3.0 and 4.0), and *WordPerfect*.

Though the Saba's promise is great, its performance gets mixed reviews. Its formatting ability worked very well, and (with the occasional exception of *Microsoft Word*) it successfully formatted pages for all the supported word processors. The PageReader's spreadsheet formatting ability was particularly impressive. The Saba's character recognition ability, however, left something to be desired. Despite its extensive repertoire of over 150 font styles, the PageReader had some trouble recognizing characters even when it accepted the font. Much of the problem can be blamed on paper skew caused by the lack of effective paper guides; frequently, rescanning the same page produced better results. The OCR software also proved inept at reading near letter quality dot matrix and laser fonts. The Saba found Epson's FX-80 NLQ 10-pitch font, which is supposed to be acceptable, completely unreadable.

The PageReader's lack of typeset text support is more serious. Unlike other scanners now on the market (most of which, admittedly, cost at least $300 more), the PageReader strikes out completely when it tries to read typeset or proportionally spaced text; its applications are thereby limited to handling typewritten pages and simple computer printouts.

The PageReader comes with an informative user manual and provides an interactive help screen that gives specific advice about topics at hand.

Saba is addressing a need many businesses have felt for years. Not only is the application right on target, so is the price. If Saba can correct its page-skew problems and provide typeset text support, it will win the heartfelt gratitude of secretaries, editors, and cost-conscious businesspeople everywhere. *–TJ Byers*

Paul Meyers is a San Francisco-based video producer and freelance writer specializing in science and technology. Eric Brown is a contributing editor for PC World. *Michael Goodwin is an associate editor for* PC World. *TJ Byers is a freelance writer and the author of* Inside the IBM AT *(McGraw-Hill, New York, 1986).*

THE SOFTWARE SHELF

Edited by William Rodarmor and Scott Spanbauer

This Month

THE SOFTWARE SHELF

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VP-Graphics

Drawing and 1-2-3 graphics enhancement program

Pros: *Fast; inexpensive; large virtual screen*

Cons: *Small symbol library; no user-definable grid; limited to .PIC files; some bugs*

Version 1.0
Paperback Software
2830 Ninth St.
Berkeley, CA 94710
415/644-2116

List price: $99.95
Requirements: 384K, one disk drive, DOS 2.00 or later version, graphics adapter
Not copy protected

It was only a matter of time before Paperback Software brought its inexpensive disk-in-a-book marketing approach to presentation graphics. The result, *VP-Graphics,* is a capable, object-oriented graphics program that gives beginning and intermediate graphics users state-of-the-art tools for creating charts and simple drawings, adding text to graphics, and enhancing *1-2-3* charts. Advanced features include a built-in spreadsheet for generating graphs and a

Phillip Anderson

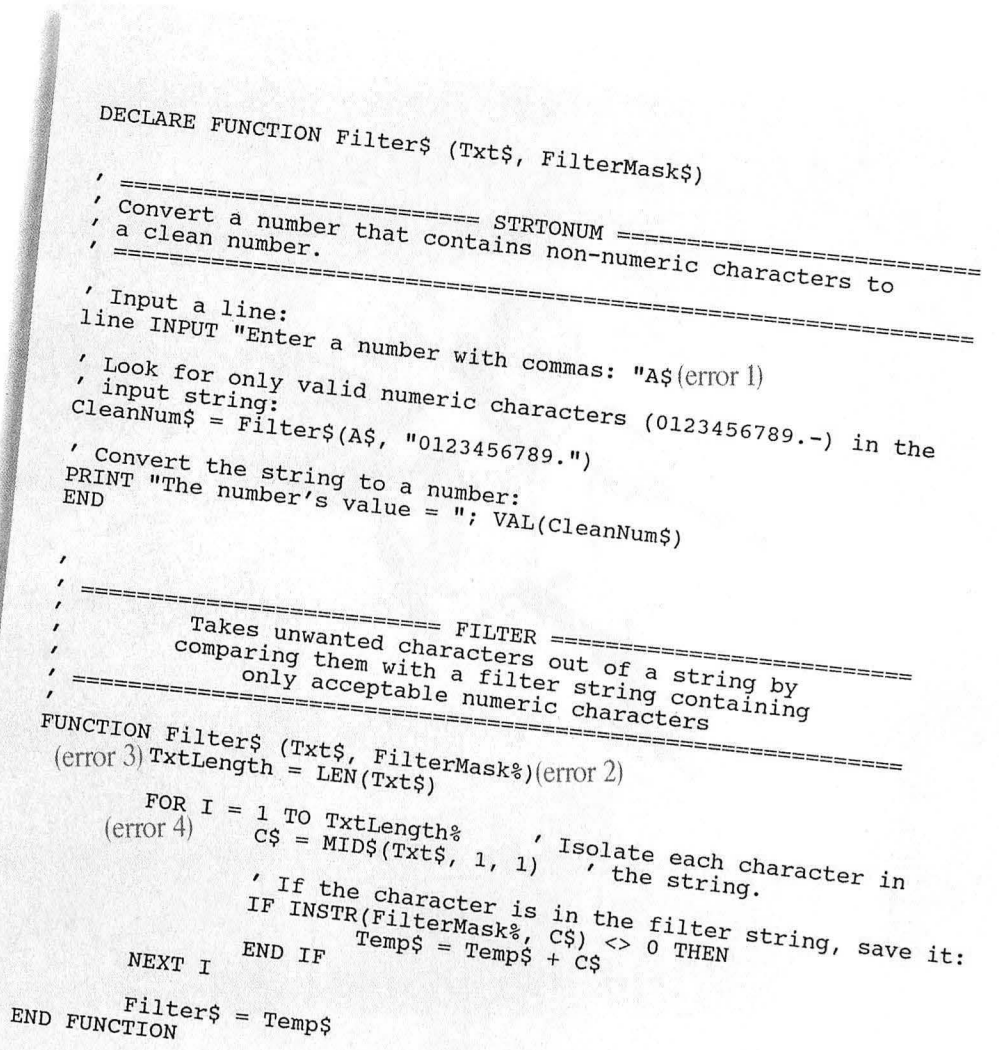
virtual screen mode that allows you to work on multiple drawings, scoot among them, and easily print them in any combination.

Of course, *VP-Graphics* can't compete with more expensive programs such as *Freelance Plus*. It lacks a user-definable grid for detailed work, and the program's library of 30 symbols is far too skimpy. Not only is the program limited to enhancing *1-2-3* graphs, it also uses a proprietary graphics format that is incompatible with *Ventura Publisher, PageMaker,* and other desktop publishing packages. And like most newborn products, *VP-Graphics* is plagued with some nettlesome bugs—in particular, one that can destroy data when you flip between Zoom and Max views in the virtual screen mode.

Nonetheless, *VP-Graphics* offers a truckload of features for a pittance. Drawing tools include line, box, rectangle, and ellipse functions; and you can further enhance drawings (or imported images) with drop shadows and numerous shadings. Four line styles, three line widths, single and double arrows, and eight fill patterns are also thrown in for good measure.

VP-Graphics' text function is equally impressive. You can choose between six fonts in seven point sizes, including the Greek alphabet for mathematical and scientific applications. Unlike most graphics programs, *VP-Graphics* allows you to enter as many as 255 characters on a single line, instead of the usual 80. And if you need to generate a graph but don't have *1-2-3*, simply turn to *VP-Graphics*' 15-column by 1024-row spreadsheet. The spreadsheet offers a similar range of graphing functions and works easily with data in ASCII or DIF format.

Speed is another plus. *VP-Graphics* is compiled in Turbo Pascal, and drawing and editing functions execute quickly even on an 8088-based PC. You can select program options and manipulate images with cursor keys, or you may speed your mouse to run at nearly 32 times its normal pace. With a little practice, you can import a *1-2-3* bar chart and spruce it up in less than 10 minutes.



```
DECLARE FUNCTION Filter$ (Txt$, FilterMask$)

' ========================== STRTONUM ============================
' Convert a number that contains non-numeric characters to
' a clean number.
' ================================================================

' Input a line:
line INPUT "Enter a number with commas: "A$(error 1)

' Look for only valid numeric characters (0123456789.-) in the
' input string:
CleanNum$ = Filter$(A$, "0123456789.")

' Convert the string to a number:
PRINT "The number's value = "; VAL(CleanNum$)
END

'
' ========================== FILTER ==============================
'       Takes unwanted characters out of a string by
'       comparing them with a filter string containing
'             only acceptable numeric characters
' ================================================================
FUNCTION Filter$ (Txt$, FilterMask%)(error 2)
(error 3) TxtLength = LEN(Txt$)

      FOR I = 1 TO TxtLength%          ' Isolate each character in
(error 4)     C$ = MID$(Txt$, 1, 1)     ' the string.
            ' If the character is in the filter string, save it:
            IF INSTR(FilterMask%, C$) <> 0 THEN
                  Temp$ = Temp$ + C$
            END IF
      NEXT I

      Filter$ = Temp$
END FUNCTION
```

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Let alone give you the incredible ability to edit and continue. For example, you can step through the FOR loop, go back and correct *TxtLength*'s missing "%" (error 3), then resume execution from that very statement.

Or allow you to monitor the changing value of *Temp$* until you locate the especially subtle error number 4—the proper function call is *MID$ (Txt$,* I, *1)*—and, via our on-line help, confirm the fix by displaying MID$'s syntax at the touch of a key.

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If you've used any contemporary graphics programs, you'll feel right at home with *VP-Graphics'* pulldown menu system. You tap commands by pointing and clicking or by selecting them in *1-2-3* fashion. As you might expect, selecting a menu produces a list of options, which in turn leads to dialog boxes where you specify program settings.

Image manipulation also follows standard conventions. To select an image, place the cursor in the center of the object and click the mouse or press <Enter>; the object is then framed by small blocks called handles. To move it, hold the mouse button down and drag the framed object to its new location. To resize the image, grab a handle and pull.

A similar procedure invokes an extremely useful feature called *fencing,* which lassos several objects at once. Other functions split up associated objects and pull widely distant images together. You can also select pictures hidden behind other objects, rotate or flip them, or create mirror images. Sophisticated polyobject functions let you reshape polygons, smooth and unsmooth polylines (which might represent, say, coastlines on a map), and convert a series of polylines into a polygon.

Still, the lack of a user-definable grid is regrettable. The program's default grid lays down invisible lines ¼ inch apart with snap points every ⅛ inch, making precision drawing difficult. You can disable the snap points, but without a finer grid you might as well be drawing in the dark.

But few graphics programs offer an extraordinary feature like *VP-Graphics'* 16-page virtual screen. With a canvas this big, you can use objects from one page as building blocks for drawings on another or, if you're ambitious, paint whole murals by creating multiple-page drawings and taping the printed pages together.

You can gain different perspectives on the action by zooming in and out with commands in the View menu. For example, the Zoom to Max function elevates you to an eight-page view of the virtual screen. Unfortunately, dropping back down to the default half-page view is tedious work. You can't just select the view from the View menu but must instead plow through every zoom level and endure innumerable screen redraws.

The Zoom to Max mode also harbors a serious bug. Although you can create and edit objects in the mode's eight-page screen, you do so at your own risk. Often, when you fence several objects and attempt to resize them, the program kicks you out to DOS. As you stare at the 'Fatal Error in VP-Graphics' message, you suddenly realize you've lost your data.

VP-Graphics' file handling can be just as fluky. The Open and Save functions work well enough, but Append drops data only into the first virtual screen. If you import a standard *1-2-3* .PIC file, the program places the image in the lower left section of the current drawing screen, forcing you to move the chart or reorient the screen. Worse still, import a *1-2-3* pie chart in *VP-Graphics'* "compressed" mode and the result is digital garbage.

The 16-page virtual screen is one of the most powerful features of VP-Graphics. This screen shows an eight-page slice of the virtual screen, invoked by the Zoom to Max function.

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VP-*Graphics* supports a respectable though not exemplary list of output devices, including the Epson line of printers, two plotters, the Polaroid Palette film recorder, the HP LaserJet and Series II, and PostScript devices. The program's context-sensitive on-line help is a reliable reference for most program operations, and the user manual is reasonably complete, though it fails to mention the program's skimpy symbol file.

Considering its low price, speedy performance, mini-spreadsheet, and virtual screen, *VP-Graphics* could well give Paperback Software a fair slice of the low-end business graphics market. But first, Paperback Software should broaden *VP-Graphics'* horizons by opening the package to graphics produced by other programs and by using a popular file format that desktop publishing programs could readily use. *–Alan Southerton*

The Norton On-Line Programmer's Guides

Pop-up programmers' reference library

Pros: *Exhaustive on-line help for users of programming languages*
Cons: *Many popular compilers not supported*

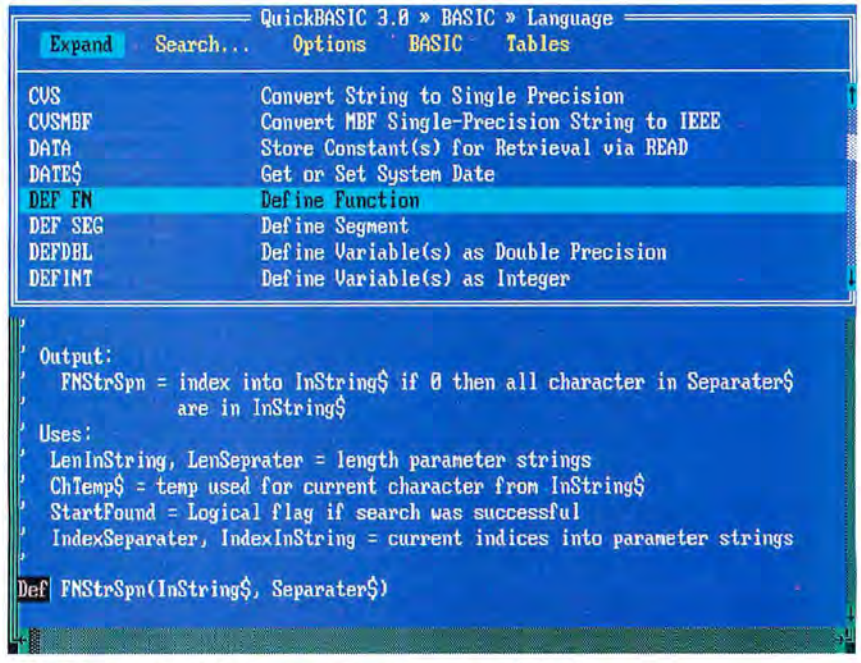
Version 1.0
Peter Norton Computing
2210 Wilshire Blvd. #186
Santa Monica, CA 90403
213/453-6398

List price: Instant Access Program $50, data bases $50 each
Requirements: 70K, one disk drive (assembly data base requires 600K disk space), DOS 2.00 or later version
Not copy protected

If you've ever done any programming, you know how much time you can waste thumbing through manuals. Few programming manuals are adequately indexed or organized, and they often are so crammed with minutiae that tracking down a fact can be a nightmarish waste of time. That is, unless you have *The Norton On-Line Programmer's Guides,* Peter Norton's on-line equivalent. *Guides* is a memory-resident, context-sensitive reference program that offers definitions and cogent programming examples at the press of a key for those using assembly language, BASICA, Turbo BASIC, QuickBASIC, QuickC, Microsoft C, and Turbo Pascal. If you work in one of the supported languages, *Guides* is a dream come true.

To get on-the-spot help with a command or expression, simply place the cursor on the item, press *Guides'* redefinable hot key, and a windowful of appropriate definitions and examples appears. To tap more extensive help (up to five screens' worth), select the Expand command from *Guides'* simple pulldown menu. If you quit *Guides,* pressing the hot key again displays the last screen viewed–just in case you didn't commit it to memory.

The key *Guides* module is the Instant Access Program, a memory-resident component that taps



The Norton Guides' pop-up programmer's help utility searches its files for the program statement the cursor is placed on. The Expand command provides a more thorough description of the statement and its uses, often several screens long.

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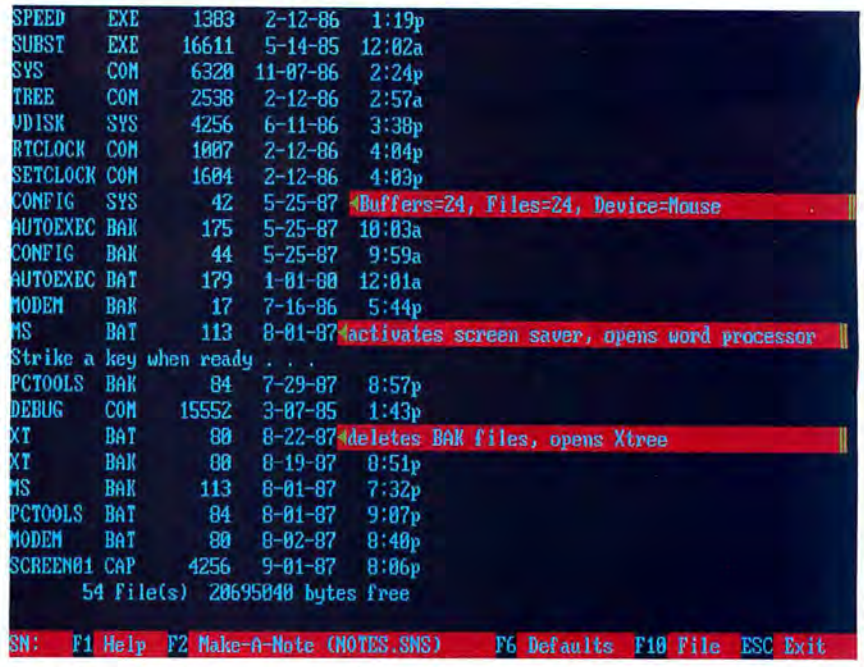
into the specialized programming language data bases you've installed on disk. The *Guides* data bases are remarkably complete, including lengthy definitions of program statements, operators, data types, and structures. Compiler listings include compiler directives, errors, I/O errors, runtime errors, predefined identifiers, and reserved words, while the assembly language data base lists relevant assembler directives, opcodes, DOS service calls, and ROM BIOS calls. All the data bases include ASCII, line drawing, and keyboard scan code tables, and other data tables specific to the particular language.

If that's not enough, you can even use *Guides* to create custom data bases. The process isn't particularly speedy, but programming shops with frequently used in-house function libraries may want to develop specific help screens for their staffs. Another likely use is creating custom data bases for customers. Although the *Guides* documentation makes no mention of license agreements, Norton Computing says it is generally willing to work with interested programmers.

Like other Norton products, *Guides* is comprehensive and easy to learn, but not particularly cheap: The access program costs $50, as does each data base. By contrast, Santa Rita Software sells its *Resident Expert* shell program along with a DOS data base for $19.95; additional data bases cost either $19.95 or $39.95. *Resident Expert* also offers help for users of Microsoft C, Turbo C, Turbo Pascal, and assembly language but, unlike *Guides*, supports only one compiler per data base and doesn't support any BASIC compilers. However, Santa Rita does support some popular compilers that Norton chose to ignore: Lattice C, Mark Williams' Let's C, Logitech Modula-2, and Borland's Turbo Prolog.

If you use one of the languages *Guides* supports, the $100 price is a cheap way to increase your productivity. It's certainly a great tool for those of us who can't remember everything–like where we last put the manual. *–Clifford J. Vander Yacht*



SmartNotes 2.0 lets you tag those obscure DOS batch files with one-line notes and will later display the notes automatically every time you view the directory. But beware: If you change a file's name or extension, the note will flutter away.

SmartNotes

Electronic note program

Pros: *Very convenient for annotating worksheets and DOS directories*

Cons: *Notes attached to text files tend to fall off*

Version 2.0
Personics Corp.
2352 Main St., Bldg. 2
Concord, MA 01742
617/897-1575

Requirements: 256K, two disk drives, DOS 2.00 or later version
List price: $79.95
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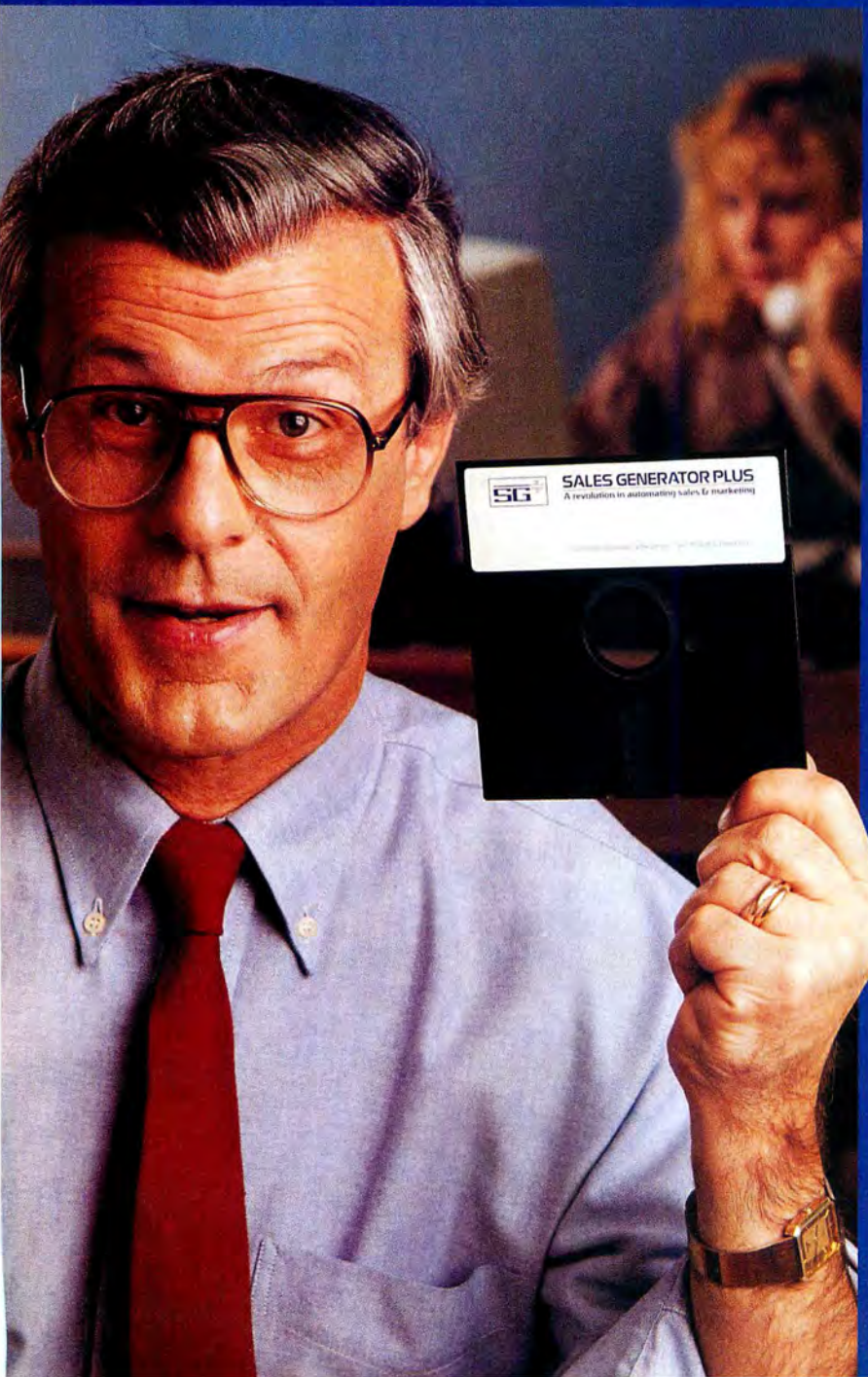

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When Personics Corporation's *SmartNotes* first hit the streets, it looked like one of the cleverest programs of 1986: a RAM-resident utility that let you annotate spreadsheets, documents, data bases, and even DOS directories with the electronic equivalent of those yellow Post-It notes.

you're not likely to stick notes on a finished document; more often you'll use them when you pass a rough draft around for comments. Personics claims that if you change the 25-character context, the note isn't lost but merely "detached." True, you can reattach the note to a new context, but

SmartNotes 2.0 *is vastly improved. More's the pity, then, that the problem of loose notes remains.*

The program, unfortunately, had a fatal flaw: a weak electronic "glue" that failed to attach the notes firmly to the text in a document. Version 1.0 attached notes by "memorizing" the note's context–the 47 characters preceding the point where it was inserted. But if you changed any one of those 47 characters in the course of editing the document, the note came unglued and drifted away. Moreover, to view notes you had to load the pertinent file. The upshot: A potentially valuable utility wound up being more trouble than it was worth.

With version 2.0, *SmartNotes* offers more notes per file, one-line notes (perfect for annotating DOS directories), and the ability to match notes with the appropriate data files and load them automatically. More's the pity, then, that the problem of loose notes remains.

Although the 47-character context has been pared down to a more reasonable 25 characters, using context as a marker is still a disastrous technique. After all, only if you notice that it's missing in the first place–and *SmartNotes* doesn't flag errant notes.

SmartNotes may have problems hanging on to text, but it's perfect for annotating worksheets; because notes are attached to cell coordinates rather than text strings, changing entries won't liberate them unexpectedly. If you want to remind yourself that a figure in your budget worksheet needs verification, press the hot key to display the *SmartNotes* menu, put the cursor where you want the note to go, and press <F2>. The program prompts you to name the note file and suggests a default name composed of the worksheet file name and the .SNS extension. Press <Enter> to accept the file name, and a blank form appears, ready to accept your note. *SmartNotes* saves the note as soon as you move the cursor away from it. The next time you load the worksheet (or any file with notes attached), the program will automatically load the note file.

SmartNotes adds several other much-needed improvements to the original. The note file capacity has been increased from 50 to 125 notes per document, and you can choose between one-, five-, and ten-line note sizes. You no longer have to press the hot key to see attached notes; the program pops them up automatically, albeit slowly. If you don't want to see notes but need to know whether they're there, you can set the program to highlight each note's context or display a marker at the note's anchor point.

SmartNotes is an easy way to annotate spreadsheets, and version 2.0 marks a vast improvement over its predecessor. But use it with text files, especially much-edited ones, and you may find yourself raking up piles of fallen yellow leaves. *–Patrick Marshall*

PrintQ

Disk-based print spooler

Pros: *Spools and prints thousands of pages of text; converts files into ASCII format for export into a spreadsheet or data base; inexpensive*

Cons: *Slower than RAM-based spoolers; conflicts with some RAM-resident programs; hot key not definable*

Version 3.1
Software Directions, Inc. (SDI)
1572 Sussex Turnpike
Randolph, NJ 07869
201/584-8466

List price: $89
Requirements: 256K, one disk drive (hard disk recommended), DOS 2.00 or later version
Not copy protected

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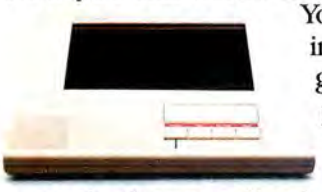

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When it comes to tying up a PC, nothing does it better than a print job. You can liberate your machine and keep the printer humming by buying a dedicated print buffer board (like the Ditron) or turning to a print spooling program that pulls the file into a reserved chunk of system RAM and runs the job in the background, freeing the PC for other tasks. Unfortunately, buffer boards aren't particularly cheap, and RAM-based spoolers are limited to available memory.

The solution? A clever $89 print spooler called *PrintQ* that treats disk storage like RAM. If the hard disk is large enough, *PrintQ* can spool up to 220 individual files totaling 64MB –nearly 40,000 pages of business correspondence.

PrintQ assumes full control over all printing tasks, printing documents in order of importance, and grouping files that must be printed on the same kind of forms.

Once *PrintQ* is loaded into memory, it waits for a program to send a print job its way, then automatically channels the data to a disk file. Pressing <Ctrl>-<Shift>-P brings up *PrintQ*'s helpful status display. Each file in the *PrintQ* directory is identified by the name of the application program that generated it (or a user-specified label) and an ID number. From a command menu at the bottom of the display, you can delete a file, hold a document for printing at a later time, and group related documents into special files called *queues*.

Whereas other spoolers print documents in a first-in, first-out sequence, *PrintQ* lets you assign each file a priority number from 1 to 9 so that important documents are printed first. If you assign files a form name, *PrintQ* will automatically print them in the same batch–a handy feature if you want to print out all your payroll checks at once, for example.

Phillip Anderson

Besides comprehensive printer control, *PrintQ* offers a number of other handy features. If it finds that the printer is off line for some reason, *PrintQ* automatically saves output to disk until the printer is up and running again. You can view reports on screen before, during, or after printing and set control specifications for each report, including the number of copies, page length, and any pauses needed for changing or aligning forms. Graphics software poses no special difficulties for *PrintQ:* It can spool *1-2-3* graphs, *PC Paintbrush* sketches, and *Chart-Master* graphics with equal aplomb.

One of *PrintQ*'s major benefits –one not anticipated by its designers–stems from the program's practice of converting spooled data into ASCII format. Instead of buying a data conversion utility or slogging through a program's complicated data export or import procedures, you simply spool the file to disk and read it directly.

Despite its strengths, *PrintQ* has some notable deficiencies. Spooling files to disk naturally

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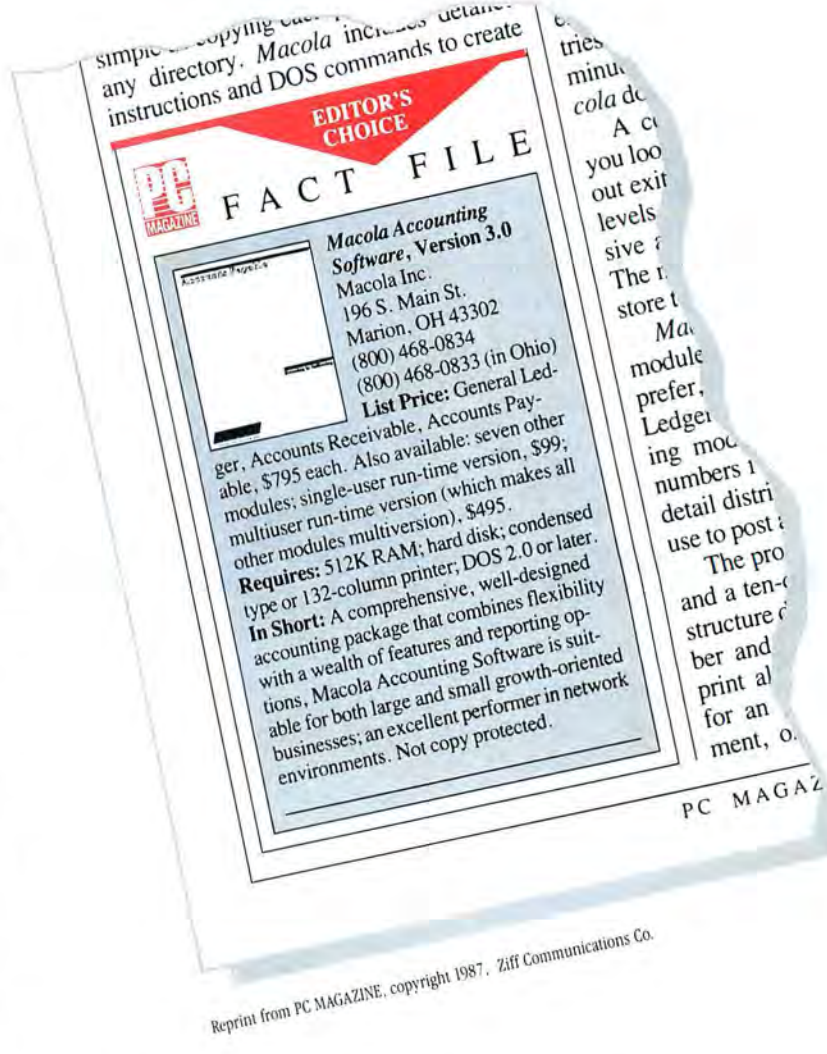
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(800) 468-0833 (in Ohio)
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takes longer than using RAM. How much longer depends on the system's microprocessor, disk drive, and application program. On an XT, for example, a typical RAM-based print spooler can write a file to RAM in 5 seconds; spooling the same file to a hard disk with *PrintQ* takes nearly 50 seconds, and printing takes about 5 minutes.

Moreover, *PrintQ* won't work with *Microsoft Windows* (though it will work with *Desqview* version 2.00), and it disdains programs such as *SmartTerm 220* and *Smartcom* that take complete control of the keyboard. It also conflicts with programs such as *Advantage Legal System* and *Computax* that print directly to a serial port memory location without relying on DOS or BIOS routines. SDI recommends loading *PrintQ* before an application—otherwise *PrintQ* may not recognize the output from the application. You must also disable any other print spooling software before using *PrintQ*.

If you need to produce a steady stream of hard copy, you'll find *PrintQ* cheaper than hardware solutions and far more capable than other print spooling programs. If you're short of RAM or money, *PrintQ* can go a long way toward keeping print jobs moving smoothly. *–Charles Kyd*

Winners & Losers

1040 tax preparation program

Pros: *Simple to use; excellent documentation and on-line help; inexpensive*

Cons: *Lacks flexibility in display and printing of results; doesn't perform all tax computations*

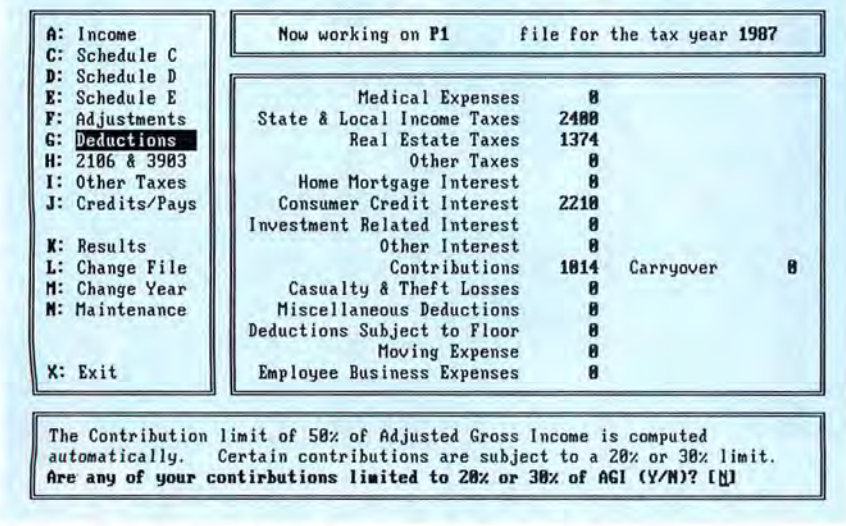
Version 1.0
Sertan Sense, Inc.
3145 Geary Blvd. #407
San Francisco, CA 94118
800/367-3058, 415/668-1299

List price: $69.95
Requirements: 256K, two disk drives, DOS 2.00 or later version
Not copy protected

Look closely at the disclaimer on any commercial tax preparation program, and you'll find a sentence that says, in essence, "We've tried our best to get everything right, but should an IRS auditor ever darken your door, please lose our telephone number." Although *Winners & Losers* issues a similar caveat, for $69.95 it gives you a handy, thoughtful package that will spare average taxpayers and small CPA firms a lot of drudgery when preparing 1040 forms. Some of the program's data entry and printing quirks may rankle power users, but complaining about software that costs so little borders on the churlish. Besides, Sertan claims that a forthcoming release will answer many of the cavils.

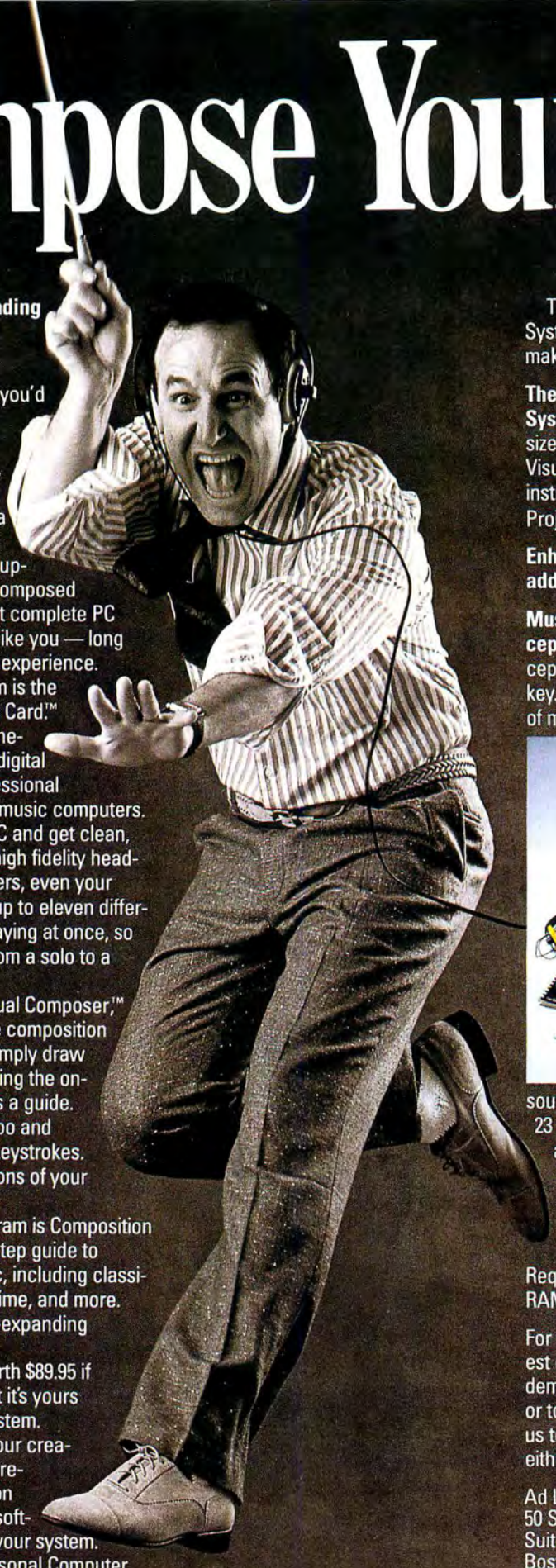
Winners & Losers presents a screen divided into a main menu, a status line indicating the current file and tax year, the data entry area, and a help screen area. In the data entry area, *Winners & Losers'* input fields are arranged in roughly the same sequence as their counterparts on the 1040 and its schedules, but they don't match exactly. This doesn't pose any problems; in fact, it streamlines input and leaves room for helpful prompts at the bottom of the screen.

Most tax programs are handicapped by line descriptions as terse as the prose on a 1040 form.



As you work through the Winners & Losers data entry screens, the program lists the items to be completed in each category—such as Deductions. Suggestions and questions at the bottom of the screen help guarantee accuracy.

Compose Yourself!



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To its credit, *Winners & Losers* warns users away from possible tax gaffes by providing concise explanations and remarkably cogent tax advice. Each input field has its own linked help message, and the display changes dynamically as you move through the data entry area. On the mortgage interest line, for example, *Winners & Losers* reminds you that your deduction may be limited if you refinanced your home after August 17, 1986.

If it does nothing else, *Winners & Losers'* modular approach simplifies data gathering. From the main menu, you can select from among nine data entry submenus, which cover subjects ranging from Income, Schedules C and D, and Adjustments, to Other Taxes and Credits and Payments. (Other submenus let you display the calculation results, change the file or tax year, and so on.) You need complete only those options that apply to your tax situation, and you can work on them in any sequence.

Data entry, however, seems to date from the PC Stone Age. The cursor only moves forward, so correcting an entry means scrolling all the way through the form, exiting, and starting from the top. How *Winners & Losers* responds to the information you enter reveals both its quirks and its talents. The program can detect and correct illogical entries, but it doesn't always resolve conflicts in the most prudent manner. For example, if you type in a name and Social Security number for your spouse, but then accidentally indicate single filing status, *Winners & Losers* will accept your secret wish and wipe out all evidence of your spouse's existence.

On the other hand, *Winners & Losers* offers one feature that even professional tax packages often lack: It limits the amount of your reportable state income tax refund to the benefit provided by the prior year's state income tax deduction. This tax benefit doesn't often apply, but the average taxpayer isn't usually aware of it, and it can have significant tax consequences.

Like *Aardvark, BNA,* and other pricey tax packages, *Winners & Losers* forces you to manually compute some entries: depreciation, gains and losses from sale of depreciable assets, and so on. The program's excellent user manual provides guidance on the figuring, though you may wish the program came with blank worksheet areas for entering the supporting computations. Sertan would do well to correct another fairly significant omission: *Winners & Losers* doesn't reduce business entertainment expenses by 20 percent for tax years beginning after 1986, as the new law requires.

Though *Winners & Losers* is a thorough tax preparation package, it isn't an A-to-Z tax planner. It automatically performs the computations relating to the phaseout of consumer interest for tax years 1987 and beyond, but doesn't compute the limitation on losses from passive activities; instead, it sends you to the manual for instructions on how to do it yourself. The omission of passive losses is understandable, since this is a notably complicated part of the tax code.

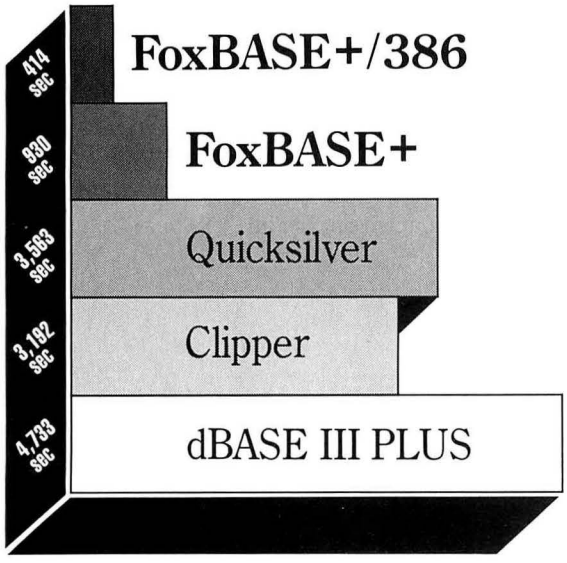
For multiyear tax projections, *Winners & Losers* allows you to use data from the prior year. However, certain items, such as itemized consumer interest, are not automatically carried forward, so you still have to review all input for the new tax year. *Winners & Losers* can display results for up to four different tax years on screen but will accept data for only one tax year at a time.

Though Winners & Losers *is a thorough tax preparation package, it isn't an A-to-Z tax planner.*

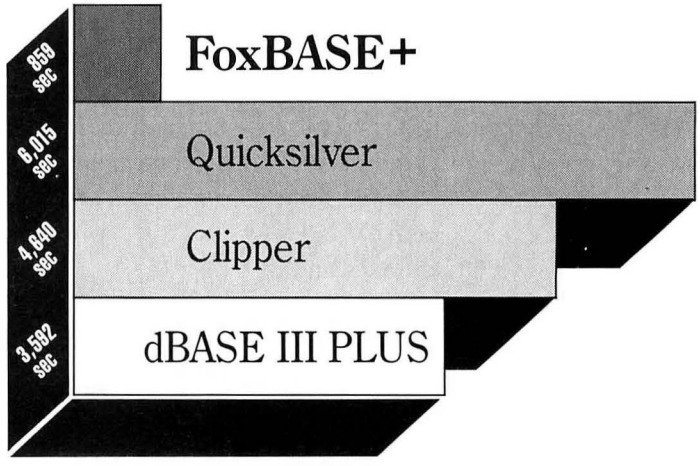
At print time, more quirks appear. Unlike some tax programs, *Winners & Losers* doesn't print its findings on official tax forms. Instead, it prints out the relevant line numbers to help you fill out the forms by hand. Stranger still, you can't abort a print job except by turning the printer off–which bounces you out to DOS. And while the program can compute the special tax on lump-sum distributions and the alternative minimum tax, the detailed on-screen computation can't be printed out. Sertan Sense claims that a forthcoming release of *Winners & Losers* will correct some of these

dBASE Users!
Independent Reviewers Say:

Nobody Beats The Fox ...Nobody's Even Close



Data Based Advisor



BYTE Magazine

FoxBASE+ Fastest By Far

BYTE* benchmarks show that FoxBASE+ takes only 14 minutes to do what dBASE III PLUS needs an hour to do. The others are even slower. Clipper needs an hour and 17 minutes. Quicksilver needs an hour and 40 minutes.

Nobody beat FoxBASE+ in ***even one*** of the 27 BYTE benchmarks.

FoxBASE+ zipped through the exhaustive Data Based Advisor** benchmarks in just 15.5 minutes. New FoxBASE+/386 ran them in only 7 minutes! By contrast Clipper took 53 minutes, Quicksilver took 59 minutes, and dBASE III PLUS took an hour and 18 minutes.

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*Using the benchmark timings published in BYTE, September 1987.
**Using the suite of benchmarks published in Data Based Advisor, March 1987.

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FAX: (419) 874-8678

Circle 68 on reader service card

flaws and also accommodate passive losses, include a pop-up calculator, simplify schedule-to-schedule movement, and accept such details as W-2 and investment breakdowns.

Winners & Losers was originally targeted at the mass market, but Sertan discovered that the program is mostly popular with professional tax preparers. One- and two-person CPA firms with few clients requiring heavy-duty tax planning can ill afford the $400 to $500 it costs to update *Aardvark* or *BNA* every year. For these professionals, *Winners & Losers* is ideal. Though inelegant in some ways, it's a program they can do business with. *–Ralph Soucie*

HQ

Desktop organizer

Pros: *Excellent Rolodex and word processor/notepad modules; convenient access to DOS commands; user can select modules*
Cons: *Limited calculator*

Version 1.0
TEK Microsystems
2067 Massachusetts Ave.
Cambridge, MA 02140
617/497-1200

List price: $79
Requirements: 92K, one disk drive, DOS 2.00 or later version
Not copy protected

HQ is a memory-resident desktop organizer from TEK Microsystems that is not unlike Lotus's *Metro*. It includes a first-class word processor/notepad, a phone book and dialer, an appointment calendar, a macro processor, access to DOS functions, and password-based security. Only the calculator seems a bit primitive. Given a chance, *HQ* will soak up as much as 130K of RAM, but as with better desktop organizers, you can load only the modules you want.

HQ's Disk Manager is designed with DOS haters in mind and offers a variety of file functions.

HQ's notepad is a *SideKick*-style text editor with several distinct advantages over *Metro*. For starters, you can save notepad files in any directory (not just in the current directory, as with *Metro*). To load a file, you needn't type in a path and file name, either–just pick the file from *HQ*'s handy directory listing.

Notepad files aren't pure ASCII text, since *HQ* adds a few file header and end-of-file codes, but *HQ* imports and exports ASCII files without problems. Within the notepad you can search for strings, cut and paste, and automatically insert date/time and memo headers. To print a notepad file, simply call up the main *HQ* menu and select Print.

HQ's appointment calendar displays two months on the left side of the screen, and the current day's schedule on the right. Like *Metro*, *HQ* lets you set an alarm on any entry in the daily schedule, but only *Metro* lets you designate how many minutes early the alarm should chime. Both packages have a zoom feature that allows you to schedule events at 15-, 30-, or 60-minute intervals, and both let you schedule events at times in between (say, 8:07).

HQ's excellent phone book displays an alphabetized name list on the left and a Rolodex card on the right, with fields for name, address, two phone numbers, and a three-line comments section. *HQ* automatically sorts the Rolodex cards on the name field and can auto-dial a number from the phone field.

One of *HQ*'s most elegant modules is its Quickkey macro generator. You can use Quickkey like a mini-*SuperKey* to assign command sequences to a single key and create named macros. Quickkey even generates on-screen menus that display macro libraries or simplify navigation around a hard disk. Most impressive is *HQ*'s ability to restrict Quickkey macros to a specific program.

HQ's Disk Manager is naturally designed with DOS-haters in mind, and the module offers a garden variety of file functions–copy, rename, change directory, and so on–plus a few extras. *HQ* will locate a specified file anywhere on disk, in any directory, even with wild-card characters. You can also format 360K and

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- **CSS data files can be as large as your operating system (DOS) allows.**
- **CSS precision exceeds the standards of all common precision benchmarks.**
- ***Technical note: The CSS user interface and all I/O were written in Assembler and bypass DOS; graphics and data management were written in Assembler and C; the computational algorithms were written in Assembler and optimized Fortran.***
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Circle 189 on reader service card

1.2MB floppy disks from within *HQ* without leaving the current application.

The only weak link in *HQ*'s chain is the calculator, which performs only standard arithmetic operations and accepts normal or Reverse Polish notation. Completely lacking are any financial functions–one of *Metro*'s fortes. To its credit, the calculator does allow you to store up to ten numbers that you can later recall in the calculator, in other *HQ* modules, or in an application.

With the spotlight firmly pointed at such big-name products as *Metro* and *SideKick Plus*, it is sometimes hard to discern excellent programs working in the penumbra. In fact, *HQ* is a standout in its field. If you're looking for extensive calculation power, *Metro* is a better choice. But in almost every other area, *HQ* performs admirably. *–Scott D. Palmer*

The MicroHelp Utility

RAM-resident utilities package

Pros: *Many useful utilities; easy to use, highly configurable; very compact*

Cons: *Command-string abbreviations can't be defined on the fly*

Version 1.10
MicroHelp, Inc.
82220 Carlyle Dr.
Marietta, GA 30062
404/973-9272

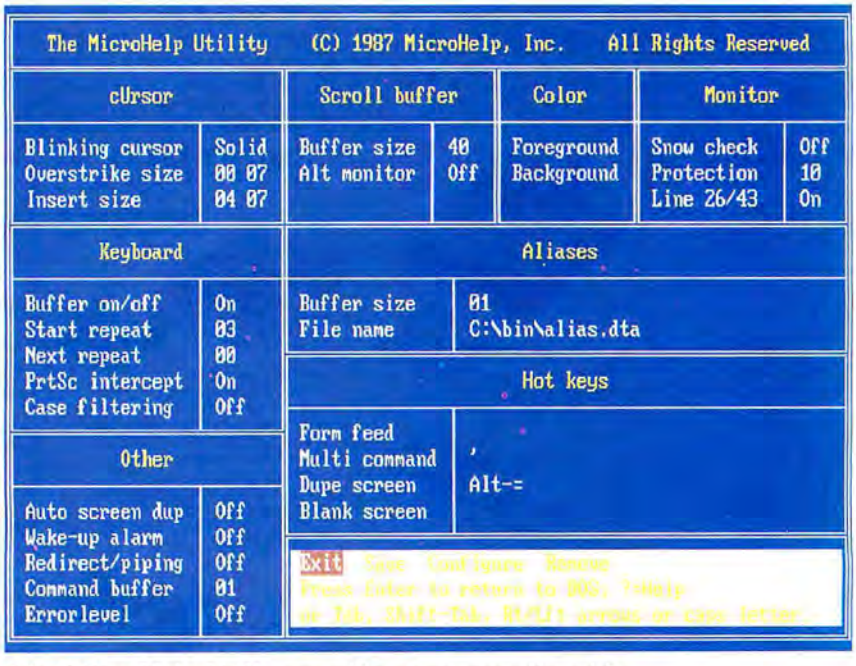
List price: $59
Requirements: 128K, one disk drive, DOS 2.00 or later version
Not copy protected

Stir a dash of *Cruise Control*, a pinch of *FlickerFree* and *Jot*, and a handful of other dime-store utilities together, and you get *The MicroHelp Utility*, a mulligan stew of programs designed to make life at the keyboard easier.

TMU, it seems, can tackle just about any problem–and it does it all for a modest investment in RAM and money. The package magnifies on-screen images, eliminates flicker, boosts cursor speed, stores and recalls text and graphics screens, lets you recall and edit DOS commands, establishes a 127-character keyboard buffer, blanks the screen, changes screen colors, intercepts print screens, creates abbreviations (known as aliases) for commonly used command strings, and acts as an alarm clock. But wait–there's more.

TMU can continuously display the date, time, and keyboard status (that is, <CapsLock>, <ScrollLock>, <Ins>, and <NumLock>) on the 26th line of a monochrome or CGA monitor or the 25th or 43rd line of an EGA monitor. The time is updated every 45 seconds.

Programmers developing software that must run on color and monochrome systems will appreciate *TMU*'s ability to display an application's output on two screens at once. You can even order *TMU* to update the secondary screen at intervals ranging from 18 times a second to 12 times a minute. The more frequent the updates, of course, the slower the product runs.



The MicroHelp Utility provides an unusually wide assortment of utilities that can be customized from this easy-to-use configuration menu.

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FH	Micropolis 1335	28ms	71MB	**$849**
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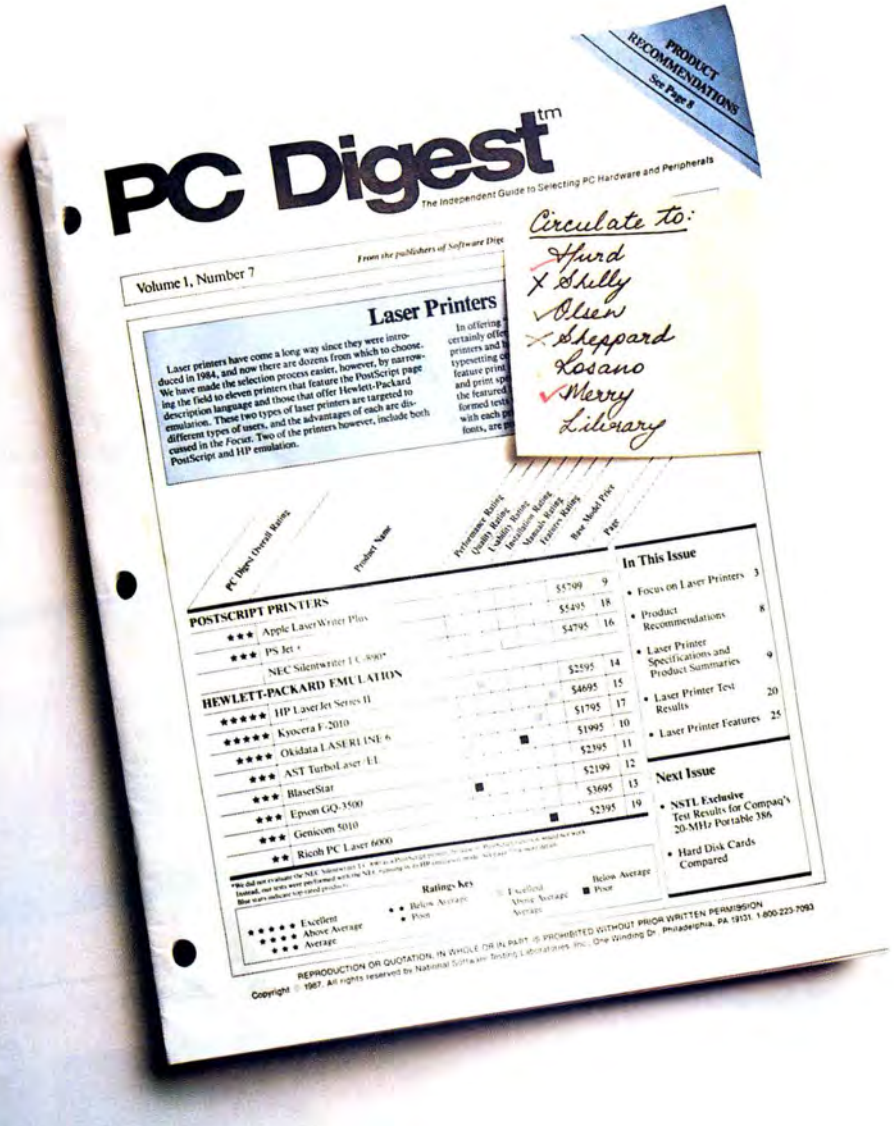
The PC manager's survival manual.



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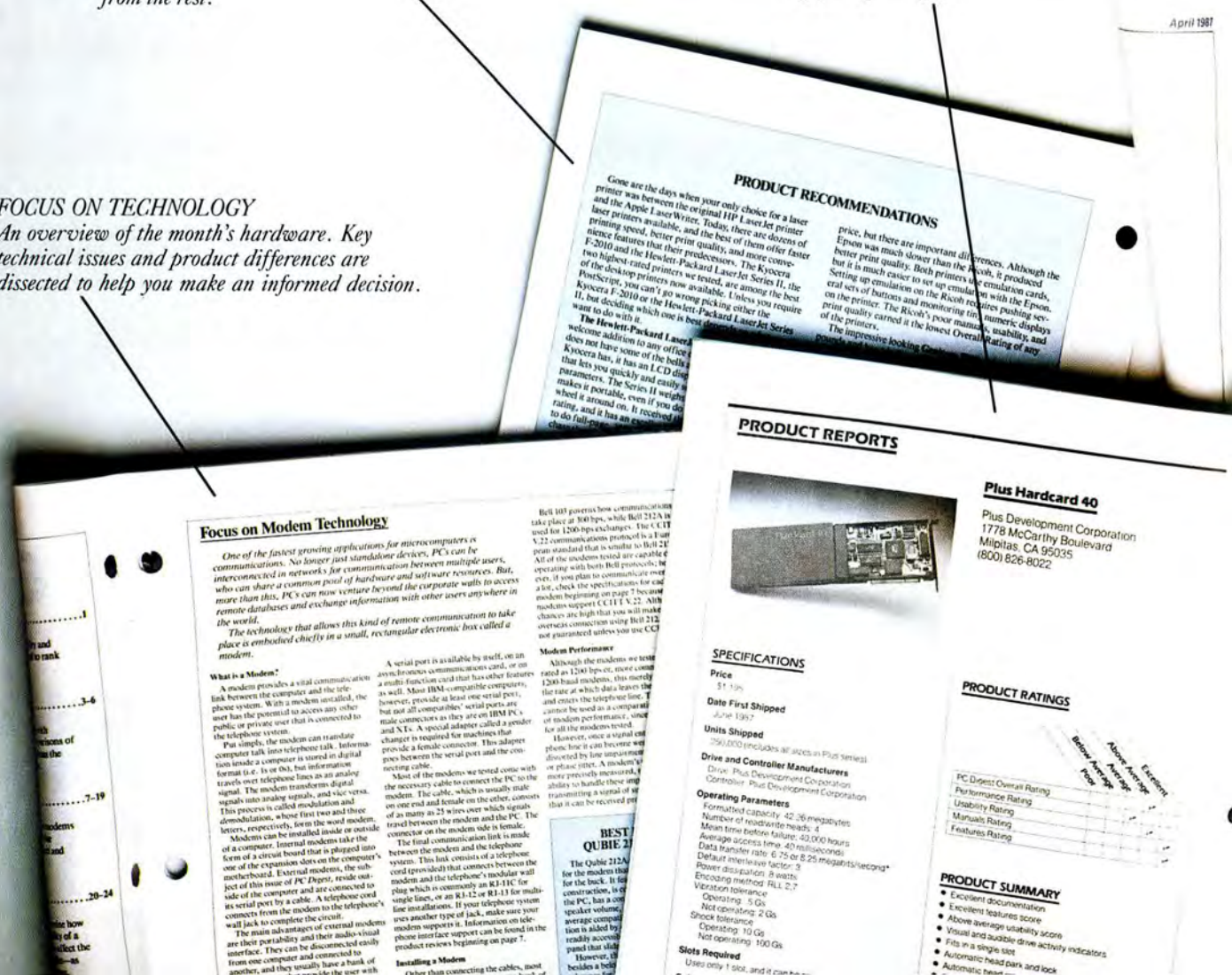

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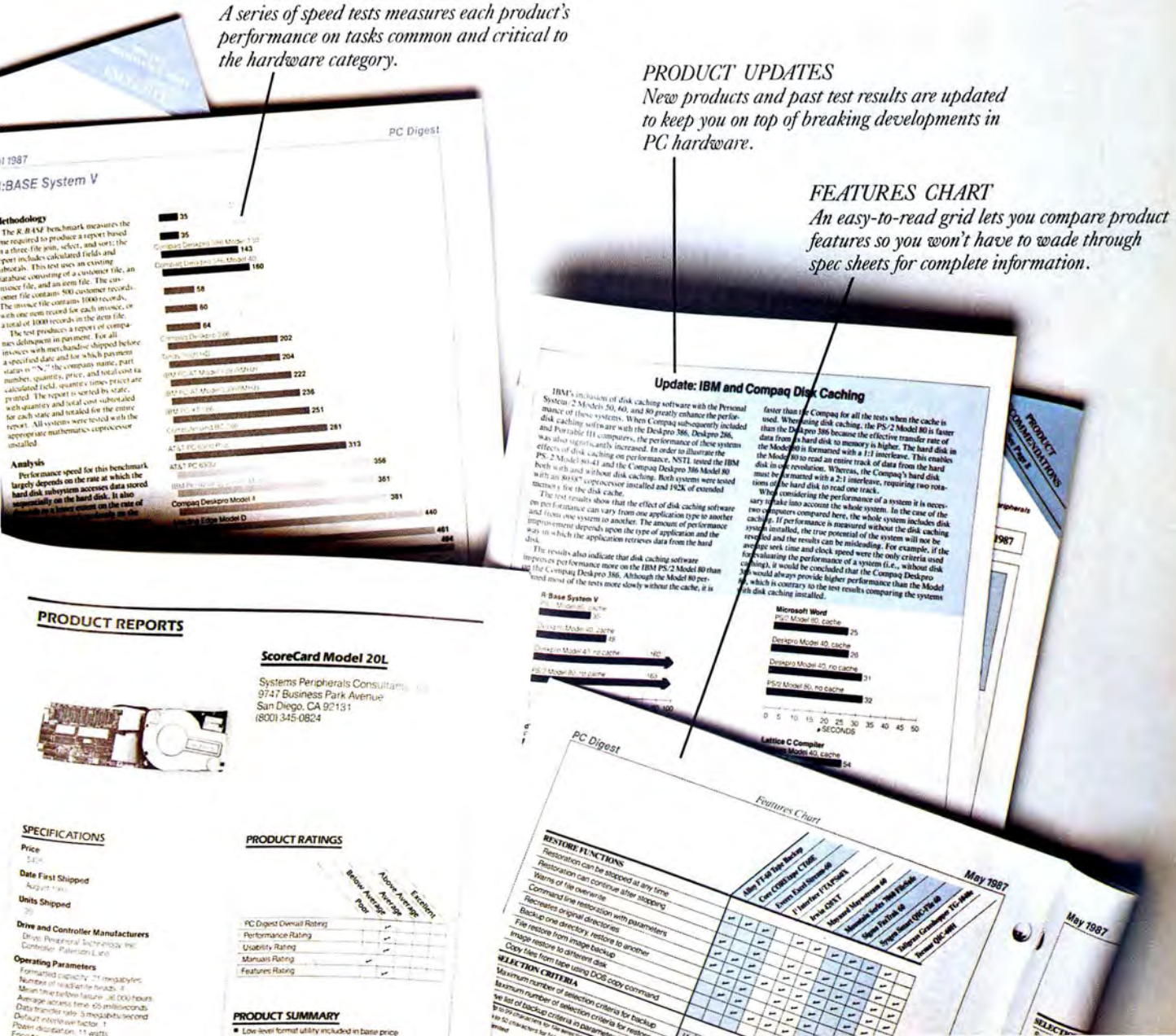

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Finally, *TMU* lets you enter a batch of DOS commands on a single line and will execute them in sequence. For example, typing CD\WS'DEL *.BAK'DIR /W logs the system on to the *WordStar* directory, deletes all backup files, then runs a directory listing. *TMU* also remembers and retrieves all previously entered DOS commands, making it a handy device for creating transient, repeatable batch files.

TMU has more customizable options than most cars–for everything from how long it takes keys to auto-repeat to the shape (but not the color) of the cursor at the DOS prompt. You can change *TMU* settings anytime at the DOS level via a full-screen menu.

As memory-resident programs go, *TMU* is relatively amiable. *TMU* won't step on most toes, although it will essentially disable *TopDOS*, which competes for many of the same keystrokes. And you can't dislodge *TMU* from memory unless you restart the system.

Before you rush out to snag a copy of *TMU*, consider the competition. Frontrunner's $69 *TopDOS* also provides command-line recall and editing and screen recall; added features include a memory-resident text editor, a tree-style file directory, a fast file locator, a MOVE command, and an enhanced DIR. On the other hand, *TopDOS* takes about 39K of memory and doesn't provide cursor control, 26th-line display, faster screen display, and so on. If you need a significant subset of these packages' features, you won't go wrong with either.
–David Weinberger

TMU has more customizable options than most cars–from the speed at which keys auto-repeat to the shape of the cursor.

Putting the One Minute Manager to Work

On-the-job productivity tool

Pros: *Good tracking device for experienced One Minute Managers; thorough help screens*
Cons: *Assumes that the user is already a One Minute Manager; skimpy connect-the-dots graphs*

Spinnaker Software
1 Kendall Sq.
Cambridge, MA 02139
617/494-1220

List price: $99.95
Requirements: 128K, one disk drive, DOS 2.10 or later version
Not copy protected

When *The One Minute Manager* by Kenneth Blanchard and Spencer Johnson came out in 1982, it triggered an avalanche of 60-second spinoffs with advice on everything from salesmanship to fatherhood. It was only a matter of time before someone latched onto the concept and made it into white-collarware. Spinnaker Software's *Putting the One Minute Manager to Work*, based on Blanchard and Robert Lorber's follow-up book of the same name, gives PC users a tangible approach to applying the one-minute philosophy.

If you have the interpersonal skills and know the buzzwords that come with the one-minute territory, this program may well be for you. With regular input from you and your management team, *One Minute Manager* provides an ongoing record of your one-minute successes and failures. But the program isn't particularly easy to navigate, and it may be a while before you learn to use it without frustration.

The heart of the program is the P.R.I.C.E. system–a series of screens that help you *pinpoint* areas needing improvement, *record* performance levels, *involve* employees by helping them define individual goals, *coach* them toward achieving those goals, and *evaluate* the results. Data entry screens prompt you to enter vital employee statistics. Later on you can retrieve that information and use it to evaluate employees' progress–and your own.

The results you get from *One Minute Manager* will depend largely on how well you set up the system to begin with. If your goal is to increase revenues brought in by your sales team, you need to define the problem–in this case low sales–and set easily measured performance standards. Next you must list your *team members* (that is, employees), agree on a mutually acceptable goal–such as "sell 50 more truffles per week"–and

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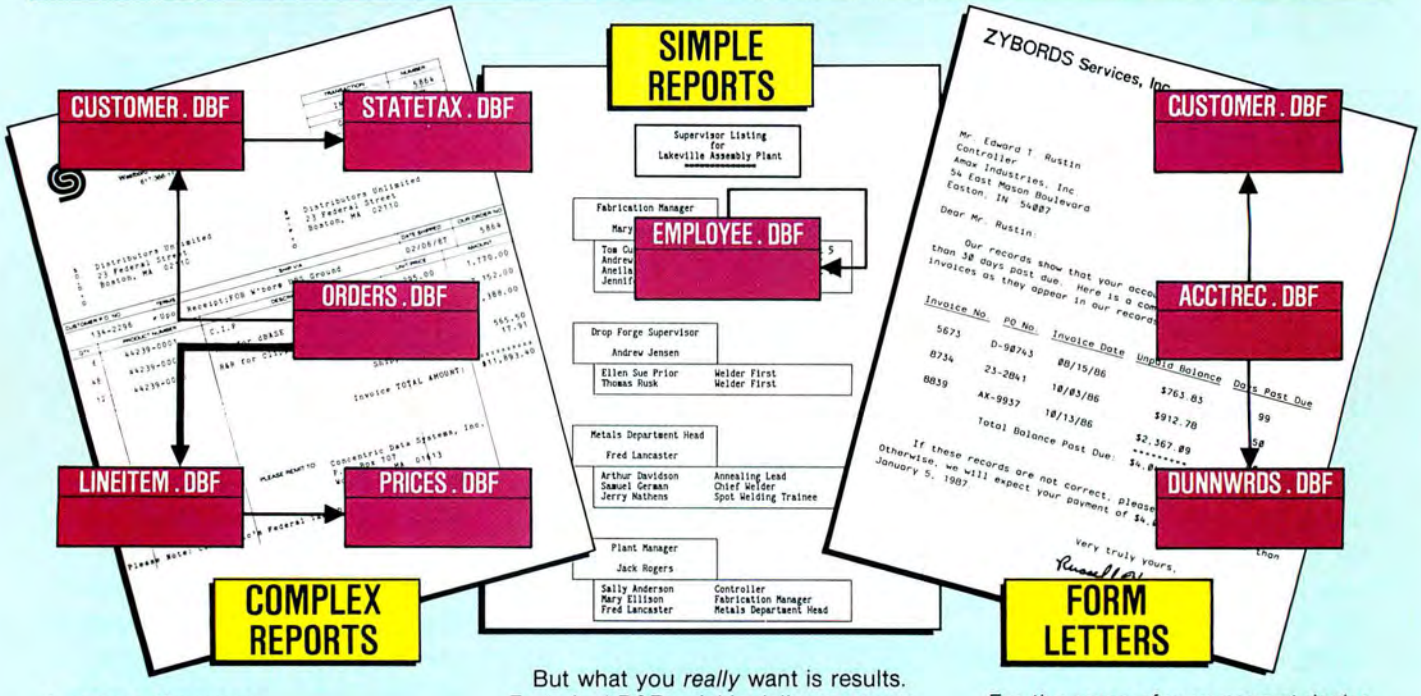

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Circle 244 on reader service card

list practical steps designed to reach that goal. In a different screen you'll need to type in current sales levels and a predetermined target level against which to compare them.

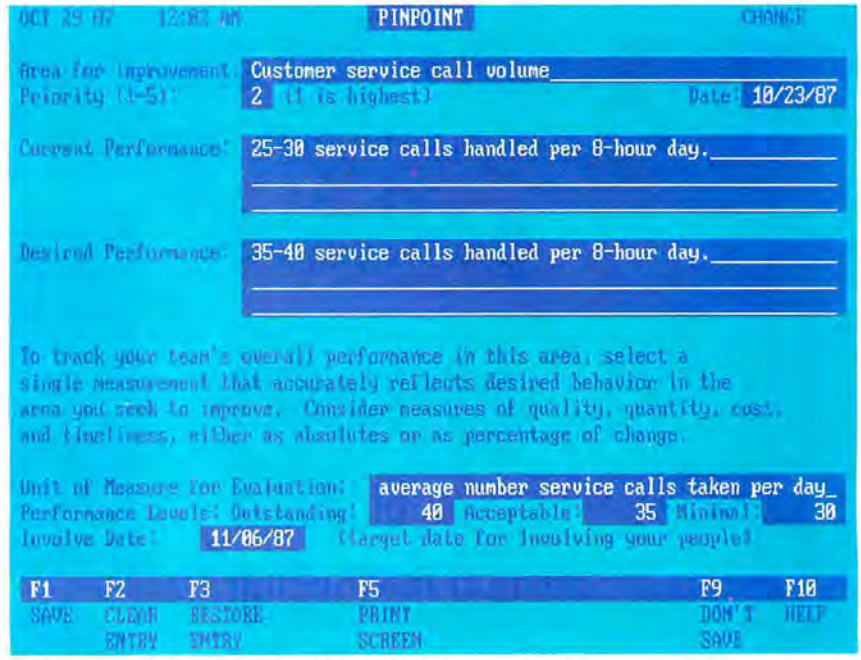
To keep records secure, three levels of access have been designed into the program. The manager (that's you) has access to all information, a data entry person can access the record section only, while team members can read and write only to their own files.

What do you get for all this data entry? When the urge seizes you, you can review what you have typed in, and *One Minute Manager* will graph the sales data entered. As far as analyzing the data, though, it's up to you. When you're ready to evaluate employee performance, for example, the program won't compare performance goals to actual achievements or recommend appropriate action. Apparently, the only information shared among the program's screens is the employee names and the area targeted for improvement. Moreover, some program features cry out for improvement. Function keys, for example, do different things in different data entry screens, and the program's designers seem to have designed the graph function in about 60 seconds.

"Good One Minute Managers graph everything," says the user manual, because graphs are easy-to-understand, concrete measures of performance. Not these graphs. The text-based, connect-the-dots graphics are flimsy-looking and hard to read. While the designer's decision not to add expensive graphics is laudable, a simple bar graph would make the results easier on the eyes.

Though *One Minute Manager* is rife with the buzzwords of behavioral management, One Minute Managers may find it a useful record-keeping system once they get accustomed to the program's labyrinthine structure. Managers with more than a minute to spare for their employees will prefer to get by on plain common sense.
–Leslie Lauderdale

Alan Southerton is a technical writer at Imaging Technology in Woburn, Massachusetts. Clifford J. Vander Yacht is a computer consultant in Jackson, Michigan. Patrick Marshall edits the Commentary Page of the Oakland Tribune. *Charles Kyd is the author of* Financial Modeling Using Lotus 1-2-3 *(Osborne/McGraw-Hill, Berkeley, 1986) and has worked as chief financial officer for a number of small entrepreneurial companies. Ralph Soucie is a certified public accountant with McCallister & Co. in Portland, Oregon. Scott D. Palmer is a reporter for* Federal Computer Week *in Washington, D.C. Leslie Lauderdale is a freelance writer specializing in instructional design and the author of* Home Accountant Plus: A Guide for IBM PC Users *(Reston Publishing, Reston, Virginia, 1985). David Weinberger is a staff writer for an electronic publishing software company.*



Prefab data entry screens from Putting the One Minute Manager to Work help you track employee performance but don't provide any real evaluation assistance.

"I live out...my life with the nightmare that the Soviet Union will one day discover... public relations."

Marco Polo, If You Can, 1982

BUCKLEY

"...the point, surely, isn't that Victorianism can't anaesthetize lust."

National Review, June 28, 1985

"...a philosophical paella..."

National Review, July 12, 1985

"I would like to electrocute everyone who uses the word 'fair' in connection with income tax policies."

National Review, July 12, 1985

"...under the rubric of mutual assured destruction."

National Review, July 12, 1985

"Anthony Brogan reflected on the internationally practiced, slightly open-fingered, fingers-loosely-bent, counter-clock-wise-slow-motion royal wave..."

High Jinx, 1986

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Ed Kashi

Beta users who exploit OS/2's multitasking are seeing "15 to 50 percent productivity gains," says William Lowe, head of IBM Entry Systems Division.

IBM Tells a PS/2 Success Story

As the PS/2 scores a million in its first semester and OS/2 graduates early, IBM's William Lowe sees some golden opportunities.

Eric Bender

The numbers were in hand, as Entry Systems Division head William Lowe puts it. A million of IBM's Personal Systems/2 had gone out the door since the April rollout. The five huge, highly automated factories in the United States, Australia, Mexico, and Scotland were cranking out 9000 machines a day. Even so, Lowe declares happily, they were not meeting demand.

So in late October, only two weeks before the computer industry gathered in Las Vegas for its biggest annual show, IBM decided it was high time to permanently squelch the skepticism about the new Personal Systems/2 line.

Revealing these production figures during a hastily organized breakfast bash for more than a thousand computer dealers at COMDEX/Fall, IBM also disclosed that it was only weeks away from unleashing its next competitive weapon: Operating System/2. The long-awaited Standard Edition of the system software appeared in December, rather than in the first quarter of this year. (IBM is offering the upgrade to current users of DOS 3.00 and later versions for $200; the regular price is $325.)

Given Big Blue's sudden green light, software vendors from Ashton-Tate to ZSoft accelerated their drive toward market with a substantial crop of OS/2 applications. The first packages are appearing this winter, while IBM and Microsoft redouble their efforts to enlist developers for the initial Standard Edition release of OS/2.

"It's extremely important to get the industry applications on the OS/2 base [even] before we come out with our Presentation Manager and the Extended Edition, and we're going to make every effort," Lowe says. In the long run, he expects the software development community to shift en masse. Those who don't? "You'd have to question their motivation."

Operating Systematically

IBM had seeded 4000 beta copies of OS/2 with developers and users inside and outside the company. By the time of OS/2's official shipping date, more than 125 applications had been announced. Those are merely the early entries; "the wave that's just behind is tremendous," promises Jim Archer, head of IBM OS/2 development.

In its commercial form, OS/2 has reassured some skeptics who thought the prototype dangerously slow. Borland International president Philippe Kahn, a longtime critic, hails the performance boosts achieved in the final months before delivery. His firm's *Paradox* data base manager "runs about 20 percent faster under OS/2 than under DOS," Kahn says.

Mike Maples, director of software development operations at Entry Systems, estimates that applications running in OS/2's DOS-compatible mode generally run about 5 percent slower than with DOS, and that packages rewritten for OS/2's protected mode run either at about the same speed as DOS versions or slightly faster.

By exploiting OS/2's multitasking, though, users can attain "15 to 50 percent productivity gains," Lowe says. So far, Archer adds, OS/2 tests have shown "really good interactions between applications," and authors seem to be respecting the development rules.

Lowe also intimates that IBM may be ahead of schedule for follow-up versions of OS/2, pointing out that the in-house target for Standard Edition 1.0 had always been fourth-quarter 1987.

Version 1.0 of the Extended Edition, which bundles in communications and data base management functions, is scheduled to appear in July for $795. Version 1.1 of the Standard Edition, which adds the Presentation Manager graphics interface, is slated for October. And version 1.1 of the Extended Edition, which likewise includes the Presentation Manager, is scheduled for November delivery. Users will be able to upgrade from version 1.0 to 1.1 of both Standard and Extended Editions free of charge.

Writing software for the first Standard Edition is a substantial effort, but developers say that the Presentation Manager looks like a great deal more work. Does Lowe anticipate that Presentation Manager applications will begin to emerge about the time the system software is delivered? "I would expect so," he replies, because IBM already is working with software firms.

Ed Kashi

In the PS/2's first year of shipment, Lowe claims, IBM couldn't meet demand.

Since OS/2's debut in April, IBM has let information about the operating system slowly trickle out. The industry is still awaiting details on how the company plans to boost the 32MB storage limit to 314MB. (Compaq Computer already has solved that problem for DOS with Microsoft's help.)

IBM did announce its OS/2 local area network system software, *OS/2 LAN Server*, which will be available in November for $995. *OS/2 LAN Server* will incorporate the basic network request-handling technology built into Microsoft's *LAN Manager*. It also will support the same network application program interface (API), so standard OS/2 applications will work with both network system software products. However, IBM's offering is fashioned for OS/2 Extended Edition and environments where personal computers connect to larger IBM machines, and the two parallel net-

work standards are expected to diverge over time.

OS/2 will become the dominant operating system within one-and-a-half to three years, Lowe predicts. However, "DOS will continue to be a major direction for us," says Richard Hanrahan, vice president for programming at Entry Systems.

In particular, IBM is looking for ways to link DOS and OS/2 environments and to break through the 32MB file storage barrier. An additional goal is to boost DOS's ease of use. This means DOS may soon get a facelift along the lines of Microsoft's MS-DOS Manager, which currently ships with Zenith's Eazy PC. Though the DOS character-based interface would differ from the Presentation Manager's bit-mapped graphics, the two interfaces "would be intuitively similar," Hanrahan explains.

Hardware Facts

Like OS/2, the entire PS/2 family has met or beaten the shipment schedule. "We've increased our production schedule three times," Lowe reports. He expects 1987 to prove IBM's best year to date, but not all industry analysts are impressed.

As IBM kicked off its "thanks a million" campaign, more than 350,000 PS/2s had gone to the European market. By common estimate, perhaps another 100,000 machines remained in the distribution pipeline. That means that only about half a million PS/2s actually had landed on desks in the United States.

IBM's increased sales quotas for its resellers and direct sales staff, its aggressive promotions for dealers and customers alike, and the substantial discounts available on PS/2s all argue against claims of success. Additionally, some analysts suggest that more than half the PS/2s shipped are entry-level Models 30 and 25, which can't run OS/2 and lack the new Micro Channel Architecture bus.

But "the hottest product around right now is the Model 50," insists Ned Lautenbach, head of IBM's National Distribution Division. He cautions against comparing relative sales among the PS/2 family: "We're shipping everything we can build." And he shrugs off PS/2 promotions and discounting as normal business practice.

Lowe acknowledges that sales were weighted toward the low-end products until midsummer. "It was only since September that we've really come on stream strongly with the Model 60 and 80 machines," he says. But IBM didn't waste time then: "We believe that we are the largest supplier of 386s."

COMDEX/Fall answered any lingering questions about third-party support for the Micro Channel, with more than 100 such products on view. Because the PS/2 is much more tightly defined than earlier PCs, "it's more attractive from an investment point of view," Lowe declares. Third parties also get new capabilities, including freedom from conflicts with other add-ons and the ability to run multiple "intelligent" devices simultaneously. The first glimmerings of such products—which will handle communications tasks or support multiple users—have begun to appear, Lowe points out.

In contrast, PS/2 compatibles did not appear in 1987. That's not surprising, Lowe says. "Anything can be replicated in time, with enough industry and with alternate approaches," he remarks. "But some things take longer than others." He expects the PS/2, and particularly its Micro Channel Architecture, to take a long time indeed.

And he puts IBM's position bluntly: "We don't intend to license the Micro Channel to other computer manufacturers....We're going to make every effort to ensure that our products aren't being copied, when we feel we have legal protection."

COMDEX/Fall answered any lingering questions about third-party support for the Micro Channel, with more than 100 such products on view.

Eric Bender is PC World*'s East Coast editor.*

Lotus Develops a Wordsheet

Three high-profile developers describe the design of Agenda, the radically new "personal information manager" from Lotus.

Eric Bender

Agenda, says Lotus, is a new class of application software that doesn't begin life by insisting that you change yours. You don't need a new operating system, a graphic user interface, an 80386-based machine, or even an AT compatible. You don't need to change your working habits. You do get a quietly dramatic promise: a deceptively simple, radically effective way to handle the many scraps of information and to-do items that need your attention each business day.

This personal information manager, scheduled to ship this spring for $395, is designed to handle strings of text with a flexibility that goes far beyond that of a conventional relational data base manager. *Agenda* was planned from inception, says codeveloper Jerry Kaplan, to let you enter, view, link, group, and regroup whatever textual information you want–completely at will and with a minimum of keystrokes.

So what does that help you accomplish? At first blush, *Agenda* may seem like nothing more than a high-powered to-do list. But the program's willingness to accommodate each user's individual work habits has already earned it a reputation for handling a dizzying variety of applications–among them a self-sorting notebook, a filter for on-line news, a technical support manual, and an idea generator.

Coauthor Mitchell Kapor, whose last hands-on development stint produced *1-2-3*, has a none-too-modest goal for *Agenda:* to launch a new software category. "I would be happy if this were the *VisiCalc* of text," he says.

Coming Together

The *Agenda* story began three years ago when Kapor, then Lotus's chief executive officer, met Kaplan on a swing through West Coast artificial intelligence (AI) firms. Kaplan, a founder of AI tool supplier Teknowledge, was busily testing theories about applying AI ideas to PCs.

But Kapor talked him into coding up a few data base prototypes for "some vague idea about personal information management," as Kapor puts it. Working as a Lotus consultant, Kaplan received the title of principal technologist in May 1985.

Also that spring, Ed Belove joined Lotus and began to create what became the List Manager accessory for *Metro*. That sophisticated pop-up to-do tool had a clean, intuitive interface, and Belove's work struck Kapor as a good match for Kaplan's offbeat data-representation schemes.

So in the fall of 1985, Belove and Kaplan joined forces. Finding themselves locked out of their offices one Saturday, they spent the day brainstorming in the Lotus cafeteria, and drew up the outline for *Agenda*.

Meeting with Kapor, they established an unorthodox division of labor. Kaplan would write the underlying data base manager, commuting to Boston from California every month or so; Belove

Max Aguilera-Hellweg

Codevelopers Jerry Kaplan, Mitchell Kapor, and Ed Belove wanted Agenda to thrive on personal idiosyncrasies.

would write the interface; and Kapor would function as software taste tester.

The starting point for the design, says Kaplan, was "the idiosyncratic management of heterogeneous personal information." But the task was complicated by Kapor's lack of a crystallized idea for the program. "I was working more from the middle out," he recalls. "I'd have key examples of the things that it ought to do."

Some precise, innovative, and elegant concepts were already in place. Kaplan wanted to avoid certain problems inherent in standard business data bases, focusing instead on the needs of individuals.

Traditional record-oriented data base managers are focused on speedy handling of large volumes of well-defined data. These architectures typically require tight definition of records and a rigid organization plan for those records before you can begin to enter data.

That's fine for the transactional needs of companies, but it's unnatural for the information needs of individuals, notes Kaplan. Individuals usually deal with a more limited amount of information in an ad hoc, free-form way. It comes to them in a variety of forms, from scrawled notes to phone messages to electronic mail.

Kaplan's alternative was an "item/category" architecture (see the sidebar "Hidden in Agenda"). That framework makes short textual "items" the basic elements of information. Each item is associated with one or more "categories," and you shift "views" on information by selecting and arranging various categories on screen. You can change any of this at will because, unlike conventional data base designs, Kaplan's architecture keeps your data independent of the data base structure. The scheme also includes some clever ways to filter the information for queries.

Additionally, Kaplan wanted a package that responded quickly at all times, rather than one that dazzled on some jobs and dawdled on others. "We wanted a constant retrieval time on an XT, regardless of the data being presented or how it was being formatted on the screen," Kaplan says. To this end, he drew on familiar AI techniques, including background processing of tasks. (*Agenda* may seem to work independently of keystrokes as it putters around with material that has just been created or modified.)

Naming the New

The developers soon had a working data base prototype in hand and a working name (*Oxford,* after a manufacturer of notepads). But for months afterwards, discussions about how to describe the project provoked "huge arguments," Kapor says. "We had this artifact that we couldn't talk about. It was as if we had drawn a diagram, but we didn't have the parts named and labeled."

Deciding what to build on top of this flexible data base was a more formidable task. Clearly *Agenda* should leverage the basic skills built into *Metro*'s List Manager. Among new tricks, *Agenda* would allow users to quickly attach priorities or due dates to items and then sort items that way. But what other services should it provide?

For another year, *Agenda* served as a test platform for sophisticated features and applications–some stuck, some didn't. "A lot of them, we decided, were distractions," says Kapor.

Certain fancy AI-style features for automatically moving items and their associated categories around proved more complicated than useful. The final product achieves some of the same effects with a relatively straightforward conditions/action language.

Other jobs that might seem natural extensions were ruled out from the beginning. Among these was project management, which aims at larger and more formal organizational missions. *Agenda,* explains Belove, suits projects "that have much more subjective interconnections between tasks."

But Belove emphasizes that Lotus still insists on building in "headroom"–substantially more power in the software than users need immediately. "We want to provide more space than people need to do the first thing they want to do," he says.

By far the most common request from early users, Kapor says, was that "we radically expand the capabilities for dealing with externally generated data." Many of these testers had to wade regularly through on-line news and electronic mail, and "they weren't going to retype that stuff," he says. "They didn't even want to massage the data by hand. They wanted just to pull it into the program and be able to browse through it."

So *Agenda* ended up with some distinctive tricks for handling large chunks of text, including automatic conversion and referencing of incoming text, based on recognition of keywords within the text.

That still leaves *Agenda* users with a substantial amount of typing. But when you're managing activities, you enter an item only once, Kapor points out. "You keep coming back to the item–looking at this part, adding to it incrementally, looking for new patterns, and so on."

Additionally, some nice touches in *Agenda* minimize the grunt work of typing. One is automatic completion: As you type in a category entry, *Agenda* searches the data base to find a match and fill in the blank for you. Other fea-

```
File: C:\AGENDA\SALES                                    12/24/87   14:28
View: Activities

Field Calls                                          Priority    Contact
  √ Visit Patty Smith at Binckley to see how         ·High       ·Patty Smith
    they are doing with new Maple machine.
  △ Schedule field call Jan. 3 to Abigail Scheer     ·Medium     ·Abigail Scheer
    at Capricorn Co.

Phone Calls                                          Priority    Contact
  △ set up meeting at Babcott to discuss Oak         ·High       ·Anna Lasky
    before the end of the month
  √ Don't forget to call Anna Lasky with Oak         ·High       ·Anna Lasky
    info she requested.
  △ Call Marketing to arrange a Catalpa demo for     ·Medium     ·Pat Weaver
    Pat Weaver.
  √ Call Charlie Brower at ZED Inc to discuss        ·Medium     ·Charlie Brower
    possible Alder sale.
  △ call printer to ask about brochure               ·Low        ·Joe

Prospects                                            Priority    Contact
  △ Do a mass mailing to all prospects on our        ·Low
    marketing research list.
==F1==┬==F2==┬==F3==┬==F4==┬==F5==┬==F6==┬==F7==┬==F8==┬==F9==┬==F10==
Help  ‖ Edit  ‖ Copy  ‖ Done  ‖ Go To ‖ Move  ‖ Mark  ‖Vw Sel ‖Cat Mgr‖ Menu
```

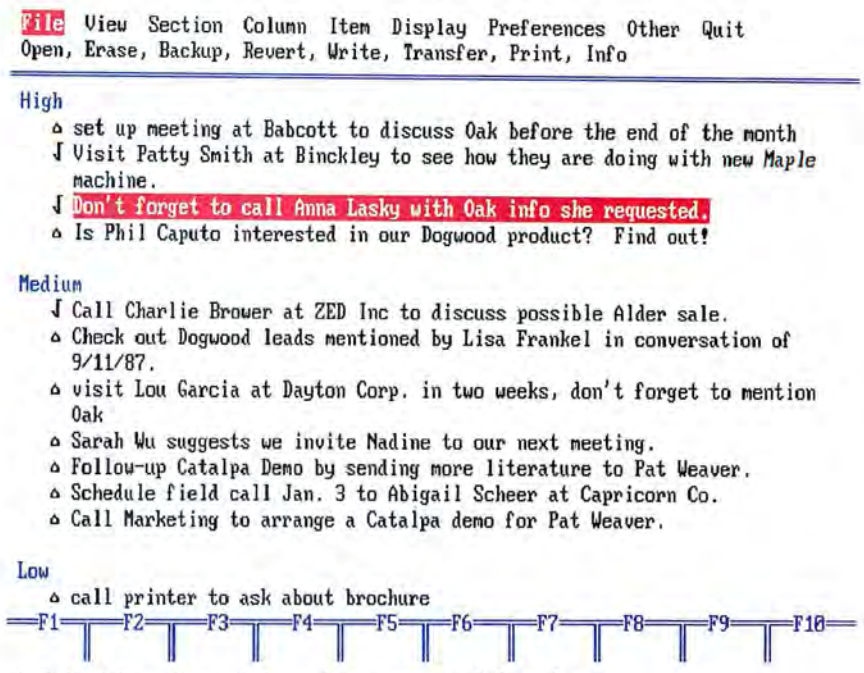
A sample Agenda data base for sales personnel, with an Activities view showing lists of tasks ahead. Visit Patty Smith... is an item, Agenda's basic building block. Field Calls, Phone Calls, Prospects, Priority, and Contact are categories, which provide the basic organizational structure. Both items and categories can be easily inserted, edited, and rearranged on screen with a few keystrokes.

tures are more subtle: The program attempts to intelligently assign items to categories by scanning the words in the items and the categories. The user can fine-tune the process by adjusting two settings. "Initiative" controls how hard the program tries to match items to categories. "Authority" controls whether the program makes assignments on its own or must ask the user first.

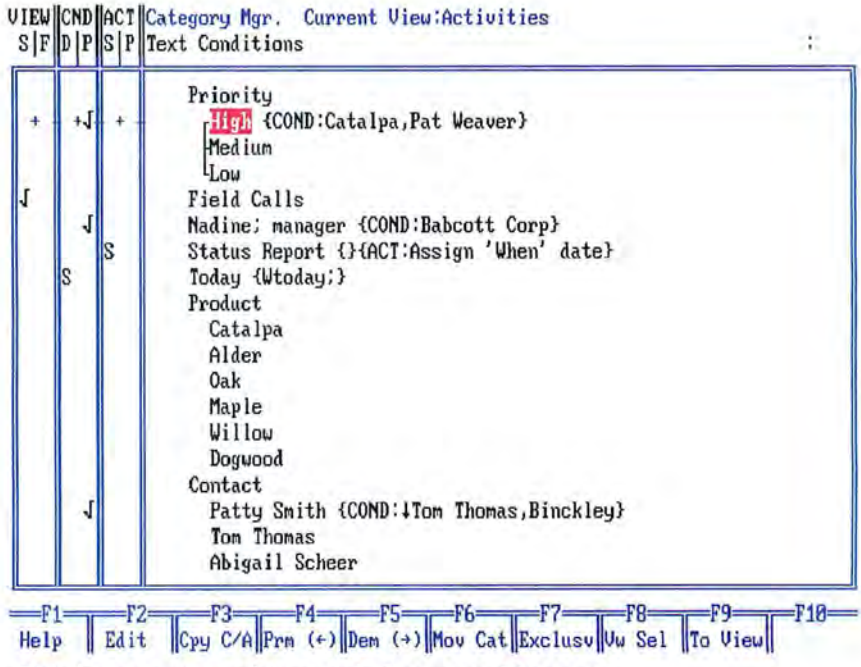
With its offbeat nomenclature and structure, *Agenda* confused some early users. Lotus lowered the learning curve with several familiar assistants–ring menus, dialog boxes, on-line help, and on-screen labeling of function keys–but has not yet achieved complete victory, Kapor says.

"The battle has been to lower the wall you have to climb over in order to experience the benefits of the garden inside," Kapor explains. "We hope that by the ship date, it will be a nice 2-foot wall that you can just step over–not a 6-foot wall with barbed wire and armed guards and Dobermans running around.

"One way to make things much more transparent to users is to radically restrict the functionality," Kapor adds. But that option went against the grain.



A Priorities view of the sales personnel data base. If an item is changed here, the Activities view will be updated also. The familiar Lotus-style ring menu runs across the top of the screen.



This beta version of Agenda's Category Manager gives an overview of the data base's structure and provides a relatively simple, visual method to build views and hierarchies of categories and to assign conditions and actions to categories. The final version may vary somewhat.

Addicting Applications

From the first, *Agenda* collaborated on its own development. Among its management roles, the software enabled the authors to share a data base that described the project's progress. Three thousand miles from Lotus headquarters, Kaplan could dial in and retrieve information that he could then organize into his own views.

The three authors say they found a high "addiction factor" among those to whom they had quietly prereleased *Agenda*. And

Hidden in Agenda

To help you get personal with your information needs, *Agenda* allows you to enter textual data in a free-form way and to continually modify the structure of your data base with a few keystrokes.

Agenda's atomic unit of information is the *item,* which can include anything you want that will fit in 350 characters of text.

Each item can have a *note* attached to it, containing up to 10 pages (10K) of text. As with *Metro*'s List Manager, you display the note simply by hitting <Enter>, and a note symbol appears in front of the item. But with *Agenda,* notes can serve as structured records much like those in a traditional flat-file system, with lines of text corresponding to fields. These contents can refer back to the rest of the data base in a host of powerful ways.

Items are attached to one or more *categories.* You can create categories at any time, in a number of ways. Typically, you'll start with the screen where you've been typing a list of items, by entering a name on a header that tops the list. *Agenda* calls lists *sections;* each section header is a category.

You also can open up another, related category by inserting a new column next to your original items. For example, you can create a column, call it 'Priorities' when a dialog window asks for a name, and assign priorities to the original items by entering 'high', 'medium', or 'low' opposite each item.

The usual working environment is made up of *views,* which combine the functions of a conventional data base manager's data entry and report forms. An Activities view, for example, might include all your categories that describe work in progress. The view grows and evolves over time, providing a series of snapshots of your work, as *Agenda* product manager Conall Ryan puts it.

You might next create a Priorities view that automatically picks out items whose priorities have been assigned in the Activities view. If you insert or change such an item in the Priorities view, the update will ripple back to the Activities view.

The data base's underlying structure can be seen and manipulated in the Category Manager. Hierarchies of categories can be established, and categories can be made mutually exclusive (as with high, medium, and low priorities).

Each category also can be assigned an associated set of conditions (such as a certain due date) and actions (such as adding all items with a certain due date to the high-priority category). When an item is created or modified, *Agenda* automatically checks to see what conditions it meets and assigns the item to the proper categories. Once the item lands in a category, it activates all the category's actions.

Additionally, *Agenda* lets you perform fairly sophisticated queries by making selections from the screen. You pick categories of interest and then indicate whether associated items should be included in the query.

Agenda handles all this complexity with a standard Lotus-style interface, including ring menus, dialog boxes, and

the ability to retrace steps with the <Escape> key. Function key assignments are described at the bottom of the screen. The flashiest interface technique is natural language date parsing, which can properly interpret entries such as 'day after tomorrow' or 'the last Tuesday in January'. (The beta version is not omniscient, though, failing on 'this afternoon'.) While developers speculate that a mouse might speed editing, Lotus has no plans for such support.

The package can import and export structured ASCII files–standard ASCII files that have been edited to include simple tags that let the data base know which portions of text are items, which are notes, and so on. When material is imported on a regular basis, an external utility can automate this process. Lotus is also working on more direct ways to import *1-2-3* worksheets and perhaps other standard formats.

These imports probably will account for the largest increases in the size of *Agenda* data bases. Some early users with heavy loads of external information have taken up to 3MB of storage for their data bases, although that probably represents the high end of demand, Ryan suggests.

Originally planned as a memory-resident DOS package, *Agenda* will be offered in stand-alone DOS and OS/2 versions. The DOS version includes a small pop-up notepad for jotting down information when running other programs. Lotus does not expect conflicts between *Agenda* and other popular memory-resident packages such as *SideKick*.

Like any powerful data base manager, the package offers an extensive range of features that won't be mastered in the first few days, but *Agenda*'s basic functions can be learned in less than an hour, the developers insist. *–E. B.*

Agenda
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500
Requirements: 512K, DOS 2.00 or later version; hard disk recommended
List price: $395
Not copy protected

surprising user applications began to crop up–everything from managing checkbooks to dealing with takeover rumors at a brokerage house, from planning office space to tracking worldwide economic events for bank credit analyses. One user even set up a way for *Agenda* to classify Dow Jones business reports on a company as positive or negative. "That was the one that really shocked me," Kaplan says.

Kaplan didn't have many personal tasks to organize but found that *Agenda* still had plenty of plans for him. "The whole organization of my life was improving, and not necessarily for the better," he says wryly. More specifically, he found himself doing errands he'd rather put off. "Forgetting is a very important part of managing your life, and *Agenda* doesn't forget."

As he finished up his work on the project, though, and started his own software firm, *Agenda* began to pay off. "My office manager thinks I'm Mr. Organization," Kaplan remarks.

That was not the only irony as *Agenda* emerged. During the project, Belove moved from hotshot programmer to Lotus kingpin, as vice president of corporate research and development.

Kapor, in contrast, has abdicated his Lotus crown and is now researching artificial intelligence and cognitive science at M.I.T. "He went from PC mogul to technical intellectual," Kaplan says. "We joke about this as the product that cost Mitchell his job."

Eric Bender is PC World*'s East Coast editor.*

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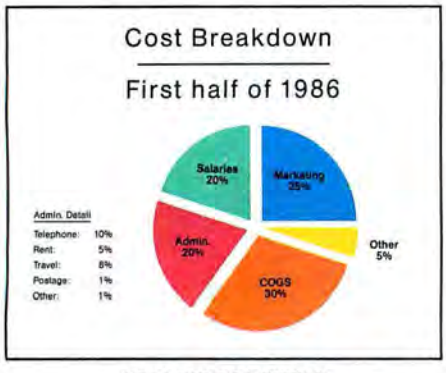

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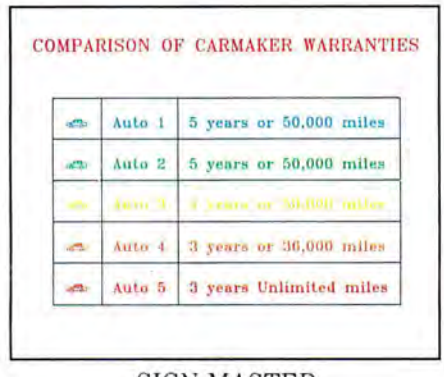

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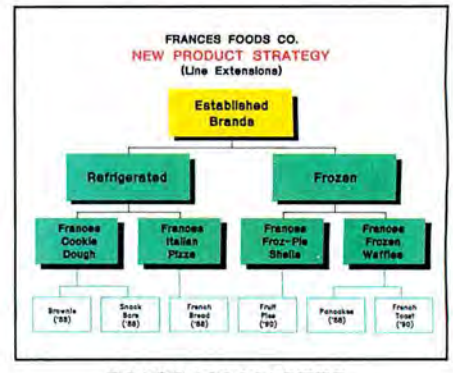

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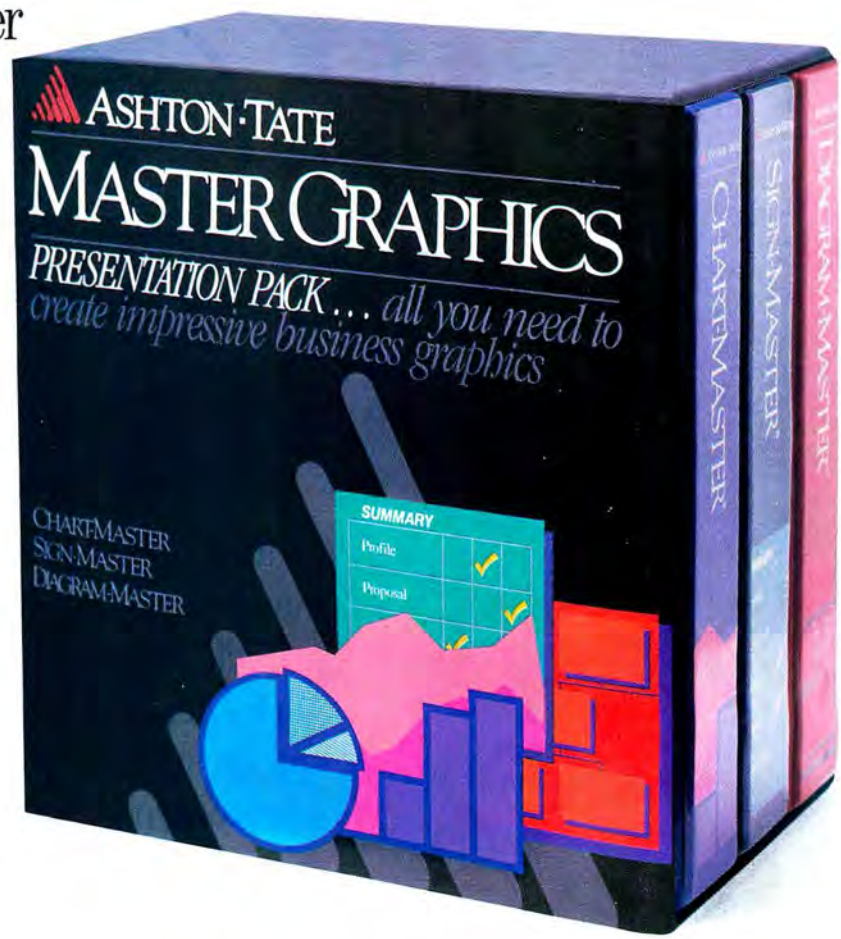

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Circle 10 on reader service card

Macro Menus for WordPerfect

Scott Baldwin

Managing WordPerfect macros can frazzle even proficient users, but with Merge codes, you can create custom on-screen menus for total macro control.

George Beinhorn

Most *WordPerfect* users undergo three rites of passage: the Trek of a Thousand Features, the Trial of the Hidden Format Codes, and the Maze of the Myriad Macros. By the time postulants achieve the third level, they've assembled dozens of *WordPerfect* macros–but they may not remember what the individual members of this collective were created to do.

WordPerfect has a solution for overgrown macro libraries. Buried at the tail end of the Merge chapter of the *WordPerfect* manual is a section titled "Flights of Fancy" that suggests a way to create convenient pop-up menus and submenus. By grouping macros together on custom menus, you can access them with just a few keystrokes.

The key to creating *WordPerfect* macro menus lies, oddly enough, in the program's Merge function. Like mail merge functions in most word processing programs, *WordPerfect* Merge combines the contents of two files to produce customized form letters. Control codes embedded in a primary file holding the skeleton document (such as a form letter) access Merge data (like addresses) in one or more secondary files. Inventive use of these same control codes makes it possible to create a macro menu and link macros to it.

Macro Menu Primer

Screen 1 shows a simple menu with four options: I for Invoice, L for Letterhead, P for Phone Messages, and X to quit. To trigger a macro, you simply select I, L, or P and press <Enter>; 'Merging' then appears on the status line until *WordPerfect* displays the appropriate template–an invoice form, a letterhead, or a phone message form.

Setting up a menu system like this is a matter of creating a custom menu and linking macros to it. The only potentially tricky part is making sure all these documents have related file names so that the Merge process–actually used here not for merging but as a trick for displaying macro files–achieves the desired results.

In Screen 1, for example, the main menu is saved in a text file named MAIN, while the macros linked to options I, L, and P reside in files named IMAIN.MAC, LMAIN.MAC, and PMAIN .MAC, respectively. (*WordPerfect* automatically tags macro files with the .MAC extension.) The file names may have from 2 to 8 characters, as long as the first character is the same as the menu option and the remaining characters are the same as the file that holds the custom menu, in this case, MAIN.

It doesn't matter whether you create the menu or the macros first, but for the purposes of this example, we'll assume you've already created macros for menu options I, L, and P and saved them with the appropriate file names (or changed the names of existing macro files that you want to group on a menu). All these macros should reside in the same directory as WP.EXE so they can be called from any subdirectory.

To create the sample menu in Screen 1, type in the menu options as shown and include the prompt line 'Enter choice:'. Make sure you don't insert any extra carriage returns before or after the menu; otherwise, each time you call up the menu these carriage returns will be inserted in whatever document you happen to be working on.

Once you've typed in the menu, you need to add three *WordPerfect* Merge codes: <Ctrl>-O, <Ctrl>-C, and <Ctrl>-G. <Ctrl>-O displays text, such as menu option prompts, on the

WordPerfect status line at the bottom of the screen. <Ctrl>-C temporarily pauses a macro to accept input from the keyboard, while <Ctrl>-G runs a macro.

First, add <Ctrl>-O to make sure the menu text will be echoed on the screen when you call up the menu. Simply move the cursor to the beginning of the menu text and press **<Ctrl>-O**; do the same at the end of the text. What appears on screen at each end, as Screen 2 illustrates, is ^O. Although these control codes are visible while you're editing the menu document file, they're hidden when the menu is displayed.

Next, you'll want to insert the code that pauses the macro to accept keyboard input. After the 'Enter choice:' prompt, press **<Ctrl>-C**. Then, to reduce the number of keystrokes needed to access a menu, type in the character string common to all three macro file names, in this case **MAIN**. That way, when you make a menu selection and press <Enter>, ^C captures the keystroke and adds the character string MAIN to it. Next, to get *WordPerfect* to run IMAIN.MAC, LMAIN.MAC, or PMAIN.MAC, bracket ^CMAIN with **<Ctrl>-G** codes. These commands instruct *WordPerfect* to search for a macro file whose name starts with the letter chosen from the menu and ends with MAIN.

Easy Escapes

Of course, every menu should have a built-in exit option. By simply pressing <Enter> you can get out of a menu, but then *WordPerfect* searches for a macro to execute. Not finding one, it eventually displays the end of the document file from which you executed the menu macro.

To make exiting cleaner and faster, create a macro named XMAIN.MAC consisting of <Home><Home><Cursor-Up>. This macro will return you to the beginning of your document file. Save XMAIN.MAC; now whenever you call up the main menu and select X, you'll exit the macro menu and return to the beginning of your *WordPerfect* document.

Automating the Menu

The last step in setting up the menu system is creating a macro so you can display the menu with two keystrokes. Switch on the macro definition function by pressing **<Ctrl>-<F10>** and name the macro **<Alt>-M**. Then press **<Ctrl>-<F9>**, the Merge/Sort key, to access the merge function. Hit **1** to select merge, then type the full path name and the file name **MAIN** at the primary file prompt. (You must enter the full path name if you want to access the menu from any *WordPerfect* subdirectory.) Finally, press **<Enter>** twice to bypass the secondary file prompt (which is usually used for mail merge operations).

Now when you press <Alt>-M, *WordPerfect* displays the text between the ^O codes in the MAIN file, stops when it encounters ^C, and waits for you to identify one of the MAIN.MAC files by entering I, L, or P. When you've made your selection, the program seeks out the appropriate macro and runs it.

As your applications grow, you may need to add functions that don't logically belong on a given menu. WordPerfect *accommodates nested menus of virtually unlimited depth.*

Nesting Menus

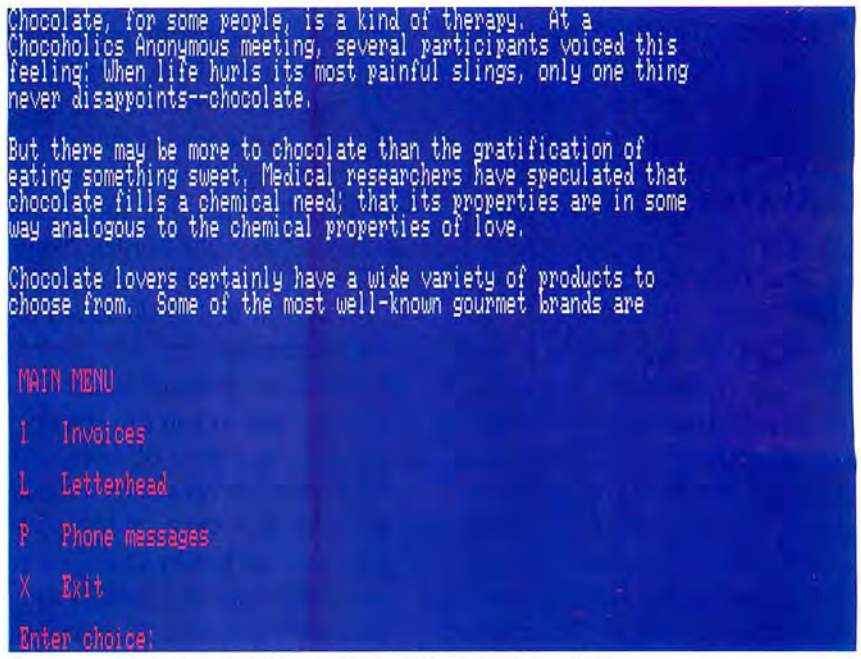
As your applications grow, you may need to add functions that don't logically belong on the Main menu. That's no problem with *WordPerfect,* which accommodates nested menus of virtually unlimited depth.

Suppose you want to expand the Invoice item in the Main menu example to include invoices that bill professional time, track product sales, and send reminders to past-due accounts. To make Invoices a submenu in the Main menu example, type in the text shown in Screen 3 and save it in a file named *INVOICE.* Remember,

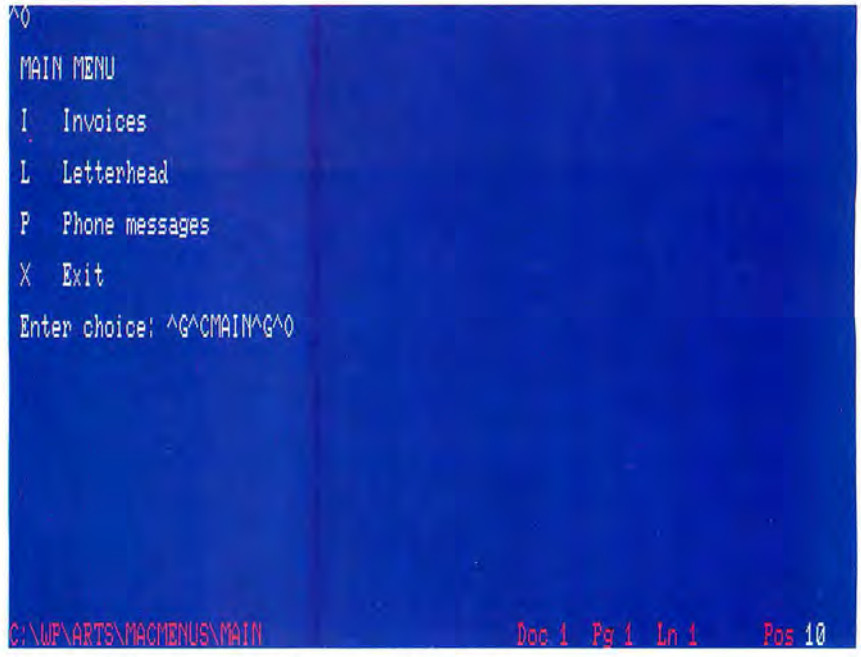
all the named macros you create and attach to options T, S, P, and R on the Invoice submenu must contain *INVOICE* in their names: TINVOICE.MAC, SINVOICE-.MAC, PINVOICE.MAC, and RINVOICE.MAC.

Next, you must replace the IMAIN.MAC macro in the Main menu with a new one that displays the Invoices submenu when you select I. To create the new *IMAIN.MAC*, use **<Ctrl>-<F10>**, type **IMAIN**, press **<Enter>**, and press **<Ctrl>-<F9>** (Merge/Sort). Select Merge, type **INVOICE** at the 'Primary file' prompt, and hit **<Enter>** twice to bypass the prompt for a secondary file. Now when you select I from the Main menu, the Invoice submenu pops into place.

For convenience you should also add an item to the submenu that returns you to the Main menu. Create the new macro by selecting **<Ctrl>-<F10>** and entering **<RINVOICE>**. Then enter the keystrokes for the Merge/Sort operation with the MAIN file: Press **<Ctrl>-<F9>**, select Merge, enter **MAIN** at the 'Primary file' prompt, and hit **<Enter>** twice to bypass the secondary file prompt. Now selecting R from the Invoice menu returns you to the Main menu.



Screen 1: When you choose an option (such as L for Letterhead) and press <Enter>, WordPerfect retrieves a template saved in a macro file.



Screen 2: Setting up a menu system requires entering menu text and the control codes illustrated here. You must also create macro files and link them to the menu.

Dressing Up Menus

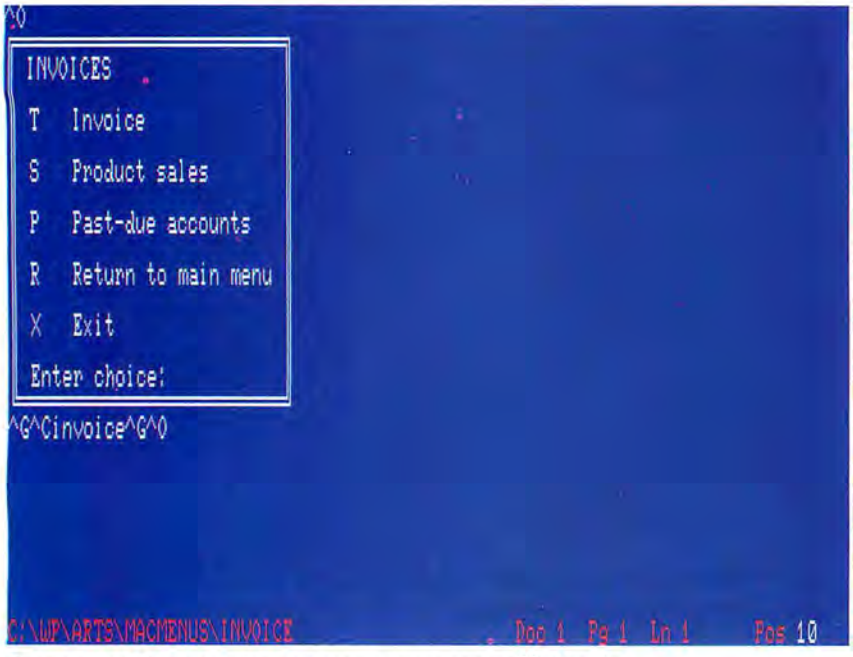
While *WordPerfect* menus are handy, they're also handicapped. For instance, you can't page or scroll through menus; a single screen of items is all you can display. Nor can you position menus on screen. Since <Ctrl>-O replaces status line text, menus always scroll up from the bottom-left corner of the screen.

Finally, menu design is somewhat limited because <Ctrl>-O doesn't recognize format codes for boldface, underlining, highlighting, or changing screen colors. Still, menus needn't be drab; using *WordPerfect*'s Line Draw function, you can dress up a menu with a border, as Screen 3 illustrates.

But a little preparation is in order. Before you draw anything, make sure the menu text is positioned to your liking. Entering or deleting text after you've laid down a border can break up the vertical lines. Use the <Space> bar rather than <Tab> to position text. Because tab spaces may not be translated properly when the macro menu is displayed (in other words, when the merge is run), menu text and borders can become distorted.

Keep in mind, too, that *WordPerfect*'s ^C function prevents any subsequent lines (such as a bottom border) from being displayed. To get around this problem, move the 'Enter choice:' line and all the codes that appear after it down below the border. Now, when you make a menu selection such as L, it will be displayed below the border.

When you're ready to draw, save the text so you can start over if you make a mess of things. Pop open *WordPerfect*'s Screen menu by pressing **< Ctrl > - < F3 >**, select **2**, choose the border character you need, and draw the borders using the cursor keys (see "Create Business Forms With *WordPerfect*," *PCW*, November 1987). If you must edit the text after it's been boxed, you can preserve the borders by switching to Typeover mode (press <Ins>) and erasing with the <Space> bar instead of using <Del>.



Screen 3: To organize macros even more efficiently, you can create a nested menu like this one, which is accessed from the Main menu shown in Screen 1.

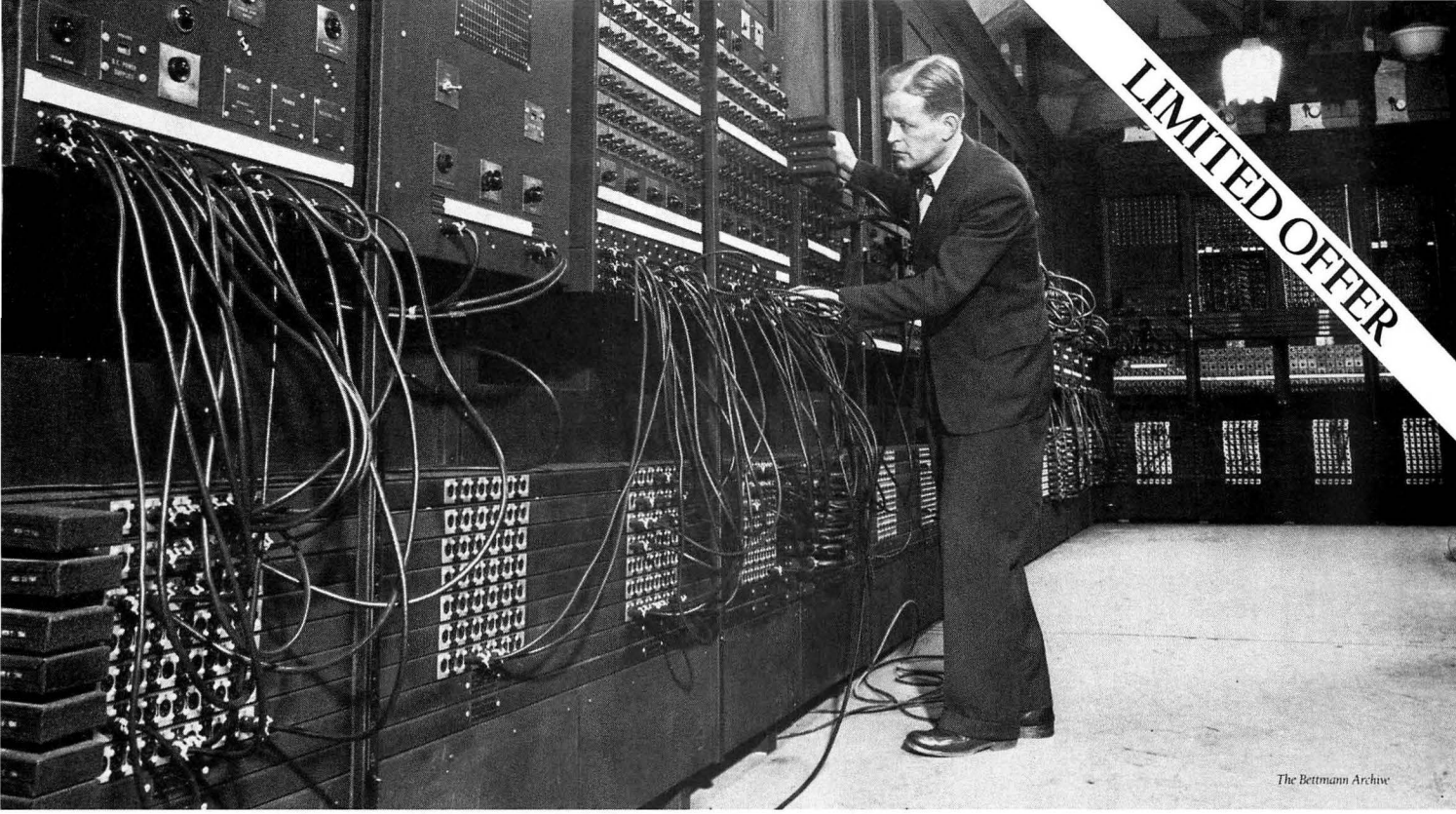
Menu designers may want to create a large, full-screen menu by setting margins at 0 and 80. But caution is advised: Pressing <Alt>-<F3>, the Reveal Codes function, demonstrates that the line 'Margin Set:0,80' now appears in the document. Unless you erase this line (with <Del>), it will appear in the document you're working on when you display the menu and exit. Removing the code will initially wreak havoc on your neatly formatted menu, but fear not–*WordPerfect* will display the menu properly when you fetch it with <Alt>-M.

Documenting Menu Flow

There's no limit to the number of submenus you can chain together, but keeping track of an extensive macro tree system can be difficult. When you find you have a dizzying array of macro names and submenu titles, draw a system flowchart and label each menu option with a succinct description of its function.

Setting up a simple macro menu system can turn *WordPerfect* into a highly automated office tool. You can, for example, fill out a supply requisition, print an invoice, and label envelopes all from one menu. You can even create your own pop-up help screens. If nothing else, a menu system can help new employees and temporary help faced with learning dozens of unfamiliar macros become productive quickly with *WordPerfect*.

George Beinhorn is a freelance editor and writer in North San Juan, California.



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Consumer Watch

Advice and information for the computer consumer

Having trouble chasing down information from a foreign computer manufacturer? Here are tips for getting a response on the double.

Edited by Anita Amirrezvani

An Eclectic Mix

Just as immigrants from many nations form the American melting pot, the typical computer system combines hardware from all over the world. By spurring competition and driving prices down, products from nations such as Japan, Korea, England, and France have proven a windfall for consumers.

Still, low prices aren't everything. You need to be able to find supplies, accessories, and manuals after the sale as your computer needs change and expand. But tracking down this information for foreign products can be trying. Dealers don't always have supplies or information at hand, and dealer inquiries to manufacturers aren't always answered right away. Moreover, companies sometimes move, change names, are sold, or discontinue a given product, making it tricky to locate information or supplies.

You can often find quick answers just by getting on the horn. But if your efforts to get information by phone don't work, here's a tried-and-true technique. First, request assistance in writing from the dealer or the foreign manufacturer's United States office. If you receive no reply within four weeks, send a copy of your letter to the manufacturer's foreign headquarters with a cover letter mentioning that the U.S. representative has not responded to your request. At the same time, send copies of both letters with a cover letter to the U.S. office. You're virtually certain to hear from one of those sources within a couple of weeks.

Writing the letters is easy; hunting down the foreign addresses sometimes takes more work. In the list "A Guide to Overseas Hardware Manufacturers," you'll find both U.S. and overseas addresses of major foreign manufacturers. (American companies that distribute foreign products under their own labels are not included, since writing their overseas offices is unlikely to help.)

If the address you need is not in the accompanying list, you can track it down by checking business reference works at a local library. *–David F. Siemens, Jr.*

David F. Siemens, Jr., is a writer in Mesa, Arizona.

A Guide to Overseas Hardware Manufacturers

Alps

Alps America
3553 N. First St.

(continues)

Anthony Russo

San Jose, CA 95134
800/828-ALPS
800/257-7872 CA
408/432-6000

Alps Electric
1-7, Yukigya Ohtsuka-cho
Ohta-Ku
Tokyo 145, Japan

Amstrad

Vidco
1915 Westridge Dr.
Irvine, TX 75038
800/237-3116
800/222-5420 TX
214/518-0668

Amstrad Consumer Electronics PLC
Brentwood House
169 Kings Rd.
Brentwood
Essex, CM14 4EF
England

Apricot

A.I.C. Computers Inc.
111 Granton Dr. #401-402
Richmond Hill, Ontario
Canada L4B 1G5
416/492-2777

Apricot Computers PLC
International Division
Shenstone House
Dudley Rd.
Halesowen
West Midlands B63 3NT
England

Blue Chip

Blue Chip Electronics
7305 W. Boston St.
Chandler, AZ 85226
800/832-2272 outside AZ
602/961-1485

Blue Chip Electronics
Taksteeg 2-4
1012 PB Amsterdam
Netherlands

Brother

Brother Int'l Corp.
8 Corporate Pl.
Piscataway, NJ 08855-0159
800/284-4357 outside NJ
201/981-0300

Brother Industries Ltd.
46-15, Ohsu, 3-chome
Naka-Ku
Nagoya 460, Japan

Canon

Canon USA, Inc.
1 Canon Plaza
Lake Success, NY 11042
800/441-1313 outside NY
516/488-6700

Canon, Inc.
7-1, Nishi-Shinjuku, 2-chome
Shinjuku-Ku
Tokyo 163, Japan

CIE

CIE Systems, Inc.
2515 McCabe Way
Irvine, CA 92714
800/437-2341
800/624-2516 CA
714/660-1800
714/660-1421

C. Itoh Electronics, Inc.
Toho Seimei Bldg., 27th fl.
2-15-1 Shibuya
Shibuya-Ku
Tokyo 150, Japan

Citizen

Citizen America Corp.
2401 Colorado Ave. #190
Santa Monica, CA 90404
213/453-0614

Citizen Watch Co., Ltd.
P.O. Box 238, Shinjuku Mitsui Bldg.
1-1, Nishi-Shinjuku, 2-chome
Shinjuku-Ku
Tokyo 160, Japan

Epson

Epson America, Inc.
Computer Products Division
2780 Lomita Blvd.
Torrance, CA 90505
800/421-5426
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Epson Corp.
80 Hirooka, Shiojiri-shi
Nagano 399-07, Japan

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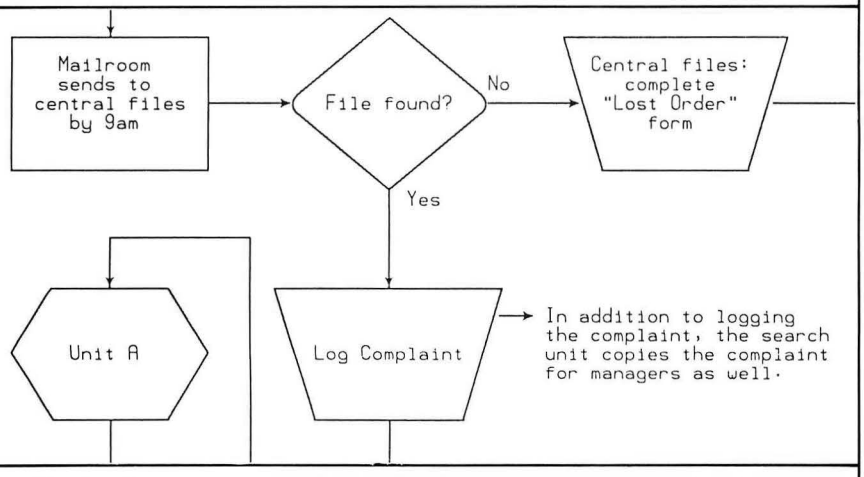

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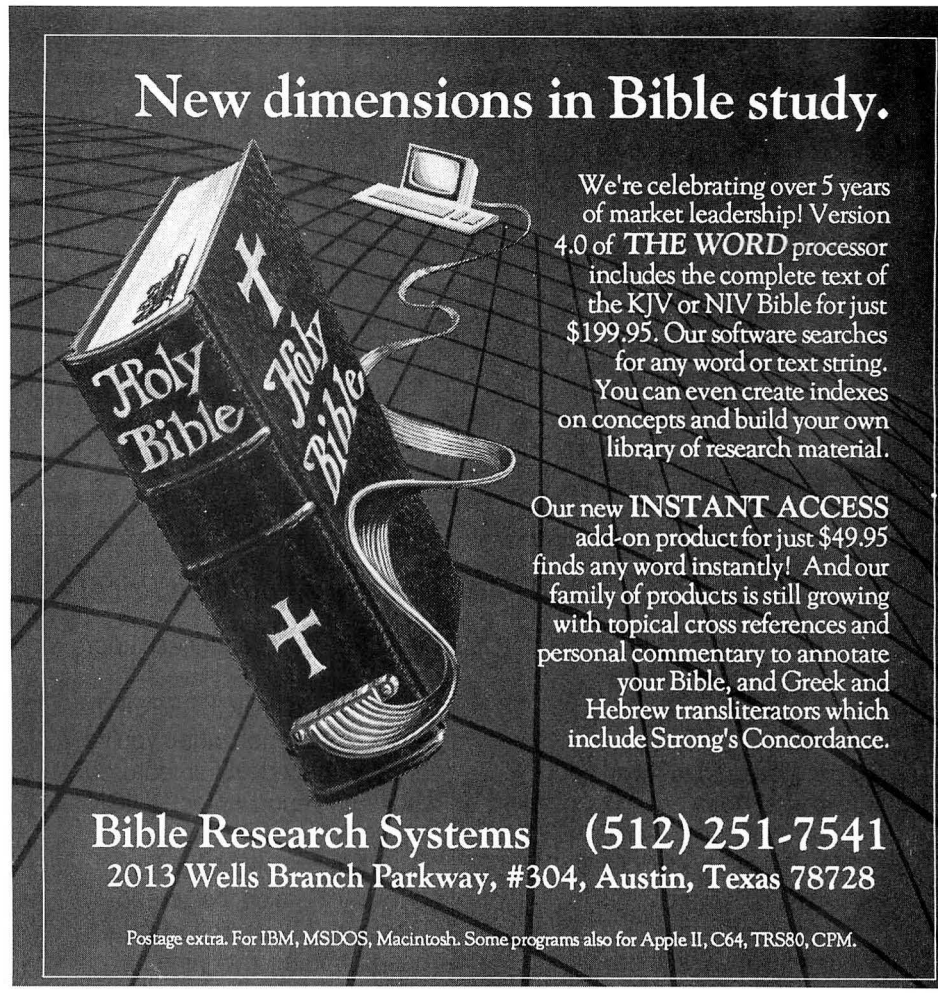

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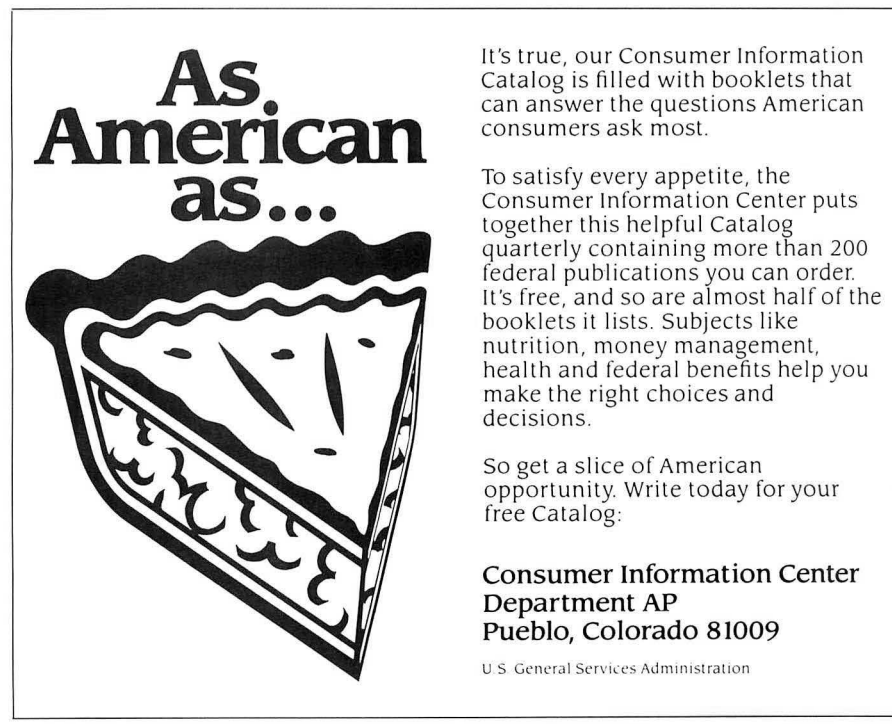

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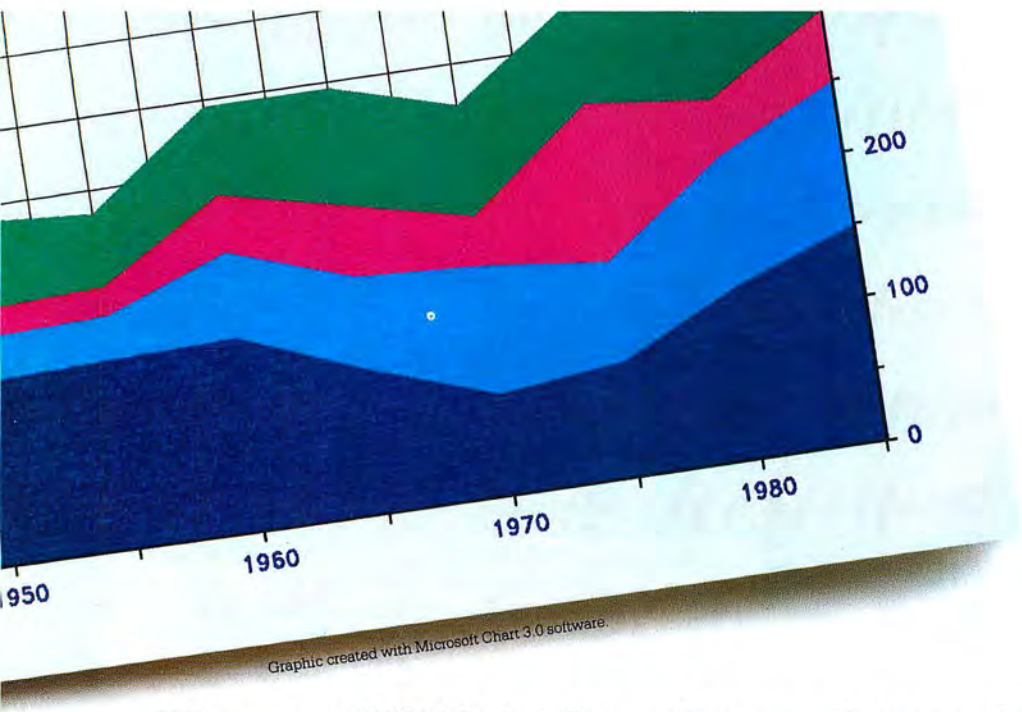

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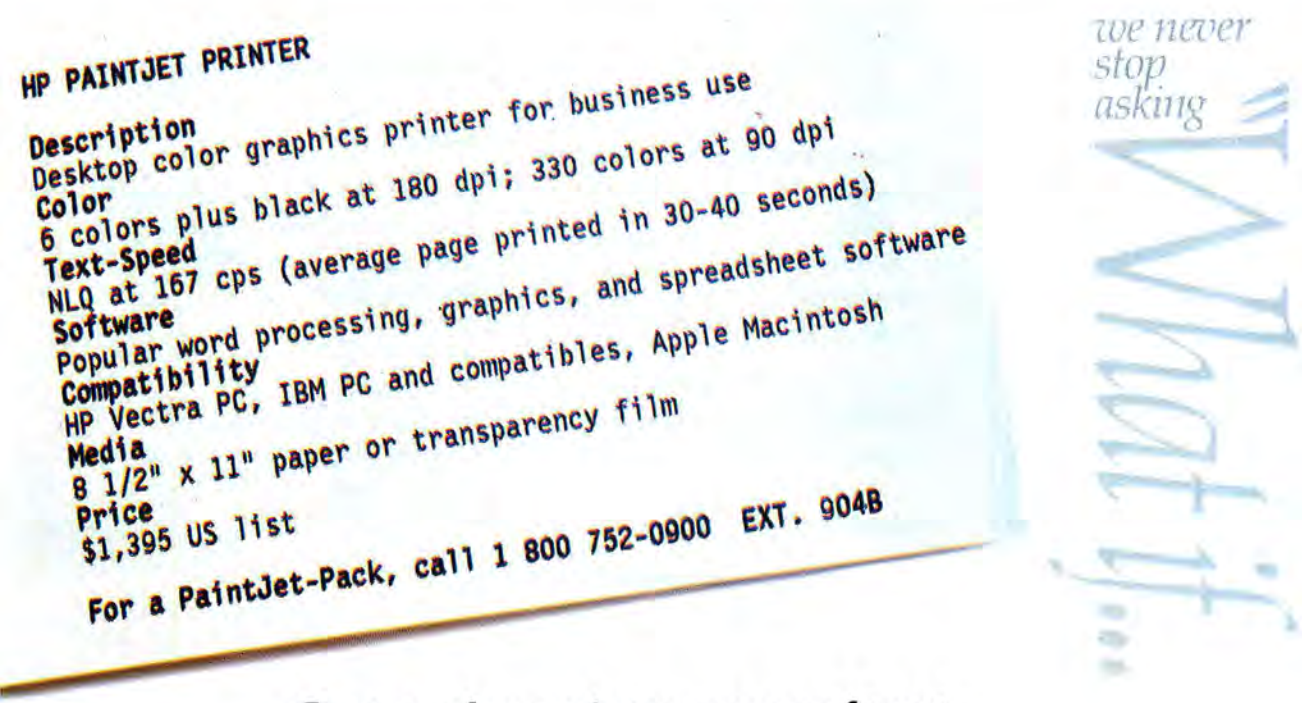

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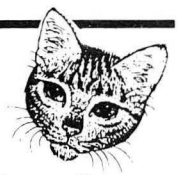

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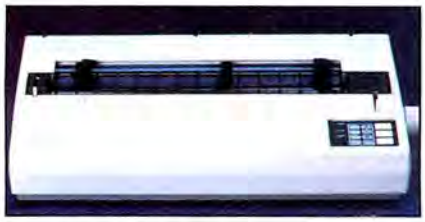

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The Upgrade Path

Hands-on advice for upgrading PCs, compatibles, and peripherals

This month: Stretching the parallel connection, a slotless clock for the PC, 2MB on the semicheap for the LaserJet Series II, and more

Robert Luhn

Long-Distance Connection

It's ironic that printers—surely the loudest, most disagreeable peripherals around—must almost always be tethered within earshot of the PC. But don't blame printer designers for this state of affairs. The laws of physics make it difficult to transmit data over a parallel printer cable longer than 15 feet without incurring unacceptable errors.

The engineers at Intellicom pondered the problem and conjured up the Long-Link, a parallel interface "extender" that can put as much as 7500 feet between you and the racket. Long-Link's secret is a pair of compact transmitters and receivers that convert parallel data into serial form and back again. The transmitter attaches to the PC's parallel printer cable; the receiver, to the printer's Centronics port, with standard telephone wire or twisted-pair wiring connecting the two (the latter is used for distances exceeding 500 feet). Intellicom estimates that Long-Link's data transfer rate is 1200 characters per second, fast enough to accommodate almost any laser printer.

Unlike most upgrades, fitting the Long-Link into your computing scheme doesn't involve any system configuration. The steps are simple: Plug the PC's parallel printer cable into the female Centronics parallel connector on the Long-Link transmitter box. Then connect the supplied 50-foot phone cord and AC adapter to the appropriate jacks on the unit. Hike down to the printer, snap the Long-Link receiver onto the printer's Centronics parallel interface, connect the receiver's AC adapter, and plug in the other end of the phone cord.

Informal tests show that a PC and a printer can communicate quite securely via a Long-Link connection. However, the company suggests that customers test the output just to be on the safe side. If erroneous characters crop up,

(continues)

Mark Farbin

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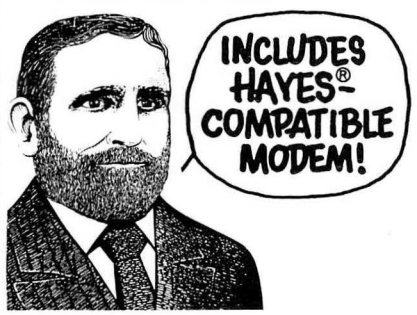

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the line connecting the printer and the PC may be damaged, or surrounding electronic "noise" produced by other machines may be affecting the transmitted data. If replacing the line doesn't solve the problem, you may want to switch to twisted-pair wiring, which many newer offices already have in place for local area networks. Either way, you'll be ready for quiet, long-distance printing.

Long-Link
Intellicom
9259 Eton Ave.
Chatsworth, CA 91311
800/992-2882, 818/882-8866
California
List price: $179

The Slotless Clock Card

Time is money. And getting the time of day from a PC, XT, or compatible usually means filling a slot with a pricey combo RAM board that just happens to include a clock/calendar chip. But what do you do if your system already has a memory board–or is out of slots? Naturally, you turn to *The Upgrade Path* and discover the dClock II, a $69 clock/calendar chip-on-a-baby-board from Microsync that attaches to the connector on the back of a floppy disk drive.

Like any good electronic timepiece, the dClock II keeps a 24-hour clock and a 100-year calendar, corrects for leap years, and putters along when your system is turned off, thanks to a long-lived lithium battery. Better still, you can install the dClock II in about 10 minutes.

Turn off the PC, unplug all external cables, ground yourself, and slide off the system's hood. As you look down, you'll notice that the ribbon cables extending from the disk controller connect at the top of each floppy disk drive. Remove the cable from one of the drives and mate it with the shiny male connector on the dClock board; then push the dClock's black female connector back over the drive's exposed copper-colored connector. Reassemble the system and turn it on. (If both floppy disk drives start spinning, the dClock connector has been connected to the drive upside down.)

Installing the dClock software is similarly straightforward. Just slip the supplied utility disk into drive A:, type **INSTALL**, and answer a few questions; the program automatically creates a DCLOCK2 subdirectory on the system's boot disk, copies the necessary files over, and modifies the AUTOEXEC.BAT file appropriately. However, one glitch crops up in the process. If you direct the program to copy the dClock files to drive A:, you're prompted to replace the dClock disk with the boot disk–but you'll find the files are not installed. To put the dClock files in their proper place, type **B** when asked 'Install dClock II on which drive?', and place the boot disk in drive B:.

Once installation is complete, restart the PC with the modified

boot disk in drive A:. The Microsync copyright message will appear, followed by a dummy date and time. Type **DDATE** at the DOS prompt; at the 'Enter new date' and 'Enter new time' prompts, enter the desired numbers in mm-dd-yy and hh:mm:ss formats, respectively. That's it.

Since the dClock II automatically displays the correct day and time whenever the system is turned on or rebooted, remove the DATE and TIME commands from the system's AUTOEXEC.BAT file. Programs that rely on the system date and time should also be listed in AUTOEXEC.BAT after the DDATE /R command that triggers the dClock software.

Cautionary note: In a fit of upgrade altruism, Microsync includes a text file on the dClock disk that details how to install 256-kilobit RAM chips on older XT, Portable PC, and Compaq Portable motherboards. The process, which boosts system memory to 640K, is not unlike that discussed in "Slotless Compaq RAM" in the November *Upgrade Path*. But instead of just replacing the system's decoder PROM, Microsync directs users to solder a wire across two jumper pins. Unless you're a thoroughly experienced PC pro, don't attempt this upgrade. You won't save much money, and you could easily damage the system permanently.

dClock II
Microsync Inc.
P.O. Box 116302
Carrollton, TX 75011
214/788-5198
List price: $69.95

Requirements: PC, XT, or compatible system; one disk drive; DOS 2.00 or later version

A Plus for the Series II

When Hewlett-Packard's engineers drew up the blueprints for the LaserJet, they probably weren't thinking about the desktop publishing programs to come. The LaserJet was designed simply to print text faster than a dot matrix printer, sharper than a daisy wheel printer, and quieter than both.

And the LaserJet succeeded. But with the rise of desktop publishing, presentation graphics, CAD, scanners, and so forth, the cry rose for more memory. HP, with a nervous glance over its shoulder at the Apple LaserWriter, eventually responded with the LaserJet Series II, which comes with 512K but can pack as much as 4MB of RAM.

Beefing up the Series II's memory contingent is not for the faint of wallet: HP's 2MB and 4MB boards add $995 and $1995, respectively, to the price tag. Thankfully, Pacific Data Products has come to the rescue with the 1-2-4 Memory Board for the Series II and the Canon LBP-811 laser printers. At first glance, the board's no great deal: A 2MB version lists for $895; a 4MB board, for $1595. But an unpopulated 1-2-4 board costs only $259, and if you plug in the necessary 256K-

(continues)

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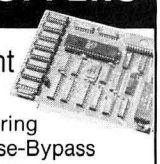

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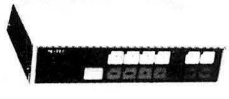

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Adding chips to the 1-2-4 board is easy enough–simply ground yourself thoroughly, push the appropriate 256K-bit or 1-megabit RAM chips into the sockets specified in the user manual, and set three tiny DIP switches on the board. Note, however, that you can't mix and match chips: 256K-bit chips can be used only if the board is configured for 1MB; 1-megabit chips are reserved for 2MB and 4MB configurations.

Thanks to the Series II's modular design, installing a 1-2-4 board is a 3-minute job. Turn off the printer, unplug the power cord and parallel or serial cable, and swing the unit around so that the paper tray is on the right. Remove the single screw securing the "RAM Expansion" access plate on the side of the printer; you'll notice a pair of white plastic expansion board guides and, just inside the opening, a white female connector. Align the 1-2-4 board with the guides, chip side up, and slide it all the way in; the row of pins on the underside of the board should easily merge with the white connector. Put the access plate back in place, reconnect the Series II's external cables, and turn on the printer.

Once the printer passes its internal diagnostic tests, take the printer off line (by pressing the on-line button on the front panel) and hold down the test button until the on-line, formfeed, and manual lights flash. After a few seconds, the LaserJet will print out a test page listing the currently available memory at the top. If you install a 2MB 1-2-4 board, for example, the printout should read "Installed Memory = 2560 Kbytes." Put the Series II back on line, and it's ready to roll.

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Novice upgraders who don't know where to start should consider *Supercharging Your PC* (Osborne/McGraw-Hill, Berkeley, California, 1987) by Lewis Perdue. This $19.95 tome is a solid introduction to upgrading your PC, XT, AT, or compatible system with everything from hard disks to fax boards. Along the way you'll pick up essential technical

information and learn about relevant (and occasionally offbeat) applications for your PC.

Correction

Eagle-eyed readers may have noticed that the photos in the October edition of *The Upgrade Path* did not match their captions. The images were inadvertently switched. The opening photo should have been paired with "Poor Man's Turbo Board," an examination of the AT Turbo-Switch II from Megahertz Corporation; the second photo belongs with the "Do-It-Yourself Reset Button" item, which discusses the joys of using the Irata-Reset from Irata Systems. We regret the error and hope it hasn't caused prospective customers or these vendors too much distress.

Please forward submissions and queries to The Upgrade Path, PC World, *501 Second St., San Francisco, CA 94107 or electronically to MCI Mail PCWORLD, CompuServe 74055,412, or The Source STE908. Articles submitted by mail should be accompanied by a self-addressed, stamped envelope and an ASCII file of the item.*

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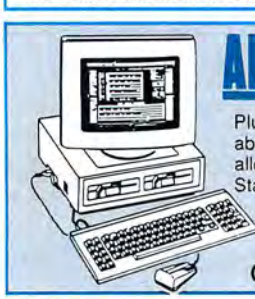

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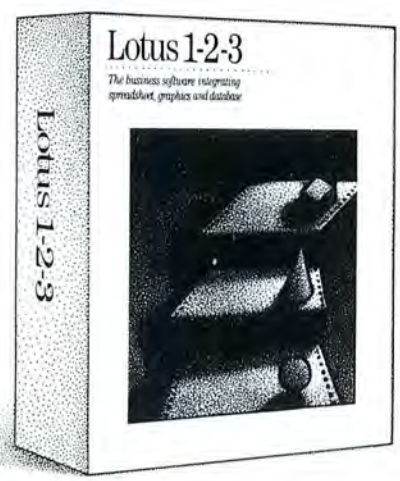

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Karl Koessel

The Two-PC Family

Q. *I have a dual-floppy IBM PC and have just purchased an IBM AT. The AT resides in my office on the upper floor of my house, while the PC lives on the lower floor where it is used by my sons for schoolwork and, of course, games. My sons have used the AT a little and like the speed the hard drive delivers and being spared the annoyance of having to swap disks in and out of the floppy drives. Can my sons use the PC to access the AT's hard drive with the computers on separate floors?*

Mike Gillespie
Flanders, New Jersey

A. Resource sharing—which enables one computer to use another's peripheral devices—is within the scope of networking. However, the benefit of sharing the AT's hard disk hardly warrants the expense of implementing a network. Consider getting your PC its own hard disk, such as Plus Development's Hardcard—a hard disk on an expansion card. The Hardcard card also holds the hard disk's controller and draws very little power (an important consideration in light of the PC's small power supply). Installation is as simple as slipping the card into an expansion slot. It won't provide networking capabilities, but your sons will be a little less covetous of your AT.

If you really want to explore networking, you could set up a simple serial-based LAN, such as Server Technology's *EasyLAN*, for about $100 per node (plus the cost of a network program like the *IBM PC Network Program*). However, such a simplistic LAN, although sufficient for limited file transfers and the sharing of printers, is not fast. Your sons would be able to use the AT's hard disk as though it were in the PC and would be freed from the floppy disk shuffle, but they would not experience the quick response they desire.

For a more capable net, look at Orchid Technology's PCnet Starter Kit, which sells for $1090 list (you may be able to find it for less if you shop around). A small 1-megabit-per-second coaxial LAN like this would provide fast remote access to the AT's hard disk and at the same time protect your data from accidental adulteration. The kit includes two interface cards, 20 feet of cable, and software.

EasyLAN
Server Technology, Inc.
1095 E. Duane Ave. #107
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(continues)

List price: two-station kit (including interface boards and 20 feet of cable) $1090
Requirements: 45K, DOS 2.00 or later version
Copy protected

Hardcard 20
Plus Development Corp.
1778 McCarthy Blvd.
Milpitas, CA 95035
408/434-6900
List price: $795
Requirements: DOS 2.00 or later version

Hardcard 40
Plus Development Corp.
List price: $1195
Requirements: DOS 3.00 or later version

A Third Floppy Drive

Q. *I have an IBM XT with 640K, two half-height 360K floppy drives, and a 20MB Hardcard. I'd like to add a 3½-inch floppy disk drive. Can I install it in the empty drive cavity, the one that normally holds a hard disk? Will DOS 3.20 support three floppy drives?*

Also, I'm thinking about replacing my Amdek 310A monitor with an EGA- or VGA-compatible model, possibly the Mitsubishi Diamond Scan or the NEC MultiSync. Can my Hercules Graphics Card Plus drive those monitors? What about the Hercules Color Card? Or do I need some other graphics adapter instead?

Rob Reintges
Beverly, Massachusetts

A. Although your XT's floppy disk controller (FDC) can support up to four floppy drives, the FDC's design allows only two drives to be connected internally. The other two must be connected externally via a cable that attaches to the 37-pin D-shell connector on the back of the XT's FDC. IBM sells such a drive for $395 (see *The Hardware Shelf, PCW,* November 1987, for a review of this product).

To install a 3½-inch floppy drive in your XT's empty drive bay, you need a new FDC, one to which you can connect more than two drives internally. If you decide to go this route, contact Access Computers, a Toshiba distributor in Plantation, Florida. For less than half the price of IBM's external 3½-inch drive, Access sells its Universal Floppy Controller, a third-height 3½-inch 720K drive from Toshiba, and the 5¼-inch Universal Mounting Kit for Toshiba Drives that you'll need to install the drive in your XT's empty bay (1.44MB 3½-inch drives require an AT-compatible FDC).

In any case, take a look at "Double Your Storage," *The Upgrade Path, PCW,* May 1987. Although that item concerns replacing an internal 5¼-inch floppy drive B: with a 3½-inch drive, it includes handy information about using 3½-inch drives.

As far as upgrading to EGA or VGA standards is concerned, you need both an adapter and an appropriate monitor. The Hercules Color Card can drive multiscan monitors such as those you have mentioned (the Hercules Graphics Card Plus can't), but it provides only CGA functionality (320-by-200-pixel 4-color graphics or 640-by-200-pixel 2-color graphics). If you're satisfied with the EGA's 640-by-350-pixel 16-color graphics or the enhanced EGA's 640-by-480-pixel 16-color graphics (both from a palette of 64), you can upgrade a step at a time. Buy yourself an IBM or third-party EGA (or an enhanced EGA clone) to drive your Amdek in the EGA's 720/640-by-350-pixel monochrome modes for now. Then later you can buy a multiscan monitor and drive it at the adapter's higher resolution.

If you want nearly full VGA capabilities, which include 320-by-200-pixel graphics with 256 colors and 640-by-480-pixel graphics with 16 colors (both from a palette of 262,144), you'll

The benefit of sharing an AT's hard disk hardly warrants the expense of implementing a network.

have to purchase a VGA-emulating adapter designed to fit into a standard PC expansion slot (such as Video 7's Vega VGA or Paradise's VGA Plus), a monitor that accepts analog input (like the Mitsubishi or the NEC multiscans or a PS/2's), and the appropriate cable to connect the two. (None of the VGA boards available at press time were fully VGA compatible; some are BIOS-level compatible, others register-level compatible. This means some will run programs like *Word 3.0* but won't run *Windows/386* or OS/2, while others do just the opposite.) For more information on video display adapters, see "The Ultimate System Buyers' Guide," *PCW*, January 1988.

Vega VGA
Video 7
46335 Landing Pkwy.
Fremont, CA 94538
415/656-7800
List price: $499

VGA Plus
Paradise Systems
99 South Hill Dr.
Brisbane, CA 94005
415/468-7300
List price: $399

Universal Floppy Controller
Access Computers
1539 N.W. 65th Ave.
Plantation, FL 33313
800/262-6756, 800/330-0100
Florida, 305/792-2266
List price: $69
Requirements: PC, XT, or compatible

Compatibles manufacturers have not licensed BASIC in ROM; however, most offer a complete version on disk.

Third-height 3½-inch 720K Toshiba drive
Access Computers
List price: $105
Requirements: controller, mounting hardware

5¼-inch Universal Mounting Kit for Toshiba Drives
Access Computers
List price: $14

Blanker Balked by EGA

Q. *I have two shareware screen-saver programs that are supposed to prevent damage to the screen by blanking the display if I don't type for 10 minutes. Both work perfectly with my XT's color/graphics adapter, but on a system equipped with NEC's GB-1 enhanced graphics adapter and MultiSync monitor, only the cursor blanks out. What's up?*

Al Fueyo
Winter Haven, Florida

A. Your screen-blanking programs were written before EGAs were introduced and are meant for MDA- and CGA-equipped PCs. Although most manufacturers bundle a screen-blanking program with their EGAs, NEC, like IBM, does not. However, many utility programs, such as Revolution Software's *Cruise Control* or Alpha Software's *Keyworks,* include a screen-saver utility. And by now, no doubt, public-domain screen blankers for the EGA are available on your local bulletin boards.

Compatibles and IBM BASICA

Q. *Why doesn't IBM BASICA or IBM software such as the* Personal Decision Series *(specifically, the* Data Edition, Plans+ Edition, *and* Reports+ Edition*) run on my clone? Is there a way to make them run?*

Keith Clark
Carson City, Nevada

A. IBM PCs, XTs, ATs, and PS/2s all contain what is known as Cassette BASIC in ROM. When you load IBM's BASIC or BASICA from the DOS disk, you are augmenting Cassette BASIC with the more advanced commands of BASIC or BASICA (which are also known as Disk BASIC and Advanced BASIC, respectively). Because other compatibles manufacturers have not licensed BASIC in ROM, their machines lack the essential "kernel" to which IBM's BASIC or BASICA disk programs add functionality. Therefore IBM's BASIC and BASICA do not run on compatibles.

(continues)

However, most compatibles manufacturers offer a complete version of BASICA on disk, calling it BASICA.COM, BASICA.EXE, or GWBASIC.EXE.

While these versions of BASIC support IBM's *Personal Decision Series (PDS)* software, *PDS* hard disk installation routines look for a file called BASICA.COM in the root directory. So if your compatible's version is not called BASICA-.COM, give the *PDS* installation routine a placebo: At the DOS prompt, type the command **COPY CON C:\BASICA.COM**, press **< Enter >** twice, press **< F6 >**, and press **< Enter >** again. You can now install your *PDS* software. Next, delete the dummy BASICA.COM from the hard disk's root directory (**DEL C:\BASICA.COM < Enter >**) and either replace it with your compatible's BASIC or ensure that the directory that holds your BASIC interpreter is included in your PATH command (see "The AUTOEXEC.BAT File," the sidebar to "Power Your PC With Batch Files," *PCW*, December 1987). In either case, if your BASIC is called GWBASIC, rename it with the command **REN GWBASIC*.* BASICA.* < Enter >** (*PDS* doesn't care whether the extension is .COM or .EXE). Your *PDS* software will now run on your compatible.

Putting PRINT.COM in AUTOEXEC.BAT

Q. *How can I debug DOS 3.20's PRINT.COM so it will skip the 'Name of list device [PRN]:' prompt? Such a modification would allow AUTOEXEC.BAT to automatically install the background print queue without my having to press <Enter> just to accept the default printer port.*

Robert Schuchat
Owings Mills, Maryland

A. There's no need to resort to debugging PRINT.COM; simply include the program's /D:PRN switch (to specify the default list, or print, device) in your AUTOEXEC.BAT's PRINT command. (You can, of course, specify a list device, such as COM2 or LPT3, by substituting the appropriate name for PRN.) Just remember that when you use the /D:*device* switch, it must be the PRINT command's first parameter.

Most manufacturers bundle a screen-blanking program with their EGAs.

Programmable Word Processors

Q. *Before I switched to PCs, I did a lot of programming on an Apple II in WPL, a dedicated language that operates within a word processor. I believe that a program I wrote for attorneys has commercial value, but now, because so many lawyers' offices use PCs, I would like to rewrite the program for DOS-based machines.*

What word processors, if any, are available with a dedicated programming language? I don't mean merely macro functions but real programming capability, with variables, arrays, loops, conditionals, subroutines, and a GOTO command.

Terrill J. LaRue
Daytona Beach, Florida

A. I am not familiar with WPL, but Ashton-Tate's *Framework II* may have just the talent you desire. This integrated package combines spreadsheet, word processing, outlining, telecommunications, graphing, and data base management capabilities–all of which can be orchestrated by programs written in *Framework II*'s programming language, FRED. Using FRED, you should be able to duplicate your WPL word processing program as well as enhance it with the functionality of *Framework II*'s other modules.

To facilitate FRED program development, Ashton-Tate offers the *Framework II Developer's Toolkit*, which includes source code for a sample application and several user-defined functions to enhance the FRED language. The kit also includes documentation for an assembly-language interface to your FRED programs.

Framework II
Ashton-Tate
20101 Hamilton Ave.
Torrance, CA 90502-1319
213/329-8000
List price: $695
Requirements: 384K, DOS 2.00 or later version, two disk drives
Not copy protected

Framework II Developer's Toolkit
Ashton-Tate
List price: $149.99
Requirements: Framework II

Full FILLing Utility

In response to the problem of copying large groups of files from a hard disk to floppies ("Floppy Copy of Hard Files," *The Help Screen, PCW,* October 1987), reader Dominic Calderone recommends FILL, a public-domain utility written by Jean Lalonde of Montreal, Canada. This easy-to-use program employs an elegant technique that keeps the number of floppy disks to a minimum: First it lists the names and sizes of the files to be copied. Then it copies the largest file onto the first floppy disk and removes the file's name from the list. That done, it copies the next largest file that will fit in the space remaining on the first disk and, of course, removes that file's name from the list. This process continues until the disk cannot accommodate any more of the files remaining to be copied. You are then prompted for a new disk.

Do you have any questions concerning the IBM PC or compatibles? Send them to The Help Screen, PC World, *501 Second St., San Francisco, CA 94107 or electronically to MCI Mail PC-WORLD/179-3813, CompuServe 74055,412, or The Source STE908.*

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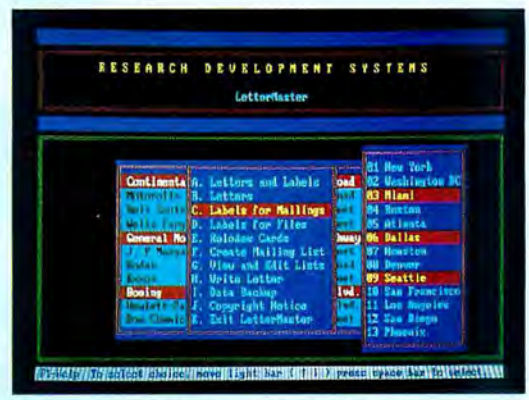

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Edited by Tom Swan

Pascal Pop-Ups

Have you ever wondered how to program pop-up menus and windows like those in *SuperKey*, Turbo C, and QuickBASIC? Pop-up windows are based on screen swapping. Contrary to common belief, you don't need to know assembly language to write your own pop-up windows. As POPUP.PAS [see Listing 1] demonstrates, writing screen-swapping routines is easy with Turbo Pascal's built-in MEM array.

Procedure MoveFromScreen moves the screen contents into an array variable. Procedure MoveToScreen moves the array's contents back to the screen. Together, the two routines save and restore any rectangular text-mode display window.

If you have an EGA or CGA card, change the DISPLAY constant from $0B000 (the beginning address of the IBM Monochrome Display Adapter's video memory) to $0B800 (the beginning address of the EGA's and CGA's video memory). Coordinate values x1, y1, x2, and y2 define the rectangular area to be saved and restored. The upper left corner is at coordinates (x1, y1). The lower right corner is at (x2, y2). Parameter Buff is an untyped variable, necessary because we can't predict how big the actual array will be.

Variable Upper holds the memory address at coordinates (x1, y1). The variables right and down specify the window's horizontal and vertical dimensions; first and second are FOR-loop counters. The two FOR loops do the actual work of transferring display memory to and from the untyped buff array.

Using these two procedures, you can now design programs that have pop-up menus and help screens. Best of all, they don't require a degree in assembly language to understand.

Michael Fang
Plano, Texas

Editor's note: To create POPUP.PAS, enter Listing 1 into Turbo Pascal's editor. Compile and run. You'll see a display full of text. Press <Enter> to display a sample pop-up window. Then press <Enter> again to restore the portion of the display covered by the pop-up. This example demonstrates that MoveFromScreen and MoveToScreen correctly save and restore the rectangular display area from (20, 6) to (60, 18). When you extract these two procedures for your own programs, be careful to make the buffer array large enough to hold the text inside the window area you are saving. If the array is too small, Turbo Pascal can overwrite other data in memory, possibly crashing the program, not to mention ruining your day.

Return to Sender

ALTA.MAC [see Figure 1] is a *WordPerfect* macro that addresses an envelope and includes a return address. The macro reads the mailing address from a document, adds the return address, and prints the result. After printing, the macro cleans up and then returns the cursor to its original position. To use the macro, place the cursor at the beginning of the address and type <Alt>-A.

The six <Enter>s that follow ZIP insert blank lines below the return address. Vary this for different-size envelopes.

(continues)

```
PROGRAM PopUp;                    { For text-mode screens only }
CONST   DISPLAY = $0B000;         { $0B800 for CGA and EGA displays }
VAR     buffer : ARRAY[ 1 .. 4000 ] OF BYTE;
        i, j, ulc, ulr : INTEGER;

PROCEDURE MoveFromScreen( x1, y1, x2, y2 : BYTE; VAR Buff );
VAR  upper, right, down, first, second, start : INTEGER;
     buffer : ARRAY[ 1 .. 4000 ] OF BYTE ABSOLUTE Buff;
BEGIN
   start := 1;
   upper := (((2*x1)-2)+((y1-1)*160))-1;
   right := ((x2-x1)+1)*2;
   down := (y2-y1)+1;
   FOR first := 1 TO down DO
      BEGIN
         FOR second := 1 TO right DO
            BEGIN
               buffer[ start ] := mem[ DISPLAY : upper + second ];
               start := succ( start )
            END;
         upper := upper + 160;    { Advance to next line }
      END;
END;

PROCEDURE MoveToScreen( x1, y1, x2, y2 : BYTE; VAR Buff );
VAR  upper, right, down, first, second, start : INTEGER;
     buffer : ARRAY[ 1 .. 4000 ] OF BYTE ABSOLUTE Buff;
BEGIN
   start := 1;
   upper := (((2*x1)-2)+((y1-1)*160))-1;
   right := ((x2-x1)+1)*2;
   down := (y2-y1)+1;
   FOR first := 1 TO down DO
      BEGIN
         FOR second := 1 TO right DO
            BEGIN
               mem[ DISPLAY : upper+second ] := buffer[ start ];
               start := succ(start);
            END;
         upper := upper + 160;    { Advance to next line }
      END;
END;

BEGIN
   TextMode(3); ClrScr;
   FOR i := 1 TO 19 DO            { Create some text on screen }
      FOR j := 33 TO 123 DO
         Write( chr(j) );
   Write( '  *.*, PC World, February 1988' );
   Writeln; Writeln;
   Write( '   Press <Enter> to display pop-up window.' );
   MoveFromScreen( 20, 6, 60, 18, buffer );  { Save screen }
   Readln;
```

(continues)

Listing 1: POPUP.PAS demonstrates how to use Turbo Pascal to create pop-up menu or help windows.

The <Alt>-<F8>54<Enter> <Enter> statement defines the top margin as four half lines. Change the 4 to the number of half lines you need.

A. W. "Lee" Foster, Jr.
Houston, Texas

Editor's note: To enter ALTA-.MAC, load WordPerfect *and press* **< Ctrl > - < F10 >** *to begin defining a macro. Enter* **< Alt > -A** *to name the macro key. Next, carefully type each keystroke as shown in Figure 1, replacing the three return-address lines with your own name and address. When you are finished, press* **< Ctrl > - < F10 >** *to end the macro definition. Type your letter, place the cursor on the address, and type* **< Alt > -A**. *Be sure to have your printer on and an envelope inserted.*

Multiline Word Merge

I use *Microsoft Word*'s Print Merge facility to produce personalized form letters. The Ask instruction within a form letter prompts the user to enter the recipient's name and address and to answer a few questions.

My form letters support a four-line address and usually contain an Ask instruction to allow me to add a paragraph. Occasionally, I need five or even six address lines or want to add more than one paragraph. Luckily, there's an easy solution to these problems.

Word uses control characters to represent certain commands in the document. Control J (ASCII 10) represents a new paragraph, and Control K (ASCII 11) represents a new line.

```
    Gotoxy(ulc,ulr);    Write(                                          );
    Gotoxy(ulc,ulr+1);  Write(                                          );
    Gotoxy(ulc,ulr+2);  Write(                                          );
    Gotoxy(ulc,ulr+3);  Write(                                          );
    Gotoxy(ulc,ulr+4);  Write(                                          );
    Gotoxy(ulc,ulr+5);  Write(                                          );
    Gotoxy(ulc,ulr+6);  Write(                                          );
    Gotoxy(ulc,ulr+7);  Write(                                          );
    Gotoxy(ulc,ulr+8);  Write(                                          );
    Gotoxy(ulc,ulr+9);  Write(                                          );
    Gotoxy(ulc,ulr+10); Write(                                          );
    Gotoxy(ulc,ulr+10); Write(                                          );
    Gotoxy(ulc,ulr+11); Write(                                          );
    Gotoxy(1,23);
    Readln;
    MoveToScreen( 20, 6, 60, 18, buffer );     { Restore screen }
END.
```

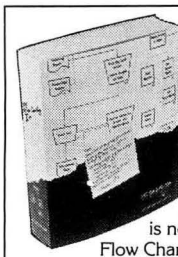
```
This pop-up window could
  display a menu listing
  or help information.


    Press <Enter> to
     restore screen.
```

Listing 1 *(continued)*

```
<Alt>-F4
<F2><Enter><Enter><F2>
<Ctrl>-<F4>2
<Shift>-<F3>
<Alt>-<F8>54<Enter><Enter>
<Shift>-<F8>305<Enter>75<Enter>
Return Name<Enter>
Return Address<Enter>
Return City, State ZIP<Enter>
<Enter><Enter><Enter><Enter><Enter>
<Ctrl>-<F4>5
<Shift>-<F8>340<Enter>75<Enter>
<Shift>-<F7>2
<PgUp>
<Alt>-<F4>
<PgDn>
<Ctrl>-<F4>1
<Shift>-<F3>
<Shift>-<F2>
<Shift>-<F2>
<Shift>-<F2>
<Shift>-<F2>
```

Figure 1: ALTA.MAC is an envelope-addressing WordPerfect macro that prints both the recipient's address and your return address.

(continues)



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```
echo off
cls
if x==%1x goto retry
if x==%2x goto onekey
if x==%3x goto twokeys
find "%1" <MAGINDEX | find "%2" | find "%3" | sort/+17 | more
goto end
:twokeys
find "%1" <MAGINDEX | find "%2" | sort/+17 | more
goto end
:onekey
find "%1" <MAGINDEX | sort/+17 | more
goto end
:retry
echo Try again!  The proper syntax is:
echo.
echo       MAGFIND keyword [keyword] [keyword]
:end
```

Listing 3: Use this batch file, MAGFIND.BAT, to locate up to three keywords in MAGINDEX, a magazine article index file composed of ASCII text.

Using this information, it's easy to add lines during a Print Merge: Just include a Control K within the text that you enter in response to the Ask instruction. However, because *Word* will not accept the <Ctrl>-K key combination, you must hold down the <Alt> key while you type 11 on the numeric keypad. For example, to get Print Merge to print

Star-Dot-Star
PC World

as the "first line," I type Star-Dot-Star, hold down the <Alt> key, type 11 on the numeric keypad, release the <Alt> key (the male symbol, ♂, appears), type PC World, and press <Enter> when prompted for the first line of the address.

The same technique lets me add more than one paragraph to a letter even though the main document's Ask instruction allows for only one. I simply hold down the <Alt> key and type '10' on the numeric keypad before the first word of additional paragraphs. The format of new lines and paragraphs will be the same as the paragraph in which they are inserted.

William R. Mumpower
Norton, Virginia

dBASE Subdirectories Bug

Not being an assembly language programmer or having much experience with DEBUG.COM, it took me some time to discover why I couldn't use Calvin Hsia's *dBASE III Plus* routines ["dBASE Subdirectories," *.*, *PCW*, November 1986]. The DEBUG sequence contains two typos ('move' should be 'mov' without an *e*) and is missing a line (-r cx<Enter>).

Here is the correct sequence for creating CD.BIN with DEBUG.COM [see Figure 2]. The CD.PRG listing [repeated here in Listing 2] is correct, although the *dBASE* novice might not realize that the subdirectory path name parameter must be quoted, as in DO CD WITH "\TEMPDIR." The instructions in Mr. Hsia's letter do not make this clear.

Thanks for the tip. CD runs faster and uses less memory than the *dBASE* RUN command.

Robert B. Steinbach
Concord, California

```
*Program CD.PRG
parameter dir
close databases
load cd
call cd with dir
? 'Directory now changed to ',dir
release cd
return
```

Listing 2: CD.PRG is reprinted from *.*, November 1986.

```
A > debug < Enter >
-a 100 < Enter >
xxxx:0100 mov dx,bx < Enter >
xxxx:0102 mov ax,3b00 < Enter >
xxxx:0105 int 21 < Enter >
xxxx:0107 retf < Enter >
xxxx:0108  < Enter >
-r cx < Enter >
CX 0000
:8 < Enter >
-n cd.bin < Enter >
-w < Enter >
Writing 0008 bytes
-q < Enter >
```

Figure 2: Type the bold text and press <Enter> to create CD.BIN

Finding Your Way

I use MAGFIND.BAT [see Listing 3] to search for keywords in a magazine article index file, composed of ASCII text, that I created and maintain with my word processor. You can do the same. Each line can be as long and descriptive as you like, although an 80-character limit will keep it to one screen line. Be sure to include the page number of the article. Save the index file as MAGINDEX.

For proper sorting, start each article name in column 17. Include spaces in the file but not tabs. DOS makes a mess when you ask it to sort by a certain column in a file that includes tabs.

To search the index, type MAGFIND followed by the word you want to find. You can search for one, two, or three keywords. For example, type MAGFIND Pascal Graphics to locate titles containing both of those two keywords in any position.

Paul Tempke
Doylestown, Pennsylvania

Editor's note: When creating your own magazine article index, you might want to enter everything in either all uppercase or all lowercase. The DOS FIND filter is case sensitive, meaning that it considers Pascal and PASCAL to be different words. Note that you can begin the article titles in a column

(continues)

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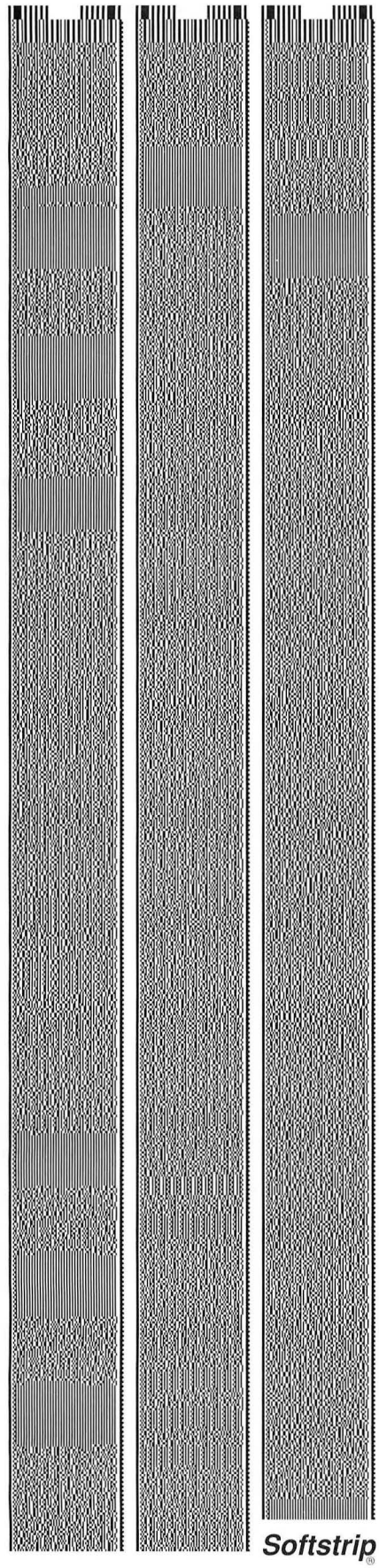

other than the 17th if you also appropriately edit each /+17 in MAGFIND.BAT. Also, you can, of course, edit MAGFIND.BAT to sort on a different column if you want your output sorted on a "field" other than the article title.

List Bug

In the August 1987 *.*, LIST.BAT does not properly pass all the necessary parameters to the subroutine batch file PRINTIT.BAT. LIST.BAT's seventh line should be:

```
for %%f in (%1) do command /c
  printit %%f %2 %3 %4 %5
  %6 %7 %8 %9
```

Without the additional replaceable parameters, %3 through %9, only the first word of the comment is printed.

W. R. Tracey
North Vancouver, Canada

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Robert M. Carr

Tech Notes: EMS 4.0– The Last Hurrah?

The DOS world's new expanded memory spec isn't too little, but it may be too late.

If you're like me, you don't want to move on to a new project or phase in life unless the rest of your affairs are in order. From all appearances, that attitude isn't unique; as the PC industry girds for its imminent move to OS/2, some developers have seen fit to fix DOS one last time.

This latest palliative is a new standard called EMS (for expanded memory specification) 4.0. It's a major overhaul of EMS 3.2, the largely successful means of breaking through DOS's 640K memory limitation. For a host of reasons, DOS may well need this last dose of medicine. But is it good for you?

EMS isn't software per se but a set of routines, now in the public domain, that describe how applications can access RAM beyond DOS's ostensible 640K limit. EMS thus unlocks a larger work space for properly written programs.

The original EMS emerged from a collaborative effort by Lotus, Intel, and Microsoft–hence the popular shorthand, *LIM*. LIM routines were embedded in memory-management circuitry on expansion boards, and they inspired a crucial driver for *1-2-3* release 2. Over time, developers of literally hundreds of other major productivity packages have worked this spec into their programs.

Don't confuse expanded memory with extended memory. One key difference is that extended memory–RAM above 1MB–is a smooth extension of DOS's memory address space, whereas expanded memory is not contiguous with conventional RAM (that is, the first megabyte of memory).

All of this begins to make sense when you consider the architecture and memory-addressing capabilities of Intel's 8086/8088 CPUs and their more potent cousins. The XT's 8088 can address 1MB of memory, and no more. The upper 384K is reserved for such system functions as video RAM and the ROM BIOS; 640K is ordinarily left to DOS and its applications for code and data.

With the 80286 and 80386 processors, RAM real estate isn't quite so dear (although stuffing your system with copious

(continues)

amounts of memory is an expensive proposition). Given the right operating system, the 286 can directly address 16MB and the 386 a full 4 gigabytes, and each can deliver the benefits of protected mode. Nonetheless, when DOS 3.*xx* is active, both operate in 8086 compatibility mode (also called real mode) and are compelled to respect the 1MB barrier.

Because extended memory is RAM beyond the 1MB divide, it's essentially irrelevant to the 8086/8088 family. Extended memory is no great shakes to 286s and 386s running DOS, either; even with those energetic processors, you won't encounter a standard way for DOS applications to access extended memory. A few programs use special techniques (such as temporarily flipping the 286 into protected mode) to gain access to extended memory. But at best, you can only park VDISK (or a similar RAM disk) or a print spooler in high memory.

Of course, if you don't mind leaving DOS altogether, you can turn to Pick or Xenix or any UNIX variant, all of which are designed to run in protected mode and thereby directly address extended memory. OS/2 has in common with Xenix an ability to run both the 286 and the 386 in protected mode–and directly access at least 16MB of contiguous memory. OS/2 applications will thus be free to take full advantage of extended memory.

Think of extended memory as an annex to a shelf on which you can keep all of your books. The big limitation to DOS 3.*xx* is that its reach simply isn't long enough. As long as you stick with unvarnished DOS, you can grab hold of books resting on the outer reaches of the shelf only by using a few awkward or limited tools.

EMS 4.0 is especially good news for fans of TSR (terminate-and-stay-resident) applications, which tend to fill RAM with code, not data.

If extended memory is a lengthy shelf, expanded memory is a lazy Susan: You can reach any book you like, but you must first specify exactly how far your revolving tray has to turn for the desired object to greet you. This effect is known as *memory paging*. But rather than spinning memory around, expanded memory operates by resetting hardware registers to point to desired pages–that is, sections of memory.

The foundation of expanded memory is also its biggest limitation. Before reaching for a book, you must perform a painstaking first step: spinning the lazy Susan or setting instructions to page in a desired region of memory. Because of this requirement, DOS programs must be rewritten to access EMS RAM.

An EMS application hides RAM in an entirely separate address space; the desired page of memory intrudes into a small vacant chunk within the 1MB. It's just within reach, a wee bit above the 640K ceiling but safely removed from areas reserved for screen RAM and such. In other words, EMS enlarges the work space by grabbing regions of RAM from outside the 1MB boundary and then depositing them in the 8086's front yard, a technique known popularly as *bank-switching*.

Once within the conventional work area, an application can use everyday 8086 instructions to read, write, and manipulate data. This data is said to have been *mapped* within reach of the 8086; the mapping region is also called a *page frame*. Any EMS application must know how to look in a page frame for information, and also that any page frame is apt to contain only a portion of the relevant information (the remainder being located on pages not currently mapped into the page frame).

Although these may seem to be subtle distinctions, they bear directly on the differences between Intel's EMS 4.0 and its immediate predecessor. EMS 4.0 is upwardly compatible with EMS 3.2, and it should run on most existing expanded memory boards–Intel's AboveBoard in particular.

But EMS 4.0 represents a significant advance over EMS 3.2. Like AST's EEMS (enhanced expanded memory specification)–a less popular but more intriguing approach–EMS 4.0 enables you to

(continues)

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execute program code from within expanded memory. While this was technically feasible with EMS 3.2, it was virtually never done. The reason is simple: Each application would have had to invent the complex techniques necessary to ensure that the right piece of code enters a page frame at the right time.

You can certainly expect EMS 4.0 to inspire at least as much third-party support as its less capable predecessor. Whether it's enough support remains the hot question.

EMS 4.0 incorporates this vital capability by means of driver software that any application can use. Programs require only a minor patch in order to make sense of Intel's code-location techniques. As a further enticement, EMS 4.0 increases the expanded memory pool from 8MB to 32MB and improves paging and memory-accessing speed as well.

Its ability to execute code out of expanded memory is sufficiently useful to guarantee wide support for EMS 4.0. If your program code regularly overflows the 640K barrier, you can't turn to EMS 3.2 for effective help; that spec addresses only data storage needs. EMS 4.0 is especially good news for fans of TSR (terminate-and-stay-resident) applications, which tend to fill RAM with code, not data.

But is EMS 4.0 the right choice? For some, the purchase decision is easy. If you already own an expanded memory board and have been using EMS 3.2 (or AST's EEMS alternative), ask your board manufacturer for the 4.0 driver. You'll appreciate the performance and the power immediately.

For those living without expanded memory, however, the decision is tougher. It's tempting to think that EMS 4.0 might extend DOS's life indefinitely. But before making up your mind, ask yourself whether you're desperate for more memory right now; you may want to sit tight if you're getting by reasonably well. Hardware and operating system innovations will soon be flying thick and fast, so you can't lose by concentrating on getting the most out of your present system. Sharpen your software skills and resist the urge to upgrade hardware.

Until ambitious OS/2 applications arrive, the vast majority of users can probably manage just fine within the 640K limit. People who absolutely must get more out of their PCs can take a simple step like adding software-based functionality: sample a desktop publishing package or learn a file manager. Or you might try a really bold move—reading the documentation of the programs you already use. Learn about your program's advanced features, and try them. Become adept at using .BAT files and backup programs.

If you must add RAM, consider whether you'll use it primarily as a home for data or for several (possibly hefty) applications. Quick access to data may be all you need; be careful not to overupgrade. You may be able to obtain all the power you need by buying a 286 machine equipped with a fast hard disk rather than installing megabytes of EMS RAM. Although jumping to an entirely new system as a way of avoiding a possible fad may seem drastic, it isn't all that extreme; the key is choosing the appropriate software path. You'd also be prepping for OS/2.

Should you need to run multiple applications or make additional room for code, then EMS 4.0 represents a strong solution. You can certainly expect EMS 4.0 to inspire at least as much third-party support as its less capable predecessor. Whether it's enough support remains the hot question.

Although the PC community exhibited rare unanimity in embracing EMS 4.0 (even EEMS partisans AST and Ashton-Tate went along), users will need more than official reassurances. Since existing applications won't be able to execute from expanded memory without modification, everyone is faced with a new round of software upgrades.

Upgrades often force us to rethink what we're doing. Bank-switching schemes like EMS 4.0 have been more than a stopgap but less than a lasting solution. Expanded memory has endured longer than many expected simply because it works. Although memory paging tends to be slow, ever-

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increasing CPU clock speeds have largely masked performance problems.

EMS 4.0, however, has altered the debate. The goal of EMS RAM is no longer just to make room for mammoth spreadsheets; it's to run multiple programs simultaneously. And that means tweaking a recalcitrant operating system.

Fortunately, alternatives exist to collecting upgrades or junking existing programs–or settling for a less-than-optimal system. Quarterdeck's *Desqview 2.0* works as a sort of "master driver." Pair it with EMS 4.0 (or EEMS), and you needn't wait for a raft of individual drivers. Your applications will coexist nicely in expanded RAM. *Windows/386*, another control program, is similarly capable of running several full-fledged DOS packages at once.

In the long term, however, OS/2 represents the major alternative to EMS 4.0 for those with a yen to run multiple applications. Multitasking is, after all, OS/2's reason for being. And OS/2 should be here any day now.

So is EMS 4.0 an industrial-strength platform, or does it mark the nostalgic end of an era? The revised spec is unquestionably a strong solution to some major DOS 3.*xx* limitations. Had EMS 4.0 been available around the time the AT was introduced, support for it would have been overwhelming; virtually all DOS applications would have been modified to store portions of code in expanded memory. But today, with developers straining to create and maintain software for both the DOS and OS/2 worlds–as well as to learn Presentation Manager's graphics vernacular–applications will be adapted to EMS 4.0 only to the degree that you demand it.

Robert M. Carr is the creator of Framework II *and a cofounder of the software start-up Go Corporation.*

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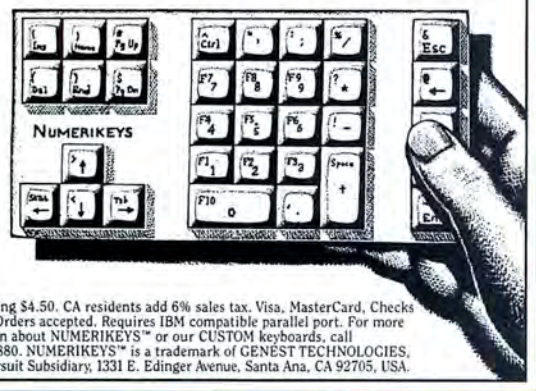

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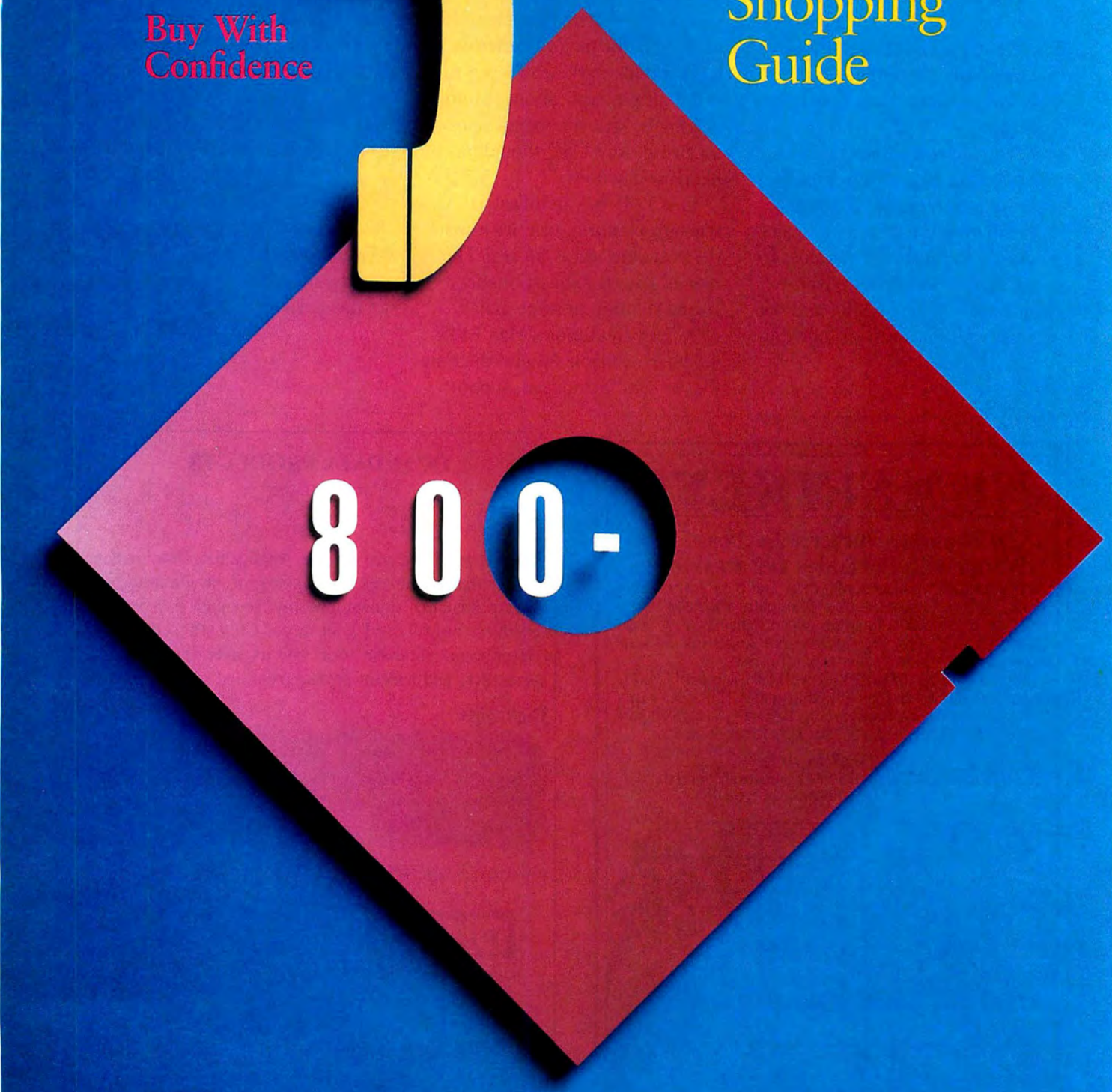

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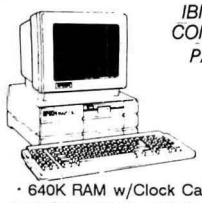

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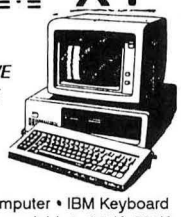

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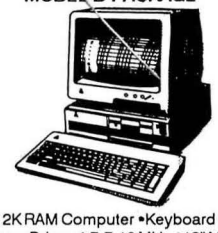

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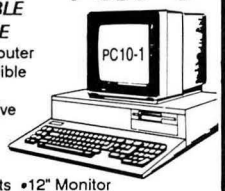

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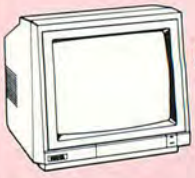

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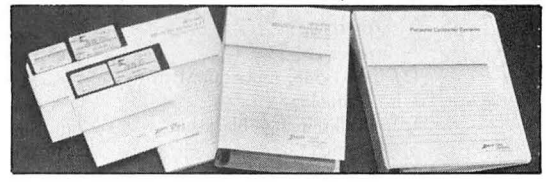

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Leslie Fiering

Another Angle: The Software Upgrade Dilemma

To upgrade or not to upgrade? That's the question large companies face every time a new version of a corporate software standard is announced. The upgrade may offer a much-needed bug fix or long-awaited enhancements, but the cost of implementing the change for hundreds or thousands of users can be daunting.

The price of the software is usually the least of the total bill. So-called soft dollars spent on administrative overhead and technical support are usually the biggest expenses in multiple-unit installations. Time is money, and research by the Microcomputer Managers Association indicates that upgrading 100 copies of a single software product can require up to 450 working hours over a period of 17 to 32 weeks.

Just obtaining an evaluation copy through corporate purchasing channels can take a week or two. Then testing compatibility with the installed base of hardware and software can take another two to four, depending on the complexity of the environment. More delays ensue while purchasing authorization is obtained from management, and again when the purchasing department negotiates corporate discounts through a dealer or the manufacturer. That's already two to four months.

Then comes the hard part: installation. Usually the old version must be uninstalled from far-flung hard disks before the new one can be run. New training courses must be developed or, at the least, old ones rewritten. Applications developed under the earlier software versions have to be modified and copies of those applications tracked down at branch offices across the country. For the largest corporations, upgrades can take a year to complete, about twice as long as the period between many major software upgrades today.

By comparison, support requirements of software standards like *1-2-3* or *MultiMate* are usually minimal thanks to user familiarity. In fact, nine out of ten users support each other. Small wonder that corporations resist software clones that claim to be "just as good as–at half the price." A $100-to-$200 savings on the purchase price doesn't begin to offset the soft-dollar costs.

But software developers who are enthralled with the elegance of their products, trying to camouflage bug fixes, or simply intent on generating a little market excitement continue to speed the pace of minor product introductions and updates. Too often, they withdraw the previous version of the software from the market or severely curtail their support for it, forcing users to buy an upgrade that they may not need. This imposes too much administrative overhead on corporations. Requiring an invoice or registration number may seem reasonable for an individual upgrade, but it's a nightmare when the user base is spread across 50 states.

Developers need to remember that the price of the package is the smallest part of a corporation's investment in a software standard. The promise of increased functionality must be weighed against increased administrative and technical support costs. Vendors can help sway skeptical corporate buyers toward upgrades by limiting new releases to significant enhancements and keeping upgrade requirements as simple as possible.

Leslie Fiering is manager of advanced technology for Banker's Trust Company and a member of the executive board of the Microcomputer Managers Association.

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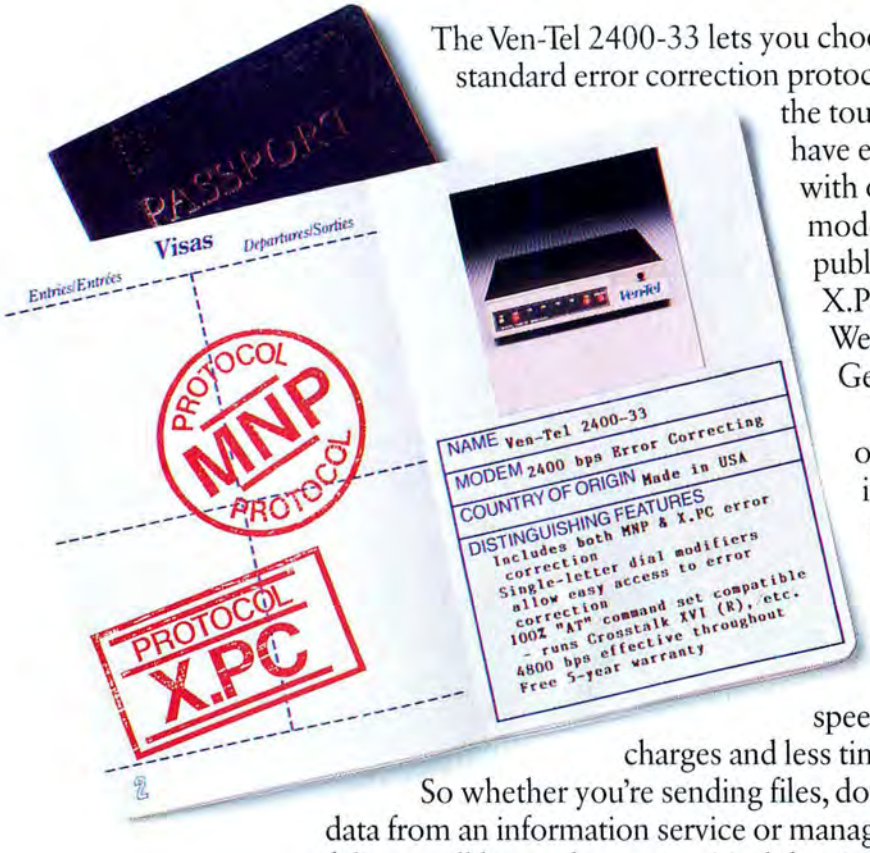

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