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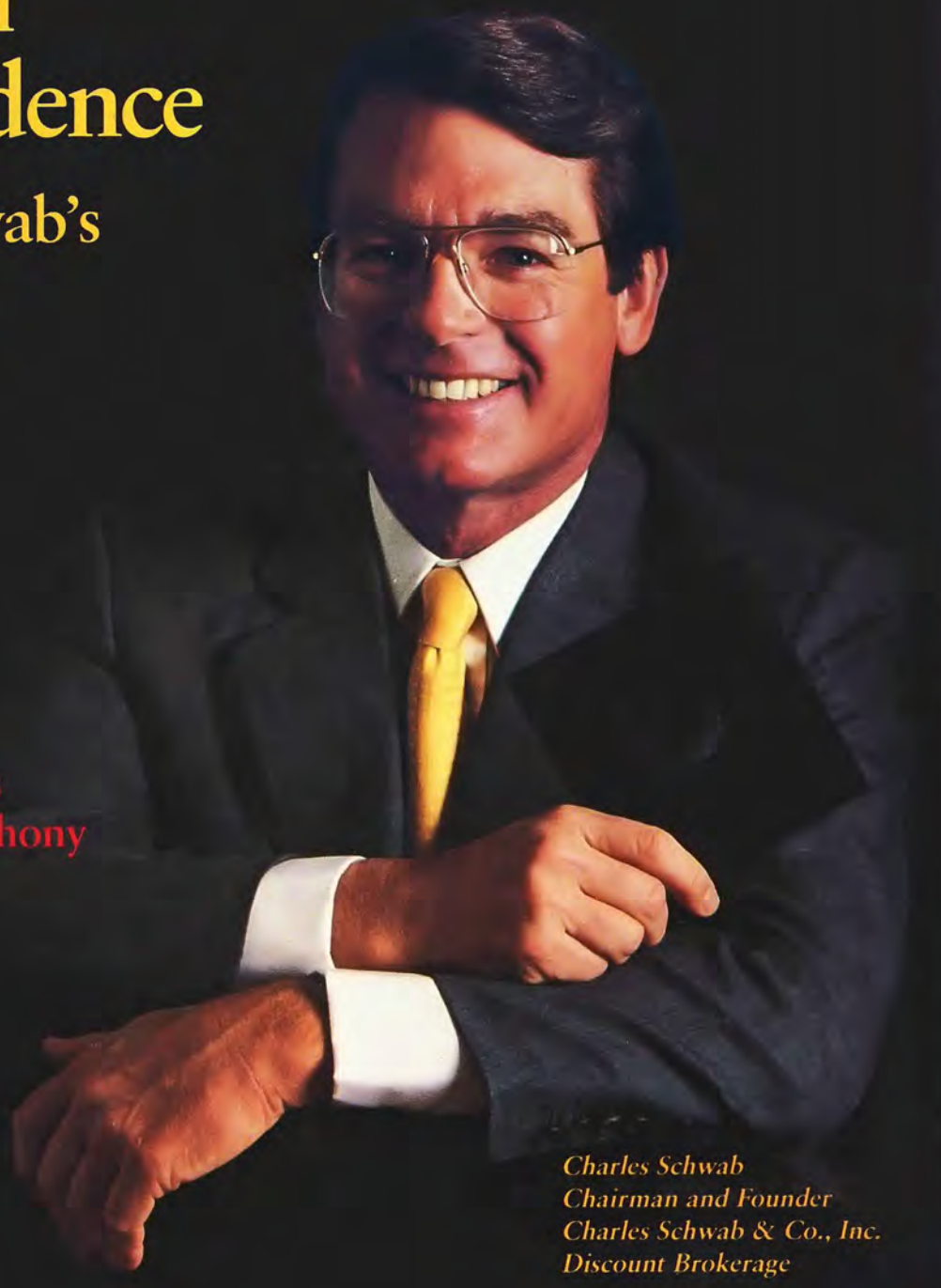

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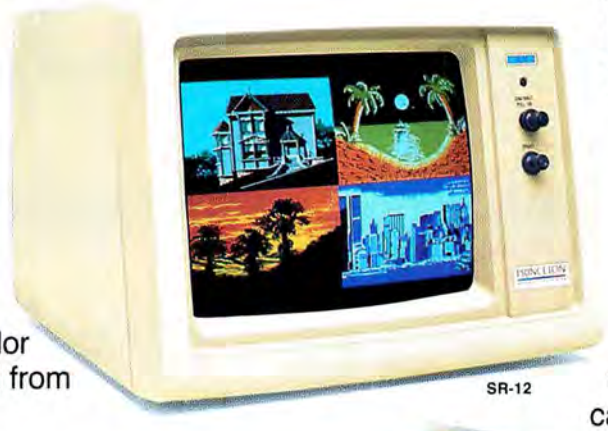

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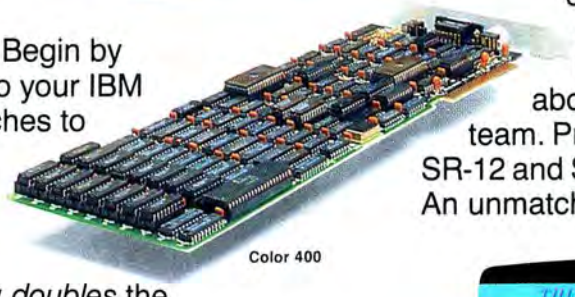

Color 400

COLOR 400

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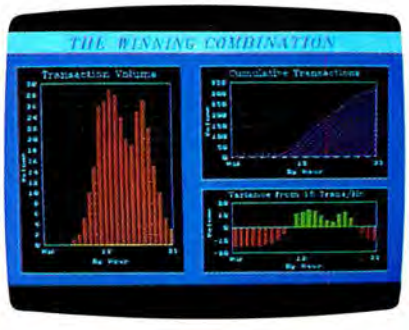

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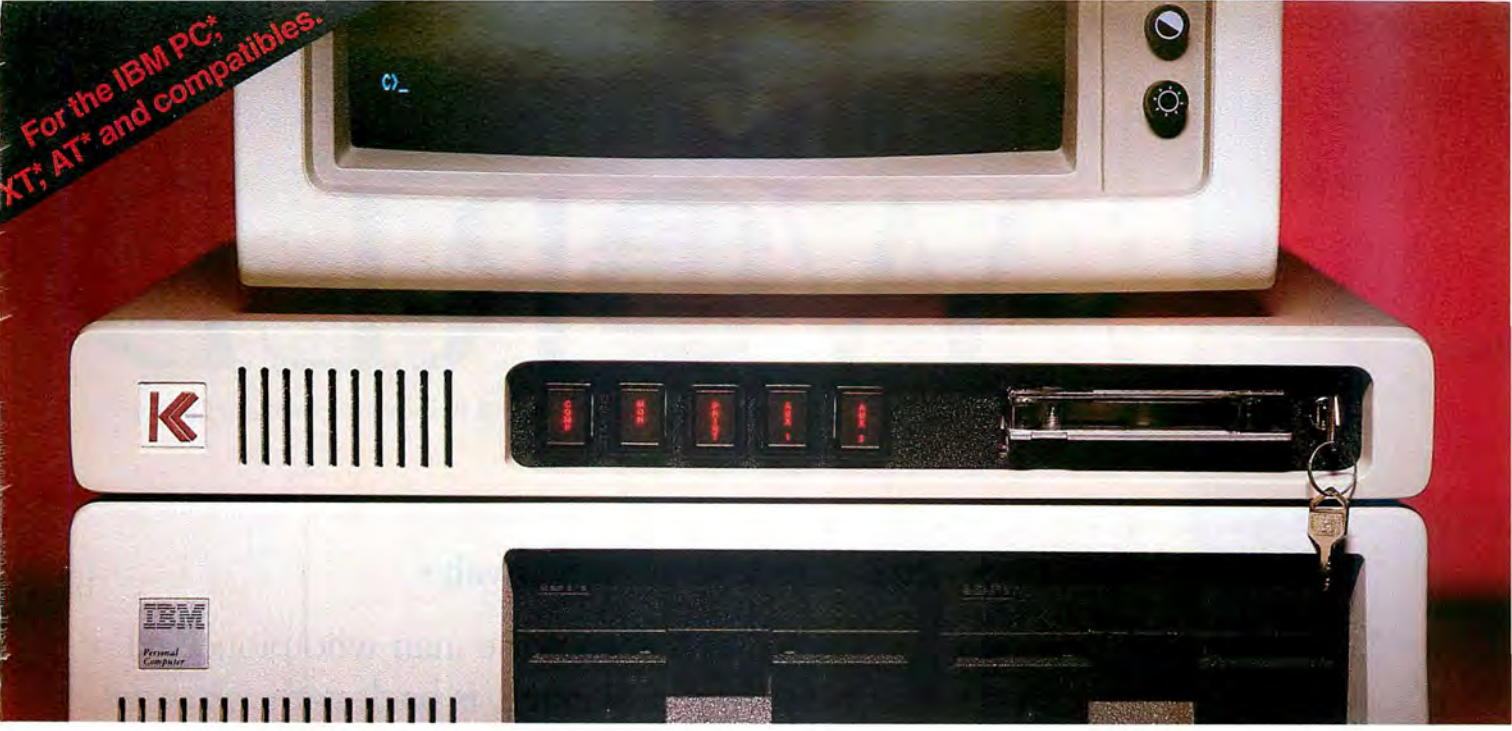

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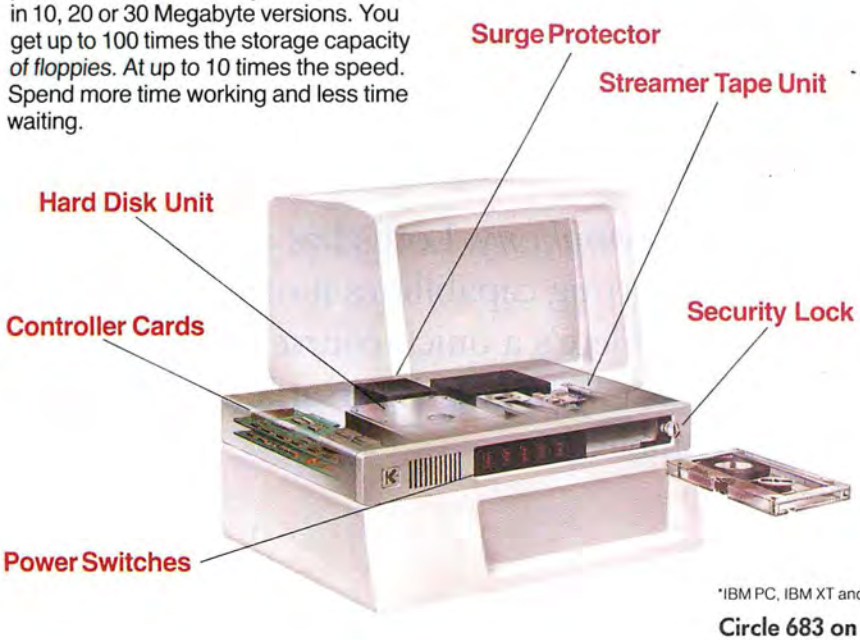

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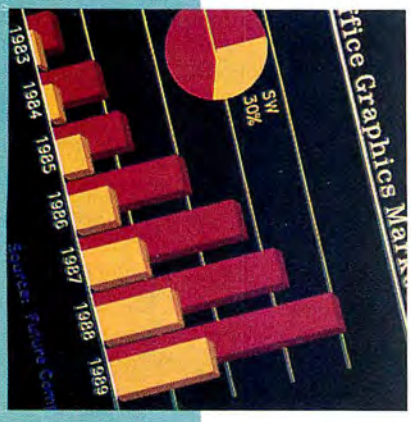

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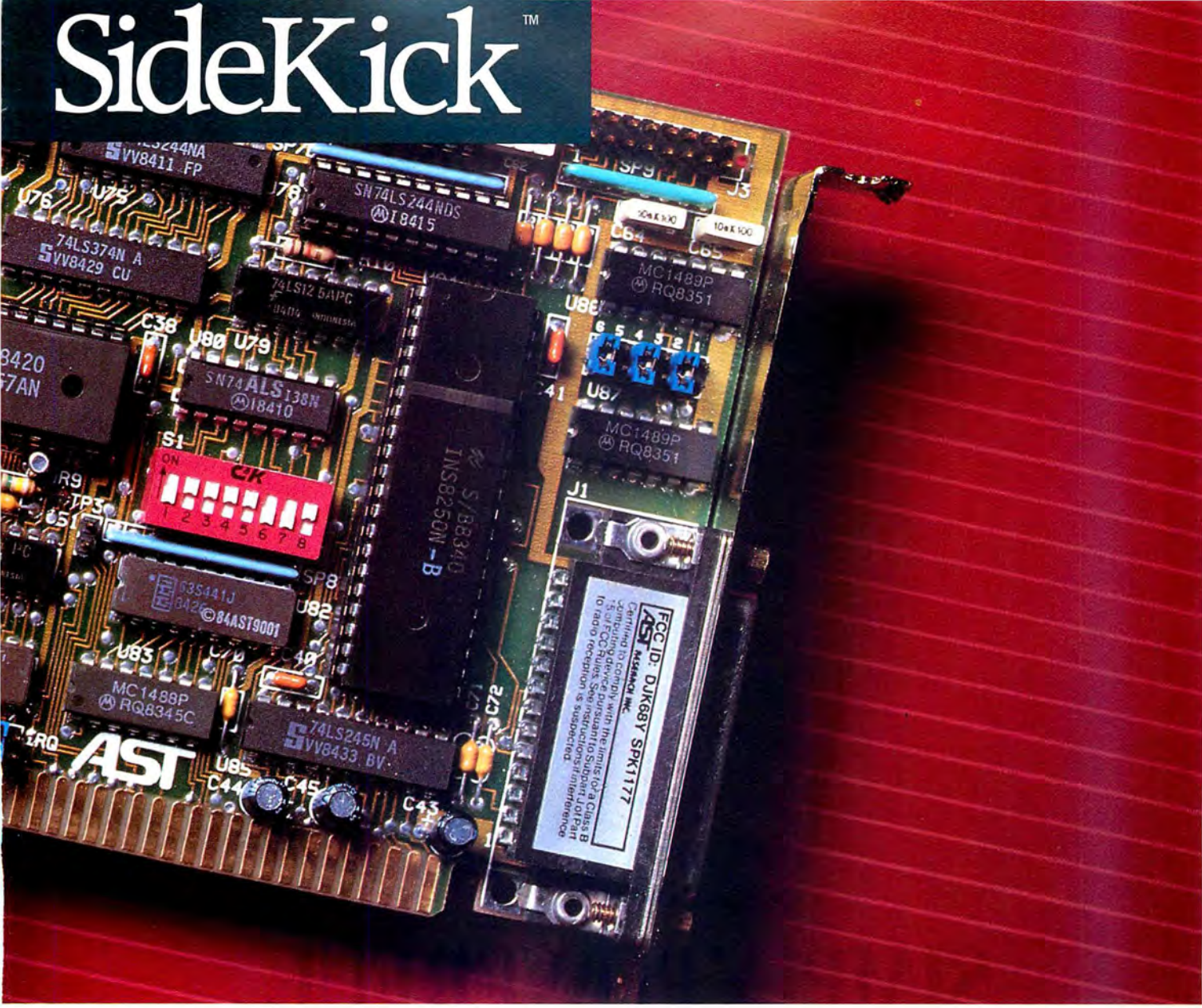

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David Bunnell

Great PC Expectations

The personal computing industry weighs the benefits of standardization against the threat of a monopoly.

In 1984 IBM was a $46 billion company with 395,000 employees worldwide. If it reaches its declared goals, by 1994 it will be a $185 billion company—the largest in the world.

Some people, apprehensive of such a tremendous growth rate, foresee IBM completely dominating the personal computer industry. I am not that pessimistic.

De facto standards are useful, but they are by no means the best. For one thing, the IBM PC standard is a moving target; it is continually evolving. And only IBM has control of its destiny.

Eddie Currie, president of Lifeboat Associates, likes to say that when IBM introduced the PC in 1981, the personal computer industry encountered a large mass and went into orbit around it. And he questions whether the industry will ever achieve the velocity needed to escape that orbit.

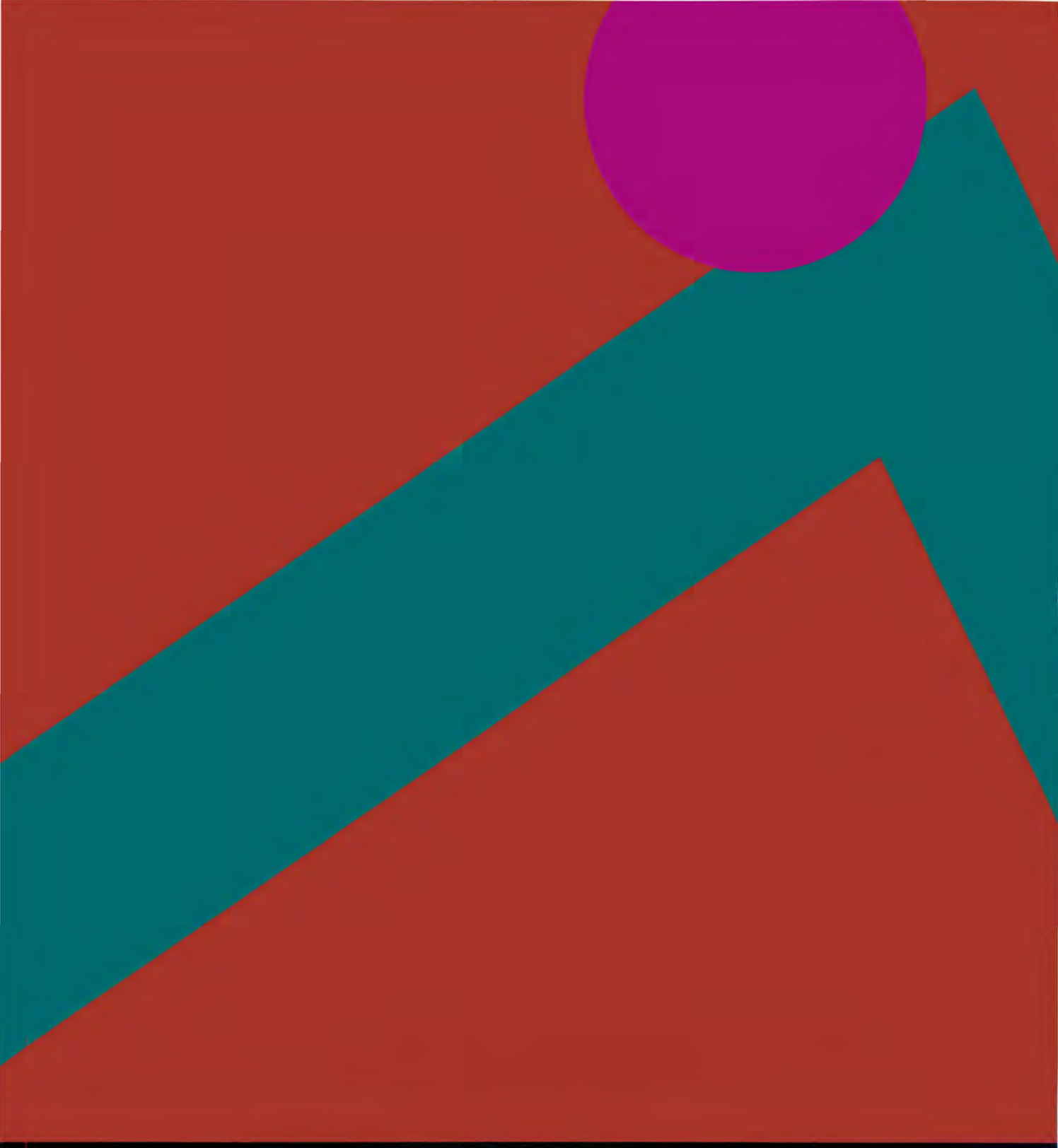
Perhaps not, but we may well develop coexisting orbits. IBM has a few fierce and feisty competitors that haven't adopted the Big Blue standard.

Apple Computer fought back by introducing a new standard—the Macintosh. Like the IBM PC, the Macintosh represents a milestone in the history of personal computing. In establishing a new graphics interface, the Mac has made personal computers accessible to more people than ever before.

It is no accident that PC World Communications publishes *Macworld* as well as *PC World*. We share a perspective with many software companies: The IBM standard represents a major opportunity, but we wouldn't want to see it become the only standard.

The demise of the PCjr may help establish the Japanese MSX standard, which could be as revolutionary for home computing as the IBM PC standard has been for business computing. By 1990 even more personal computing standards will probably be cutting into the IBM pie.

A major factor limiting IBM's control of the personal computer market is the company's thus-far limited success in software development. Despite Big Blue's bullish ambition to achieve a 35 percent increase in software sales over the



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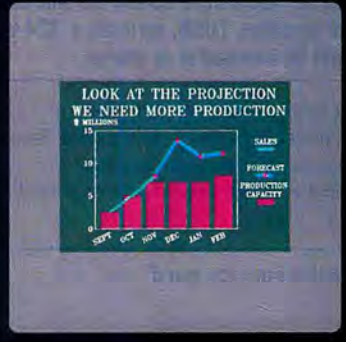

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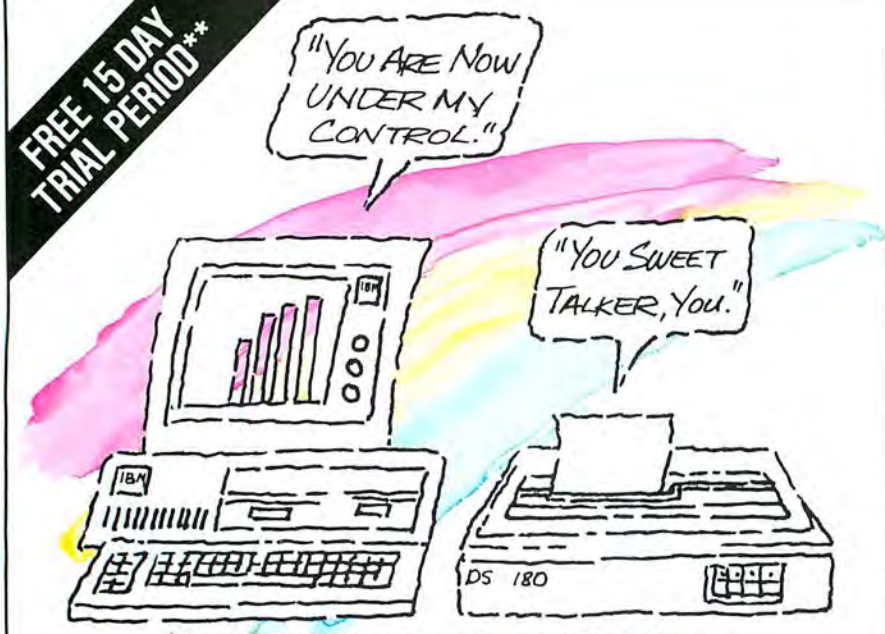

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Circle 82 on reader service card

next five years, one company cannot govern all software development. Such a fate would be like having one book publisher control modern literature.

Software represents the intellectual interface between human and machine. Software is our greatest challenge.

The Mozarts and the Hemingways of software may not yet be born–and it's likely that they will be too iconoclastic to labor anonymously within one of IBM's software factories.

None of the truly innovative software designed for the IBM PC standard was created at IBM. Lotus Development's *1-2-3* was written by Mitch Kapor and Jonathan Sachs on royalties earned by writing a *VisiCalc* module. They managed to parlay *1-2-3* into one of the biggest business success stories in history, and their program outsells any IBM software package by at least 10 to 1.

Ashton-Tate's *Framework*, another hot integrated software package, is one of the most important programs on the market–it fulfills the personal computer's potential as an intelligent organizer.

Framework's outline processor and multiple functions allow PC users to manage complicated documents that require a word processor, a spreadsheet, a data base, and graphics capabilities. This all-encompassing program points to the ultimate direction all software packages must take.

But the full potential of personal computers has only begun to be realized, convincing me that IBM cannot dominate the market.

(continues)

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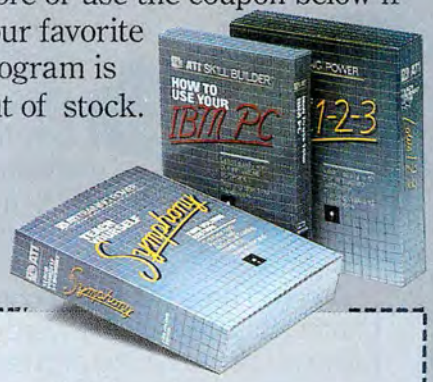

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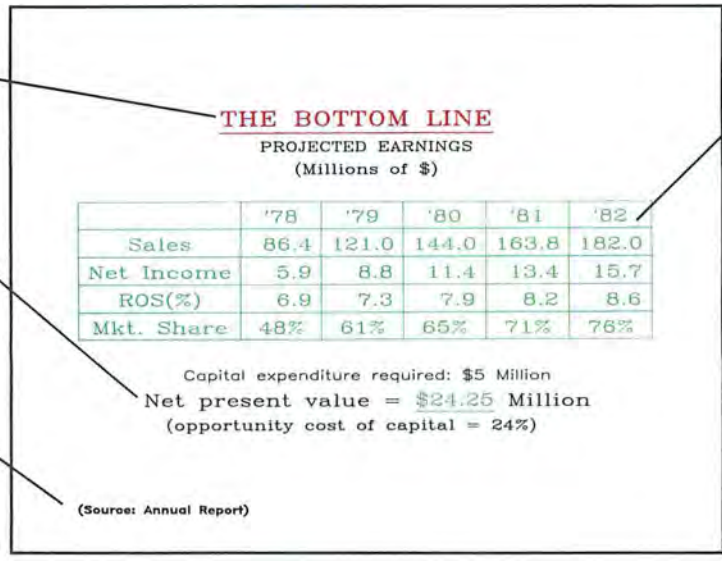

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Point and click vs. stroke, stroke, stroke.

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Big Blue has an impressive fleet of PCs, but it doesn't control the waterways. We users do. The combination of the personal computer and communications holds possibilities so vast that even if Big Blue achieves its ambitious goals, the company cannot grow fast enough to contain the creativity in this industry.

Thus, IBM does not pose an insurmountable threat to the industry. Often unjustly cast as a stifler of innovation and competition, Big Blue has the power to create new opportunities. Thanks to the success of the PC and its many clones, personal computers have penetrated new markets.

Despite Steven Jobs's belief that "the traditional approach–from the top down–won't work," IBM has clearly shown it has an effect on the market: Thanks to IBM, there are a lot more personal computers in the world.

A popular dream of personal computing is one person, one computer–but why limit the dream to such a monogamous relationship? I use four different computers and expect to use a few more in my time.

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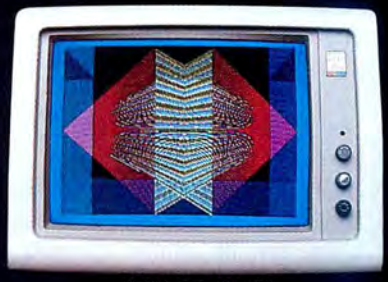

16 COLORS, 320x200

The Edge

The Plain Facts:

EVEREX THE EDGE	Everex The Edge	Paradise Modular Graphics	Tecmar Graphics Master	Tseng Lab Ultra Pak	Persyst Bob	Hercules Graphics Card
• IBM Monochrome Compatible, 720x348, High Resolution	✓		✓	✓		✓
• Runs Lotus 1-2-3™ and Symphony™ in high resolution monochrome:	✓		✓			✓
—132 columnsx25 rows	✓			✓		
—132 columnsx44 rows	✓			✓		
• PC Paintbrush in monochrome	✓		✓	✓		✓
• 16 shades of green on the IBM monochrome monitor	✓	✓				
• Runs color software on the IBM monochrome monitor, full screen:	✓	✓				
—Flight Simulator	✓	✓				
—PC Paintbrush	✓	✓				
—PC Paint	✓	✓				
—PC Tutor	✓	✓				
—Pinball	✓					
—Without software patch needed	✓					
• Automatic Boot-up without software patch needed	✓		✓	✓	✓	✓
• Runs Lotus 1-2-3™ and Symphony™ in high resolution color:	✓		✓			
—16 colors, 320x200	✓		✓			
—4 colors, 640x200	✓		✓			
• Printer port (standard)	✓		✓	✓	✓	✓
• Software switchable among color, monochrome and 132 columns mode	✓					
• Price	$399	$395	$695	$680	$595	$499

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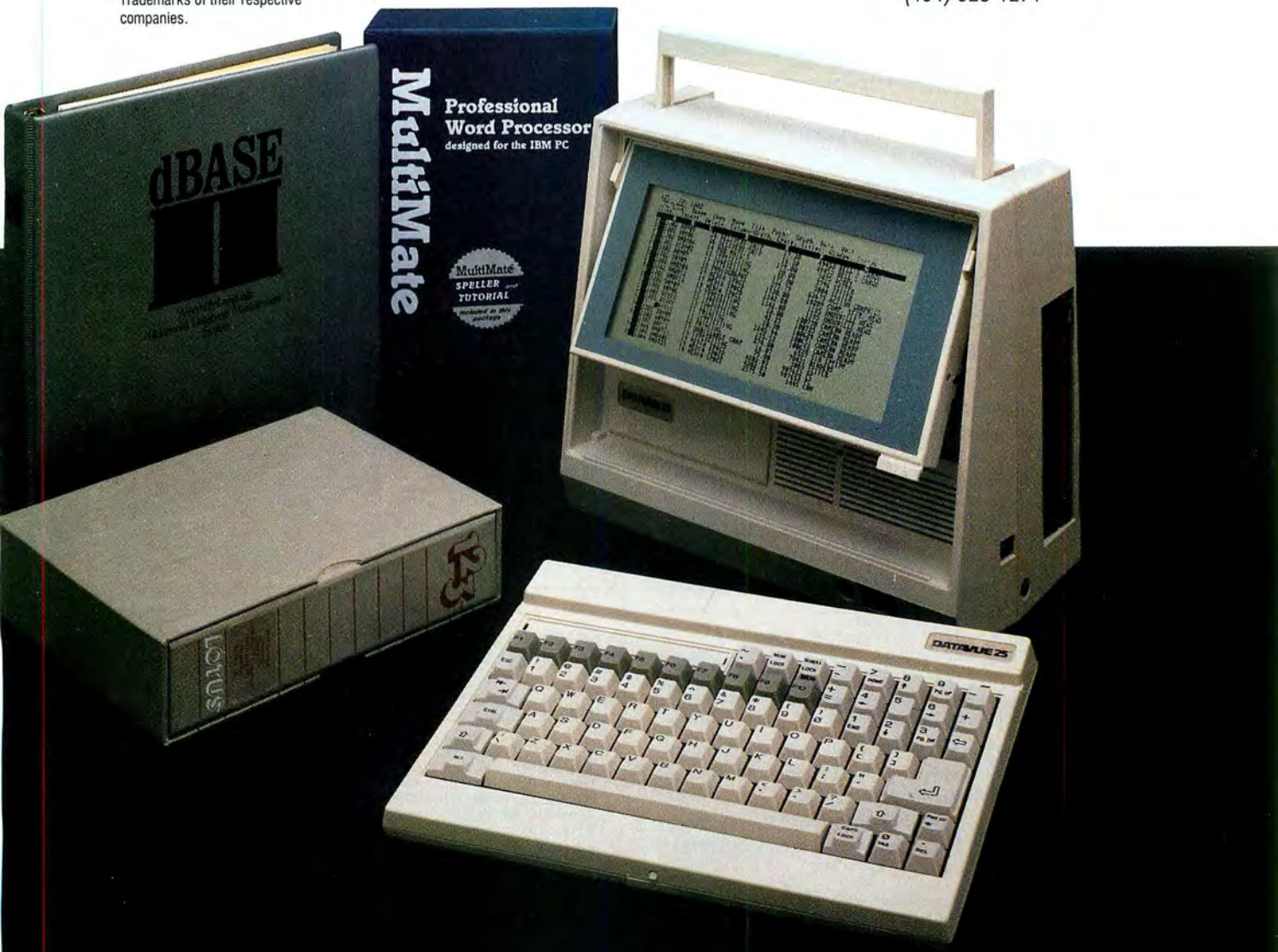

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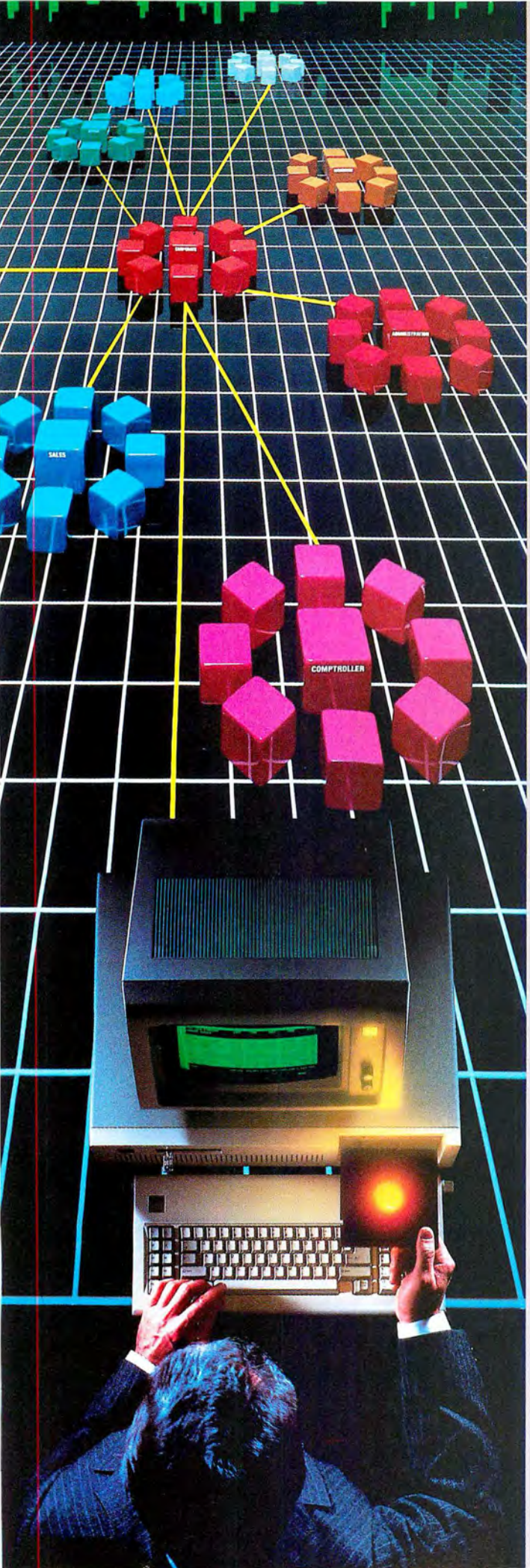

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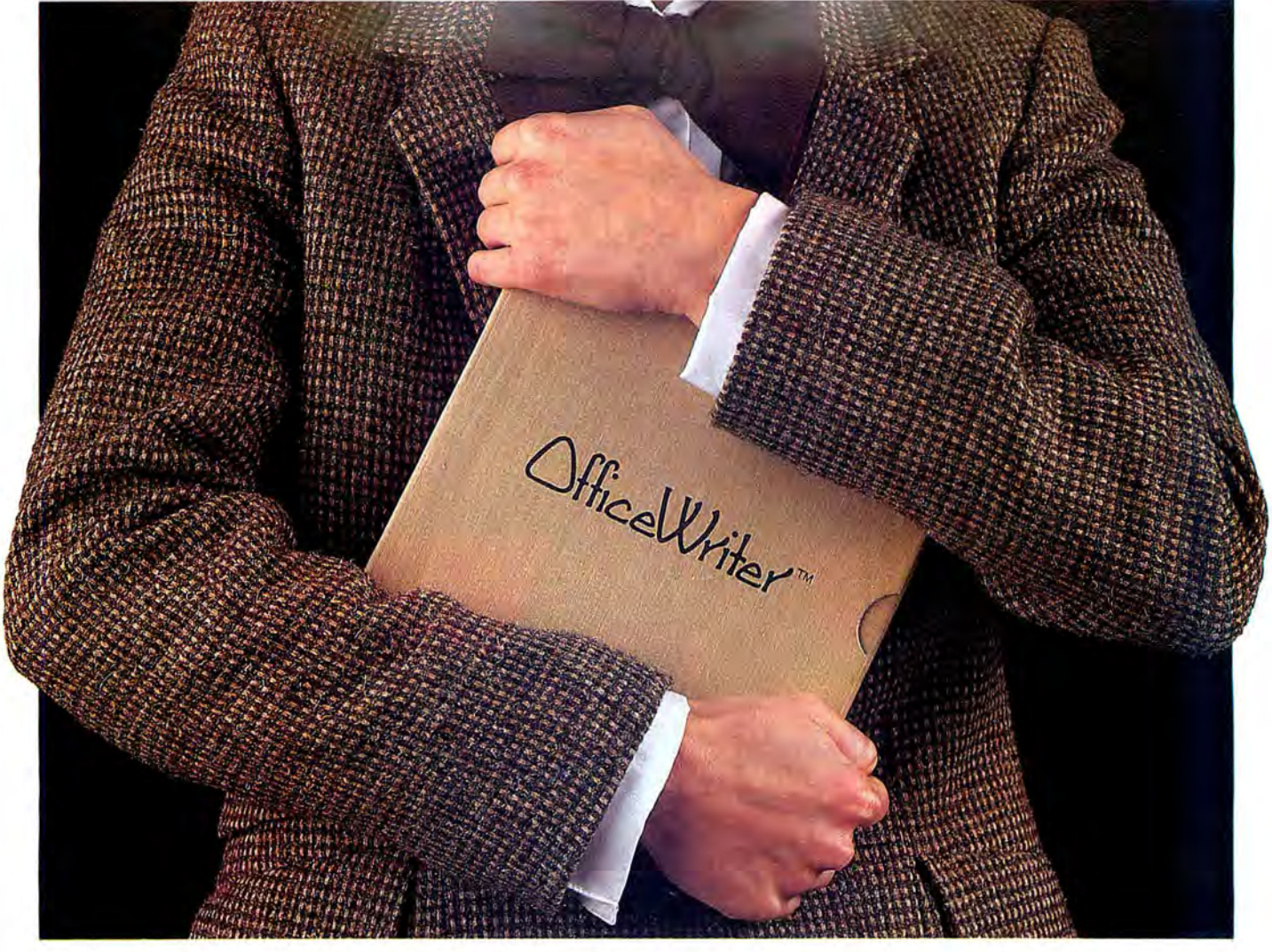

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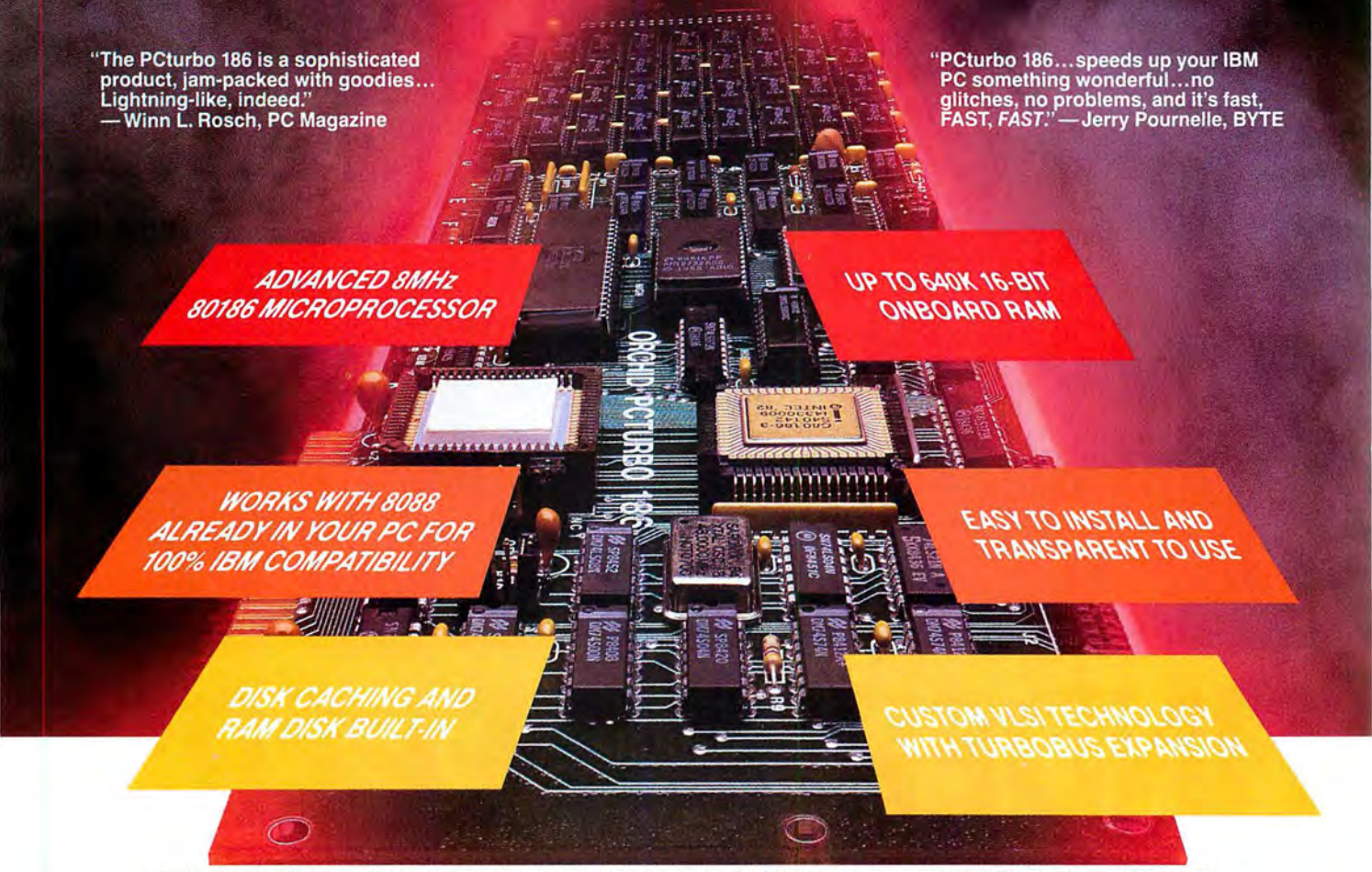

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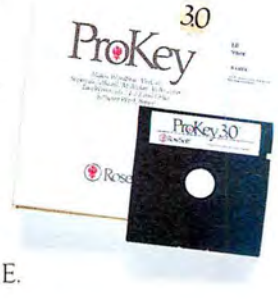

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John C. Dvorak

IBM Needs Heart

The company that dominates the marketplace should understand that its new customers demand and deserve more honesty and openness than they've seen so far.

Is IBM slowly becoming its own worst enemy? Its attitude toward the new low-end customer surely must change. The company cannot maintain its seemingly insincere stance as the newcomers enter the computer scene; newcomers are not as tolerant of IBM as are old-line DP managers. Sooner or later these new customers will rebel.

Although IBM makes a superior piece of machinery once the product is debugged, the company doesn't release fully debugged products. The spotty history of the PCjr and the most recent problems with the PC AT and its hard disk are testimony to IBM's fallibility.

For most companies such fallibility poses no problem–they fess up. IBM's failure to acknowledge any faults reminds me of a pathological liar or the poor soul who won't admit that it's really his fault that he isn't a success. But IBM isn't a failure. It's a big, BIG success. Why does it continue to use the "I don't know that there's a problem" or the "no comment" technique? Doesn't IBM know that this rubs people the wrong way?

Take the PCjr (please). First of all, IBM must have been embarrassed by the criticism of the PCjr that grew in the popular and trade press from a few gripes into a crescendo–gripes and tirades that eventually led to the machine's demise. Of course, you'd never know it from the company line: "Embarrassed? Not us!"

IBM paid attention only to the loudest gripes–those hounding the company about the cheap image of the Chiclets keyboard. IBM did right by buyers and gave them a second keyboard free. The second keyboard was not much better than the first, but it was acceptable. But by that time, the noise level of PCjr complaints was drowning out anything positive about the machine. This is the tragedy of the PCjr. Once everything was fixed (and there was a lot that needed fixing), it was a good little computer.

During that entire fiasco did IBM once publicly acknowledge that the first keyboard was a blunder, a bad idea, a mistake?

(continues)

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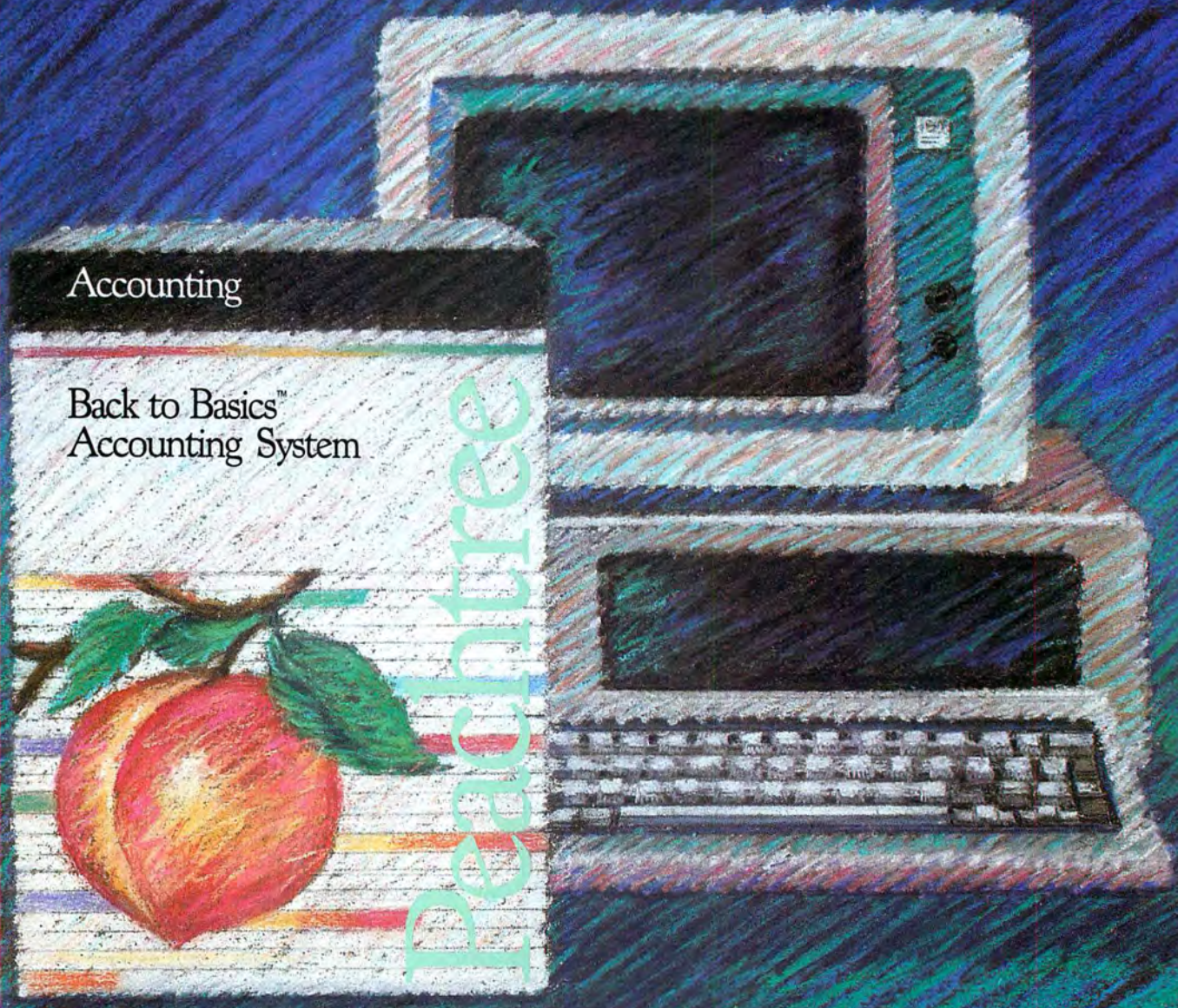

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John C. Dvorak

No. It just went on with business as usual. The analysts were left to interpret the keyboard change.

IBM finally dropped the PCjr in March but wouldn't immediately say that the machine's demise was for good. Well? Is it for good or not? Don't these so-called spokespeople know what's going on? Does anyone at IBM know what the company is going to do? Who do they think they're fooling with this charade? "Uh, we don't know about the future of this machine because although we're a $50 billion company, we don't do strategic analysis or anything like that. We play it by ear; that's why we don't know nothin'." How long do these guys think the public is going to buy that kind of malarkey? I ask you. How can some of these so-called executives sleep at night? That's what I'd like to know. In the end, and to make matters worse, IBM blamed the whole PCjr fiasco on the MARKET! Never once was it suggested that IBM created the condition for its own lack of success.

IBM's failure to admit that it had problems with the AT or to confess what they were (to a public hungry to know) was yet another pathetic attempt to maintain composure, which is unacceptable in 1985. In fact everyone knows that IBM cannot continue its growth rate with these outdated ideals. As Emerson once said, "A foolish consistency is the hobgoblin of small minds."

Surely in the cases of both the PCjr and the PC AT, IBM cannot think that the public is endeared by what appears to be a cover-up, a whitewash, a stonewall. Are they trying to emulate Nixon in an attempt to cajole the computer-buying business market? A peculiar tactic, I'd say!

What this comes down to is that IBM is not endearing. In fact, more than a few people profess a deep-seated dislike (even hatred) of IBM. Too many people don't trust IBM, too many people don't like IBM. The company is admired for only two things: service, and its ability to make money. Hey, I was at the first West Coast Computer Faire when the audience stood up and cheered Ted Nelson's declaration that the personal computer revolution was partly a condemnation of IBM.

Far too many people simply don't like IBM's self-created image and its orchestrated attitude of superiority. It doesn't cut the mustard anymore.

People will not accept anything but perfection from a company that seems cold, distant, lacking in humanity. If IBM is only in it for the money, then they have to perform extra hard. It's their rules—they created this image. Who ever heard of an IBM spokesperson described as warm and open? They're always described as professional, businesslike, and no-nonsense. Who ever heard of an IBMer telling a joke? In fact, find an IBMer and rib him about the cheesy scrolling of the color card—you'll witness a stone face like you've never seen. This is seen by many as a pitiful lack of humanity.

(continues)

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I know I'm not the only one who feels this way. It's particularly galling to me since I'm a fan of the personal computer line and reluctantly have to recommend IBM equipment to people because it's a good choice for certain business uses. There are thousands like me who wish they could recommend something else, simply because we are tired of the cold, dispassionate ruthlessness of IBM.

IBM is not warm and cuddly—which is fine with me. Apple's new age jingoism makes me nauseated, so I don't want that either. But a company that is not going to be warm and cuddly at least can be honest and tell it like it is. I was always taught that honesty is the best policy and that the customer is always right. Why isn't this IBM's policy? Is IBM insecure? If IBM is insecure (and it must be) then it's for a reason. I hope an American company figures out the reason and exploits it before the Japanese do.

IBM should try to understand that today's small-computer buyer wants to feel proud of his or her equipment. Nobody likes to be told, "You use an IBM PC! How can you buy from those guys? Yuk!" It's just not comfortable.

IBM needs a heart and it better get one soon.

John C. Dvorak is a writer and editor in Berkeley, California. He recently edited Dell Publishing's Dvorak's Instant Expert Series, *and his columns are featured in the* San Francisco Examiner *and* InfoWorld.

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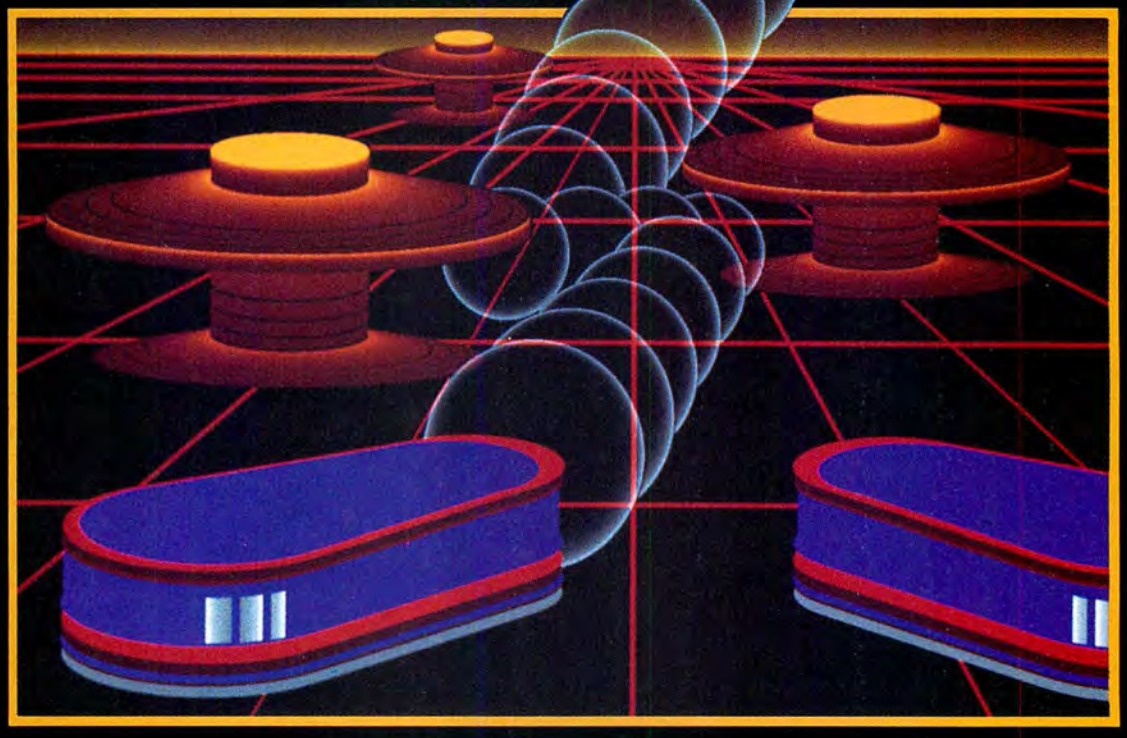

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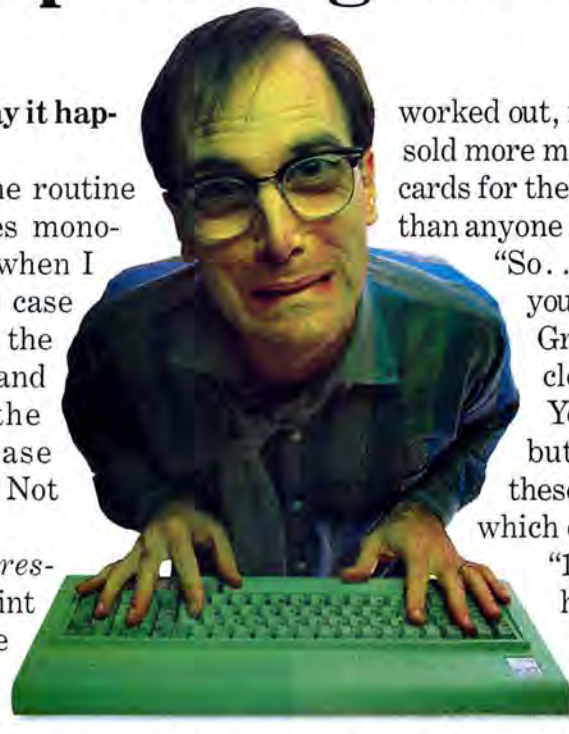


"I know, because one day it happened to me . . .

"I was running some routine tests on a non-Hercules monochrome graphics card when I was struck by a severe case of *low resolutionitis*. I'm the president of Hercules and that's me exhibiting the symptoms of the disease in its advanced stages. Not a pretty sight, is it?

"What causes *low resolutionitis?* Experts point to ordinary monochrome graphics cards with coarse, hard-to-read graphics. A bad case of eyestrain may develop if action is not taken immediately.

"Fortunately for me, a Hercules Graphics Card was nearby. A quick change brought soothing 720 x 348 graphics. That's twice the resolution of ordinary 640 x 200 graphics cards.

"Which means better graphics for Lotus™ 1-2-3™, Symphony™, Framework™, pfs:Graph,® Microsoft® Chart and Word, SuperCalc3®, AutoCad™, and dozens of other programs.

"Including Microsoft Flight Simulator, now Hercules compatible!

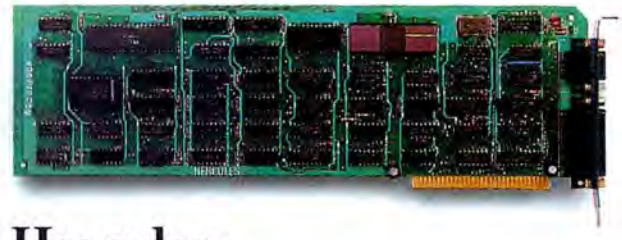
"Oh, and don't forget that a parallel printer port is standard on the Hercules Graphics Card, not an extra cost option.

"Now, if you're worried about buying a new product that hasn't had all the bugs worked out, relax. Hercules has sold more monochrome graphics cards for the IBM® PC,XT™ and AT™ than anyone else in the world.

"So . . . you're convinced that you should buy a Hercules Graphics Card. Now, steer clear of cheap imitations. You may save a few bucks, but you won't get all of these five essential features which only Hercules has:

"1) A safety switch that helps prevent damage to your monitor, 2) the ability to keep a Hercules Color Card in your system, 3) the ability to use the PC's BASIC to do graphics, 4) a Hercules designed chip that eliminates 30% of the parts that can go wrong, and 5) a two year warranty, because we think reliability is something you should deliver and not just talk about."

"Call **1-800-532-0600 Ext 401** for the name of the Hercules dealer nearest you and we'll rush you our free info kit.



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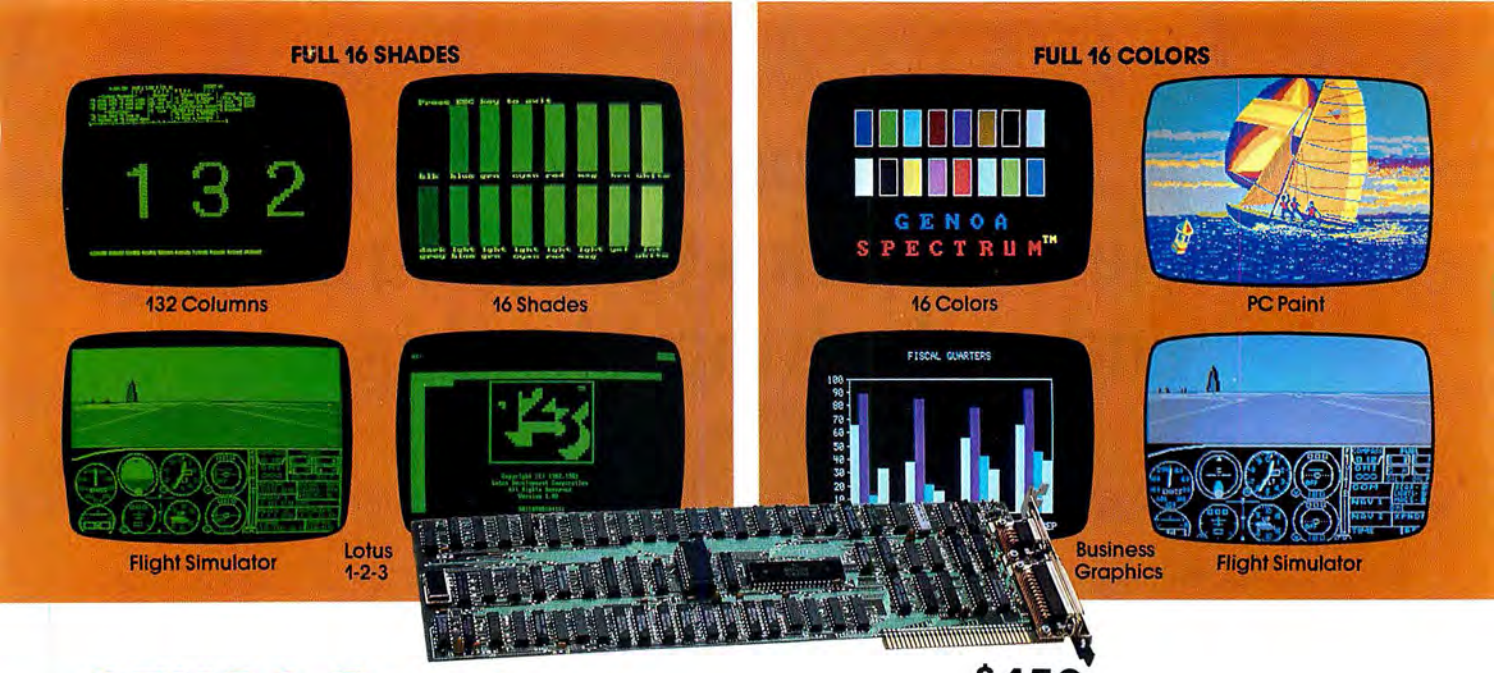
Circle 77 on reader service card



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Graphics resolution on IBM mono 720 x 348	✓		✓	✓	
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16 shades color emulation on mono monitor. 320 x 200	✓	✓			
Standard printer port	✓		✓	✓	✓
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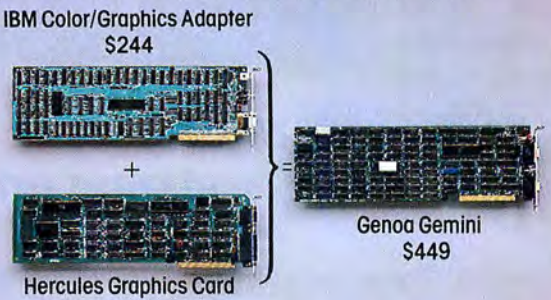

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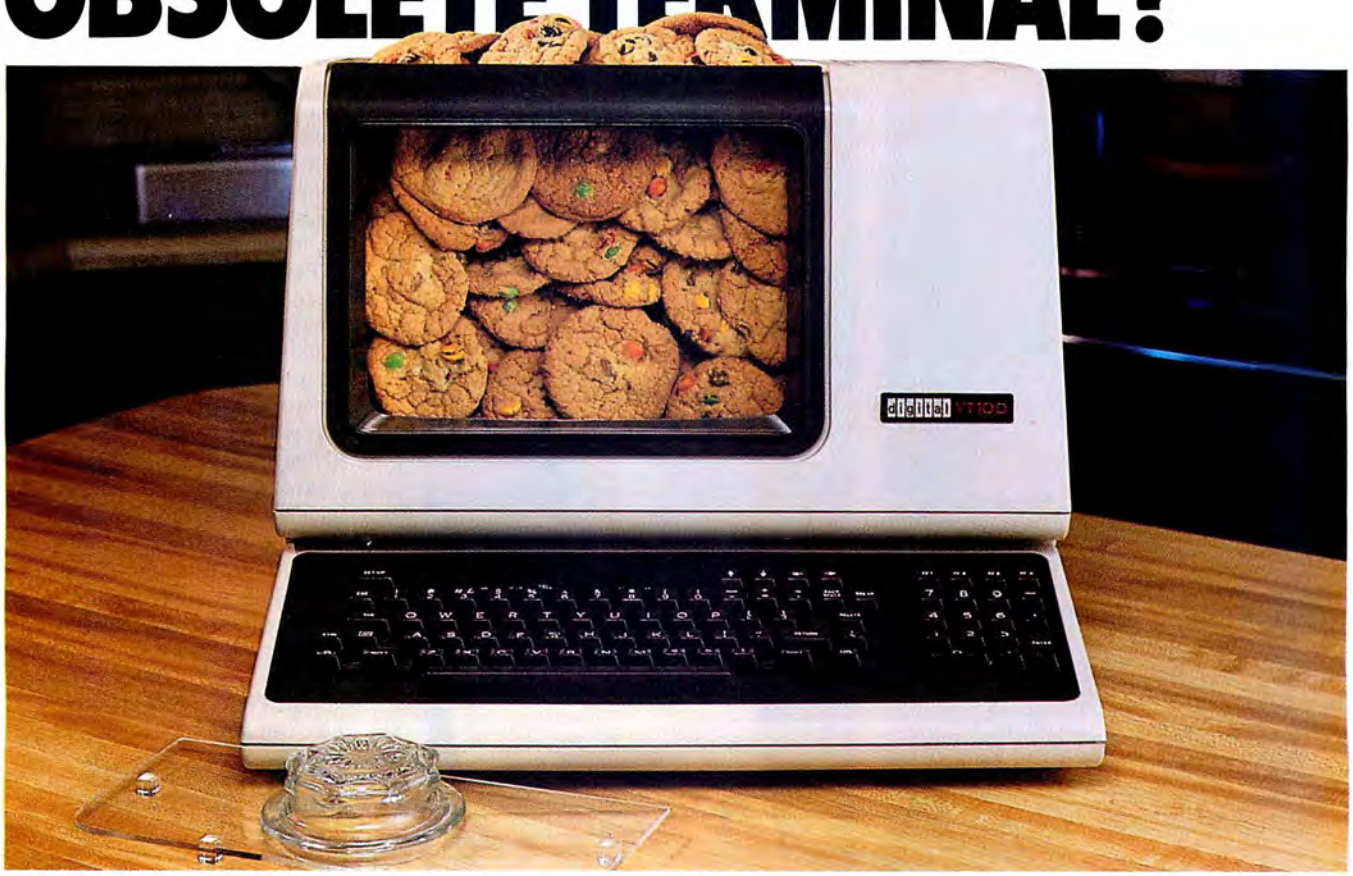

IDEA CREDIT: Hank Cramer of Campbell, California See your name in print! The best ideas for uses of obsolete terminals replaced by SmarTerm will be used in future ads. Write Persoft, Dept. COOKIE., 2740 Ski Lane, Madison, WI 53713.

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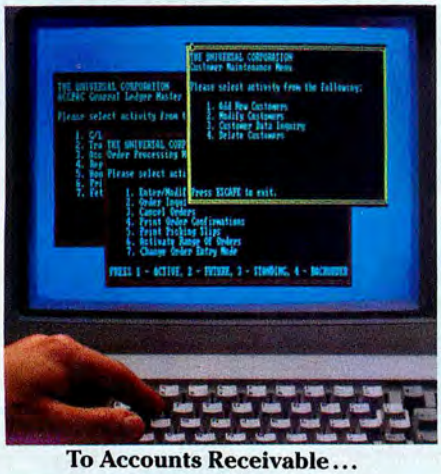
Circle 142 on reader service card

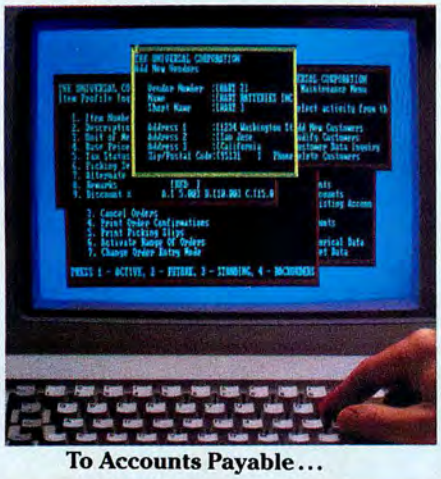
Move From General Ledger...

Directly Into Order Entry...

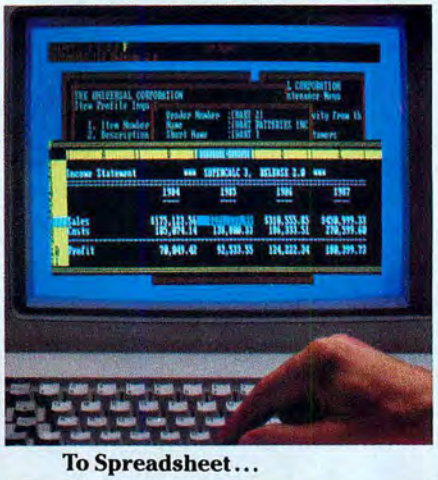


To Accounts Receivable...

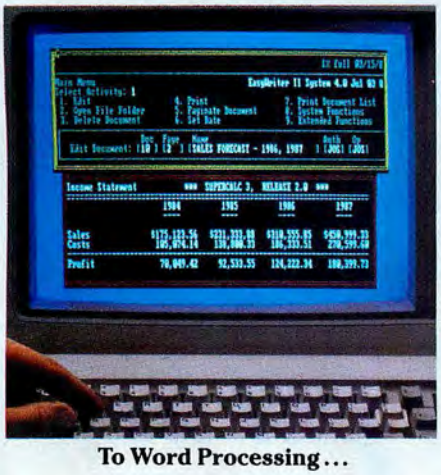
To Inventory Control...



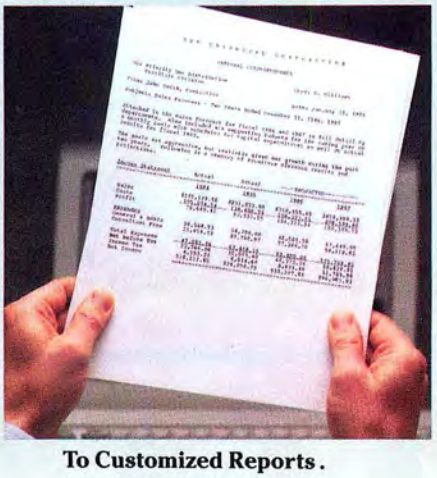
To Accounts Payable...



To Spreadsheet...



To Word Processing...



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REMark: Software Wildcats

Grousing about software me-tooism? A savvy software author supplies an alternate vision.

Alan Cooper

Listening to some software developers, you'd think it's a jungle out there: Competition is fierce, the good niches are occupied, and precious few products remain to be written. I don't agree. Opportunities for software authors–and therefore for the computing public–have never been better.

My view of the software development world is a good deal more sanguine than that proffered by many of my partners in programming. I see that world as a vast plain populated with software authors who can drink at any number of watering holes. What's disconcerting is the startling number of these pools of opportunity that are deserted–programmers are crowding around only a half-dozen or so oases. Personal-computer-based word processing programs, spreadsheets, and data base managers now number in the hundreds, yet among them, new ideas and implementations are rare. *ThinkTank*'s ingenuity caught many by surprise, as did *LisaProject*. In software development, success inspires imitation. The result: we now have a bombardment of outline processors and graphics-oriented project planners.

Software development is tough, and the obstacles are invisible to all but the developer. Fortunately, the rewards are great, and the breadth of opportunity surpasses that offered by any other business endeavor. The rising mortality rate in the software industry has nothing to do with market shrinkage or "windows of opportunity" that have abruptly slammed shut. Aside from a few spectacularly badly managed companies, failures have occurred where developers ignored yawning market gaps while trying to occupy already crowded niches. It boils down to this: We don't need another integrated productivity package. The sweetest watering hole on the veld will eventually dry up if it's drained by too many thirsty artists.

The craft or art or science (take your pick) of writing personal computer software is not unlike the creative process behind any

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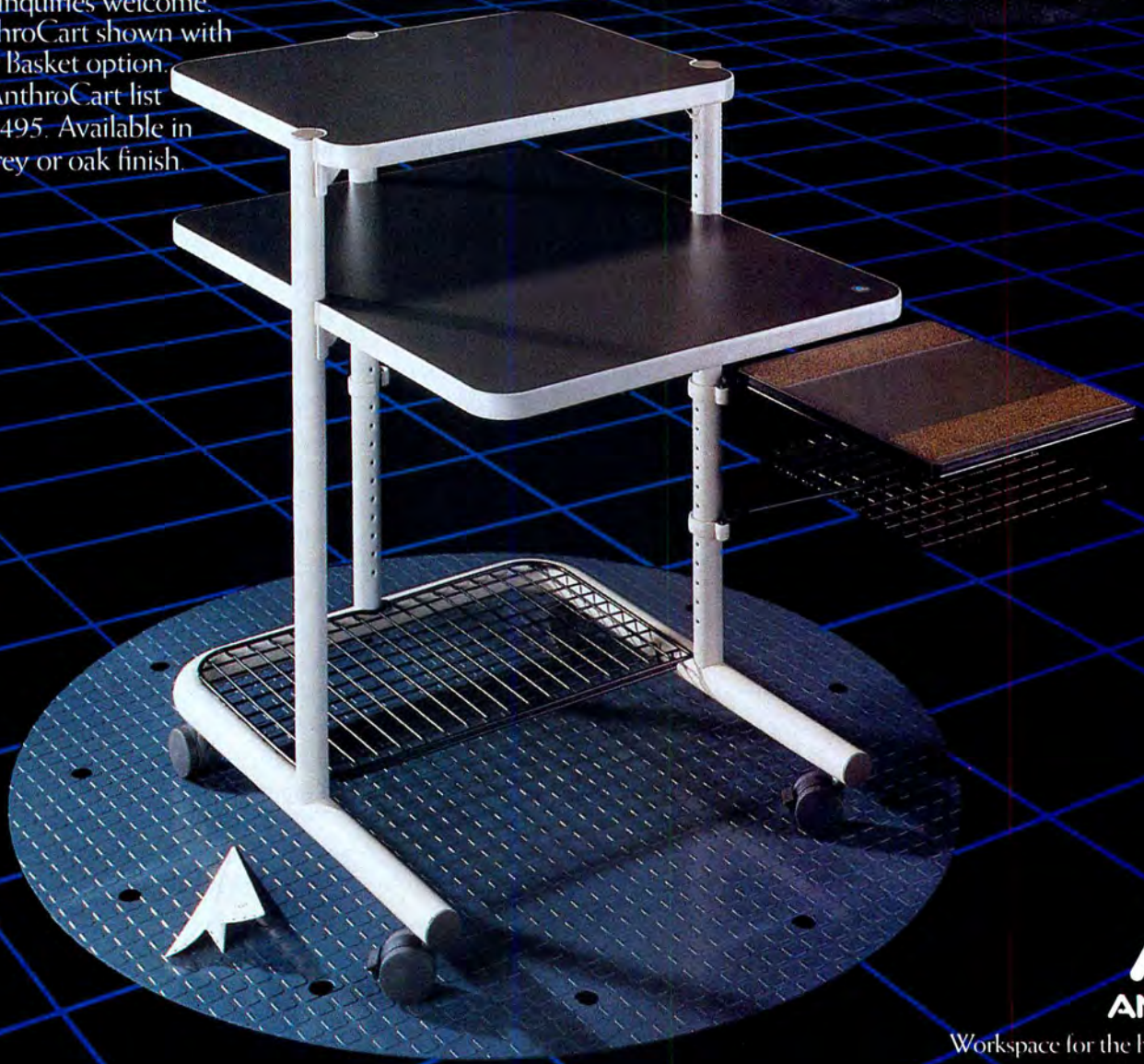
AnthroCart shown with Printer Basket option. Basic AnthroCart list price $495. Available in slate grey or oak finish.



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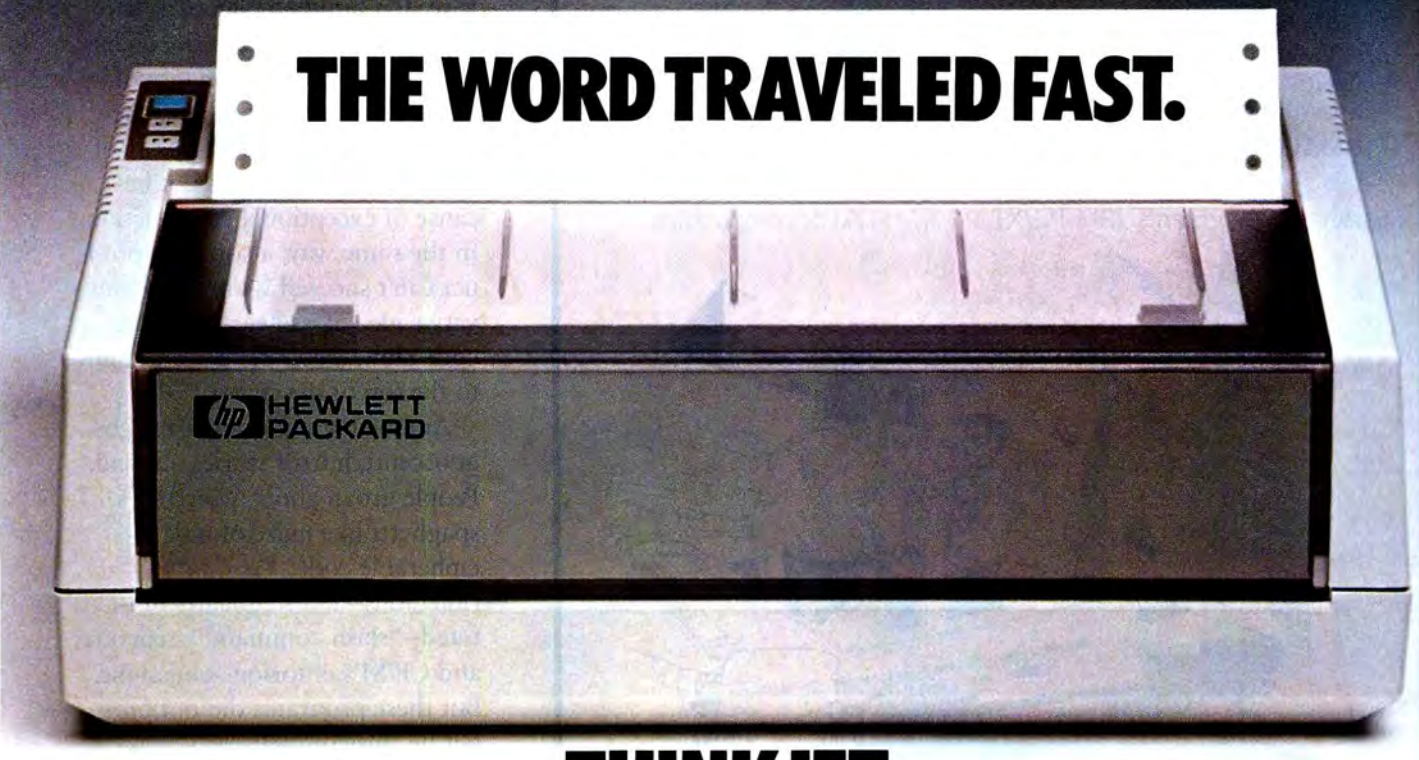
WHEN HEWLETT-PACKARD DEVELOPED A PERSONAL COMPUTER PRINTER THAT USES A QUIET JET OF INK, PRINTS 150 CHARACTERS PER SECOND AND COSTS ONLY $495,



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Hewlett-Packard research has used inkjet technology to make the ThinkJet personal computer printer surprisingly quiet while printing 150 high quality, dot-matrix characters per second for text or graphics. The ThinkJet printer weighs only 6½ pounds and it takes up just a bit more room than your telephone. So, it can work right on your desk. There's even a battery-powered model that lets you print anywhere. And, the ThinkJet printer's ink supply and printhead are designed in one neat disposable unit that simply clicks out when it's time to change.

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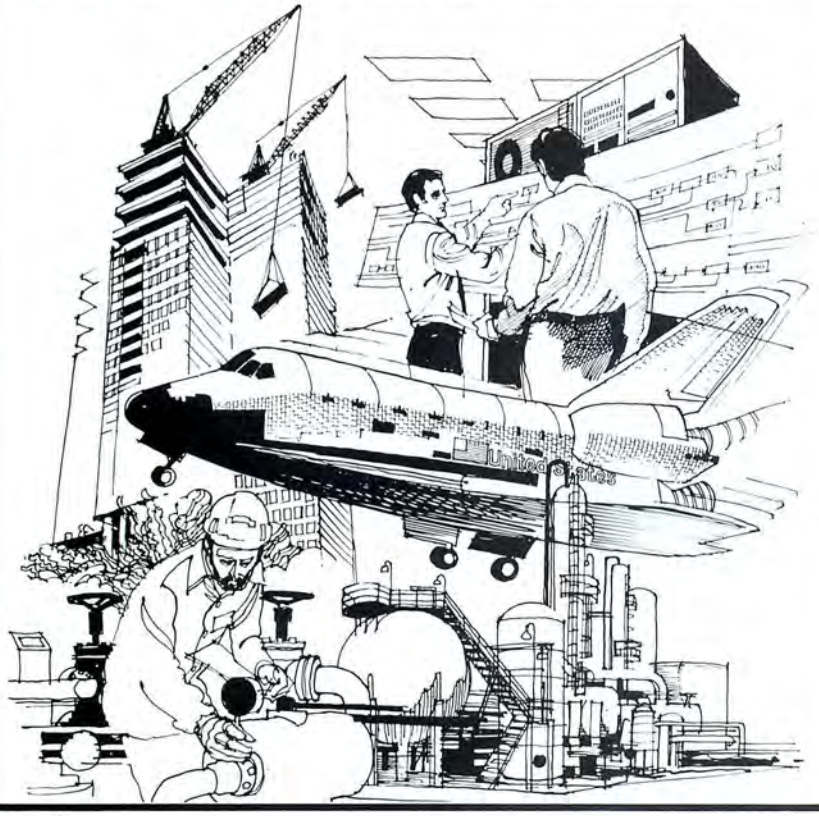

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other commercial product. Programming itself is easy; it's certainly no harder than carpentry. Commercial software development, however, is brutal. Programming differs from product development in the same way that carpentry differs from architecture. If a building collapses, it's generally a function of the quality of its design, not the quality of its workmanship. If a building succeeds, it does so on the merits of its concept and design–not because of exceptional construction. In the same way, a software product can't succeed without an innovative idea at its heart. Elegant code alone won't send a program to the top of the charts.

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(continues)

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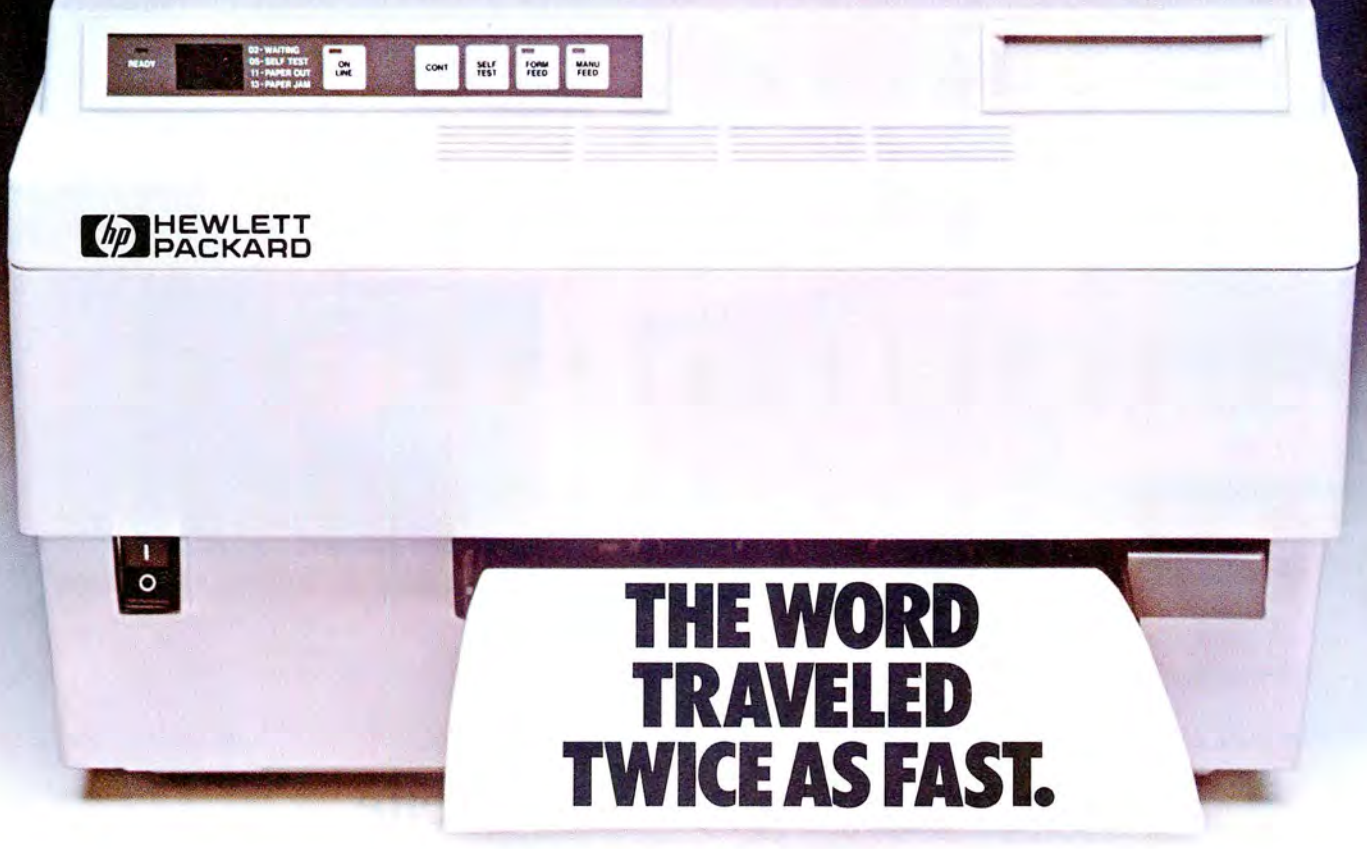

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Business graphics programs, on the other hand, represent a triumph of creative inertia. Virtually every graphing package depends for its data on numbers entered in a spreadsheet; the program then draws a graph from the numbers. Why not be a little outrageous and create a program that reverses the action? Let a user sketch a line on a video screen and then translate that into a spreadsheet full of proportional numbers.

This kind of rethinking—of divining fresh solutions to old problems—is as rare as geese that lay golden eggs, and it's nearly as profitable. For perhaps the first time since Gutenberg, an invention—the personal computer—has enabled software developers to reach a mass audience cheaply. This opportunity attracts mainstream thinkers, sure, but eccentrics and prodigies are still in their heyday. In accounting, precocious 22-year-old bookkeepers don't make millions, but in software, the "high-school dropout makes a fortune" saga is not unheard of. Because the cost of entry is so low, the field continues to stimulate innovation. A kid weaned on a Commodore PET in junior high school can turn personal computing on its ear with an original program idea.

(continues)

MOST SIGNIFICANT PRODUCT OF THE YEAR - PC WEEK

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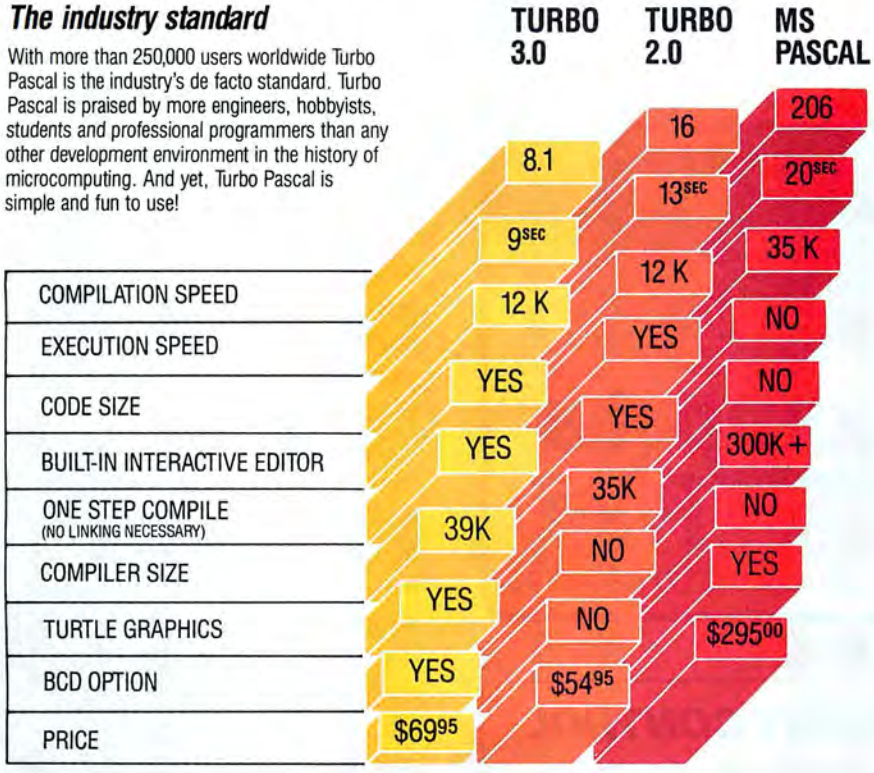

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- Then, we totally rewrote the file I/O system, and we also now support I/O redirection.
- For the IBM PC versions, we've even added "turtle graphics" and full tree directory support.
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Jeff Duntemann, PC Magazine: *"Language deal of the century . . . Turbo Pascal: It introduces a new programming environment and runs like magic."*

Dave Garland, Popular Computing: *"Most Pascal compilers barely fit on a disk, but Turbo Pascal packs an editor, compiler, linker, and run-time library into just 39K bytes of random-access memory."*

Jerry Pournelle, BYTE: *"What I think the computer industry is headed for: well documented, standard, plenty of good features, and a reasonable price."*

Portability.

Turbo Pascal is available today for most computers running PC DOS, MS DOS, CP/M 80 or CP/M 86. A XENIX version of Turbo Pascal will soon be announced, and before the end of the year, Turbo Pascal will be running on most 68000 based microcomputers.

(*) Benchmark run on an IBM PC using MS Pascal version 3.2 and the DOS linker version 2.6. The 179 line program used is the "Gauss-Seidel" program out of Alan R. Miller's book: *Pascal programs for scientists and engineers* (Sybex, page 128) with a 3 dimensional non-singular matrix and a relaxation coefficient of 1.0.

An Offer You Can't Refuse.

Until June 1st, 1985, you can get Turbo Pascal 3.0 for only $69.95. Turbo Pascal 3.0, equipped with either the BCD or 8087 options, is available for an additional $39.95 or Turbo Pascal 3.0 with both options for only $124.95. As a matter of fact, if you own a 16-Bit computer and are serious about programming, you might as well get both options right away and save almost $25.

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The flip side of this astonishing opportunity is the hidden cost of software development. The discipline moves ahead by bounds, leaving gaps in the knowledge base. Indeed, the personal computer software field lacks an information infrastructure and a shared pool of expertise from which successful new PC software can be fashioned. Few of today's hits are based on another developer's success; instead, they're from-the-ground-up monuments to self-expression.

The qualities that breed success in the marketplace are intangible and ill-defined: friendliness, performance, responsiveness, and metaphor. Little has been written about these elusive essentials. And despite their indisputable value, these attributes receive scant attention from university researchers, corporations, and think tanks. Academia continues to be enthralled with such details as pattern recognition and sorting algorithms, but in the real world of PC software development, technical tricks don't ensure a high-performance product–or money in the bank. *1-2-3* may contain dozens of fancy algorithms, but rest assured that they are not the cause of its success.

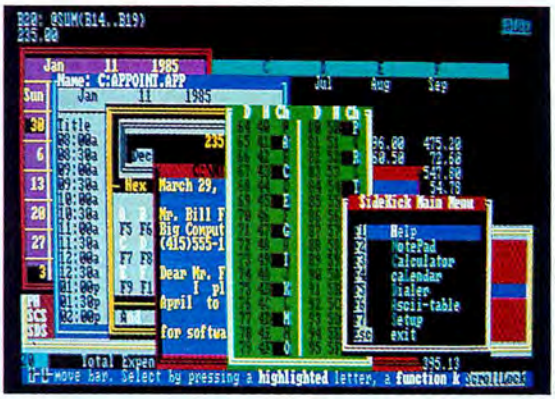
Universities channel creativity in a way that encourages advances in small increments rather than in

(continues)

Borland's SideKick Software Product of the Year*

SideKick is InfoWorld Software Product of the Year. It won over Symphony. Over Framework. Over ALL the programs advertised in this magazine. Including, of course, all the "fly-by-night" SideKick imitations. SideKick . . . . Simply the best.

Here's **SideKick** running over Lotus 1-2-3. In the SideKick **Notepad** you'll notice data that's been imported directly from the Lotus screen. In the upper right you can see the **SideKick Calculator**.



All the **SideKick** windows stacked up over Lotus 1-2-3. From bottom to top: SideKick's **"Menu Window"**, **ASCII table**, **Notepad**, **Calculator**, **Appointment Scheduler/Calendar**, and **Phone Dialer**. Whether you're running WordStar, Lotus, dBase, or any other program, SideKick puts all these desktop accessories instantly at your fingertips.

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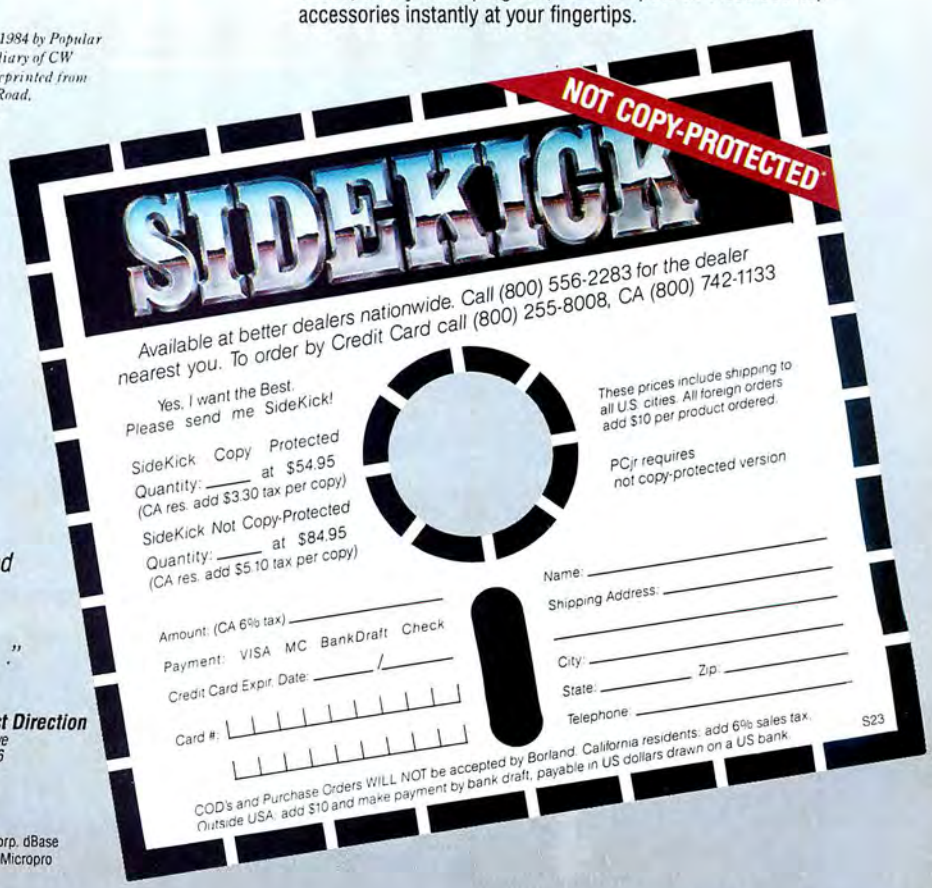
Dan Robinson, InfoWorld: *"SideKick is a time-saving, frustration-saving bargain . . . ."*



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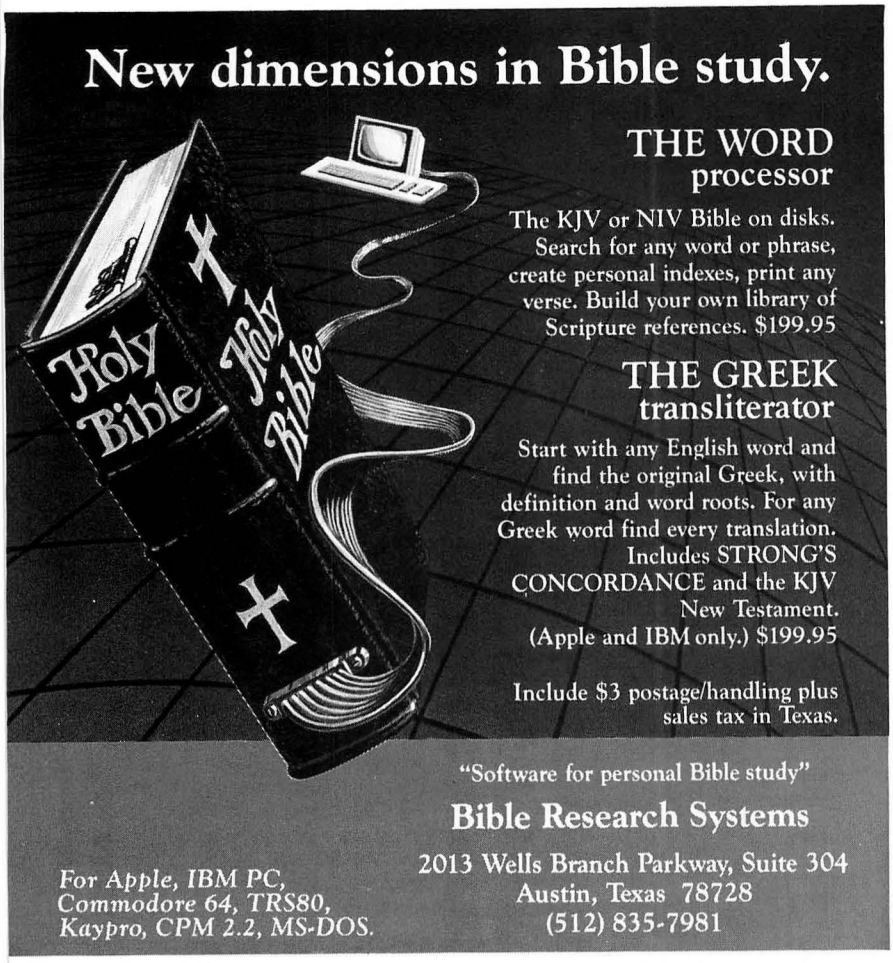
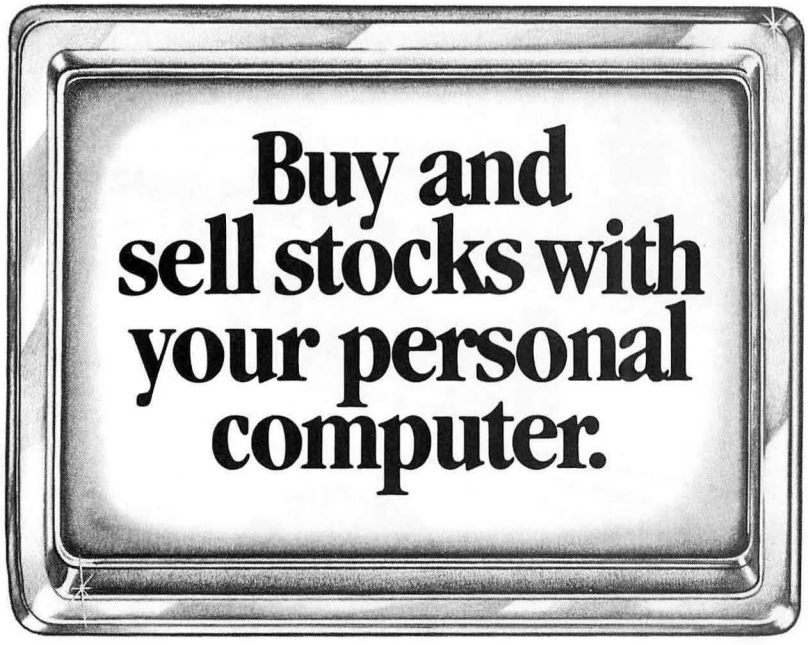
Alan Cooper is a veteran software author based in Silicon Valley and the creator of SuperProject *from Sorcim/IUS.*





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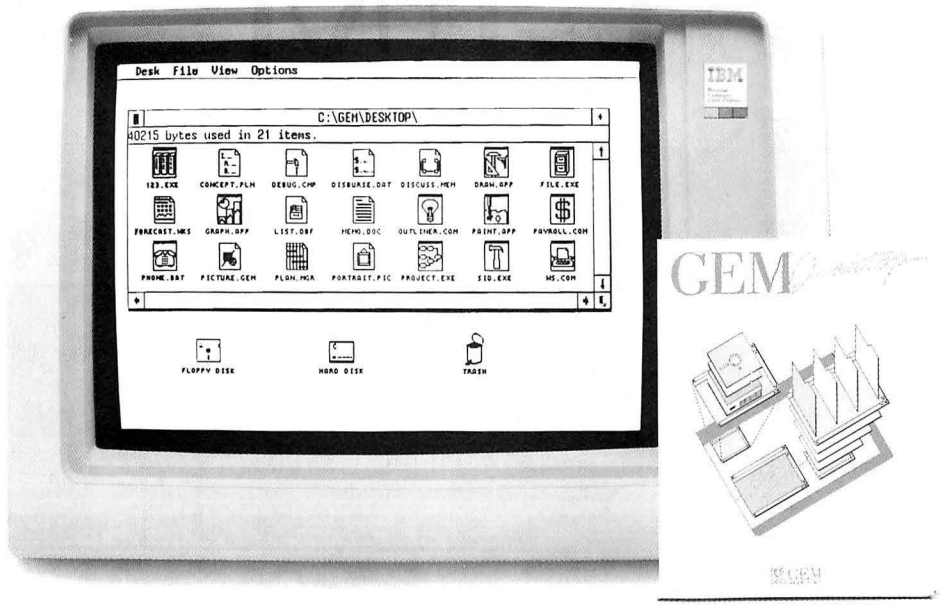

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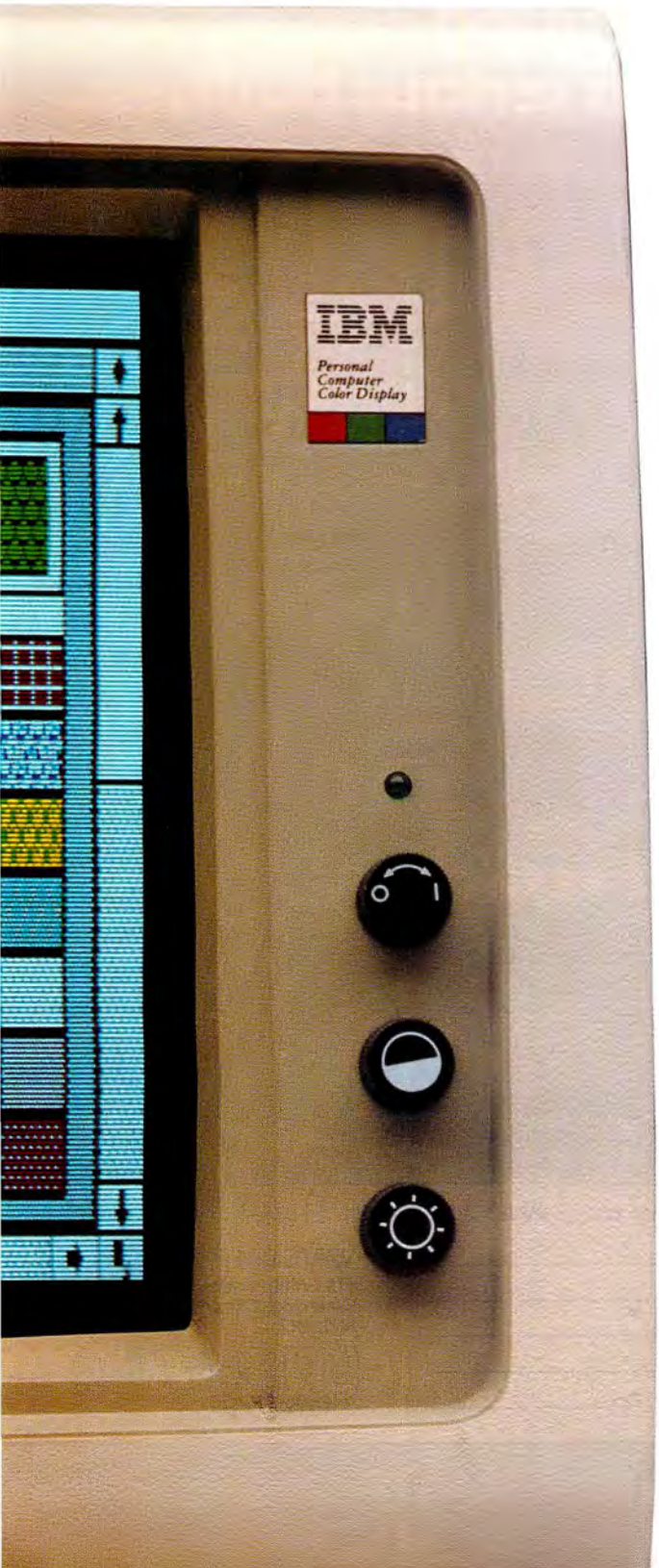

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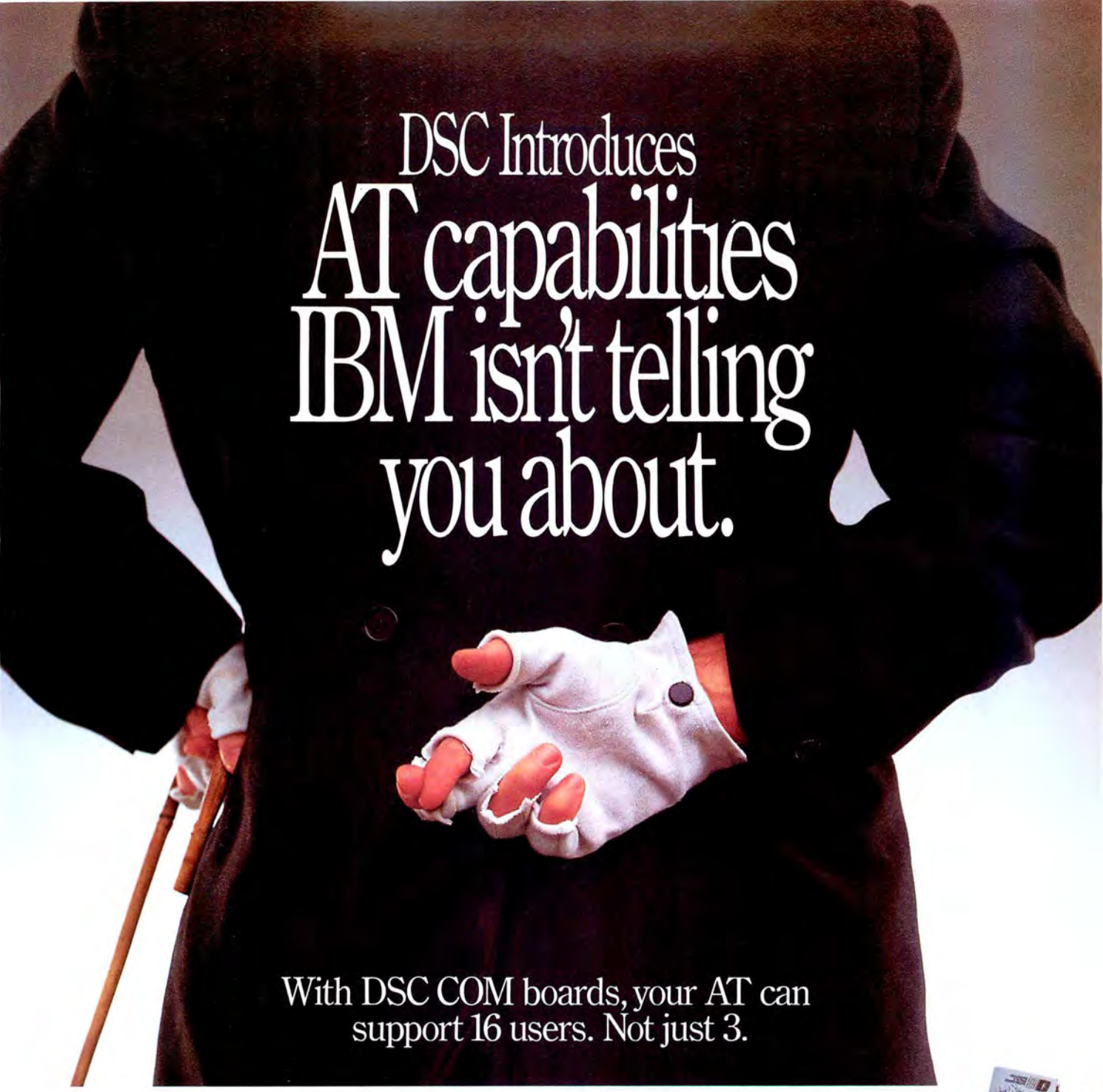

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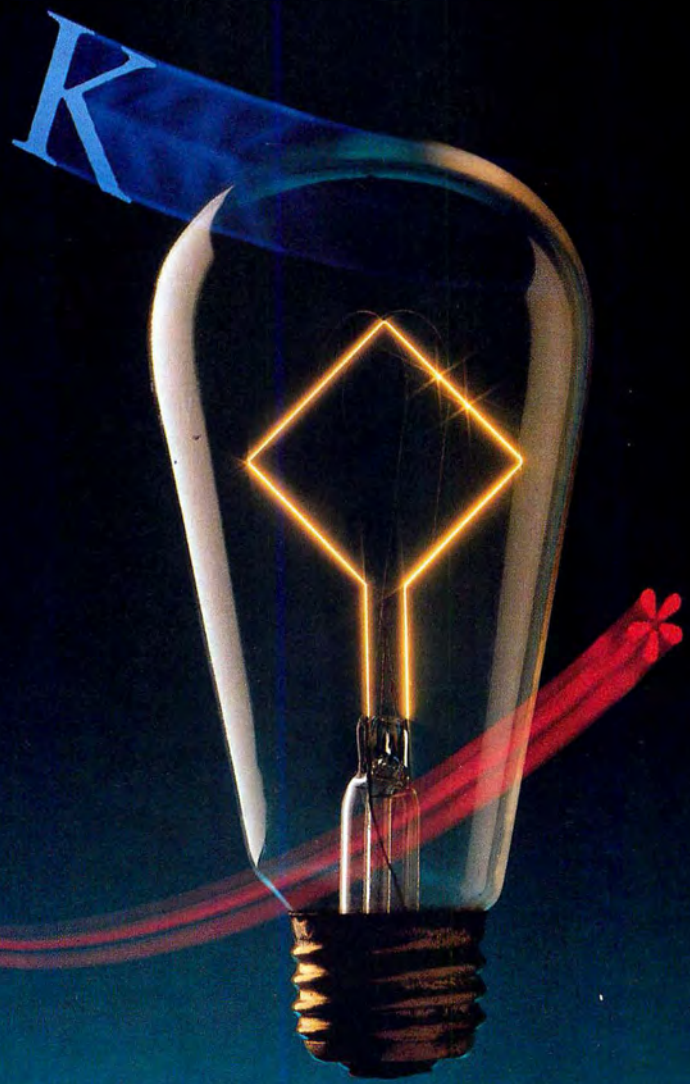

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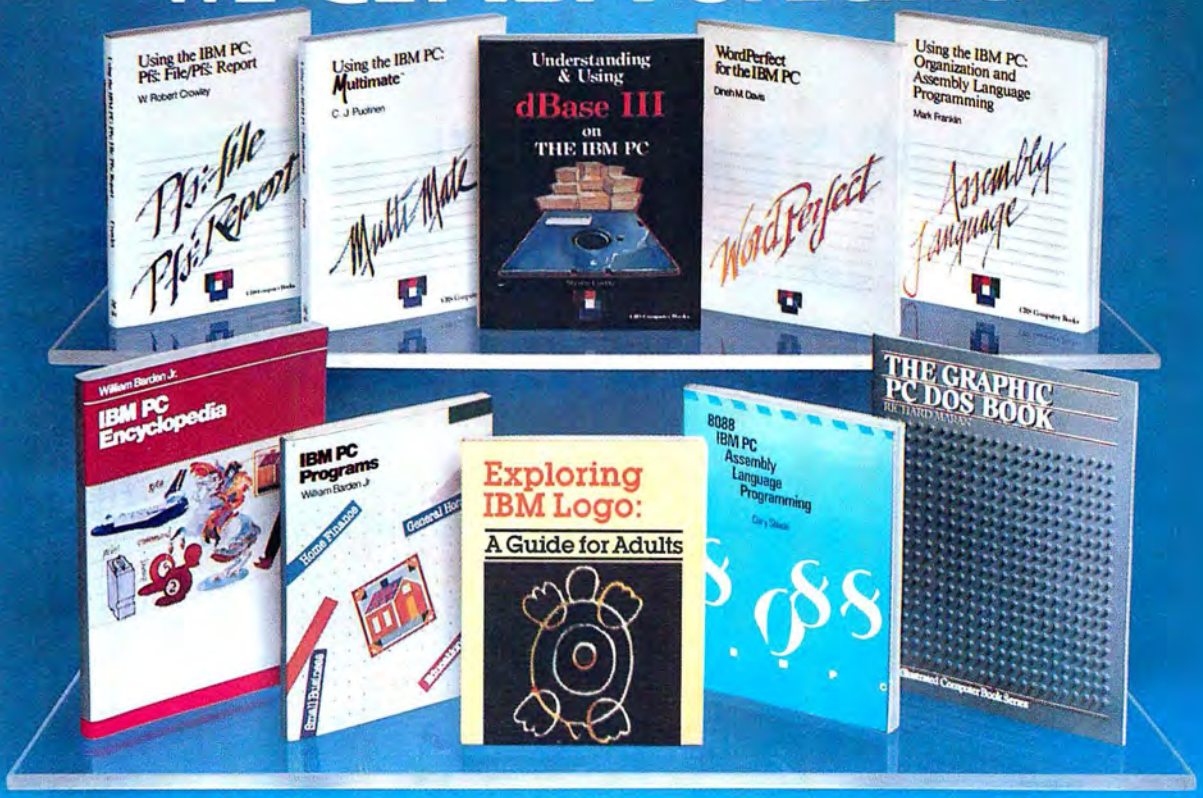

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Letters

Reactions and responses from the PC World community

Use a Modem, Go to Jail

I thought you might like to know the resolution of the case *People v. Tcimpidis*, discussed in David Bunnell's column "A Case of Government Interference" [*PCW*, February 1985]. Reginald Dunn, head of the Criminal Division of the Los Angeles City Attorney's Office, has informed me that the city believes it has insufficient evidence to continue the prosecution of SYSOP [bulletin board system operator] Tom Tcimpidis and will seek dismissal of the charges. Under California law such a dismissal is "with prejudice," so the case cannot be refiled; in short, a dismissal will permanently halt the prosecution. I consider this a major victory for the rights of free speech over the Big Brother machinations of the phone company. Thanks for the support.

Chuck Lindner
Attorney for Tom Tcimpidis
Los Angeles, California

The case of People v. Tcimpidis *was dismissed with prejudice "in the interests of justice" on February 7, 1985.–Ed.*

Use a Modem, Part Two

I much appreciate your coverage and comments regarding the ridiculous debacle involving my bulletin board system, the MOG-UR, and Pacific Bell. However, I would like to clarify one point before I am besieged by requests to repair television sets. Rather than a TV repairman as the column described me, I am actually a freelance engineer working in the video production and postproduction fields.

My system contains all the messages, information, and transcripts relating to the case from its start. Callers are welcome to log on and peruse this material at 818/366-1238.

Tom Tcimpidis
Granada Hills, California

Sly WordStar

You can't always believe what you read, I discovered after reading "A Drive to Succeed" [*PCW*, February 1985]. I always devour any articles on IBM's PCjr since they are hard to find.

In the article Seth Novogrodsky stated that after installing a Drive Two Enhancement Package with 512K of RAM from Rapport (now known as Racore), he successfully ran *WordStar*, version 3.3, which, he said, won't run on a 128K PCjr.

I disagree. I own a PCjr with 128K and one disk drive, and I wrote this letter with *WordStar*, version 3.3. The only difference between running *WordStar* on a PCjr and on an XT is that before typing **WS** on the Jr, you must first type **MODE 80** at the A> prompt.

Neil Lawton
Cocoa, Florida

MicroPro International will neither confirm nor deny that WordStar, *version 3.3, will work on the 128K PCjr, but the company does sell a PCjr version, which leads us to believe that certain Jr configurations make* WordStar *balk. However, we've tried it and it works. Also, as reader Lawton notes, Rapport Corporation is now*

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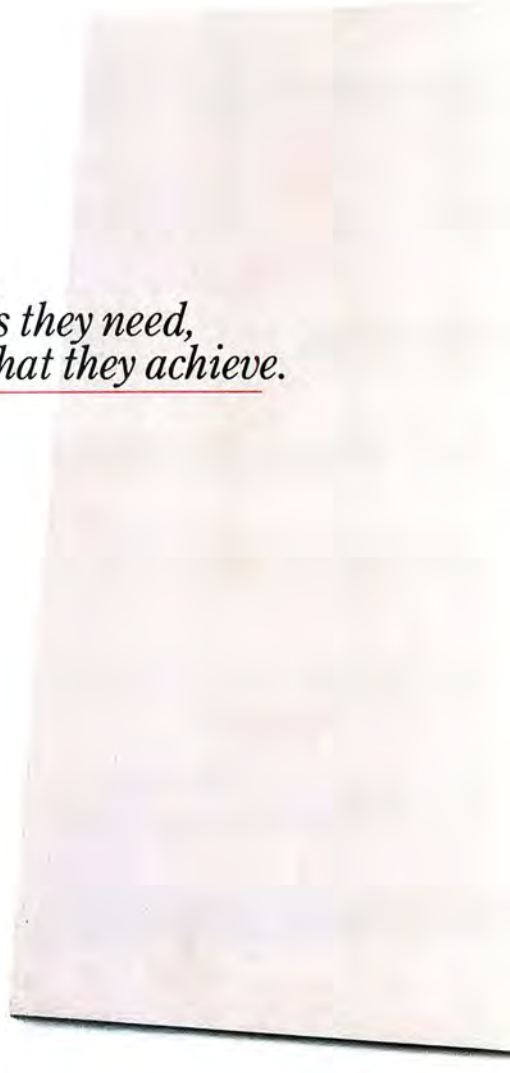

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Racore Corporation, 10 Victor Square, Scotts Valley, CA 95066; 800/325-1833, 408/438-7255 in California.–Ed.

Star-Dot-Star All-Stars

I'm a new reader of *PC World*, and I must say I am very pleased. I started my subscription to obtain the kind of information contained in *.*. I encourage you to compile a book of items from *.* and *The Help Screen.*

William Remmert
Federick, Maryland

*A prescient request–our collection of *.* memorables will be published in June 1985 as* Hands On: Practical Tips and Useful Programs for IBM Personal Computers From the Pages of PC World *by PC World Books.–Ed.*

Information Overload

As a PC owner and a subscriber to *PC World*, I have found your magazine my best source of information and ideas on getting the most out of my machine. I've gone so far as to obtain a complete set of back issues and find myself going through the older copies as often as the recent ones.

Unfortunately, the number of issues is becoming unwieldy to sift through. Do you have plans to produce a cumulative index? Such an index on 5¼-inch disks might be a good idea–and right in line with your readers' needs. Or how about using an on-line data base, accessible via toll-free number? You could include hardware and software information and sell commercial space on the system.

Patrick J. Dunne
Fairfax, Virginia

A cumulative index is in the works, although it probably won't be available in the near future–or on disk. Keep in mind that PC World *does publish an annual article index each January. As for the on-line data base, you're in luck. Through Direct-Net, you can search and retrieve PC hardware and software information, as well as* PC World *subscription particulars and program listings. Annual membership is $50; a demo disk and documentation can be had for $10. Contact Direct-Net at 800/223-0822, 800/824-5526 in California.–Ed.*

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Textra Update

I'd like to thank *PC World* for its fine review of our *Textra* word processor ["From the Software Shelf," *PCW*, February 1985]. The article states, however, that documents are limited to 30K (or 20 pages). The actual limit is 60K. I'd also like to tell your readers that version 3.1 is now available (version 2.1 was reviewed). The new version adds directories, expanded printing features, block highlighting, extensive help facilities, and several dozen smaller improvements. The price has been virtually halved–from $95 to $49.95. Interested readers can contact us at Ann Arbor Software, 407 N. Main, Ann Arbor, MI 48104.

Scott Anderson
Ann Arbor Software
Ann Arbor, Michigan

Corned Beef Florentine

PC World appears to be a bit color-blind. "Sure an' Begorra" [*PC World View*, *PCW*, March 1985] might better have been entitled "Sure an' Bologna" in light of the accompanying illustration. Although similar, the tricolor of Ireland is green, white, and *orange*, while Italy's flag is green, white, and red.

Mark Savage
St. Charles, Illinois

The Tandy 1000 Blues

As a recent purchaser of the PC-compatible Tandy 1000 from Radio Shack, I have found very little in the way of information and support for the machine. I'm writing to you, the only magazine for IBM compatibles, for help.

Because of the machine's aggressive pricing, I expect the 1000 to show strong sales, and I'm confident it's a machine that will induce much third-party support. A Tandy 1000 column would be nice.

Christopher Herd
Albuquerque, New Mexico

Although the number of PC-compatibles manufacturers is waning, we intend to continue our coverage of computers, such as the Tandy 1000, that are winning favor in the marketplace. Look for information on PC work-alikes in PC World View *and* From the Hardware Shelf, *a product roundup, in an upcoming issue. –Ed.*

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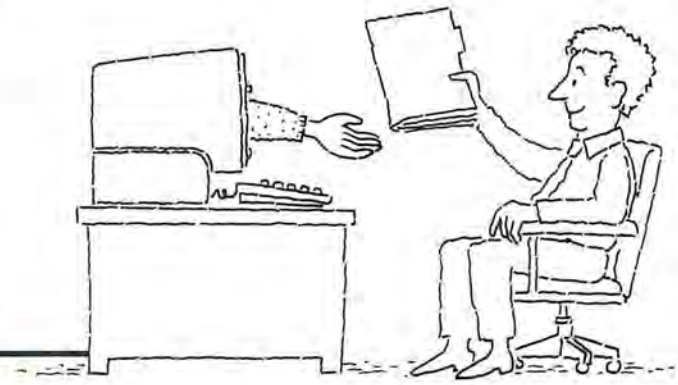

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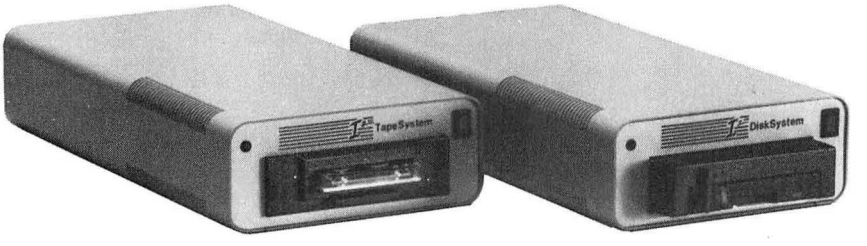

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The Dinosaur Dilemma

David Bunnell, quoted in the *Wall Street Journal* on January 31, 1985, called computer dealers "dinosaurs" and argued that how-to magazines rather than dealer support were responsible for strong sales.

He is absolutely correct. In late 1983 I was a consultant for a company that wanted to install IBM PC or PC-compatible hardware. My first stop was ComputerLand. The store had good prices, and the salesmen said they could configure a system in a few weeks. After reading about some interesting products in several computer magazines, including *PC World*, I returned to ComputerLand to purchase those items. The employees hadn't even heard of them. It took me a while to realize that I wasn't asking for weird merchandise; my information was more current than theirs.

I suggest you start a publication for retail computer stores that reprints your hardware and software reviews. It shouldn't be too proprietary; moreover, it will probably be copied by other magazines. Dealers and their customers will be well served by the information.

D. N. Garcia
Atlanta, Georgia

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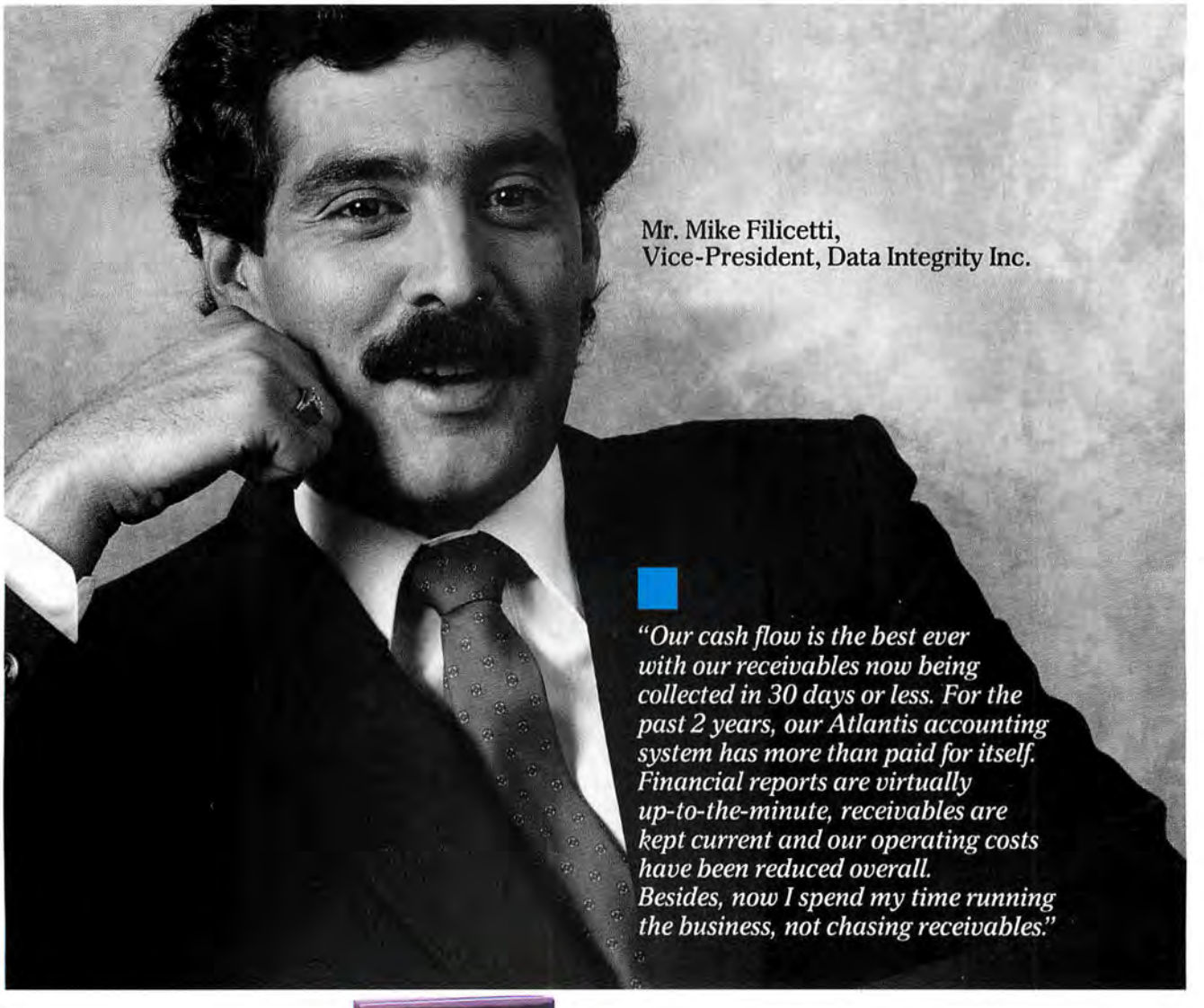

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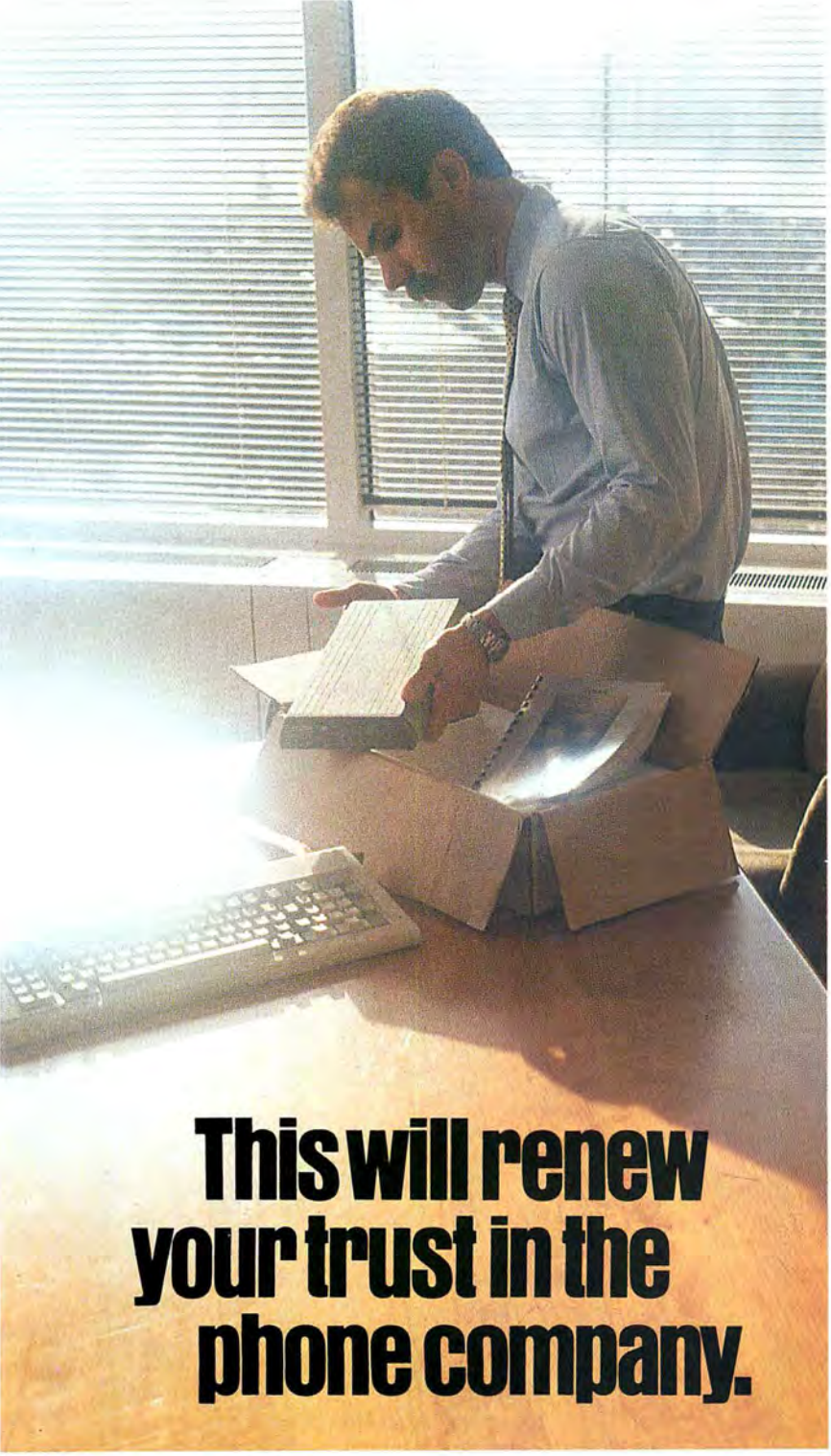

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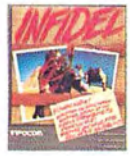

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PC WORLD

The AT Team

AT compatibles may be on the way, but there isn't much zest in the market–yet.

Kaypro. Zenith. Corona. TI. DEC. Sperry. Compaq. NCR. All those toes in the water, testing out the AT-compatibles marketplace. Feel that sense of déja vù yet?

You may be excused for momentarily thinking that you're reliving the halcyon days of 1983's PC clone assault. Just look at the PC AT: it's new, it's fast, it's interesting, it's IBM, and what else is there to say? Only that the AT is on allocation, and IBM can't possibly roll out enough machines to satisfy demand–ironic in light of the AT's alleged operating system and/or hard disk offenses. Like the PC, the AT is an open architecture machine, and that means it should be open season for third parties.

Right–open season just like the first day of grouse hunting. Expect no reprise of the PC clone wars; start-ups in particular are likely to sit this one out (taking their cue from venture capitalists). The names of well-heeled AT-compatibles manufacturers and would-be manufacturers may be familiar, but the mood is best described as tentative, leaning toward reluctant and bordering on wary.

On the face of it, this shouldn't be happening. Roger Foster, group managing director of UK-based Applied Computer Techniques (ACT), calls the 80286 chip, the brains of the AT, "the architecture of the future–it offers two things people need: power, and software compatibility."

Why, then, the doubts from the very companies that are jumping into the current AT void? Look no further than what IBM has wrought. Is the AT a stand-alone PC? Network server? Multiuser machine? Multitasking machine? Potential UNIX box? Don't expect unanimity from industry leaders. The AT is a good thing waiting to be great: waiting for graphics, waiting for some way of tapping its memory management, waiting for something to do with 16MB of RAM.

Dr. Robert Harp, chairman of Corona Data Systems, would prefer to skip the germination period and proceed directly to IBM's mythical PCII, never mind passing go and collecting the obligatory sums from OEM licensing arrangements. Harp views the AT as a temporary product destined to be "wiped out" by the PCII. Nevertheless, Corona has its own AT compatible ready to roll (possibly under the N.V. Philips label), complete with 20MB hard disk and upgraded, homegrown BIOS.

"I'd really rather not get into the AT market at all," Harp says. "I feel we're being forced into it. People who treat 286 machines as commodity items are going to lose money."

Kaypro beat everyone to the punch in February with its genuine DOS-based hard-diskless AT compatible, the 286i (waggishly nicknamed the KAT, or the Kaypro AT). For marketing chief David Kay, the 286i has the potential to be the quintessential single-user, multitasking machine ... as soon as the appropriate software (read DOS 4.00) arrives. "What the AT is, depends on when you ask the question," Kay says. "Now

PC World View *reports new developments in computer technology, items of interest to computer enthusiasts, and the most significant and enticing speculation about industry trends and personalities. We've reserved the "Grapevine" section of this column for industry reports that are still at the speculative stage.*
–Ken Greenberg

View

News and notes for the computing community

and for the next six to nine months, it's a small networking machine, a more powerful machine for people who have already owned a PC.

"But for us, multitasking is far more important than networking. Within a year, the software will be ready, and it will drive this market just like it drove the PC market. The irony is that this more sophisticated machine will ultimately be used by a less sophisticated audience."

Meanwhile, the OEM houses—Faraday Electronics, Phoenix Software, Award Software, OEMTEK, and so on—are covered. They're turning out 80286 machines, single-board computers, and BIOS ROMs for an onslaught of buyers that may take some time in coming.

Operating System Operator

UNIX is a dinosaur. MS-DOS and CP/M are mere toys.

That's the word from Charles Lombardo, fast-talking chairman of Multi Solutions, a New Jersey-based company that claims its much-heralded but yet-to-arrive S-1 operating system will be "the only operating system worthy of the title 'The Next World Standard'."

Critics and converts alike fault UNIX for its girth and forbidding interface, but no one has focused on these frailties more vigorously than Lombardo. Hungry competitor that he is, Lombardo asserts that UNIX is doddering and dull-witted, and naturally concludes that the ultimate solution is S-1. In keeping with Lombardo's fervor, S-1 ads humbly feature a slightly revised set of ten commandments carved onto a pair of stone tablets resembling microprocessors. The countdown starts with "Thou shalt have no other OS before S-1" and ends with the vaguely ominous "Only S-1 vendors and users will survive the next revelation."

Intrigued, Associate Editors Robert Luhn and Ken Greenberg decided to look up Lombardo at the Multi Solutions booth at last fall's COMDEX to discover what was fueling the burning bush. What greeted us was a pitch that

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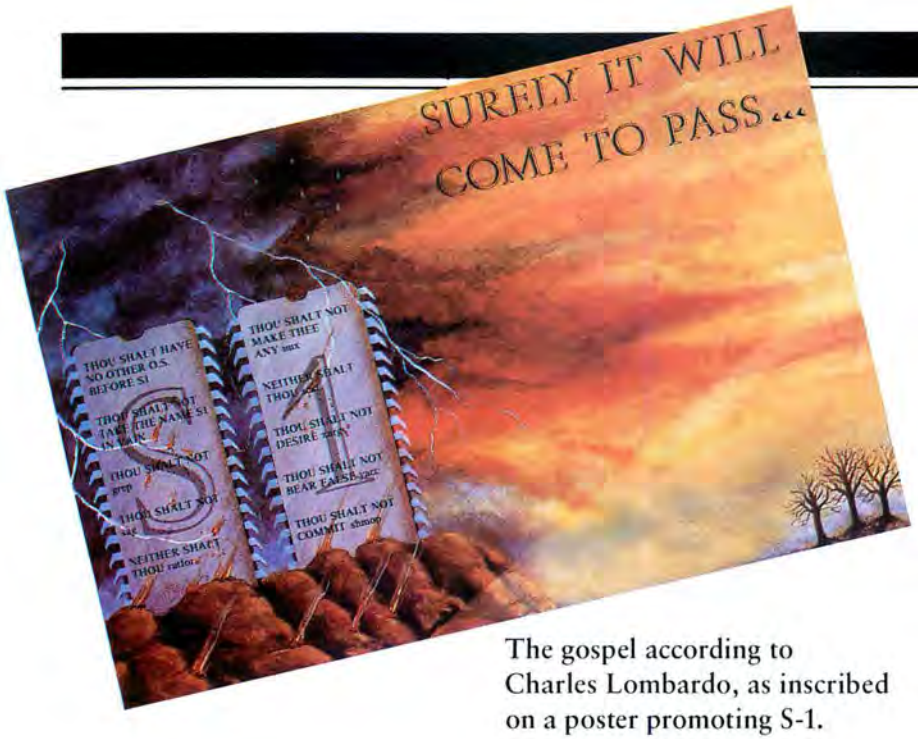

The gospel according to Charles Lombardo, as inscribed on a poster promoting S-1.

Operating System Operator
(continued from page 83)

would have brought tears to the eyes of an old bloviater like Warren G. Harding.

Lombardo affirmed that S-1 will, among other feats, make networking, multitasking, and multiprocessing as easy as falling off a chair. The operating system is "uniform and compatible across all versions of all computer hardware for all users, all programmers, and all applications."

Baptized but still unbelieving, we asked for names of computer manufacturers and software vendors who have jumped aboard the S-1 bandwagon. We learned that, unfortunately, that data is classified. Nor will S-1, after several years of threatened release, be available for independent review by the computer press–*PC World* included. The reason for not opening the product to inspection? "Our staff would be spending all their time answering phones and giving magazine reviewers technical support if I released copies. We don't have the resources for that. Besides," he added, "your reviewers couldn't understand it. It's unlike anything they've seen."

Our feelings hurt but our determination unshaken, we left still in search of the elusive S-1. And the results were indeed interesting. A quick call to Dorothy D'Attoma, corporate communications director for Multi Solutions, confirmed that the company couldn't afford to provide assistance to reviewers but was willing to fly *PC World*'s editors to New Jersey for a demonstration at company expense. D'Attoma also noted that the company is forming a $2 million subsidiary to create S-1 software. Apparently money is no object.

The months passed and we kept the Las Vegas episode tucked in our bonnets. Nary a cocktail party went by without one *PC World* editor or another putting the kibosh on the evening by wondering aloud whether anybody had ever seen S-1. Over time, we contacted such computing noteworthies as Compaq engineering chief Steve Flanigan, Corona Data Systems founder Robert Harp, and representatives of Microsoft, Onyx Systems, Oasis Technology, and others in an attempt to discover more about S-1 and the destiny of computerdom. Our queries elicited either blank stares or barely suppressed guffaws. One engineer from a large operating systems company smiled at the mention of S-1 and indicated in language shocking to our ears that S-1 was something less than revolutionary.

Dick Pick, originator of the Pick operating system, wryly noted, "It's easy for companies to lay out the buzzwords–like multitasking–but delivering the goods is no trivial pursuit. Lombardo's a loose cannon, anyway. As long as he doesn't aim his guns at me, I don't care."

So the S-1 search goes on. In the meantime, UNIX in its various permutations continues to show up on computer after computer, and DOS, in spite of a prematurely announced deathwatch, is reaching into the multiuser and networking world with versions 3.00 and 3.10. After three years, S-1 is still being tested, and the company is conducting a search of its own–for a U.S. distributor.

But then, the Tower of Babel wasn't built in a day.–*Robert Luhn*

Big Blue's News

It could be Big Blue's blues unless IBM manages to start selling its accounting software.

Last fall IBM announced its first homegrown family of integrated accounting programs, the *Business Management Series (BMS).* At that time industry analysts wondered whether IBM's clout would give *BMS* a decisive advantage over the legion of accounting packages already on dealers' ledgers. So far, the answer is a resounding no.

Neither IBM nor independent dealers will release actual sales figures, but IBM professes to be "pleased with the results." Nevertheless, all reports indicate that *BMS* is moving off retail shelves sluggishly. (That applies as well to IBM's *Personal Decision Series* of productivity programs, also homegrown and intended for integration with *BMS.*) According to Gail Weinnig, a senior researcher for the market research firm Future Computing, the IBM series hasn't yet left the gate. "*BMS* is not even showing up on a monthly survey of retailers' best-selling programs," she says. This is occurring despite Software Showcase, IBM's consignment program, which offers dealers slick retail displays and imposes no charges for software not sold (see *PC World View, PCW,* April 1985).

There may be more to this dismal debut than the inability of a promotional campaign to catch fire. Observers cite a combination of factors, including a lack of consumer confidence in IBM's customer support, dealer unwillingness to engage in the training needed to sell an unproven product, *BMS*'s bulky, time-consuming data entry process, and the programs' prodigious appetite for hard disk storage. The modules list for $695 each.

Selling a complex accounting package and training users demand skilled salespeople, but IBM's Software Showcase, designed to persuade dealers to sell *BMS,* bypasses dealer training.

BPI, whose *Business Series* currently tops the sales charts and claims the largest user base among PC accounting packages, also maintains in-the-field dealer training staff–a fact that hasn't gone unnoticed in Boca Raton. IBM recently announced an agreement to distribute the BPI series in its Product Centers (a move that only a cynic would see as pre-empting IBM's own beleaguered software).

For small businesses, there's nothing trivial about the *Business Management Series*'s penchant for megabytes–particularly if it means acquiring multiple hard disks. Program code alone for all six *BMS* modules exceeds 10MB, offering almost twice as many bytes of code for the buck as the package's nearest competitor (in fairness, much of that code is devoted to the *BMS* help facility). Even granting that most businesses may use only one to three modules at a time, and that data storage requirements depend on transaction volume, *BMS*'s program and data storage needs could easily fill an XT's 10MB hard disk. An example from IBM's own Application Sizing Estimates disk proves the point: a business that records a "medium" volume of transactions will need 9.8MB for program and data storage if it installs the General Ledger, Accounts Payable, and Payroll modules.

The fine print on each module recommends an XT; the more discerning buyer may want to get his or her hands on an enhanced AT (packing a 20MB hard disk)–assuming that is possible. Consider how easily a business can hit the storage wall if it adds to its hard disk other programs from the *Personal Decision Series,* a favorite spreadsheet or word processor, and a growing data base. Once again, IBM plays to its strength–hardware. But then, software determines hardware, right?
–Christine Whyte

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Moving and Shaking

The PC's phenomenal success in the marketplace has had a great deal to do with IBM breaking from its traditional business practices. IBM set up its Entry Systems Division (ESD) as a separate business unit and let the division control all aspects of the PC from

(continues)

COMBINE POWER AND ENHANCE YOUR PC-AT

Quadram introduces the smart way to enhance your IBM PC-AT. Quadmeg-AT and Quadport-AT. Smart because Quadmeg-AT and Quadport-AT make the most of your AT system today and expand to meet your system's growing needs in the future.

Quadmeg-AT comes socketed for memory expansion from 128K to 2 Megabytes. Harness this power to create megabyte-sized RAM drives, access

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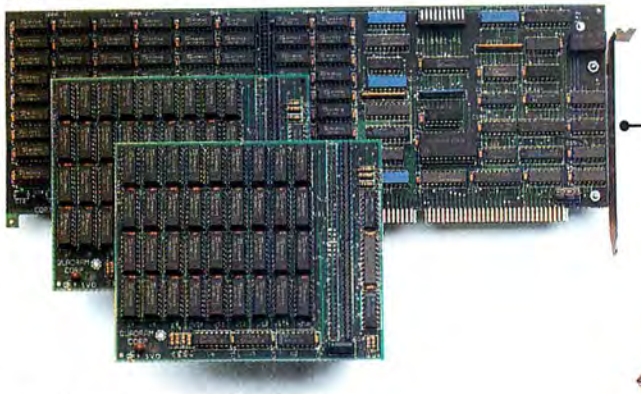


greater amounts of information, and process data faster and more efficiently than ever before. Plus, with "split memory mapping," Quadmeg-AT lets you expand the AT's base system memory to 640K without buying a space-wasting 128K card.

Advance to 4 Megabytes

When you need more than 2Mbytes, Quadmeg-AT adapts with two Quadmeg-AT Expansion Cards. Each packs 512K or 1Mbyte extra RAM.

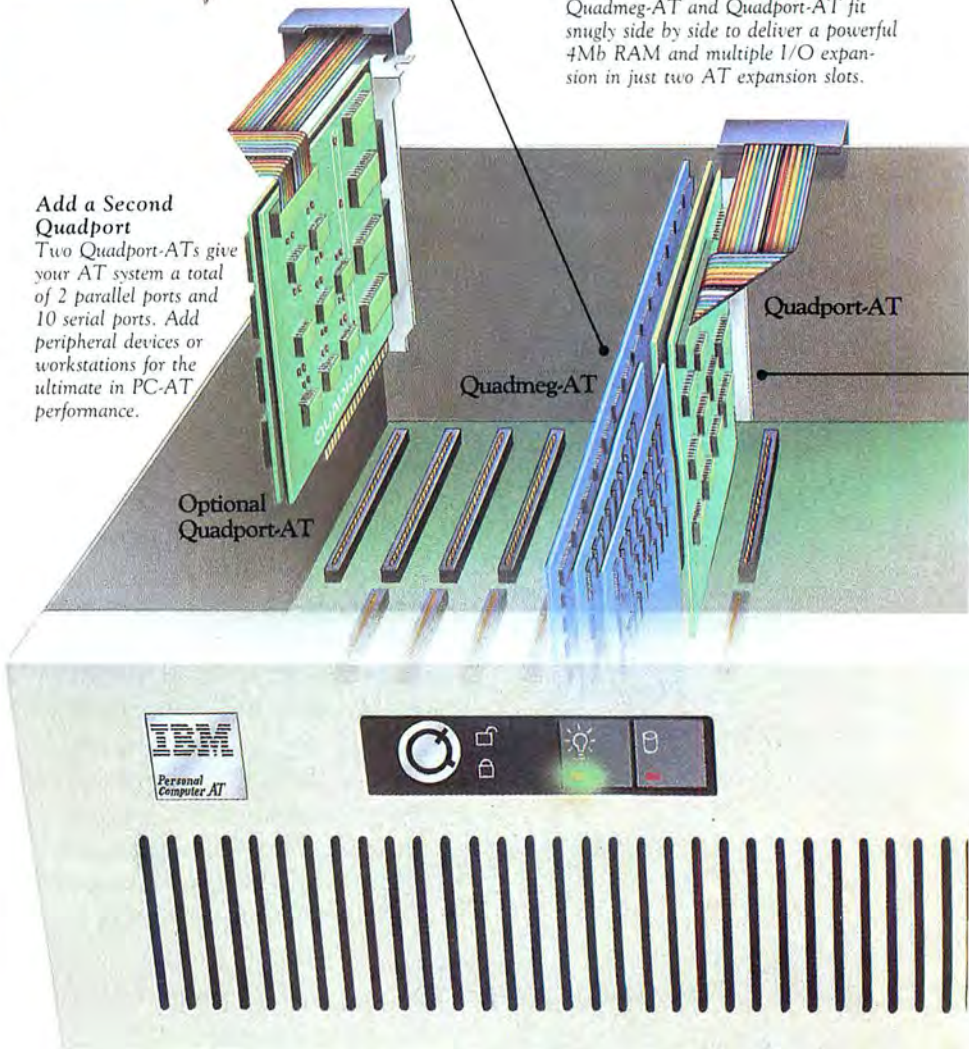
Both cards filled give Quadmeg-AT a powerful 4Mbyte capacity. Quadmeg-AT delivers the power you need to take full advantage of the AT's capabilities.

Maximum Performance in Minimum Space

Quadmeg-AT and Quadport-AT fit snugly side by side to deliver a powerful 4Mb RAM and multiple I/O expansion in just two AT expansion slots.

Add a Second Quadport

Two Quadport-ATs give your AT system a total of 2 parallel ports and 10 serial ports. Add peripheral devices or workstations for the ultimate in PC-AT performance.



™ Look for this seal. It's the mark of dependability and performance from the leader in microcomputer enhancements.

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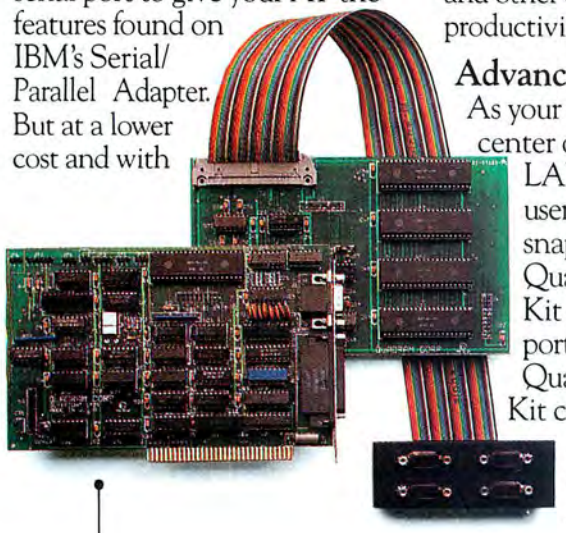
EXPANDABILITY TO THE SMART WAY.

QUADPORT-AT™

Quadport-AT combines a parallel printer port and a serial port to give your AT the features found on IBM's Serial/ Parallel Adapter. But at a lower cost and with built-in expandability. Connect printers, plotters, modems, and other devices for increased productivity.



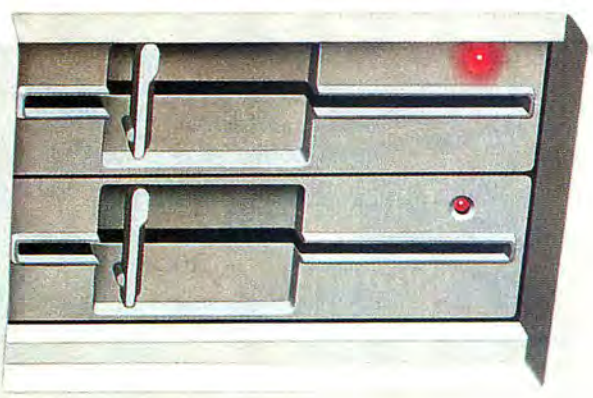
Advanced Port Expansion

As your AT becomes the center of a high-performance LAN or growing multi-user, multi-tasking system, snap on the optional Quadport-AT Expansion Kit and add 4 more serial ports to your system. The Quadport-AT Expansion Kit comes with software to access these ports, making it easy to add shared peripherals or workstations.

Enhance the smart way with Quadram.

For basic AT expansion, Quadmeg-AT and Quadport-AT work together to provide 128K memory expansion, a serial port, and a parallel port. Then, as your system grows, Quadmeg-AT and Quadport-AT give you up to 4MB RAM, 1 parallel port, and up to 5 serial ports in just two PC AT expansion slots. Only Quadram combines so much power and expandability. That's PC AT enhancement the smart way.

Features	
Quadmeg-AT: RAM expansion from 128K to 2Mbytes. Expandable in 512K increments. Split memory mapping assigns 128K or 384K to base memory. **Total RAM Capacity:** 4Mbytes.	**Expansion Cards:** Two cards available. Each comes with 512K or 1Mbyte RAM installed. **QuadMaster-AT Software:** RAM Drives and Spooling for extended memory.
Quadport-AT: Port expansion with 1 Centronics parallel port and 1 RS-232C serial port.	**Quadport-AT Expansion Kit:** (optional) 4 RS-232C serial ports. Software to access ports.



For a free demonstration visit the Quadram dealer nearest you. Or, for information, write us at 4355 International Blvd., Norcross, Georgia 30093 (404) 923-6666.

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An Intelligent Systems Company

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Big Blue's News

(continued from page 85)

manufacturing to sales. ESD pioneered, among other practices, IBM's use of outside retail stores and massive product advertising.

Now that Don Estridge, the moving force behind ESD, has been bumped upstairs to a corporate post overseeing IBM manufacturing worldwide, it seems the company has let its fling with the entrepreneurial spirit lapse.

In his new position, Estridge deals with PCs only insofar as they fit into IBM's overall product line. His successor at Entry Systems is William Lowe, fomerly assistant group executive in charge of strategies for local area networks. IBM explains the personnel shift as a means of both strengthening manufacturing throughout the company and integrating the PC into the rest of its product line. Brian Jeffrey, research director at the Palo Alto-based International Technology Group, sees it differently. "Estridge is not a team player," he says. "Lowe is a chain-of-command guy, more willing to carry out policies laid down by the corporate hierarchy."

Shortly before the Estridge departure–in what may have been a portent–IBM transferred responsibility for dealer sales, service, and support for PC products from ESD to its National Distribution Division (NDD). At the time, many IBM watchers agreed this move signaled a return to business as usual for Big Blue.

ESD continues to maintain responsibility for PC marketing, manufacturing, and engineering. (ESD was also rearranged into "business areas," among them operating systems, communications, input/output devices, and PC systems.) Analysts have noted that IBM has traditionally separated sales operations from product development. According to industry observer Sandra Gant of InfoCorp, "IBM is first, foremost, and primarily a marketing company. The realignment is a smart move."

That view is not, however, shared by analysts across the board. Some consider the action a rebuff to Entry Systems for gaffes and glitches committed in bringing the AT, the PCjr, and the Portable PC to market. One line of thinking maintains that IBM's recent decision to put PCjr out of its sales misery is in part a reflection of Estridge's failure to gauge the market accurately. Jeffrey speculates that under Estridge's leadership, ESD may have spread itself too thin, and that IBM president John Akers now wants a tighter grip on that facet of the business. "ESD was set up to handle what IBM considered a small-growth market," Jeffrey says. "IBM didn't think the PC market would take off the way it did, and PCs have become far too important to be left to Entry Systems. The main direction for PC strategy will now be set by corporate headquarters, not Entry Systems. In forming ESD, IBM proved an elephant can dance, but now that's over."

–Wes Nihei

Speed, Anyone?

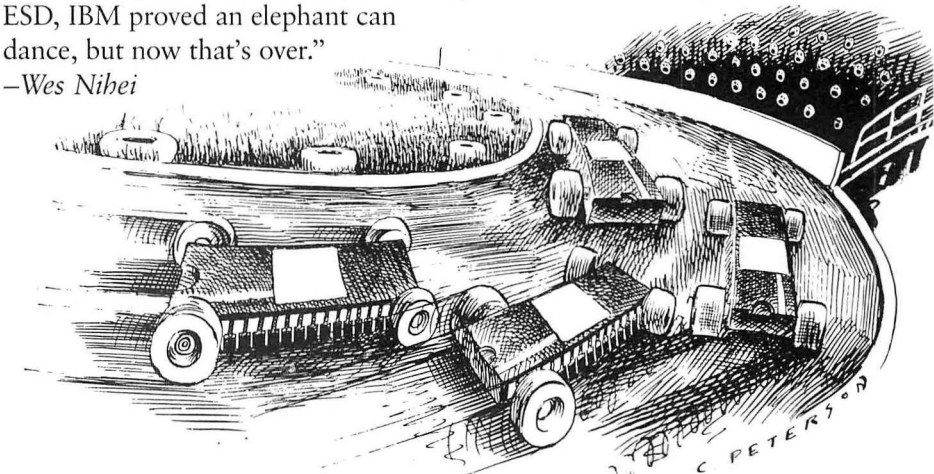
The semiconductor business has been in the doldrums of late. Demand has taken a holiday, and with truncated workweeks, so have some workers. Intel, for one, recently furloughed 900 employees and kissed profit projections goodbye until the fourth quarter. But expecting another lament for the industry? Guess again.

Intel's on the trail of something new and different, something certain to end its lack of renown. Intel, the folks who provide the brains at the end of your fingertips, has discovered a nifty way to make good in hard times.

Go retail.

Say hello to the Personal Computer Enhancement Operation (PCEO), an Intel division based in Hillsboro, Oregon, that is not apt to thrill the likes of AST and Tecmar. PCEO is now developing, manufacturing, and marketing PC add-on products–and stamping *Genuine Intel* across the flashy racing stripes that adorn its boxes.

"This new business is the logical outgrowth of the one we're in," says Rich Bader, PCEO co-director. "Our edge is that we know what's coming out." But *proprietary* isn't in the company's vernacular; Intel's contractual obligations remain intact, and Bader



says the firm will "do nothing to undercut current customers."

The new Intel group is a chip off IBM's block, its autonomy mirroring Big Blue's independent business units. "We're a marketing island in a technology-driven sea," says James Johnson, who shares PCEO managerial chores with Bader. Marketing is indeed the word. PCEO quickly set about hiring old hands in the retail wars, and the unit's roster of dealers now tops 1500 nationwide–among them Businessland, Inacomp, Micro Age, and scattered ComputerLand franchises.

The first product line to wear the Intel logo is the 8087 family of number-crunching chips (the 8087-2, the 8087-3, and the 80287). The 8087 is hardly new, but it may be receiving a new lease on life. Currently, some 50 application programs–primarily compilers and engineering packages–support the speedy math coprocessor and its kin. But Intel is betting that its retail presence and stepped-up production lines will finally coax software developers into writing routines for the chip. Ideally, that would mean tinkering with old software as well as persuading developers to support the 8087 in new packages. In Johnson's words, the 8087 is ripe for "true believers, technocrats, power users, and corporate decision makers"–an audience he's certain won't shrink from getting down to board level. "This is as heavy-duty as any of our retail offerings will ever get," he assures.

Grapevine

Corona Data Systems is nimble, the chameleon of the industry, able to change the color of its business from hard disks to PC clones, from clones to laser printers and AT compatibles... somehow always managing to make money. Next, look for the release of a graphics board on a par with the IBM Professional Graphics Adapter, but at roughly half of its $4000 price. The heart of the board is a Mallomar-size, ultrasophisticated Hitachi graphics chip.

If you like a good wager now and then, don't bet against 720K 3½-inch floppy disk drives in one of IBM's next offerings. (Notice how we're hedging here.) The word from two authoritative sources is that an alternate standard–if that's not an oxymoron–to the 5¼-inch floppy is ready to hit an unsuspecting public. "All the talk is now 3½-inch," says one insider, and that means IBM, even though Sony owns the mold. (Big Blue's JX, a PC available only in Japan, already sports the microfloppies.) IBM's recent ordering gyrations with Tandon may indicate that that disk drive vendor has received the nod. Remember: We said don't bet *against* it.

Growing Old Gracefully

You know you're getting older when personal computer industry histories and reunions crop up with more regularity than start-ups and breakthrough products. Venerable Microsoft Corporation recently marked its tenth year in business at a company meeting that doubled as a surprise party for founders Bill Gates and Paul Allen.

PC World Publisher David Bunnell was on hand to present Gates and Allen with the "PC First Decade" award, a plaque lauding Microsoft for "the most significant contributions" to personal computing during the past ten years. MITS BASIC, Microsoft's initial product, was designed for the Altair–the first commercially available personal computer–and shipped on February 27, 1975. Although the Altair didn't make it to the party, MITS BASIC evolved into Microsoft BASIC, which eventually became *the* language for the PC. Microsoft then began to dabble in operating systems, application programs, and other languages. And the rest is, well, recent history.

PC World View *welcomes contributions from readers, and we'll pay up to $50 for the items we use. Please include your name, address, and phone number with your contributions; send them to* PC World View, PC World, *555 De Haro St., San Francisco, CA 94107.*

What's a Wall doing with a da

"Cornerstone lets me do more with my PC than I could ever do with my spreadsheet."

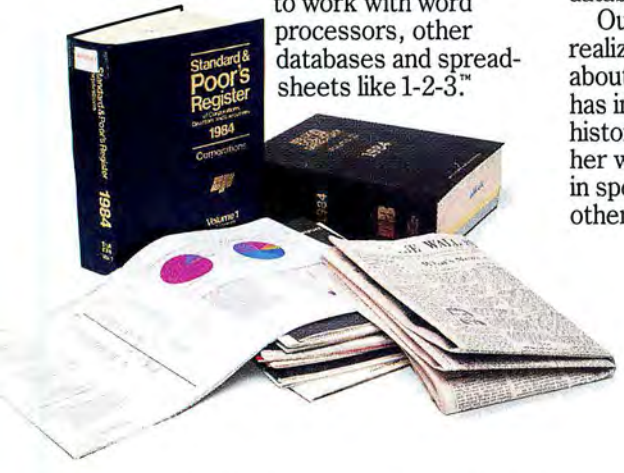
Until now, unless you had time to learn computer programming, you were unable to realize the full potential of your personal computer.

That's why we created Cornerstone,™ the first sophisticated database system specifically designed for the non-programmer.

And Cornerstone isn't one of those lightweight systems that handles only a few simple jobs. On the contrary, it's a full-featured relational database system that can help you solve the wide range of information management problems you face every day.

"It takes over where my spreadsheet leaves off."

No single program can meet all your information management needs. That's why we designed Cornerstone to work with word processors, other databases and spreadsheets like 1-2-3.™



For example, spreadsheets are great for budgeting and forecasting, and our analyst uses 1-2-3 to forecast investment performance. But she also has a business to manage, and Cornerstone is perfect for that. She started by building a database of all her clients. Now Cornerstone keeps track of expenses, generates bills and even organizes her schedule.

You'll be able to build your own database easily with Cornerstone. Our *Beginner's Guide* and *On-Screen Tutorial* teach you everything you need to get started. And if there's any doubt about what to do next, our unique Help and Options keys always explain where you are and what to type next.

"Now I can keep all my clients' histories in one place."

Cornerstone's flexible design makes it easy to modify your database as your needs change.

Our analyst, for example, soon realized it was easy to add notes about each client contact. Now she has instant access to all her client histories. Cornerstone can remind her which clients are interested in specific stocks, bonds and other investments.

J. W.,
Financial Analyst

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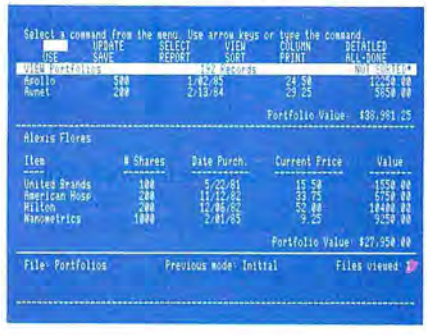
Street analyst tabase system?

Unlike other systems, with Cornerstone you won't have to decide in advance how much space you'll need for any item in your database. Cornerstone automatically makes room for a second phone number, an additional address, or even two pages of notes. And Cornerstone is efficient—it only uses as much space as you do.

"I know the current value of every portfolio."

Business people often need to use the same information in different ways. Because Cornerstone is a full-featured relational database, you only type in information once, but you can use it in as many ways as you want.

For instance, our analyst uses her data about companies and stock performance to keep track of each client's portfolio. And when she changes the price of a stock in one place, it's automatically changed in all relevant portfolios.



"I create reports I never dreamed of with my spreadsheet."

Providing information to others is an essential part of every professional's job. With Cornerstone's built-in report writer, you can give people the information they want, the way they want it.

Our analyst used to be held back by her spreadsheet's limited reporting and storage capabilities. Now with Cornerstone, she can store information on thousands of companies, select the ones offering high-yield preferred stock and provide her clients with detailed reports on them. She can also use Cornerstone's menu-driven convert system to easily transfer information from her 1-2-3 spreadsheets into her Cornerstone reports.

Cornerstone is a different kind of database system. Created by a company committed to eliminating the barriers between computers and people. It's now available for the IBM® PC, PC XT,™ PC AT™ and compatibles, and soon for the Tandy® 1000, 1200 HD and 2000. Suggested retail price of $495.

Send for your free demo disk.

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Circle 390 on reader service card

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All this, and 2-Key Accounting runs up to 30% faster than the competition.

Simple as...

You don't have to know a thing about Lotus 1-2-3 to use 2-Key Accounting. You don't have to know much about computers either. Believe it or not, you don't have to know much about accounting! 2-Key will lead you through.

Circle 269 on reader service card

Specifications

Maximum Hardware Requirement	IBM PC or compatible, 192K RAM (1-2-3 minimum requirement) 2 disk drives or 1 floppy and 1 hard disk Standard 80 column printer
Software Requirement	DOS 2.0+ (supporting DSDD drives) Lotus 1-2-3
General Ledger Accounts	200
Subsidiary Ledgers	Cash Disbursements Cash Receipts Accounts Payable General Journal Inventory Adjustment
Entries	500 lines per ledger per month or accounting period.
Options	Accounts receivable Accounts payable Inventory control Job costing Financial planning
Reports	General journal Cash receipts summary Cash disbursements summary (check register) Inventory adjustment summary Accounts payable aging Chart of accounts Complete financials including balance sheet and income statement

Affordable.

2-Key Accounting sells for $199.95.* No special hardware is required: if you have an IBM PC, PC/XT or compatible that can run Lotus 1-2-3, you can run 2-Key Accounting.

For growing needs, we offer add-on options like accounts receivable, accounts payable with check writing, inventory control, financial planning and job costing.

2-Key Accounting offers just about all the performance any small to medium size business could use. To find out more about it, see your local computer dealer. Or write us at 7100 S.W. Hampton Suite 231, Portland, Oregon 97223. Phone (503) 684-0433.

2key ACCOUNTING™

*Suggested retail price
2-Key Accounting requires the use of Lotus 1-2-3.
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SUPPLEMENTAL SOFTWARE CO.

Supplemental Software Co.
BALANCE SHEET
February 28, 1984

PAGE 1

Supplemental Software Co.
ACCOUNTS PAYABLE AGING SUMMARY

DATE: 01-Jan-80
PAGE 1

Supplemental Software Co.
INVENTORY ADJUSTMENT SUMMARY

DATE: 01-Jan-80
PAGE: 1

Supplemental Software Co.
CASH DISBURSEMENTS SUBSIDIARY LEDGER

DATE: 01-Jan-80
PAGE 1

Supplemental Software Co.
CASH RECEIPTS SUBSIDIARY LEDGER

DATE: 01-Jan-80
PAGE: 1

DEPOSIT DATE	DESCRIPTION	REF. NUMBER	DEPOSIT AMOUNT	DISTRIBUTION AMOUNT	ACCT NO
	balance fwd		0.00	0.00	
01-Feb-85	Deposit		2,893.94	2,687.12	1103
				197.15	4030
				9.67	6170
04-Feb-85	Deposit		4,815.05	4,815.05	1103
05-Feb-85	Deposit		12,407.96	12,407.96	1103

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Model HR-15XL
13 CPS
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Circle 808 on reader service card

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Circle 877 on reader service card

The Help Screen

PC World offers answers and advice at every level

This month, a tip for travelers as we examine the kind of transformer your personal computer needs to handle electric power abroad. By popular demand, we also take another look at 1-2-3 macros.

Karl Koessel

Foreign Powers

Q. *I recently moved from the United States to Belgium and lugged my Compaq portable with me. While still in the States I had purchased a surge protector and a few small electronic transformers so I'd be able to convert Belgium's 220 volts to the 110 the Compaq requires. I read "Foreign Frequency" in a previous column* [The Help Screen, PCW, *Vol. 2, No. 10*] *and understood that the 50-cycles-per-second power used in Europe (versus 60 Hz in the States) would not be a problem. I knew I might encounter some difficulty with the fan, which would run a bit slower and might not provide enough airflow to cool my computer properly. A precautionary call to Compaq in Houston convinced me that with no extra expansion boards generating heat, the machine would operate with 110-volt/50-Hz power.*

When I arrived I found that my transformers would not plug directly into the standard power outlet. After acquiring several plug adapters, I connected a transformer, plugged the surge protector into that, and, finally, plugged the Compaq into the surge protector. When I turned on the computer, its power supply blew a fuse. I found another fuse, but decided to test the voltage coming out of the transformer before reconnecting the computer. A voltage meter showed 110, so I plugged the computer in, flipped the On switch, and fried both the surge protector and the computer's power supply. A new 220-volt/50-Hz power supply is going to cost me $350 to install. What went wrong?

Eve Ingber
Brussels, Belgium

A. Your misfortune can be attributed to the small electronic tranformers that you bought in the United States and the deceptive voltage meter readings that they cause. Figure 1 contains graphs of alternating-current voltage levels for 110-volt/60-Hz power (blue), 220-volt/50-Hz power (green), and electronic transformer-generated power (red). The blue and green curves are simple; in the blue curve, the voltage level alternates–shifting from 0 to 110, moving back to 0, continuing down to −110, and then increasing to 0 again–60 times each second. The green curve follows a similar pattern, but changes amplitude by a factor of two (from 220 to −220 volts)–and alternates only 50 times per second.

The red curve illustrates the way in which transformers alter the flow of power. Such a transformer uses electronic components to cut each voltage pulse in half; that is, each pulse lasts only half as long as it would if the transformer were absent. The voltage pulses are not clipped at ±110; voltage still reaches a peak of ±220 volts 50 times per second. Note that in the shaded sections (the first positive pulse of each wave), the red shading covers half as much area as the green. Because your voltage meter calculates its AC readings based on the area under the pulse of a wave, it issued a reading of 110 volts.

Electronic transformers are fine for those appliances, such as irons and hair dryers, that merely need to transform the amount of elec-

(continues)

Attention. Awe

✓ **denotes IBM-AT compatibility.**

SOFTWARE

Aptec *(for color Dataproducts Printers)*
✓Rainbow Writer Color Text Formatter $119.
✓Rainbow Writer Screen Grabber ..... 69.

Ashton-Tate
✓dBase II 2.43 ..... call
✓dBase III 1.1 ..... call
✓Framework 1.1 ..... call

Best Programs
✓Personal Finance Programs 1.1 ..... 65.
✓PC/Professional Finance Program II 3.0 149.
✓PC/Fixed Asset System 3.0 ..... 329.
✓PC/Tax Cut *(for 1984 taxes)* ..... 129.
✓Personnel (Level 1) ..... 279.
✓Personnel (Level 2) ..... 419.
✓Personnel (Level 3) ..... 559.

Bible Research
✓THE WORD 1.0 *(KJV Bible - on disk)* 145.

Borland International
✓Sidekick 1.11C ..... 49.
✓Turbo Pascal 3.0 ..... 37.
✓Turbo Pascal 3.0 w/BCD ..... 59.
✓Turbo 8087 3.0 ..... 63.
✓Turbo 8087 3.0 w/BCD ..... 72.
✓Turbo Toolbox 1.0 ..... 30.
✓Graphics Toolbox 1.0 ..... 30.
✓Turbo Tutor 1.0 ..... 19.
✓Superkey 1.0 ..... 37.

Broderbund
✓Bank Street Writer ..... 49.

Continental
Home Accountant Plus 1.5C ..... 89.
The Tax Advantage *(for 1984 taxes)* .... 39.

Financier
✓Financier II 2.1 ..... 109.

FriendlySoft
✓FriendlyWriter 2.0 *(with FriendlySpeller)* 55.

Funk Software
✓Sideways 2.11 ..... 39.

Harvard Software
✓Harvard Project Manager 1.1 ..... 209.
✓Harvard Total Project Manager 1.0 .... 279.

Hayes
✓Smartcom II 2.1 ..... 89.

Lifetree
✓Volkswriter Deluxe 2.1 *(with TextMerge)* 159.
✓Volkswriter Scientific 1.0 ..... 289.

Living Videotext
✓ThinkTank 2.0 ..... see special

Lotus Development
✓1-2-3 1a ..... call
✓Symphony ..... call

Micro Data Base
✓Knowledgeman 1.07 ..... 249.

Micro Education (MECA)
✓Managing Your Money 1.52 ..... 105.
✓Running Program (Jim Fixx) ..... 49.

Micropro
✓WordStar 3.31 ..... 179.

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✓R:base 4000 1.15 ..... 259.
✓Extended Report Writer 1.2 ..... 85.
✓Clout 2.0 ..... 135.

Microsoft
✓Multiplan 1.2 ..... 125.
✓Microsoft Spell ..... 35.
✓Microsoft Word 2.0 ..... 239.
✓Microsoft Mouse with software ..... 135.
✓Microsoft Serial Mouse with software .. 135.
✓Microsoft Project 1.01 ..... 155.
✓Microsoft Chart 1.01 ..... 155.

Microstuf
✓Crosstalk XVI 3.5 ..... 99.
✓Infoscope 1.0 ..... 149.
✓Transporter 1.5 *(includes Crosstalk)* ... 169.

MultiMate International
✓MultiMate 3.3 ..... 259.

PCsoftware
✓PCcrayon II ..... 39.
✓Executive Picture Show ..... 139.
✓CREATABASE ..... 47.

Peter Norton
✓Norton Utilities 3.0 ..... 59.

Powerbase Systems
✓Powerbase 2.0 ..... call

Rosesoft
✓Prokey 4.0 ..... 89.

Satellite Software
✓WordPerfect 4.0 ..... 249.

Software Arts
✓TK!Solver 1.2 ..... 249.
✓Spotlight 1.1 ..... 99.
✓Visicalc ..... 99.

Software Group
✓Enable 1.1 ..... call

Software Publishing
✓PFS:Access C:00 ..... 84.
✓PFS:File B:01 ..... 84.
✓PFS:Graph B:01 ..... 84.
✓PFS:Plan A:01 ..... 84.
✓PFS:Proof B:00 ..... 59.
✓PFS:Report B:01 ..... 77.
✓PFS:Write B:01 ..... 84.

Virtual Combinatics
Micro Cookbook ..... 29.

Warner Software
✓The Desk Organizer 2.0 ..... 139.

Xanaro
✓Ability ..... 289.

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PC-DOS (2.1)
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✓Intro to the Operating System (PC Tutor) 39.

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✓Professor DOS ..... 47.
✓Tutorial Set *(both items above)* ..... 75.
✓Professor Pixel ..... 47.
✓Typing Instructor ..... 39.

Scarborough Systems
Master Type ..... 35.

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Diagnostic Test (PSAT) ..... 14.
OwlCat SAT *(15 hour)* ..... 63.
OwlCat SAT *(60 hour)* ..... 169.

FriendlySoft
✓FriendlyWare/PC Introductory Set ..... 35.

Spinnaker
Educational Games for Young Computer Users. *(All require graphics board)*
Delta Drawing *(ages 4 to adult)* ..... 34.

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✓Fraction Fever *(ages 7 to adult)* . . . . . 23.
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Rhymes and Riddles *(ages 5 to 9)* . . . . . 20.
Hey Diddle Diddle *(ages 3 to 10)* . . . . . 20.
✓Alphabet Zoo *(ages 3 to 8)* . . . . . 20.
Stone *(requires graphics board)*
My Letters,Numbers,Words *(ages 1 to 5)* 29.
Kids Stuff *(ages 3 to 8)* . . . . . 29.
Across the U.S.A. *(ages 5 and up)* . . . . . 22.

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Blue Chip
✓Millionaire . . . . . 39.
✓Tycoon . . . . . 39.
✓Baron . . . . . 39.
Broderbund
Lode Runner . . . . . 25.
FriendlySoft
✓FriendlyWare/PC Arcade . . . . . 35.
Hayden Software
✓Sargon III . . . . . 35.
Infocom *Difficulty levels shown in italics*
✓Seastalker *(junior)* . . . . . 25.
✓Enchanter *(standard)* . . . . . 25.
✓the Witness *(standard)* . . . . . 25.
✓Planetfall *(standard)* . . . . . 25.
✓Cutthroat *(standard)* . . . . . 25.
✓Hitchhiker's Guide *(standard)* . . . . . 25.
✓Zork I *(standard)* . . . . . 25.
✓Zork II *(advanced)* . . . . . 29.
✓Zork III *(advanced)* . . . . . 29.
✓Infidel *(advanced)* . . . . . 29.
✓Sorcerer *(advanced)* . . . . . 29.
✓Suspect *(advanced)* . . . . . 29.
✓Deadline *(expert)* . . . . . 33.
✓Starcross *(expert)* . . . . . 33.
✓Suspended *(expert)* . . . . . 33.
Invisiclues (hint booklets) are available for most Infocom games. Specify game . . . 7.
Microsoft
✓Flight Simulator . . . . . 35.
Origin Systems
✓Ultima III . . . . . 39.
PCSoftware
✓Armchair Quarterback . . . . . 27.
✓Chess 2001 . . . . . 27.
✓Championship Blackjack . . . . . 23.
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✓Trivia Fever . . . . . 23.
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✓Video 310A monitor *(amber)* . . . . . 179.
✓Color 600 - RGB monitor . . . . . 399.
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Plastic Keyboard & Drive Cover Set . . . . 17.
✓IBM Mono Screen Enhancement . . . . . 17.
✓Printer to IBM Cable *(specify printer)* . . . 27.
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Cuesta Systems
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✓PC Pedestal *(for IBM Mono or Color)* . . . 37.
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- Smartmodem 1200B *(w/Smartcom II)* .. 369.
- Smartmodem 2400 ..... call
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- *Compucable's Smartmodem-to-IBM Cable* ..... 25.

Hercules Computer
- Hercules Graphics Card *(parallel port)* 309.
- Hercules Color Card *(parallel port)* .... 169.
- Graph-X Software ..... 42.

IOMEGA
- Bernoulli Box 20 Meg ..... 2549.
- 10 Meg cartridge ..... 48.

Kensington Microware
- Masterpiece ..... see special

key tronic
Deluxe keyboard (KB 5151) ..... 169.

Kraft
- Joystick ..... 35.

Maynard Electronics
Floppy Drive Controller ..... 119.
Internal Hard Disk (10 Meg) with WS-1 Controller ..... 859.
Internal Hard Disk (10 Meg) with WS-2 Controller ..... 1049.

Mouse Systems
- PC Mouse (w/software, pad, & PC Paint) 139.

NEC
- Pinwriter P2-3 *(IBM, 80 column)* ..... 559.
- Pinwriter P3-3 *(IBM, 132 column)* ..... 759.
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All Orchid Boards come with PCnet Drive (Ram disk), PCnet spool (print spooling), disk caching & partitioning.
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- PC Net *(stand alone card)* ..... call

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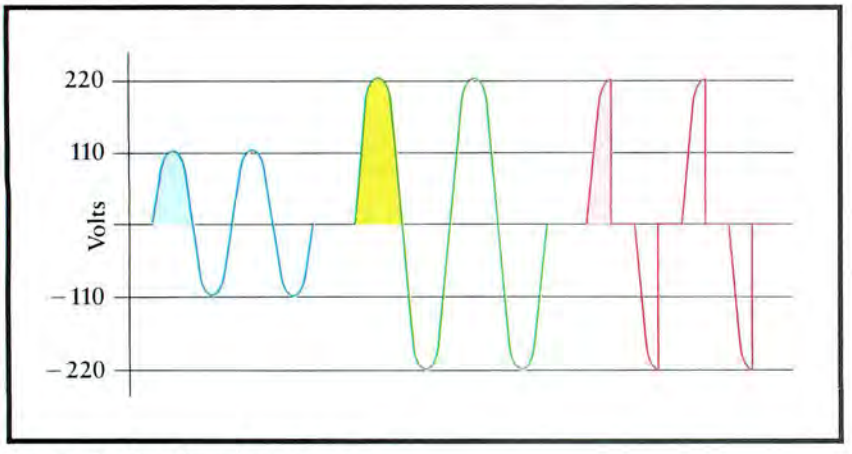

Figure 1: Graphs of alternating-current voltage levels for 110-volt/60-Hz power (blue), 220-volt/50-Hz power (green), and electronic transformer power (red)

tric *current*. The transformation works because the 220 voltage is "on" for half the normal amount of time. But the ±220 peak voltages that pass through electronic transformers will damage devices, such as surge protectors and computer power supplies, that are sensitive to actual voltage levels.

Computer hardware requires what is known as a step-down auto-transformer. Such a device uses coils of wire that ensure the voltage levels emitted are always half of those received. Step-down auto-transformers come in different sizes and can be be obtained at most electronics supply houses but unfortunately are very heavy–15 pounds and up–rendering the Compaq far less portable. The size you need will depend on the total wattage drawn by the computer and its peripherals. If you can't determine your needs or if you need larger sizes than are available locally, contact Todd Systems, a vendor of auto-transformers at 50 Ash St., Yonkers, NY 10701, 914/963-3400.

Those readers who haven't yet left for the Continent may want to consult "The Practical Portable," *PCW*, April 1985, and "Portables Abroad," *PCW*, Vol. 2, No. 2.

Macrophobia (or, Keep Those Cards and Letters Coming)

Reader response to "1-2-3 and the PC's Number Pad" in the March issue has been enormous, proving, perhaps, that *1-2-3* macros are a hot topic. Numerous correspondents noted that the <Shift> key causes the numeric keypad to alternate between its number and cursor functions. Many letters also suggested that in light of such a simple solution to Jim Hawkinson's problem of entering columns of figures into a *1-2-3* worksheet, my macro response revealed a penchant for "lengthy and difficult solutions to elementary problems." Or it did not "indicate a thorough knowledge of the product." Or it was "more complicated" than simply enlisting an idle left hand to work the <Shift> key.

True, the <Shift> key can be used instead of the <NumLock> key to access the nine numerals on the number pad (see "Number Pad vs. Cursor Keys," *The Help Screen*, *PCW*, Vol. 1, No. 7); however, the technique is inadequate for sessions that require quick entry of large amounts of numeric data. The macro solution is largely intended for those familiar with the number pad; these users tend to treat the left hand as a placeholder on the hard copy that contains the data bound for *1-2-3*. The macro solution also demonstrates that *1-2-3* macros need not be long or complex, are easy to implement, and, above all, needn't be feared as being beyond one's capability simply because they're called macros.

That said, it's true macros are not as easy to create and save with *1-2-3* as they are with some dedicated macro processing programs, such as *ProKey*. Maintaining a library of *1-2-3* macros, perhaps in a worksheet file called LIBRARY .WKS, is a good way to keep track of your finished products. And sensible organizational habits within the library file will help refresh your memory when you look up an old macro.

(continues)

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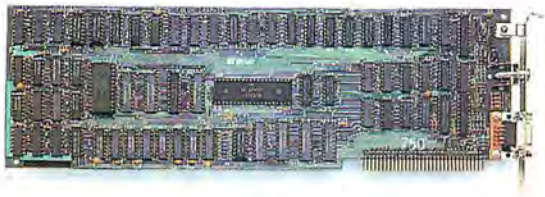

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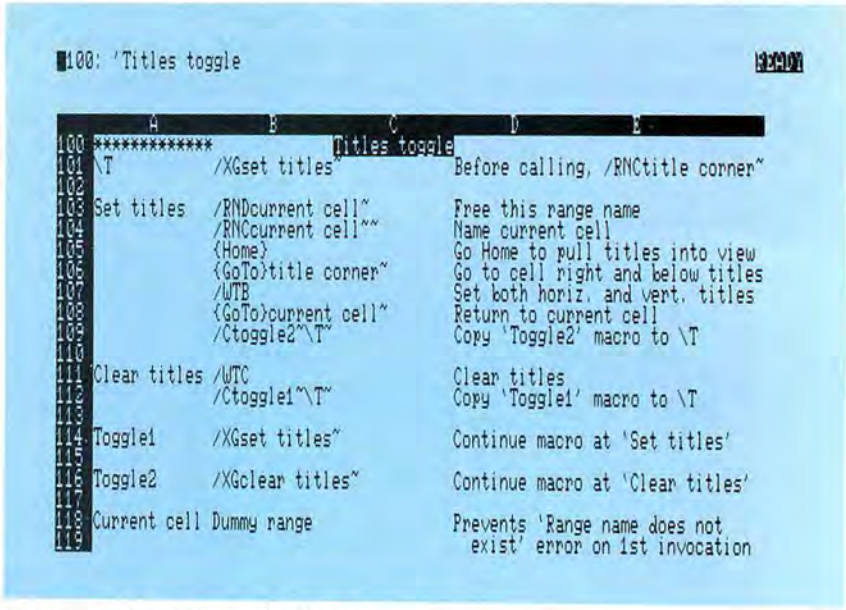

```
A100: 'Titles toggle                                          READY

     A            B                C                D            E
100 **********                    Titles toggle
101 \T           /XGset titles~                    Before calling, /RNCtitle corner~
102
103 Set titles   /RNDcurrent cell~                 Free this range name
104              /RNCcurrent cell~~                Name current cell
105              {Home}                            Go Home to pull titles into view
106              {GoTo}title corner~               Go to cell right and below titles
107              /WTB                              Set both horiz. and vert. titles
108              {GoTo}current cell~               Return to current cell
109              /Ctoggle2~\T~                     Copy 'Toggle2' macro to \T
110
111 Clear titles /WTC                              Clear titles
112              /Ctoggle1~\T~                     Copy 'Toggle1' macro to \T
113
114 Toggle1     /XGset titles~                    Continue macro at 'Set titles'
115
116 Toggle2     /XGclear titles~                  Continue macro at 'Clear titles'
117
118 Current cell Dummy range                       Prevents 'Range name does not
119                                                  exist' error on 1st invocation
```

Screen 1: A portion of a 1-2-3 macro library file showing the definition for <Alt>-T. Each label in column A is the range name for the cell to its right. Each line of the macro (column B) is explained in column D.

Screen 1 shows a portion of such a file. This segment contains the definition for <Alt>-T, a macro that automates setting and clearing worksheet titles (*/Worksheet Titles Set* and */Worksheet Titles Clear*). For purposes of legibility, the worksheet has been set to a global column width of 13, using */Worksheet Global Column-width 13*. A cell filled with asterisks (cell A100 in Screen 1) separates each macro in the library file and clearly distinguishes the beginning and the end of each macro. On this line in column C is a name describing the macro. Below the first line, column A contains labels; column B, macro routines; and column D, comments describing the actions that the macro routines produce. The <Alt>-T macro contains several routines; a blank line marks the beginning and end of each routine.

In some instances, macros may be invoked only after certain conditions have been met. The macro in "1-2-3 and the PC's Number Pad" requires that the pointer be positioned at the first cell to receive data before the macro can begin its work. For the <Alt>-T macro, the cell to the right of and below the columns and rows containing the worksheet's titles must be given the range name Title Corner before the macro is invoked. It's a good idea to keep a reminder of such prerequisites at the top of the macro's comment column (see cell D101).

(continues)

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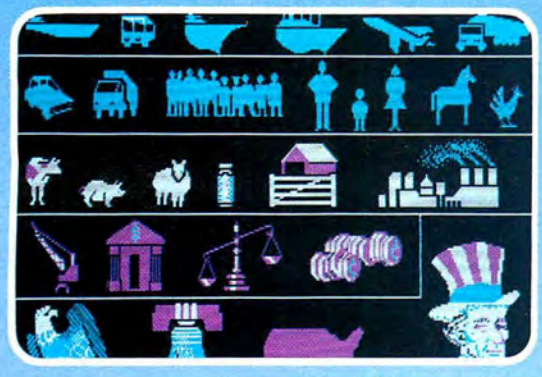

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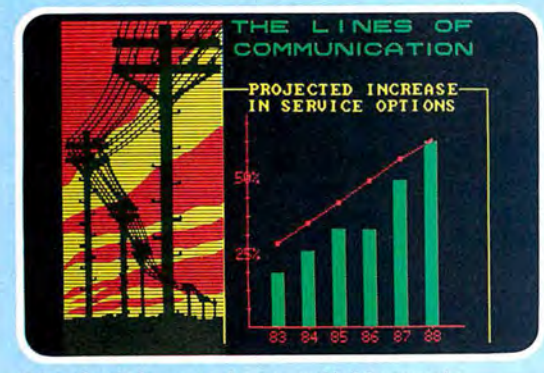

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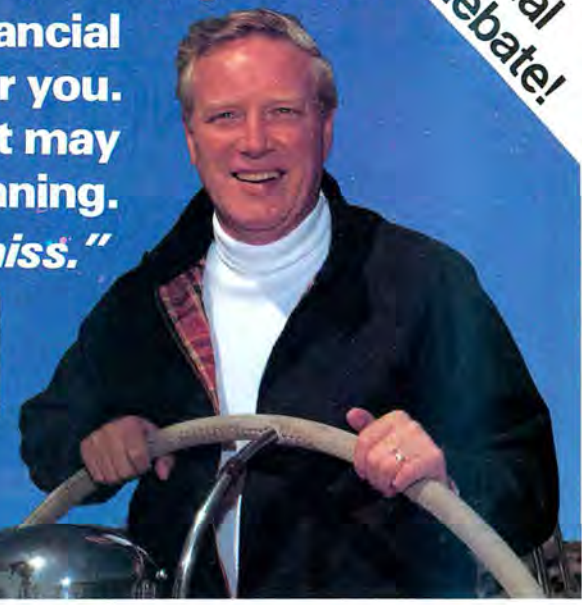

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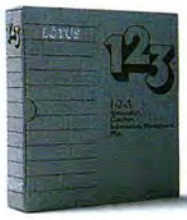

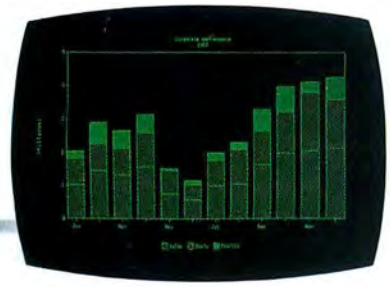

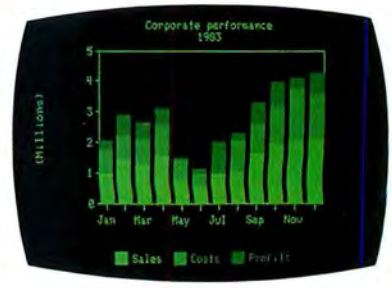

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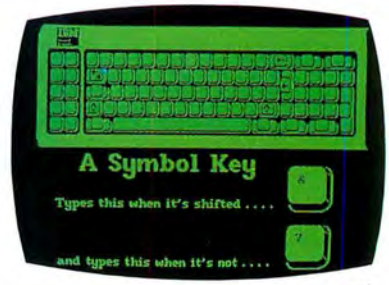

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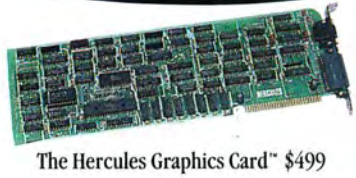

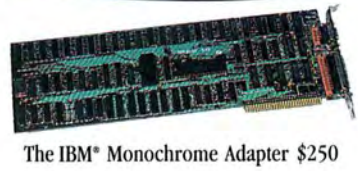

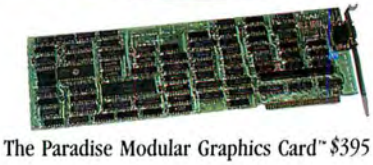

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Because the action of a macro generally proceeds downward until it reaches a nonlabel (empty, numeric, or formula) cell, assigning a range name to the first cell of each routine enables such a name to direct the flow of the macro to various routines. In the <Alt>-T macro each label in column A is the range name for the cell to its right. You can assign the names all at once by going to cell A101: press **< F5 >** (the {GoTo} key), type **A101**, and press **< Enter >**. Then invoke the */Range Name Labels Right* sequence, hold down the **< CursorDown >** key until the range A101..A118 is marked, and press **< Enter >**.

The <Alt>-T macro is a "toggling" macro, which means that each time it is invoked, it alternates, or toggles, between functions. In this case, when invoked for the first time, it sets titles; when it is invoked again, it clears titles. Toggling macros can be quite handy but should be implemented with care because they modify themselves (that is, they write to the worksheet) in order to switch functions.

You can keep toggling macros simple by following the general format illustrated in Screen 1. The two functions between which the macro alternates are kept as separate routines, each with a label to the left of the first cell of the routine. Below these labels and their associated functions are two single-line macro commands and

(continues)

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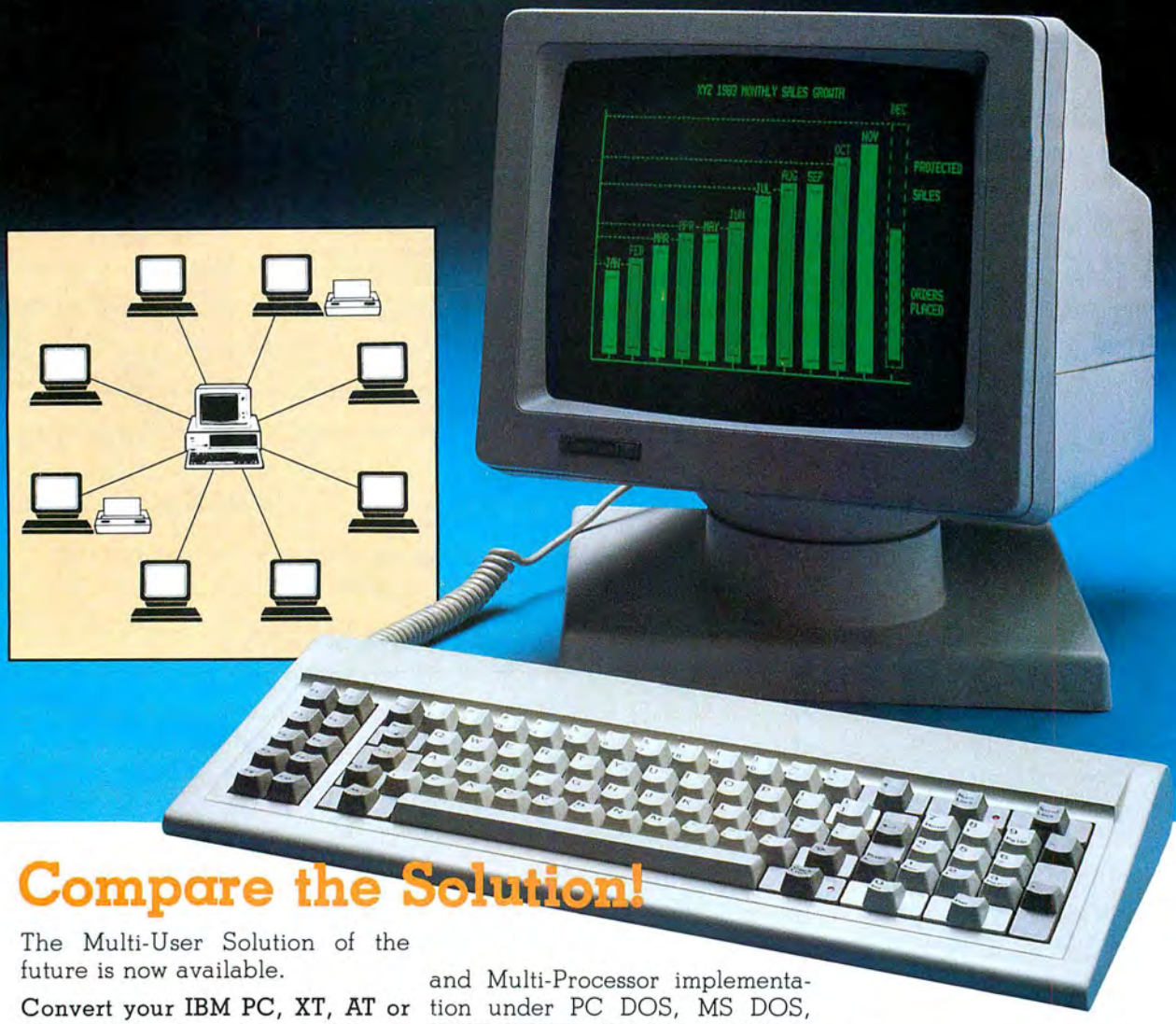

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their labels. Both these single-line commands are /XG*range*~. In one of the single-line commands, *range* is the label for the first function (Set Titles); in the other single-line command, it's the label for the second function (Clear Titles).

Because column B ranges have previously been named using the labels in column A, you can refer to ranges by their range names. Accordingly, when <Alt>-T is invoked, control passes to the macro command in the cell to the right of the label \T. This cell contains a copy of one of the single-line commands, in this case /XGset titles~. This command tells *1-2-3* to continue macro processing at the first cell in the range named Set Titles. The last line of the Set Titles routine, /Ctoggle2~\T~, tells *1-2-3* to copy the range named Toggle2 (the other single-line command) to the range named \T, overwriting the contents of that cell. When <Alt>-T is invoked again, its first command will be /XGclear titles~, which tells *1-2-3* to continue macro processing at the first cell in the range named Clear Titles. That routine ends by copying the range named Toggle1 (the first single-line command) to the range named \T. The <Alt>-T macro has now been toggled twice and is back to its original mode.

(continues)

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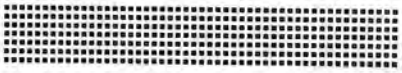

The <Alt>-T macro illustration makes use of two additional techniques. First, macros should always delete a range name before reassigning the name to another range. In the Set Titles routine, the first line invokes a */Range Name Delete* sequence, freeing the range name Current Cell before the second line assigns that name to the cell the pointer currently occupies. Simply reassigning a range name will not suffice; doing so will erroneously alter formulas dependent upon that range name. In addition, you should assign a dummy range to range names the macro will be using. This precludes the 'Range name does not exist' error when the macro tries to delete a range name. Such an error would halt the macro before its work was done.

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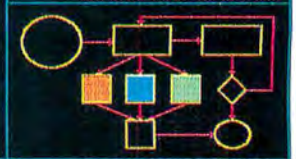

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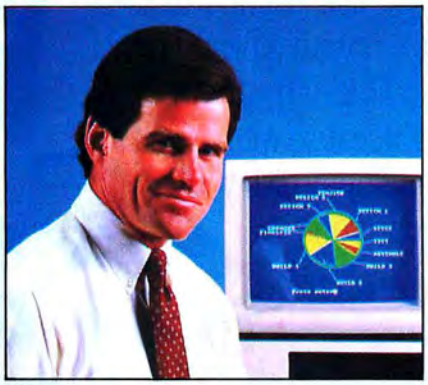

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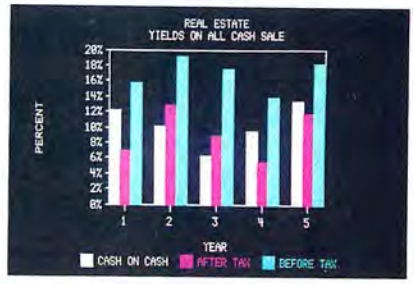

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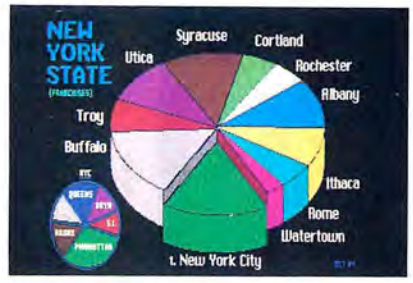

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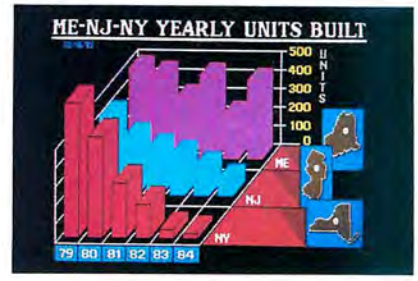

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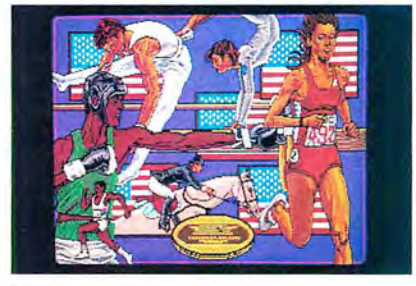

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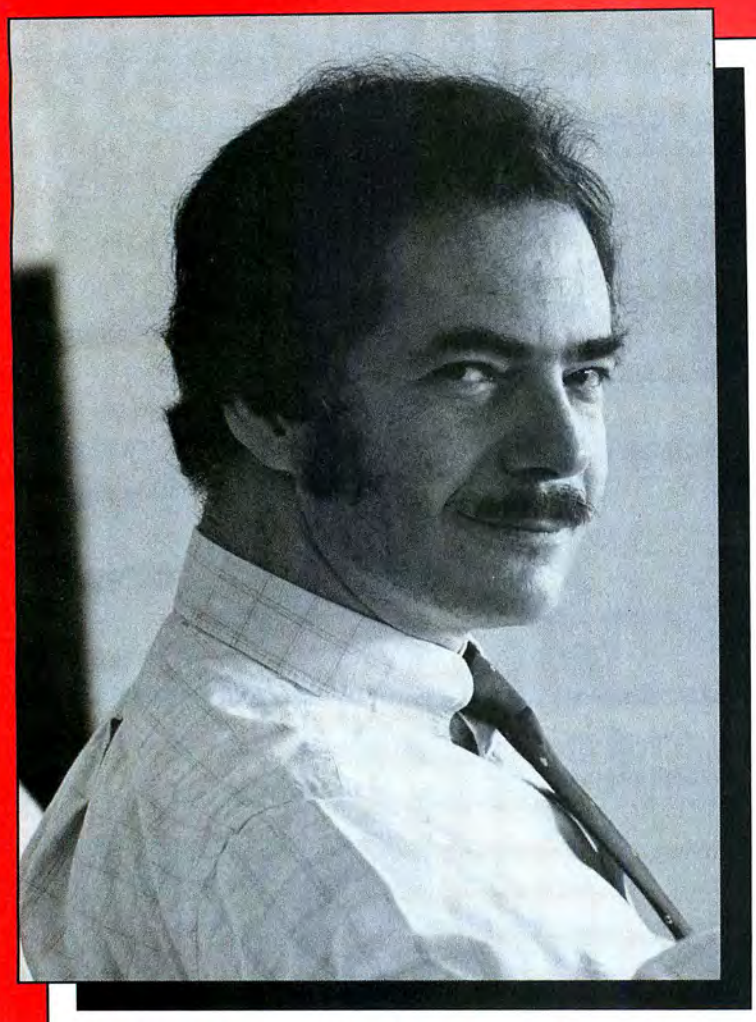

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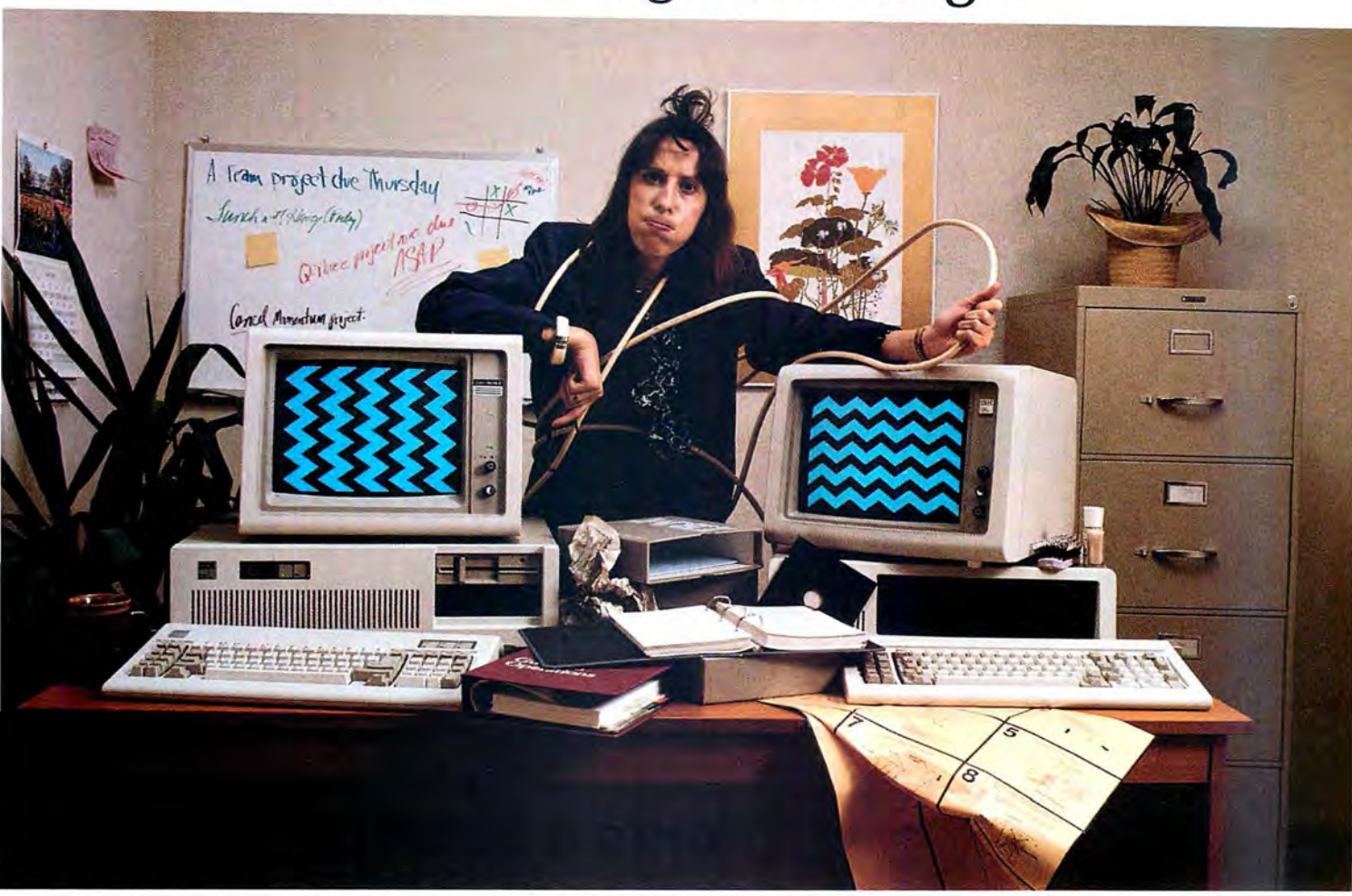

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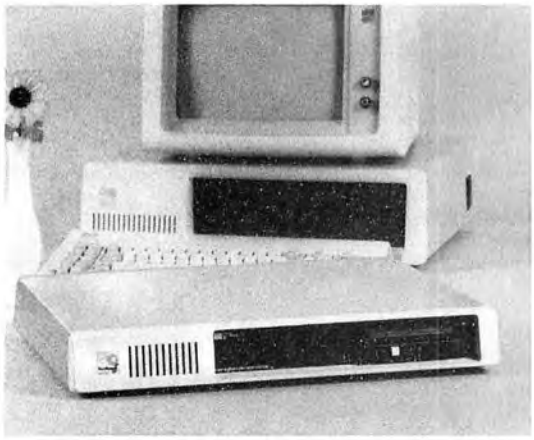

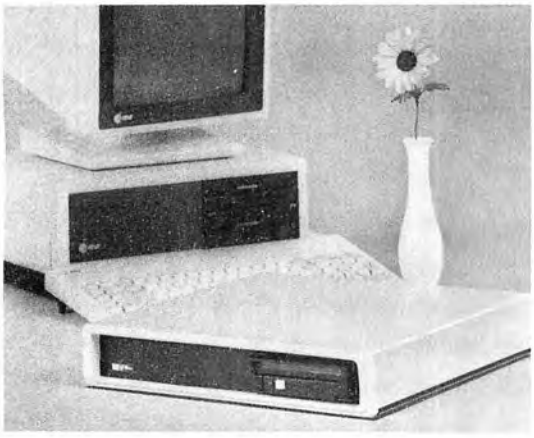

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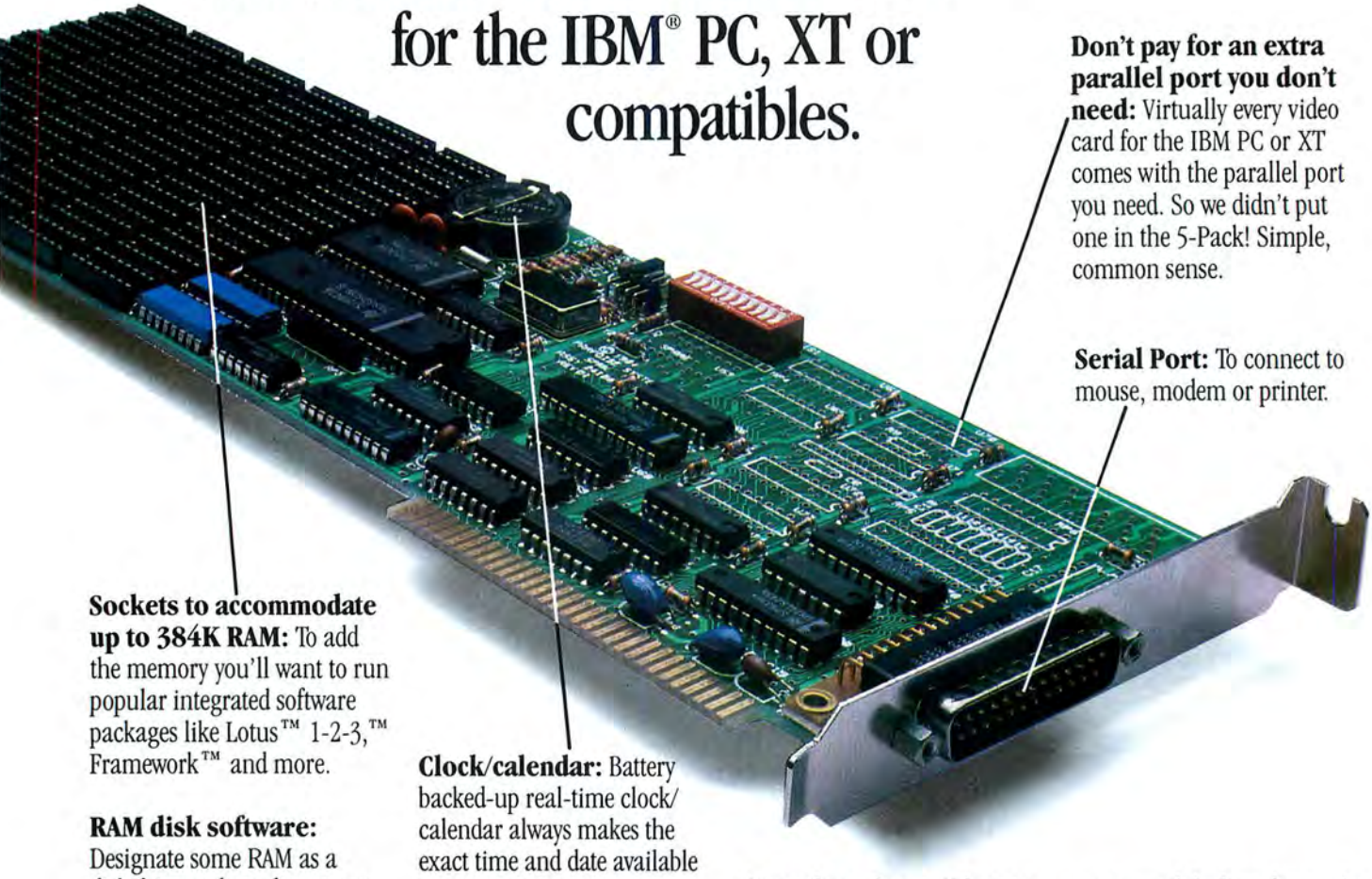

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From the Software Shelf

PC World editors offer first impressions of recent software releases

This month's Software Shelf is packed with possibilities for those who wish to avoid phones, pit their musical wits against the PC, mass-mail for less, or simply gaze at the stars.

Edited by Robert Luhn

Instant Mail Manager and EasyLink

The game of telephone tag took on a new twist when AT&T was deregulated and forced to open its lines and equipment to competitors. Hundreds of companies plunged into the communications market, selling everything from cheaper long distance to phone-on-a-rope. But with diversity comes chaos, for you never know what the gods of laissez-faire communications have in store for you. One call may be static-free, while another may sound like a B-17 wandered into your ear. Of course, there is a saving grace to the whole phone muddle—my phone bills are low because everyone calls me back.

Still, there is a way to communicate directly and effectively without having to shout above the artificial din of an AT&T-induced static storm: use a modem. One of the better ways to tread this electronic road is with *Instant Mail Manager (IMM),* an electronic mail service program from Western Union. *IMM* is more than a mere telecommunications program; it's also a word processor, an address and file manager, and via Western Union's EasyLink OnLine Services, an electronic courier. Although *IMM* won't advance the frontiers of integrated software, with one disk and one set of commands, you can perform a small repertoire. You can update, print, view, or delete files from *IMM;* create and edit addresses with the Address List function; and write a letter off line, then go on line with a single keystroke and send your message via EasyLink's electronic mail service.

To install *IMM,* select System Setup from the main menu and answer the on-screen questionnaire. You can alter display colors, set margins and column widths, assign default drives, and store all the instructions needed to automate going on line with 15 different host connections. With your investment in *IMM* comes access to EasyLink OnLine Services (mail) and FYI News Retrieval (news and information).

Setting up on-line instructions initially takes a little work. You must complete a parameter log-on sheet for each system or on-line service you want to access. Once you have stored the instructions, typing a few keystrokes directs *IMM* to automatically dial the proper number, enter your user ID and password, and answer up to six on-line prompts. If the intended recipient happens to be in your address file and is an EasyLink OnLine Service subscriber, leaving a message in his or her in-box is a matter of entering the on-line mode and supplying the name of the file you want to send and the recipient's name. *IMM* does the rest. The program also supports unattended operations, which can be programmed to send electronic mail during off-peak hours.

If you must communicate with a PC-less party (or someone who is not a Western Union subscriber), Western Union will print your message at one of 30 nationwide offices and have it delivered almost anywhere in the world in the form of a telegram, a Mailgram, a cablegram, or a computer letter by DHL Worldwide Express. DHL rates are competitive, and both 2-hour and overnight delivery are available.

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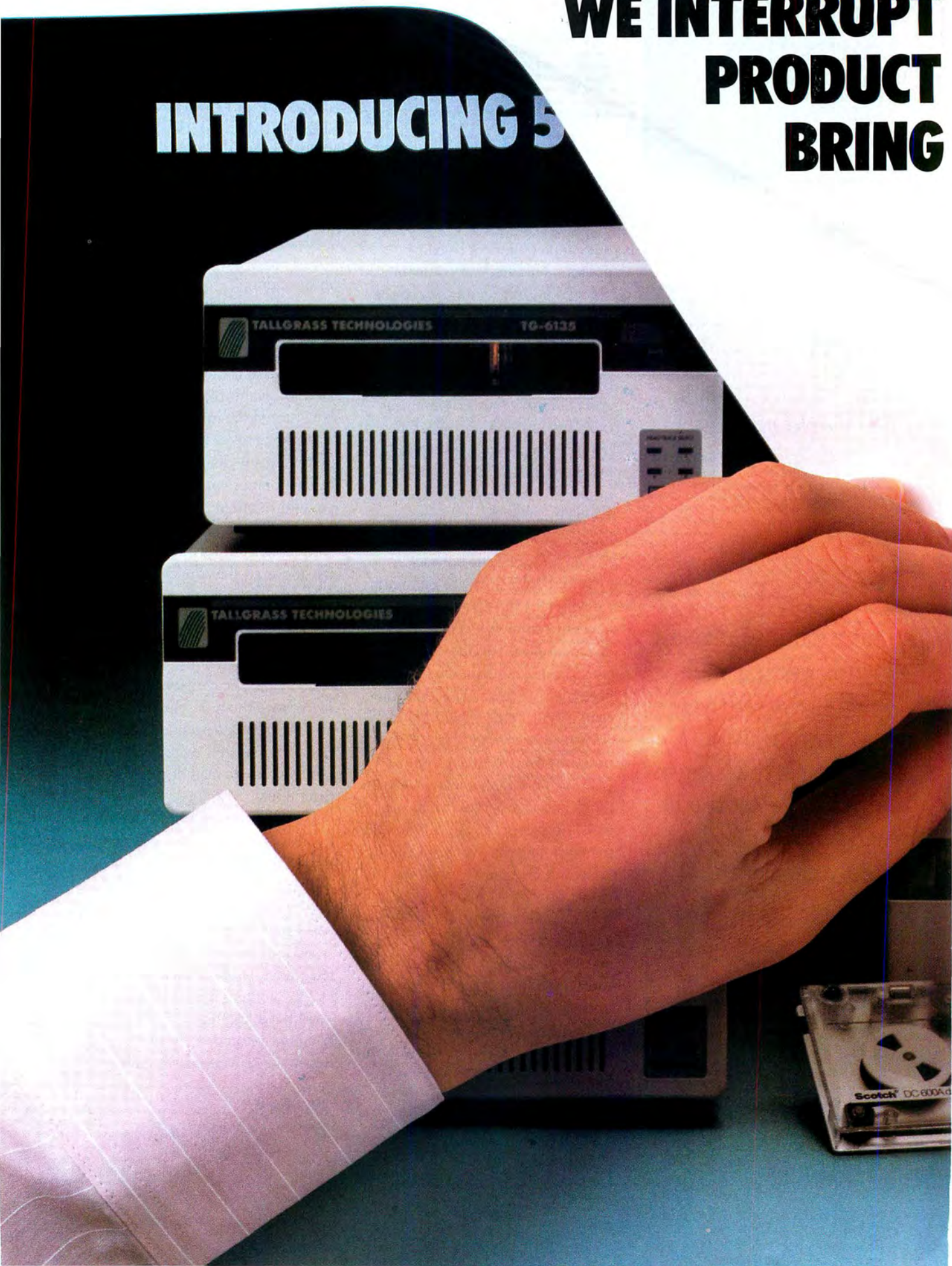


THIS MAJOR INTRODUCTION TO YOU SOMETHING REALLY IMPORTANT.

THE BIG NEWS IN DISK/TAPE IS PC/T, A SENSIBLE NEW APPROACH TO ARCHIVAL STORAGE.

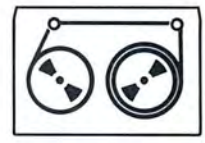
We've tamed tape. And made it docile. By making it DOS-like.

So, while this started as an ad for our five new HardFile™ subsystems, which deliver 25 to 80 megabytes of hard disk storage and 60 megabytes of tape backup, instead we want to introduce you to PC/T.™

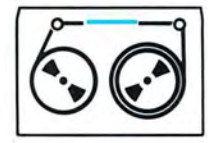
PC/T is a new format that makes tape a more sensible storage solution for personal computers. It puts tape on line, in real time, for instant access. And frees your hard disk for your most current data.

You already know how to use PC/T. Because it responds to standard DOS commands.

Here's the big news: just like any DOS-controlled hard or floppy disk, PC/T enables you to create directories and files on tape. Then you can call up the exact file you need, and change a portion of the tape without having to erase and overwrite the entire cartridge.



Without PC/T, you have to rewrite the entire 60 MB cartridge each time you make a single change.



With PC/T, you create and directly access files on tape, just like with floppy or hard disk.

PC/T formats each new tape cartridge, just like you format any hard or floppy disk, locking out bad blocks to assure that every bit of data you write to tape is recorded with utter accuracy.

What's more, PC/T gives tape true error correction capability. 50% redundancy during write operations ensures 100% reconstruction of data lost because of operator error, dust and dirt, or everyday wear and tear.

There is a catch. You can get your hands on PC/T just one way: Buy one of our powerful new HardFile subsystems. With disk plus tape. Or tape alone. Which brings us back to where we started. And gives you a place to start. Just call 1-800-228-DISK for the Tallgrass dealer nearest you.

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The next time I flew they had repaired the Sears Tower. My next stop? The World Trade Center.

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The *IMM* word processor is definitely the pearl in this packed oyster. The program is RAM-based (read fast), produces standard ASCII files, and offers a full complement of text editing features from block move to search and replace functions. The program also borrows *WordStar*'s famous cursor control diamond. A status line at the bottom of the screen indicates printing and display widths and keeps a running count of characters in a document–a convenient way of determining the cost of telecommunicating a file, since Easylink and other on-line services charge per character transmitted. You can determine the cost of sending a message via EasyLink by typing */help* during a session–and the price is right: transmitting a 100-character message at 300 bps during peak hours costs only 35 cents.

Should you buy *IMM?* When I realized I could "call" in sick to work faster and get to the beach sooner, I was charmed. When I found that *IMM*'s word processor could also handle its own address list, my doubts subsided. When I discovered *EasyLink*'s price tag, I was sold. And so will you be.
–Cindy Hamburger

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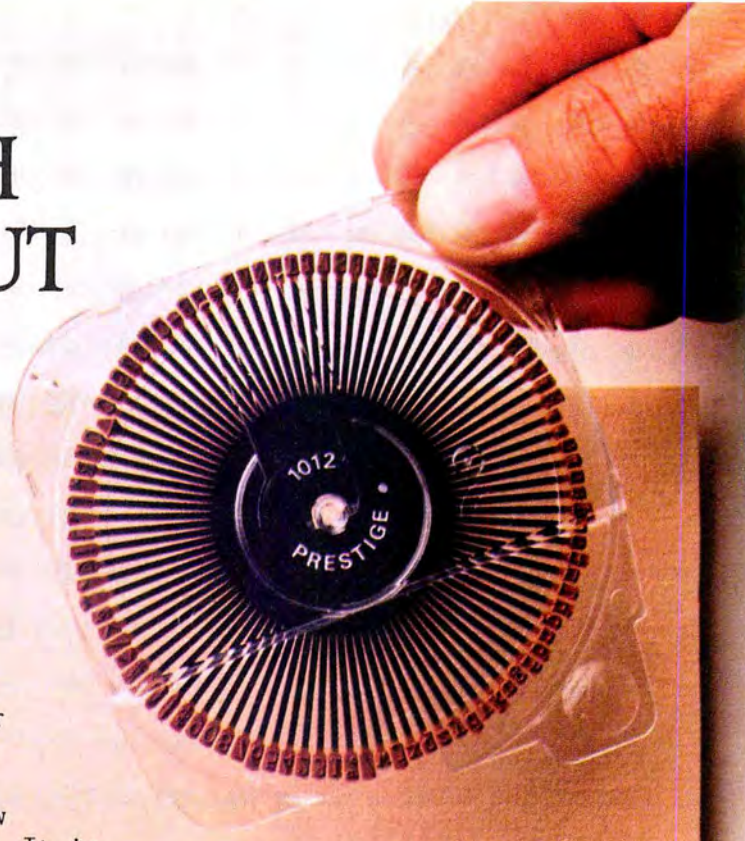

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Best of all, the DaisyWheel 36 comes from a company with a most impressive name: Datasouth--the name that means high performance.

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Tune Trivia

Press a key, and the tonic strains of "Close to You" fill the room. Co-workers peer over partitions. The PC has no volume control. The song lasts only 20 seconds, but by the last measure three fellow editors crowd into my cubicle, trying to find out what *that* was all about. No problem! Up to six music lovers can play *Tune Trivia* at one time.

Tune Trivia is the PC equivalent of the television game show "Name That Tune," in which contestants listen to snatches of music and try to identify each tune as quickly as possible. The software is a combination of computer-generated tunes, music trivia questions, and a song generator that lets you enter and play your own melodies.

Tune Trivia offers four game variations. You choose which version to play and the number of questions per contest by answering a few prompts. If you need any help (which is unlikely), a 17-page manual offers ample instruction.

In the basic version of *Tune Trivia*, the PC plays a melody for 20 seconds. As soon as you think you've identified the song, pressing any key stops the music–and the sooner the better, because you gain as many points as there are seconds remaining on the clock. Then you type in your answer.

In the strategy version, you decide how many seconds you need to identify a song. Unlike "Name That Tune," *Tune Trivia* gives no hints about the upcoming song before you ante up. Bravado is re-

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warded, however, because the shorter the time you choose, the more points a correct answer is worth.

Group or simultaneous play assigns each player a unique key on the keyboard. Whoever hits his or her key first gets to name the tune. If the first player is wrong, the song is repeated for the other contestants. All three versions give you the option of answering trivia questions for bonus points. The fourth version of the game is dedicated solely to such questions.

The tunes—some 200 or so—are culled from folk, rock, and classical melodies from the late nineteenth century to the present. Some are pretty tricky, and, as the manual admits, "The IBM sound system makes some songs sound slightly mechanical." The manual continues, "Great care has been taken to make them [the tunes] as smooth-sounding and as recognizable as possible." The designers have succeeded fairly well, but the PC is no Moog.

The trivia questions themselves are challenging and often interesting. Here are a couple for free: Who wrote Johnny Carson's "Tonight Show" theme song? (Paul Anka.) Who gave up his seat on the flight that took the lives of Buddy Holly, Ritchie Valens, and the Big Bopper? (Waylon Jennings.)

Tune Trivia can be callous at times. Once I feverishly typed *I've been workin' on the railroad* for a sure 17.32 points and was met with the synthesized raspberry that greets wrong answers. 'Sorry, Darcy', the program flashed on the screen, 'you're wrong. The correct

(continues)

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Circle 120 on reader service card

title is "I'VE BEEN WORKING ON THE RAILROAD."' Sometimes the program is quite open-minded and, for example, will accept *Daisy* when the correct answer is *Bicycle Built for Two*. 'Close enough', it concedes. Luckily, *Tune Trivia*'s designers have taken pity on frustrated or nit-picking contestants. Any time you disagree with a judgment, you can override the computer with <Esc>—with the consent of the other players, naturally.

If you play *Tune Trivia* often enough to tire of its preprogrammed songs and questions, your recourse is the program's maintenance module. Anyone who understands BASIC's PLAY statement can add songs using a preprogrammed form. (If you are unfamiliar with the PLAY statement but can read music, with the aid of your BASIC manual you can learn to input songs in a matter of minutes.) The package even comes with a *Superstar Songbook*, which includes such musical favorites as "Afternoon Delight" and "Laughter in the Rain." Those with different musical tastes can order other songbooks from the publisher. *–Darcy DiNucci*

Tune Trivia
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(continues)

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PostWare, Version 1.20

Nobody likes paying Uncle Sam an unnecessary nickel; this notion holds especially true for small businesses and nonprofit organizations that depend on bulk mailings to advertise their wares and work. When the U.S. Postal Service (USPS) increased postal rates on February 17, 1985, it fortunately preserved discounts for first- and third-class bulk mail presorted by zip code and, for even lower rates, by carrier route number. The USPS assigns the latter number to each mail delivery route within a zip code area.

PostWare, from PostalSoft, is not something you don after an intimate tête-à-tête. Rather, it's the first PC program that lets small-volume bulk mailers automatically assign carrier route numbers to mail addresses stored in certain data base programs, such as *dBASE II;* presort the addresses by zip code and carrier route; and print labels in the presorted order. It's one more way to beat Uncle Sam–and it's legal.

Presorting can save substantial sums on large mailings. First-class postage is normally 22 cents for the first ounce, but when mail is presorted by zip code and carrier route, that rate drops to 18 and 17 cents, respectively. Corresponding third-class rates are 12.5 cents, 10.1 cents, and 8.3 cents.

Of course, the cheaper price is not without its catch: you must ship a minimum number of pieces of each class per mailing. But don't worry about having to decipher the

(continues)

What every IBM PC user should ask before buying the "Sider" 10 MB hard disk:

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What's more, a small "footprint" lets you incorporate the compact Sider into your existing computer set-up with ease.

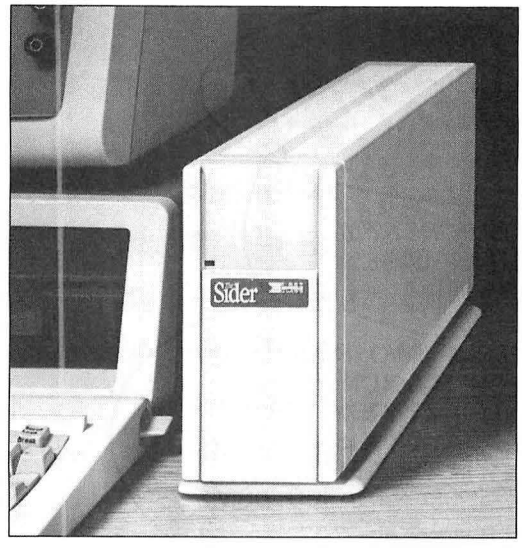
In addition, with the Sider, you not only pay far less for the subsystem, you also save money on installation. Because, unlike other 10 MB systems that require the purchase of expensive "extras," the Sider is *plug and play*. Everything you need is provided, including cables, host adaptor, installation software and manual.

What makes it so reliable?

To start, the Sider is manufactured, and sold exclusively, by First Class Peripherals, an innovative computer company which is backed by Xebec. The computer industry's leading manufacturer of disk controllers, Xebec has over a decade of experience serving customers like IBM, Toshiba, Texas Instruments and Hewlett Packard. It's this kind of expertise that helps assure the Sider's performance.

Special design features further enhance reliability. The Sider's controller is the field-proven, industry standard Xebec S1410A. And Xebec's 3200 drive tester, the toughest in the industry, ensures error-free media to keep the Sider operating reliably,

*Must contain hard disk ROM.



"Only $795?"

longer. A self-contained power supply also adds to dependability by eliminating the risk of heat build-up that could cut PC component life. One more assurance of the $795 Sider's quality: it's UL Approved and FCC Class B rated.

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You pay less for the Sider than for other 10 MB hard disks simply because you're paying for the superior quality components inside the unit, not for a lot of retail overhead costs. Since First Class Peripherals sells direct, you avoid dealer and distribution expenses, and pay only for the product.

What about a guarantee?

Like many experienced PC users, you may be reluctant to buy a hard disk priced at only $795 without first seeing for yourself how it performs. That's why First Class Peripherals offers you a reassuring, money-back guarantee that eliminates any risk on your part. Simply order the Sider and use it for 15 days. Then, if you're not entirely satisfied, return it and receive a full refund—no questions asked.

The Sider also comes with a full one-year limited warranty. Plus, there's a convenient, toll-free hotline you can call anytime you have a technical or service question, or need help.

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To receive the Sider 10 megabyte Winchester hard disk subsystem for only $795, simply order using the coupon below. For faster service, order by phone and charge to your VISA, MasterCard or American Express. (You can also call us if you have any questions or technical concerns about the Sider. We'll see you get the help you need.) Call toll-free:

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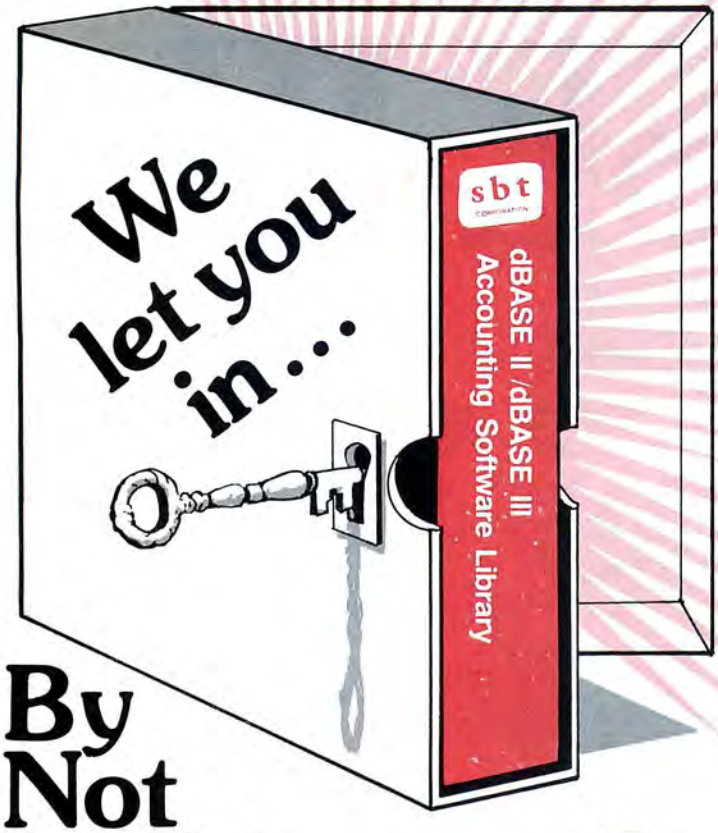

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Circle 431 on reader service card

USPS's eligibility rules on your own. Before you purchase *PostWare,* the PostalSoft staff will tell you whether your business mailings qualify. Generally speaking, organizations that send large mailings to a small, unvarying group of zip codes are eligible for the carrier route presort discount.

The *PostWare* package consists of two programs, which can be purchased separately: the *PostWare Presort Program* (for sorting addresses by zip code only) and the *PostWare Carrier Route Utility* (for sorting by carrier route). The latter program supplies carrier route numbers for up to five zip codes of your choosing; each additional zip code costs $5. Because the USPS changes carrier routes twice a year, *PostWare* supplies a free one-year subscription to updates. Subscription renewal costs $45 annually. One major drawback: Postage costs are not computed automatically by *PostWare;* you must calculate them by multiplying the rates for each sort level by the respective number of mail pieces.

PostWare's main menu lists four program functions: Carrier Route Utility, Label Format Utility, First-Class Mail Processing, and Third-Class Mail Processing. The program prompts you through each function with easy-to-follow menus.

The Carrier Route Utility enables you to sort routes for multiple zip codes simultaneously, print lists of street addresses for each route, and, most important, assign carrier routes to each mail address in the data base you are using. Another option detects errors, such as mis-

(continues)

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PC Magazine *February 19, 1985*

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IBM PC Update
December, 1984

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Software Digest Ratings Newsletter
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December, 1984

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Popular Computing
March, 1985, Paul Goldner, Raymond Hood, Yoram Lirtzman, Michael Wilding

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March, 1985

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January, 1985

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Computer Buyer's Guide and Handbook
November, 1984

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- Data transfer facility–beyond "cut and paste"–lets you transfer specific data from one module to another, linking files across all applications. For example: a field in a DBMS record can contain the name of a spreadsheet, a word processing document or selected records from another database. When viewing that record, Enable will automatically display the other "linked" file.
- User-designed menu generation–tailor Enable to your specific needs with your own unique menus, help and error messages, pop-up windows, and full choice of colors.
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Spreadsheet

- User configurable–choose among 6 varied shapes from 255 rows × 255 columns to 4095 rows × 15 columns.
- 1-2-3 macro support–automatically convert your existing Lotus macros or create your own Enable spreadsheet macros with all the same macro commands you used in 1-2-3.
- Greatly increased Lotus file conversion (twenty times faster!).

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- Comprehensive file maintenance capabilities–verify, copy, update and merge functions.
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Telecommunications

- Terminal emulation (VT-100 and other popular models).

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- Increased printer and plotter support (twice as many leading models).

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Circle 767 on reader service card

spelled street names or nonexistent addresses, that must be corrected before *PostWare* can assign a route number.

The Label Format Utility lets you design new label formats by defining 11 factors such as label height and number of labels to be printed across the paper. Current criteria can be displayed and deleted, and new formats can be saved.

Once you assign carrier route numbers and choose label formats, you can sort the address files created by your data base program. The first- and third-class mail processing functions combine up to 20 data base address files into one bulk mailing, presorting the addresses first by zip code and then by carrier route. You can then print a report that summarizes the total number of pieces in each mailing by group number (one number for each carrier route).

This report also notes how many pieces are being mailed, by state, zip code, and carrier route number; tells you whether the mailing meets the required number of pieces; supplies the necessary figures for USPS forms; and provides an interesting demographic breakdown of addressees by zip code.

To print the presorted addresses, you can either use *PostWare*'s label-generating program (which uses the presorted addresses in the work file created from the data base) or pass the work file in ASCII format to *WordStar*'s *MailMerge* or any word processing program that accepts ASCII files.

Installing *PostWare* takes about 5 minutes using the menu-driven PINSTALL program. However, before you can start using *PostWare* you must overcome one significant obstacle.

Although the program is compatible with *dBASE II* and *III, Friday, PC File,* and *T.I.M. III* and *IV,* the type, value, and length of fields in a record must conform to *PostWare*'s specifications. If you haven't already set up your data base, there's no problem. If you are already using *dBASE II* or *III,* you

Last year the experts tested the top-of-the-line Toshiba 3-in-One™ printer. Here's what they said.

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(Bill Machrone is the editor of PC Magazine.)

PC Magazine
November 27, 1984

"It is setting new standards for quality and performance in the dot matrix arena."

Computers & Electronics Magazine
November 1984

Circle 285 on reader service card

may bump up against *PostWare*'s peculiarities. For example, *PostWare* requires that city, state, and zip code reside in separate fields. The solution is to either write a command file that restructures the fields as necessary or obtain a program from PostalSoft. Since PostalSoft has received few requests for such a program, the manufacturer will discuss the price on a case-by-case basis. If you use data base programs that lack internal programming languages, you may have to resort to writing a BASIC program or modifying fields one by one.

PostWare is a practical program that can save you money as long as you meet minimum bulk mail requirements and are willing to rearrange your data base. If you want to test-drive the program, you can purchase a demo disk with built-in data base files from PostalSoft for $32. *PostWare* is worth checking out, particularly if you work in a small business or a nonprofit organization where every nickel (and every 22-cent stamp) counts.
—*Christine Whyte*

The PostWare First and Third Class Bulk Mailing System, version 1.20
PostalSoft, Inc.
2115 Sunrise Dr.
La Crosse, WI 54601
608/788-8011

List price: $395, Presort program $195, Carrier Route utility $200, demo disk $32
Requirements: 192K, two disk drives

TellStar Level II

I've been a stargazer for most of my life. After all, what's more soothing than looking at the sky on a clear, crisp December evening? On such a night you can almost forget your problems as you try to

(continues)

"Imagine what they will say about its successor."

The New Toshiba P351 3-in-One printer. They could say that inside the sleek new Toshiba P351 you'll find the ultimate 3-in-One printer. Because it offers a combination of:

Letter-quality printing. Perfectly translated graphics. And speed. (100 cps letter. And draft speed improved to 288 cps.)

They could say you'll appreciate the 24-pin dot matrix head that gives the P351 its exemplary letter and graphic quality.

They could say the new P351 gives you an almost unlimited number of ways to express yourself. With both downloadable software fonts and new plug-in font cartridges.

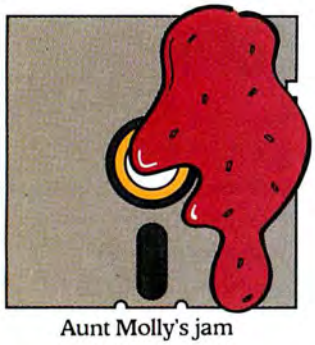
And they could say the new P351 is not only the best looking printer in the $1,000 to $2,000 range. But also the most reliable.

Of course, we're not putting words in their mouths. Just the ultimate 3-in-One printer in their hands. And yours.

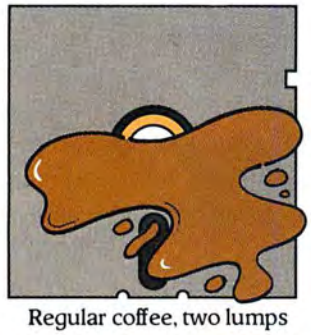
For complete information call 1-800-457-7777, Operator 32.

In Touch with Tomorrow
TOSHIBA
TOSHIBA AMERICA, INC. Information Systems Division

Give us your staine your filthy dirty,



Aunt Molly's jam

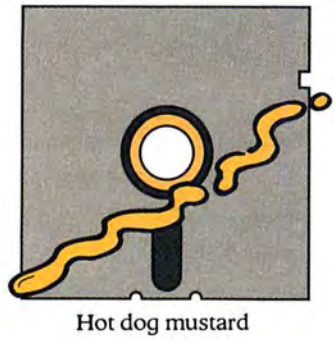


Regular coffee, two lumps

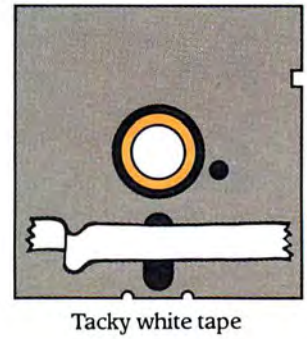
Clouds of smoke

Maria's liquid cover

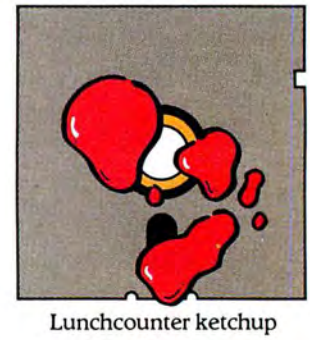
The big chill



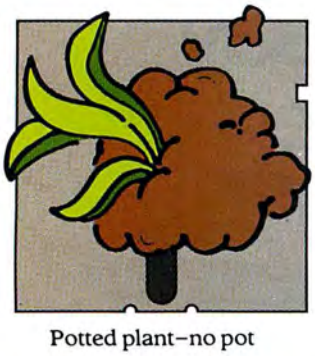
Hot dog mustard



Tacky white tape

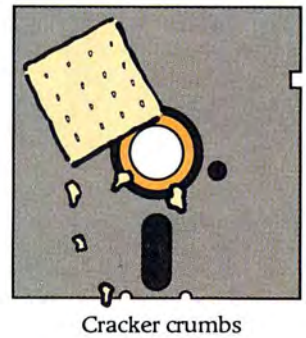


Lunchcounter ketchup

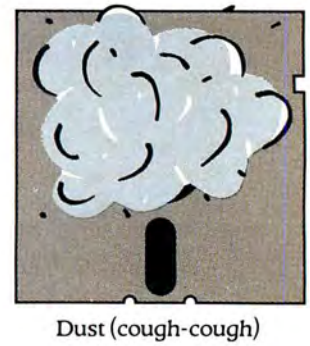


Potted plant–no pot

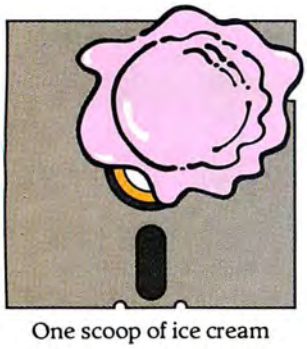
Fizzy orange soda



Cracker crumbs

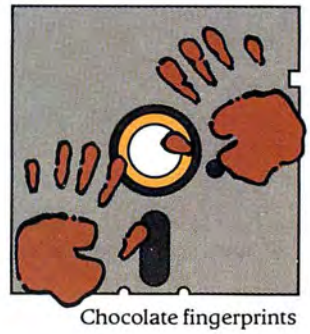


Dust (cough-cough)



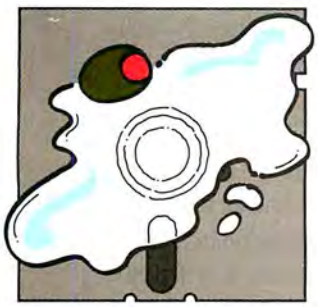
One scoop of ice cream

Sudsy soap bubbles

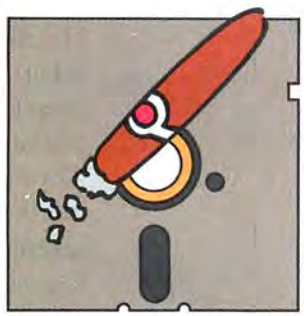


Chocolate fingerprints

d, your dog-eared, your mistreated:

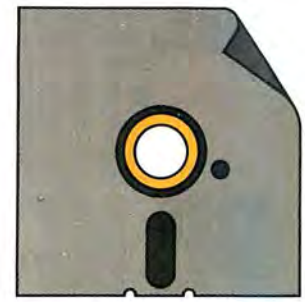


Dry martini, one olive

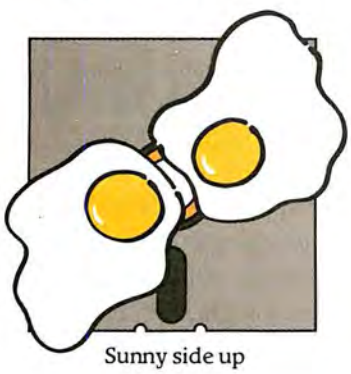


Boss's cigar ashes

Spilled milk



Dog-eared jacket



Sunny side up

Waterbased ink spots

English breakfast tea

Eraser bits

If it's a Polaroid diskette, we'll fix it.

Accidents can be fatal to floppy disks. But now Polaroid introduces a free data recovery service.

So, if you spill coffee on a Polaroid Professional Quality Diskette, we can help recover your data. (And most other accidents, too.) Call 800-241-4403 and we will tell you how our service works.

These Polaroid floppy disks boast a 20-year guarantee and are certified 100% error-free. And only Polaroid offers a free data recovery service. Because accidents happen.

Polaroid PerfectData

THE PROFESSIONAL QUALITY DISKETTE IN THE GRAY BOX.

Circle 164 on reader service card

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Circle 13 on reader service card

count the stars in the heavens. Thus I was intrigued by *TellStar*, a program that its manufacturer claims "opens your computer graphics window to the Universe." The packaging isn't hype, for *TellStar* succeeds in transforming your PC into a personal planetarium.

TellStar, distributed by Spectrum HoloByte, was written by Evan Scharf, an amateur astronomer from Colorado. Three versions are available. Level I displays only the Northern Hemisphere; Level II, the Northern and Southern Hemispheres, including objects catalogued by Messier. Level II/8087, which takes advantage of the 8087 coprocessor, is a speedier version of Level II.

Longitude, latitude, and viewing time constitute the grist for *TellStar*'s mill. A table of major U.S. and foreign cities and their coordinates is included in the user manual. Thus, by plugging in the proper numbers you can display the sky you will see tonight, the constellations Londoners will watch next week (weather permitting), or even the stars that fell on Alabama the night they drove ole Dixie down. However, *TellStar* guarantees display accuracy only from 1980-2000. Anything beyond that period in either direction may not be precise.

Once coordinates and times are set, *TellStar* offers either a horizontal or an overhead view (see Screen 1). Horizontal gives you a

(continues)

COMPUTER DILEMMAS!

Question: How do I sell the equipment I already have?
Answer: THROUGH **COMPUTER LISTING SERVICE!**
Question: How do I save money on a first time buy?
Answer: THROUGH **COMPUTER LISTING SERVICE!**
Question: How do I upgrade or downgrade when I need to?
Answer: THROUGH **COMPUTER LISTING SERVICE!**

Technology, unit costs and proliferation are causing significant changes in the data processing marketplace. Those who don't have computers probably want them. Those who have them may need something better or with different capabilities.

COMPUTER LISTING SERVICE, a division of Automated Resource Management, Inc., is a national advertising network. It meets today's needs by providing consolidated information about what new/used equipment is available, at what price, and how to get in touch with the source directly. If the idea sounds good to you, just let us know.

SELLERS PAY TO LIST THEIR MERCHANDISE! BUYERS PURCHASE A SUBSCRIPTION!

COMPUTER LISTING SERVICE IS THE VEHICLE THAT BRINGS THEM TOGETHER.

IT'S THAT SIMPLE!

FREE LISTING OR $25 DISCOUNT SUBSCRIPTION COUPON IF YOU FULLY COMPLETE AND RETURN THE SURVEY BELOW BY JULY 31, 1985. THIS ONE-TIME OFFER IS IN CONJUNCTION WITH NATIONAL TEST MARKET RESEARCH.
ABSOLUTELY NO OBLIGATION IS INCURRED BY RESPONDING.

1. Please place a check by all of the following which you own. (check all that apply)
1. ____ I don't own any
2. ____ micro computer
3. ____ mini computer
4. ____ mainframe computer
5. ____ other

2. If you were going to buy computer hardware, where would you be likely to look for information to use in your buying decisions. (please write your answer)
1. 1st choice _____
2. 2nd choice _____
3. 3rd choice _____

3. Please circle the letter which indicates whether you Agree, Somewhat Agree, Somewhat Disagree, or Disagree with each of the following statements.

I would probably not consider buying previously-owned hardware	A	SA	SD	D
I will probably buy some computer hardware within the next year	A	SA	SD	D
I believe that buying previously-owned computer equipment is not a good investment	A	SA	SD	D

4. Have you ever received a deck of advertising cards in the mail? (check one)
1. ____ not sure (skip to question 7)
2. ____ no (skip to question 7)
3. ____ I have received one
4. ____ I have received several
5. ____ I have received many

5. Do you usually look through the advertising cards in the deck(s) you receive?
1. ____ always
2. ____ sometimes
3. ____ never

6. Have you ever mailed a card from a deck to receive more information? (check one)
1. ____ never
2. ____ 1 to 5 cards
3. ____ 6-10 cards
4. ____ more than 10 cards

7. About how much are you planning to spend on computer equipment in the next 12 months? (check one)
1. ____ nothing (skip to question 9)
2. ____ $1000 - $3000
3. ____ $3001 - $4500
4. ____ $4501 - $8000
5. ____ $8001 - $10,000
6. ____ $10,000 or more

8. Which brand of hardware are you most likely to purchase? (Please write in your answer)
_____

9. Please consider the kind of computer equipment you might want to buy. How much less than the price of new equipment would you expect to pay for previously-owned equipment? (Please write in your answer)
$ _____

INSTRUCTIONS: The following questions refer to the computer resale listing services described above:

10. If you were interested in buying computer equipment, which would be your choice of terms for subscribing to a computer listing service? (check one)
1. ____ 3 issues (every 2 weeks for 6 weeks) for $50
2. ____ 4 issues (every 2 weeks for 8 weeks) for $65
3. ____ 6 issues (every 2 weeks for 12 weeks) for $75

11. If you were interested in selling computer equipment, which would be your choice of terms for contracting with a computer listing service? (check one)
1. ____ 3 issues (every 2 weeks for 6 weeks) for 12% of asking price
2. ____ 4 issues (every 2 weeks for 8 weeks) for 10% of asking price
3. ____ 6 issues (every 2 weeks for 12 weeks) for 8% of asking price

12. Are you likely to use a computer listing service to sell your equipment? (check one)
1. ____ no
2. ____ yes, within 1 to 3 months
3. ____ yes, within 4 to 6 months
4. ____ yes, within 6 months to a year

For a free listing of equipment you have for sale, fill in specifics below.

Manufacturer: _____ Asking Price $_____
Model _____ Memory _____
H-Disk (qty/size) _____ F-Disk (qty/size) _____
Monitor (type) _____ Printer (mfg) _____
Other _____

AUTOMATED RESOURCE MANAGEMENT, Inc.
P.O. Box 51211 * Raleigh, NC 27609-1211

COMPUTER LISTING SERVICE
3/12/85

EQUIP. MFG.	CONTACT NAME / ADDRESS / COMPANY NAME	PHONE NO.	********** EQUIPMENT DESCRIPTION ********** MODEL *** MEMORY *** H-DISK *** F-DISK / MONITOR - PRINTER / OTHER **** OTHER **** OTHER **** OTHER	ASKING PRICE
APPLE	DAVID WOOTEN 123 MAPLE STREET RALEIGH, NC 27612 ABC COMPANY	919/828-0521	IIe 128K NO 2-320 KB MONOCHROME - IMAGE WRITER PFS FILE, FLIGHT SIMULATOR, DOLLARS & SENSE	$ 2,337.50
IBM	ADAM SMITH 523 S. WILLIAMS ST. SANFORD, NC 25721	919/345-7639	PC-XT 256K 1-10MGBT 1-320 KB PGS COLOR - EPSON FX100	$ 3,750.00
ITHACA	LLOYD MARTIN 2013 QUAIL RIDGE ROAD RALEIGH, NC 27609 DATA MANAGEMENT SERVICES	919/872-0061	525H 256K 1- 5M6BT 1-320 KB TELEVIDO 925 - EPSON FX80 WORDSTAR, FMS80 FILE MANAGER MULTI-USER SYSTEM	$ 6,500.00

ALL INFORMATION BELIEVED TO BE CORRECT AND TRUE. BUYER RESPONSIBLE TO VERIFY ALL DATA WITH SELLER.

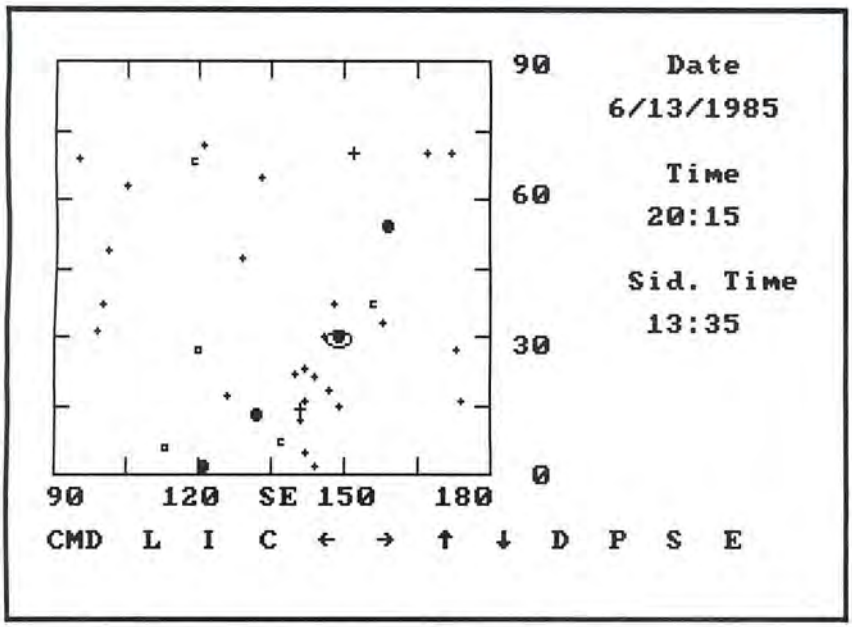
NAME _____
ADDRESS _____
_____
CO. NAME _____
TELEPHONE (_____)_____
☐ ***YES!*** *SEND ADDITIONAL INFORMATION*

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 2874 RALEIGH, NC

POSTAGE WILL BE PAID BY ADDRESSEE:

Automated Resource Management, Inc.
P.O. Box 51211
Raleigh, N.C. 27609-1211



Screen 1: The night sky, courtesy of TellStar. Your view can be rotated 45 degrees to the right or the left. In the overhead mode, TellStar displays the zenith and outlines the constellations.

90-degree view that can be swiveled 45 degrees to the right or left with the press of a cursor key. The overhead view, which displays eight compass headings, is centered on the zenith and is helpful for determining the relative position of the stars and planets.

Both modes use the same commands, including Locate, Identify, Print, and Constellation. Locate finds any object included in the program's star tables and supplies pertinent information. For example, if you request Betelgeuse, the program fills the screen with the star's vital statistics, from magnitude and elevation to rising and setting times. Then, at the press of the <Space> bar, the program switches back to the celestial display and centers a blinking cross hair over the star. If the star isn't visible, the program notes, 'Object below horizon at this time'. The Identify command tells the program to identify any celestial object you select. Using the cursor keys, move the cross hair across the screen to the object and press *I*. The program then lists the same type of information that the Locate command elicits.

Selecting the Print command prints out information or panoramas at almost any point in the program. This handy feature lets you generate your own up-to-date star charts, with related data for later study. The Constellation com-

(continues)

PMI

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IBM PC • XT • AT • ADD-IN/ADD-ON

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10MB Removable Storage Subsystem
Internal/External
CALL FOR SPECIAL PRICE

• TAPE BACK-UP FOR IBM AT, XT, PC
Complete with controller, cables & software

60MB	Half Height Internal	$1095
60MB	Half Height External	$1695
Floppy Tape — External for PC & XT		$ 995

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Fully formatted with instructions & cable

10MB	Half Height Internal	$ 549
20MB	Half Height Internal	$ 750
32MB	Half Height Internal	$1350
10MB	Removable Internal	$1145
10MB	Removable Hard Disk Only	$1095

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Complete with controller and cables

10MB	Half Height Internal	$ 695
20MB	Half Height Internal*	$ 995
32MB	Half Height Internal*	$1695
40MB	Half Height Internal*	$1995
60MB	Half Height Internal*	$2475
10MB	Half Height Removable Internal*	$1395
3.3MB	Half Height Superfloppy Internal	$ 695

Requires minimum 100 watt PS

• EXTERNAL HARD DISK SUB-SYSTEMS FOR IBM-PC, XT, AT and COMPATIBLES
Complete with chassis, power supply, controller, cables, assembled & tested. 90 day warranty.

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140MB	Fixed + 60MB Tape	$8995
10MB	Removable + 10MB Removable	$2550
10MB	Fixed + 3.3MB Floppy	$2050
20MB	Fixed + 3.3MB Floppy	$2350
6.6MB	Dual Superfloppy	$1320
3.3MB	Single Superfloppy	$ 895
65MB	External	$4995
85MB	External	$5495
140MB	External	$6995

• BEST DRAM PRICE ANYWHERE!

IBM "AT" 256K Dram Upgrade			$ 270
Quantity	*1-18*	*19+*	*73+*
IBM-PC,XT 64K Dram 150ns	4.89	4.69	4.39
IBM-PC,XT 64K Dram 200ns	4.69	4.39	4.09

• ACCESSORIES

100% IBM Compatible Color Monitor	CALL
IBM Compatible Cabinet	$ 99
130 Watt "XT" Power Supply	$ 165
Dual Half Height Cabinet*	$ 120
Hard Disk Cabinet*	$ 275
200 Watt "AT" Power Supply	$ 225
3.3MB Diskette, 5 pack	$ 75
Multifunction Card, "OK" Ram	$ 175
AT Memory Expansion Board	$ 450
50 Pin Connector Cable	$ 30

With power supply

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(617) 435-5700

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Prices subject to change.

Circle 960 on reader service card

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You need expert analysis and advice on systems, knowledgeable recommendations for applying the right equipment to solve your business problems. You need this service *before* you purchase hardware, software and peripherals.

And then, you need worry-free operation and an ongoing commitment to service from a company that's fully capable of delivering it!

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Due to space limitations we cannot list all of our more than 700 products so, to find out how competitive we are in a fast changing market, call for an up-to-date price quotation on any item. We'll send you a free catalog!

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AST Sixpack w/384K	$325
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OKIDATA ML-192 w/Plug 'N Play	$379
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Full-Height, 360K, DS/DD	$129
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Jdiskette w/serial/parallel/Jformat (controls 1.2 MB high capacity drives in PC)	$219
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IBM PC, XT, AT (many configurations available).....$Call
IBM PC with hard disk (XT look alike).....$Call
COMPAQ portable & **COMPAQ PLUS**.....$Call
COMPAQ portable with hard disk (**PLUS** look alike).$Call

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8087 & 80287 math coprocessors.....$Call

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36—170MB hard disks w/tape backup.....$Call
PC—QIC tape, 60MB external backup $1995
CDC
20—70MB internal drive for AT .....from $1295
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20 MB internal drive for AT (with hardware).....$995
I-OMEGA (BERNOULLI BOX)
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Autoboot ROM (self boot on powerup).....$95
MAYNARD ELECTRONICS
10, 20, 30MB internal hard disks for PC (available with floppy and hard disk control on single board) ..from $850
20, 27, 60MB internal or external tape backup (for PC, XT, COMPAQ or AT) .....from $995
additional tape controller cards.....$139
MICRO SYSTEMS INTERNATIONAL
25MB external tape unit (plugs into floppy controller) ..$899
SYSGEN
Image cassette backup (external) $799
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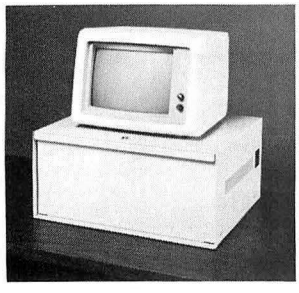

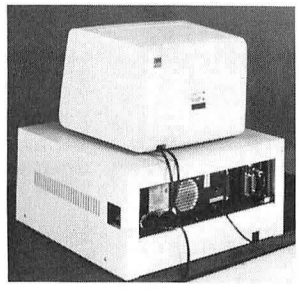

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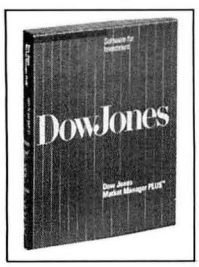

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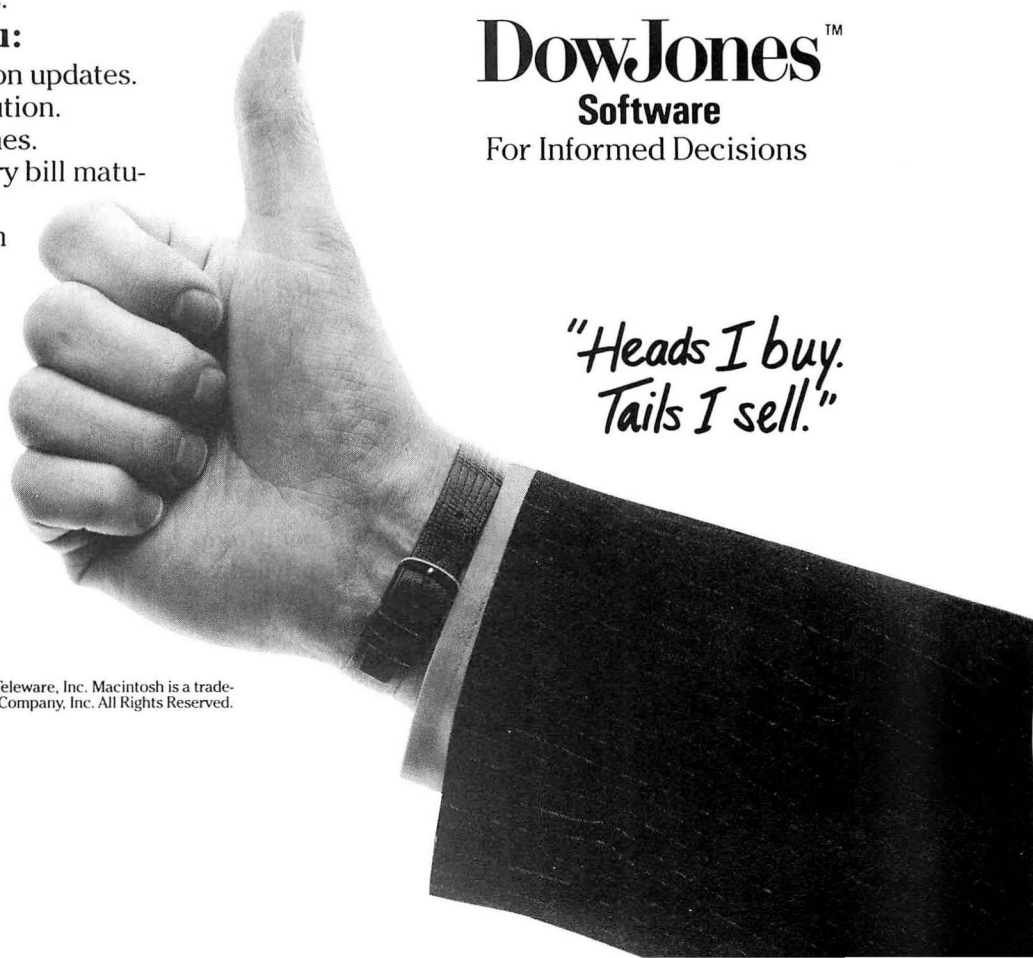

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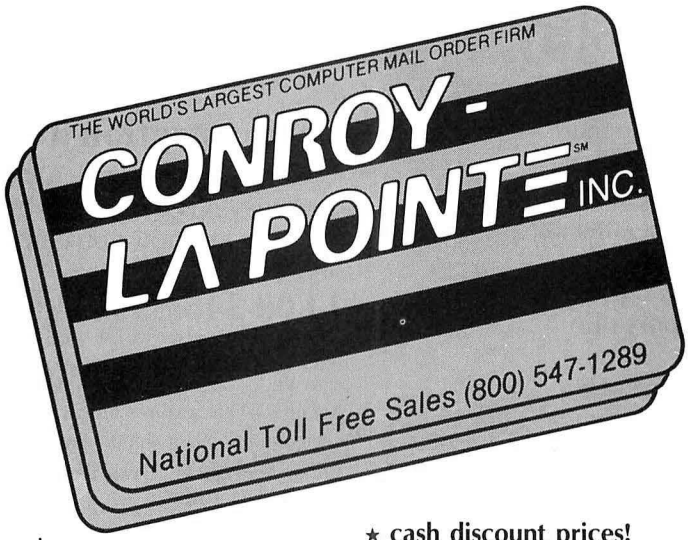

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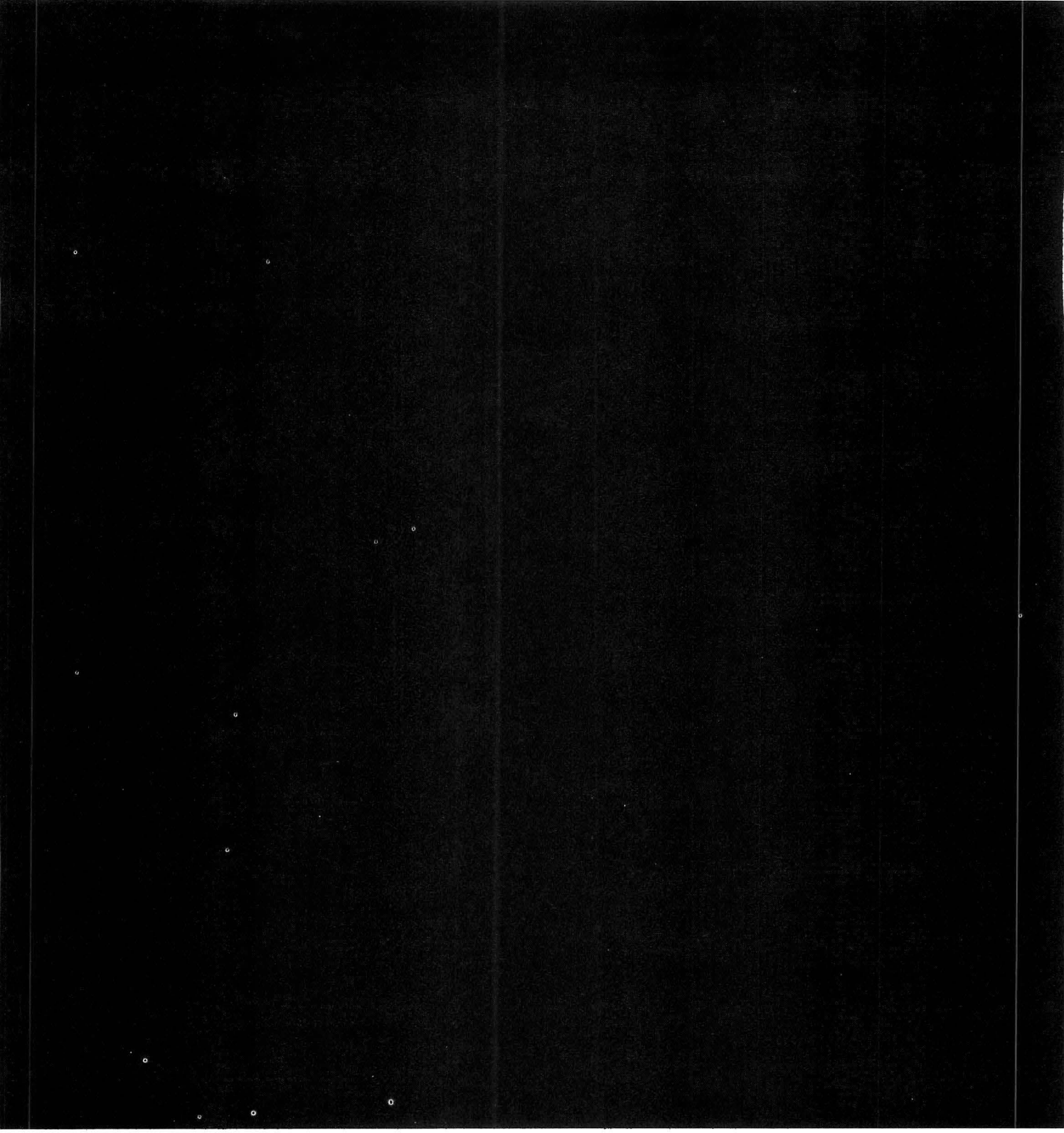

If you're like most people, the business data you need is scattered throughout any number of popular software programs. Lotus 1-2-3,™ dBASE II,™ or Multiplan.™ R:base,™ or pfs:file.™ And it's always been a hassle to merge and analyze the files in these programs without re-entering the information each time.

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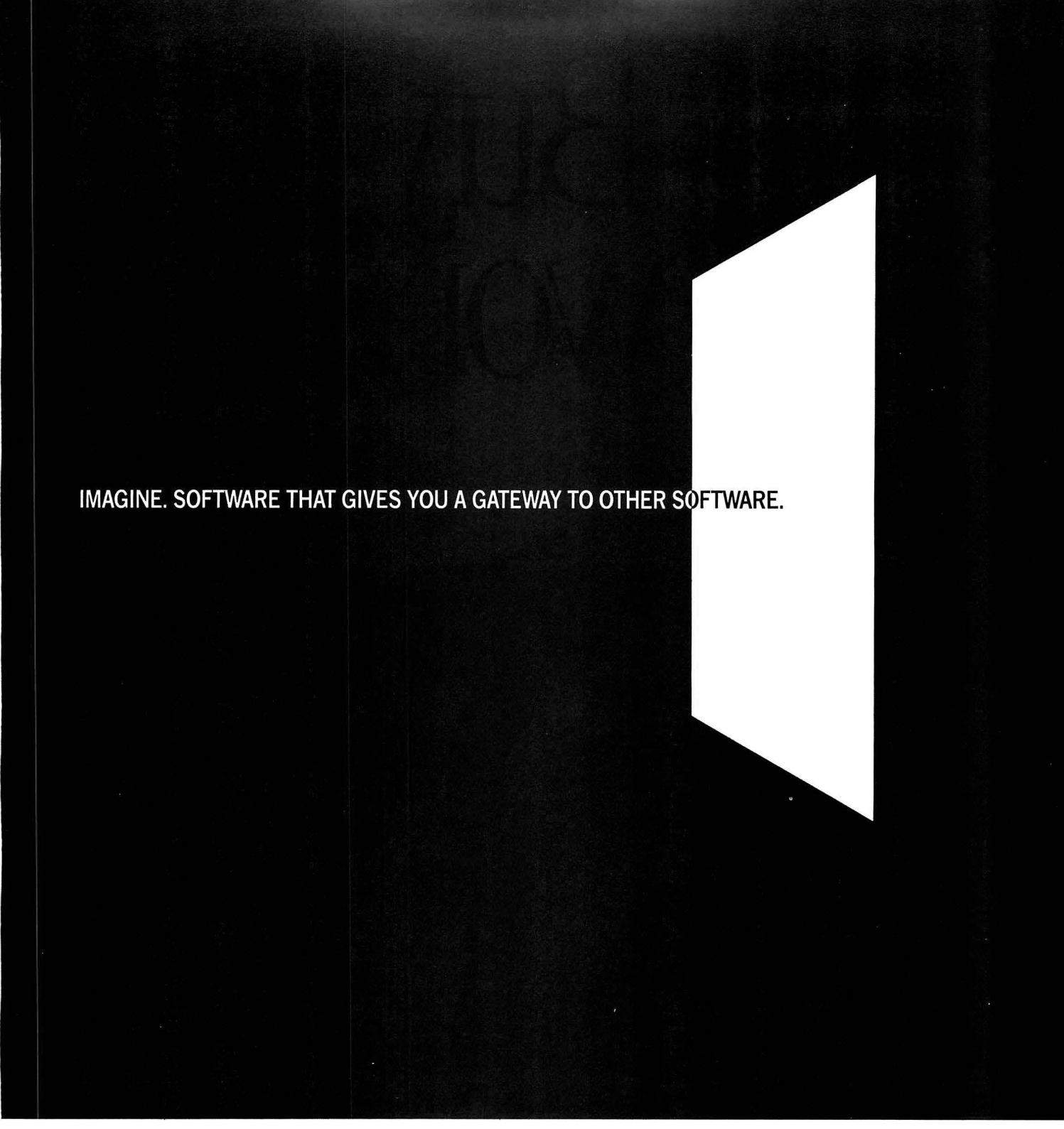

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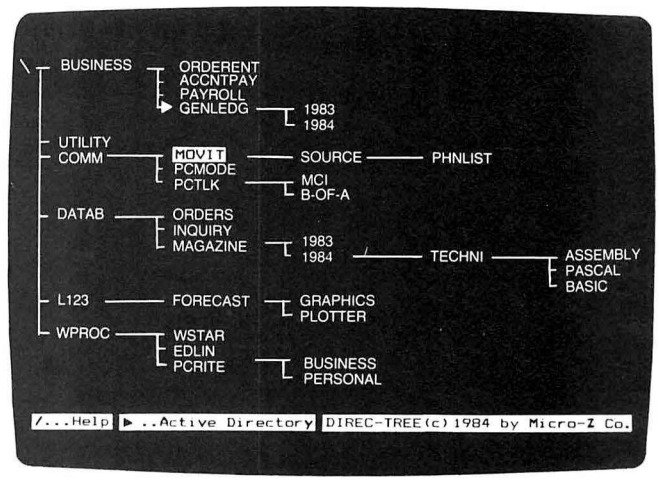

direc-Tree III©

Now, the easiest and most versatile program EVER for getting the most out of your hard disk — is even better!

Just imagine . . . within moments of running Direc-Tree, your entire directory structure is displayed in a unique TREE format that is clear and easily understood. And — this tree is functional!

Simply use the arrow keys to move a cursor from name-to-name — from branch-to-branch — and press function keys to perform DOS commands.

For example, with Direc-Tree you can now read, copy or lock a file or group of files, run programs, rename, create or remove directories just by pointing. It is simple and intuitively easy, and gives you the capability of organizing your hard disk to suit the way YOU work.

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- ▷ **TYPE** text files on screen or printer.
- ▷ **LOCK** your important files to prevent accidental erasure.
- **RENAME** or **DELETE** files easily and safely.
- **COPY** or **MOVE** files between directories or disks by simply pointing!
- **RUN** programs easily and return to Direc-Tree when finished.
- **LOCATE** missing files anywhere in the hard disk.
- **CREATE** or **REMOVE** directories to suit your needs.
- ▷ **RENAME** directories instantly.
- ▷ Run programs from user-defined **MENUS.**
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- **PRINT** the tree to printer or disk.
- **EXECUTE** complex DOS commands from within Direc-Tree.
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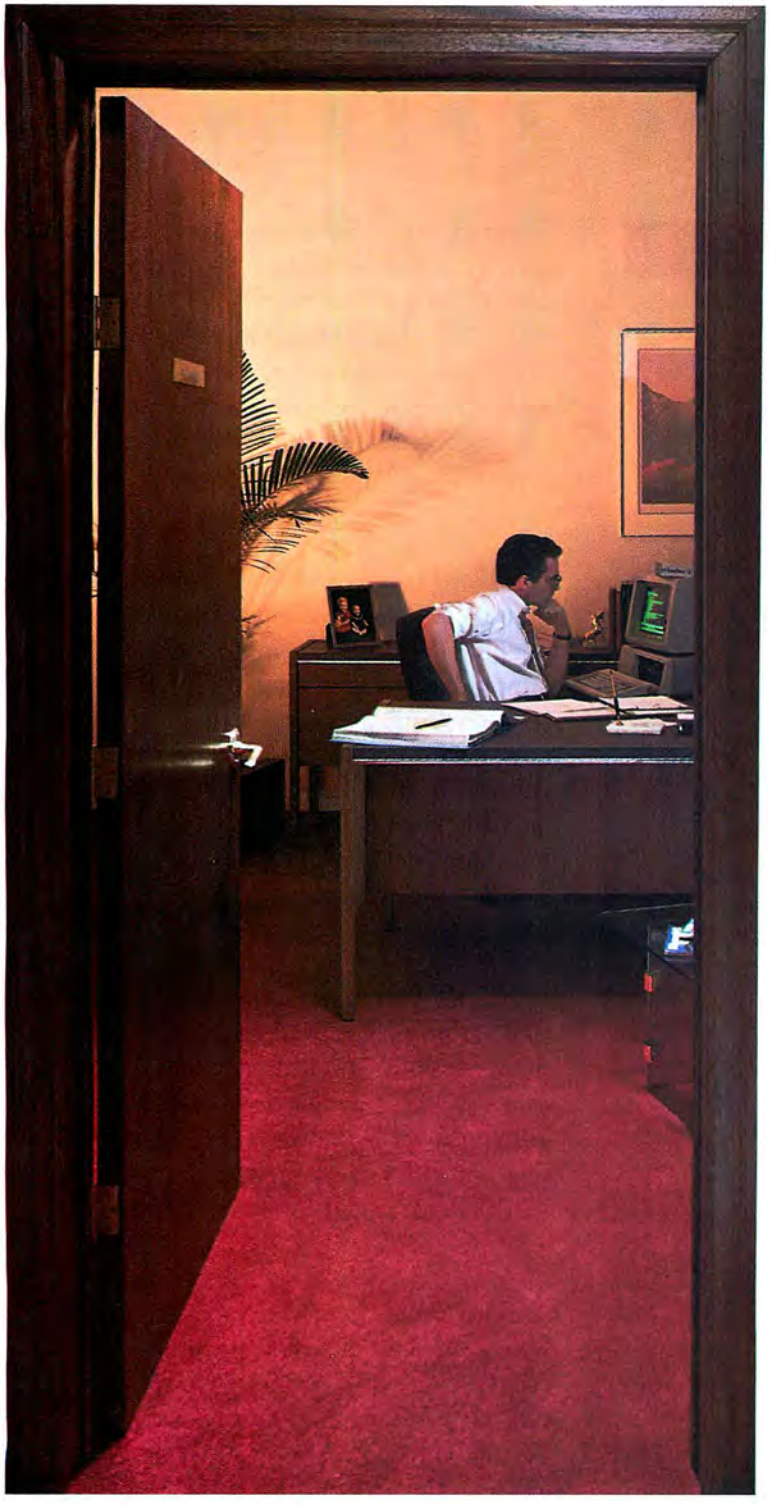

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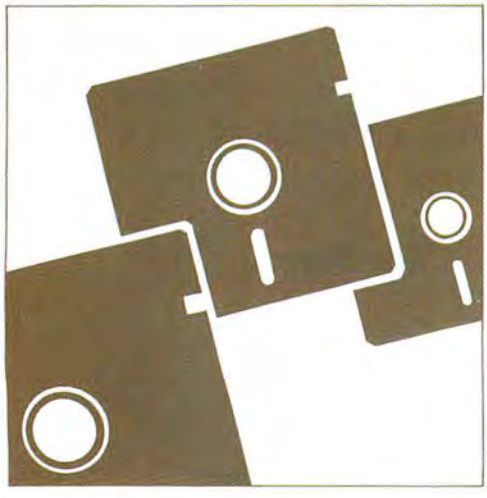

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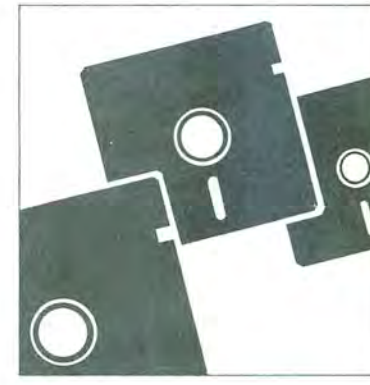

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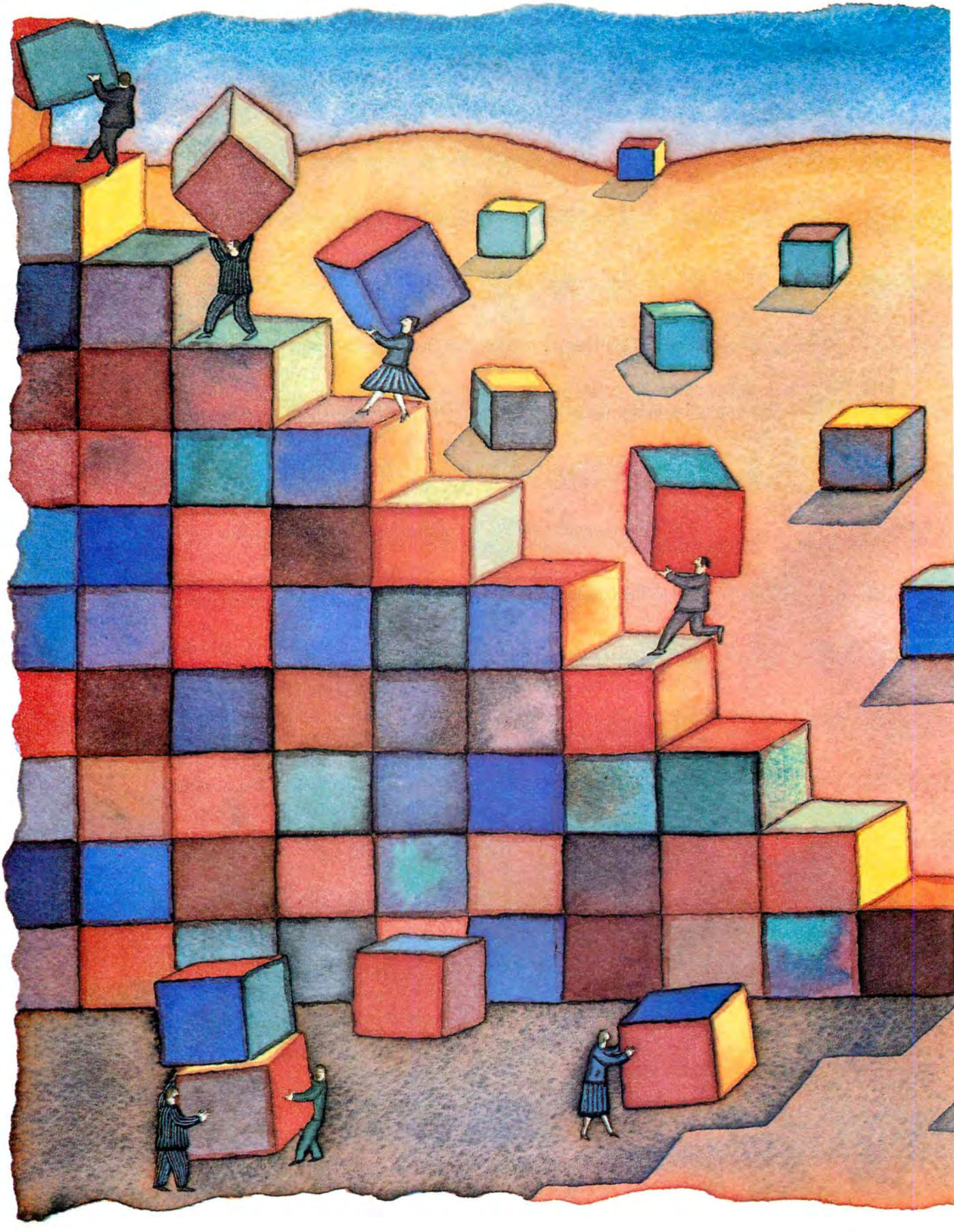

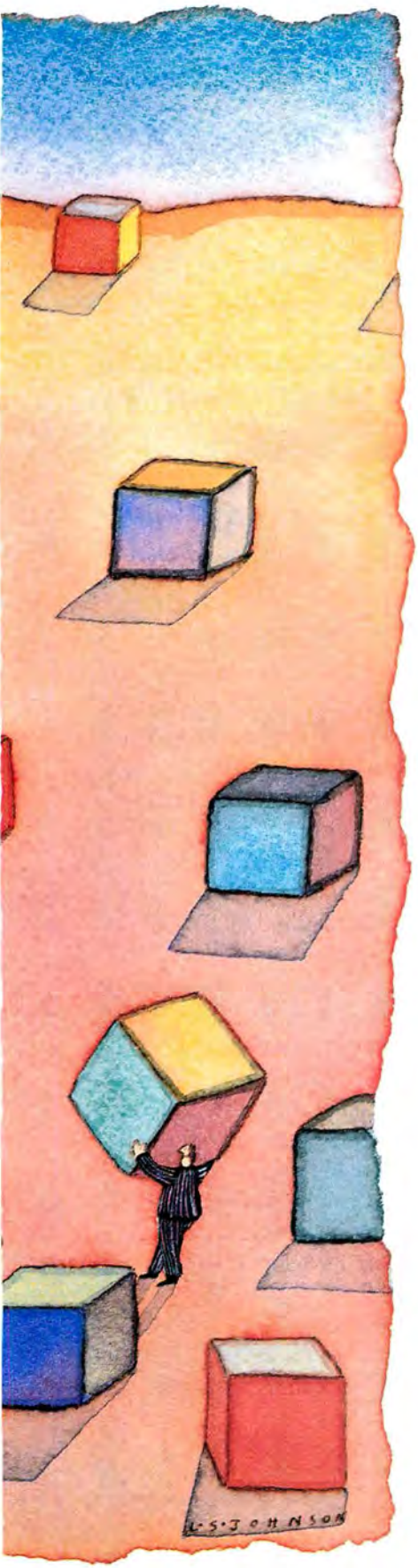

Pascal Primer

It's no accident that many first-level programming classes use Pascal. The language's imposed structure encourages programming as a problem-solving process, developing workable blocks step-by-step.

John Kearney

Since 1970, when Niklaus Wirth developed Pascal, computer scientists and educators have embraced this innovative programming language because of its elegantly simple structure and implementation, and its compactness. In fact, no programming tool to date gives you a better understanding of programming and related problem solving. Pascal's popularity recently reached the grass roots and may one day threaten the dominance of BASIC among microcomputer languages.

Like BASIC, Pascal is a high-level language. It has its own vocabulary, used to write programs as sets of statements. The two major steps in creating a Pascal program are writing the statements, for which you use an editor (such as EDLIN in PC-DOS or a word processing program), and converting (or compiling) those statements into machine-readable language, for which you use a Pascal compiler.

The recent ground swell of enthusiasm for this language among PC and compatibles users has been fueled in part by the availability of some outstanding Pascal compilers as well as a variety of additional programming aids and utilities. Never before have you had a better choice of Pascal products–including one compiler (Turbo Pascal) that offers both power and reliability at a very low cost. Turbo Pascal from Borland International was used to create the sample program for this article. The sample program may also work with other Pascal compilers.

But variety and value are only two reasons why Pascal is a language whose time has come. Like BASIC, Pascal is ideally suited to the personal computer, yet it provides greater power and programming flexibility than BASIC. It is a state-of-the-art language that features built-in debugging aids and superb readability. Pascal enables you to develop large, complex programs, far beyond those suitable for BASIC. You can create true structured programs, which should help you become a better programmer in any language.

Of course, Pascal is not perfect, and learning the sophisticated language requires a measure of dedication and an investment of time. This article introduces you to that discipline, offers tools for gaining some mastery over Pascal, and provides a glimpse of the language's inherent beauty and elegance.

Building Blocks

A good starting point is to examine the structure and organization of Pascal programs. Whether simple or complex, any program can be broken down into a series of distinct actions, each of which is accomplished by a block of Pascal program code. Each block fulfills a unique, specific purpose; all the blocks are required for successful program execution.

If you have programmed in BASIC, *dBASE II*, or any other language, you may already approach programming in this structured way. When you are faced with a new problem to solve, you probably begin by organizing your thoughts and determining the series of actions required. The essence of structured Pascal programming is to create a program block for each of those actions and to arrange the blocks properly in the program according to relatively simple Pascal rules.

To illustrate, let's examine a program designed to find the average of any 10 numbers. This exercise, which does not require programming genius, may help you understand how to dissect a problem and relate the actions involved in solving it to Pascal program blocks. A list of these action blocks would look like this:

```
MainBlock - Average 10 Numbers
        Block A - Introduction
        Block B - Get 10 Numbers
        Block C - Display the Average
            Block D - Calculate the Average
```

As you can see, each block performs one distinct action. The MainBlock can be thought of as comprising the entire program; its main purpose is to invoke the other blocks, which are the various procedures necessary to complete the program successfully. Each block is one of three types (main program, procedure, and function), and the order of those blocks is determined by their type (see Figure 1 for a list of block order). In this example, Block C, which displays the result of a calculation, is listed before Block D, the calculation as required by Pascal.

Pascal provides greater power and programming flexibility than BASIC.

The first type of Pascal program block is the *main program*. This block starts with the "reserved" word *PROGRAM* and ends with *END.*, another reserved word. (A reserved word can be used only for the purpose specified by Pascal.) Only one set of these two words–that is, one main program–is allowed per program, although the word *END* without the period can be used elsewhere in the program. (The other two types of blocks can be used as often as needed.) As in BASIC, any variable defined in the main program is considered a "global" variable and can be used throughout the program.

The *procedure* is the second type of Pascal block. It is almost identical to the BASIC subroutine in its use and operation. Procedures are easy to spot

in a Pascal program—they begin with the reserved word *PROCEDURE*. In our example, the block called Introduction (Block A) is a procedure. Procedures follow essentially the same form as the main program and may be called several times within a program.

The *function* is the third type of block, and it is unlike anything in BASIC. Pascal has the advantage of giving you the power to design your own functions, while also providing a set of standard predefined functions (listed in Figure 1). A function follows the same basic form as a program or a procedure. Its most distinctive characteristic is returning a value based on certain variables or conditions. In our example program, we create the function called Average and then use it in the Display Average procedure. You may assign a function any name and construct any kind of calculation, which can be as complex as needed.

Each Pascal program block has two elements. The first is the block heading or declaration section, which consists of declarations of the block name, all variables, and parameters. These are essentially definitions; they must be located at the beginning of their respective blocks, and they describe the program's data. In the previous example of blocks, the total of the 10 numbers is a variable that may be shared by all of the blocks, whereas the average is used in only two blocks.

The second element is the body of the block, which expresses the actions or data manipulations that will be performed. This element comprises the actual program statements.

Reserved Words

The sample Pascal program can now begin to take shape. Listing 1 shows that program, which we will discuss in detail in the following section.

It may be helpful as you examine the program listing to envision each of the blocks as a box with a small hole in the top, where you enter, and a small hole in the bottom, where you exit. These are the *only* avenues open to the Pascal programmer. What goes on inside the box can get very exciting.

Pascal uses fewer than 40 reserved words, which are simple yet provide excellent power and flexibility. Not all of these words are included in the sample program, but you will become familiar with enough of them to understand Pascal's attraction for

programmers. Figure 1 provides a list of the standard Pascal reserved words and functions.

Designed to reduce typing and spelling problems, the Pascal word set is also easy to remember. As with other computer languages, the punctuation required in Pascal code—commas, periods, and semicolons—may be troublesome at first. But these requirements were designed into the language to eliminate many bugs and to help you spot omissions at the time you compile the program.

The Program's Components

As Listing 1 illustrates, a Pascal program includes some mandatory components, such as punctuation in a strict format and certain other elements that you define. Every Pascal program or procedure consists of a heading block and a statement block. The heading block contains the declaration section of the program. One of Pascal's distinguishing characteristics is the requirement that all identifiers (constants, data types, variables, subprograms, and so on) be "declared" before they are used. The following components are included in the sample program:

Headings. Each block must begin with a single program line stating the block's name. Examples of headings in Listing 1 are

```
PROGRAM Average10Numbers(input,output);
PROCEDURE Get10Numbers;
FUNCTION Average : Real;
```

Constants. Program readability is enhanced by the use of constants. Numbers and alphabetic strings may be defined as constants, such as

```
CONST PI = 3.1416;
      Name = 'All American Sport Shop';
      MaxNumber = 10;
```

Standard Pascal Identifiers

Program parameters

input, ouput

Procedures

get, put, new, pack, unpack, page, read, readln, rewrite, write, writeln, reset

Functions

abs, arctan, chr, cos, eof, eoln, exp, ln, odd, ord, pred, round, sin, sqr, sqrt, succ, trunc

Constants

false, true, maxint

Types

integer, Boolean, real, char, text

Standard Pascal Reserved Words

and	end	nil	set
array	file	not	then
begin	for	of	to
case	function	or	type
const	goto	packed	until
div	if	procedure	var
do	in	program	while
downto	label	record	with
else	mod	repeat	

Order of Elements in Program Block

program, function, or procedure name/label
constant definition
type definition
variable definition
procedure and function declarations
statements

Figure 1: Standard functions, reserved words, and block order in Pascal

```
{Words inside these brackets are comments}
{They have no bearing on the outcome of the program}

PROGRAM Average10Numbers(input,output);          {Heading/Program name}

{Following constant and variable may be used in entire program}
CONST   MaxNumber = 10;       {Constant used to control number of inputs}
VAR     TotalBucket : Real;   {Variable used to hold current total}

PROCEDURE Introduction;
VAR     X : Integer;                  {may only use in this procedure}
        YourName : String[20];        {may only use in this procedure}
    BEGIN
      Writeln('What is your name?'); {display prompt on monitor}
      Readln(YourName);              {accept YourName from keyboard}
      Writeln('Hello, ',YourName,', press any key to begin.');
      Read(X);                       {wait until key is pressed}
    END;

PROCEDURE Get10Numbers;
VAR     Number : Real;                {random number from keyboard}
        I : Integer;                  {counter for input loop}
    BEGIN
      TotalBucket := 0;               {initialize TotalBucket to zero}
      For I := 1 to MaxNumber Do      {beginning of input loop}
      BEGIN
        Writeln('Enter a number.....'); {display on monitor}
        Read(Number);                 {get random number from keyboard}
        TotalBucket := TotalBucket + Number;
                                      {compute the running total}
      END;                            {end of input loop}
    END;

FUNCTION Average : Real;              {define function for later use}
    BEGIN                             {compute the average}
      Average := TotalBucket / MaxNumber;
    END;

PROCEDURE DisplayAverage;
    BEGIN                             {display the average on monitor}
      Writeln('Average of the 10 numbers is....',Average:4:2);
    END;

BEGIN                                 {main program logic or driver}
  Introduction;
  Get10Numbers;
  DisplayAverage;
END.
```

Listing 1: A simple Pascal program to find the average of 10 numbers

Types. In Pascal you can define each variable by the type of value it will assume. A Real variable type is any real number, positive or negative, that may have decimals. An Integer value type, on the other hand, implies no decimals. A value of the Boolean type is true or false, and Char is an individual character or string of characters.

In the hands of a true Pascal craftsperson, programs may even become works of art, resembling free-form poetry.

Variables. Understanding the last part of the definition section of each block should be easy. It is merely a matter of listing the variables that you intend to use in the block and defining the corresponding value type for each variable. Some examples of variables and their types include

```
VAR  ItemPrice, HourlyWage          : Real;
     NumberOfEmployees              : Integer;
     Exempt                         : Boolean;
     OneLetter, MenuSelection       : Char;
```

We can apply the preceding information to our Average10Numbers program. Once again, refer to Listing 1, paying close attention to the variable and constant definitions and where they are positioned within the blocks.

It is generally considered good Pascal programming practice to restrict the use of "global" variables by defining variables only within the blocks where they are to be used. This practice prevents lower-level blocks from compromising the values of variables in the higher levels. So in the sample program, YourName and Number are defined within their respective blocks and not at the beginning of the program. In this way, Pascal promotes data integrity.

Reading and Writing

As you continue to study the program listing, you may be surprised to recognize a number of features similar to those found in BASIC. Some of these features, in fact, originated as Pascal concepts. You may also find a number of unfamiliar items, which will become increasingly useful as you become more accustomed to programming in Pascal.

Now it's time to add specific information to the program so that it will accomplish its stated purpose–to average 10 numbers. Nothing happens without input–some kind of data to process. In the sample program we need 10 numbers. In this instance, the best method for input is via the keyboard, using the READ procedure, which is similar to the input statement in BASIC. The READ statement accepts data from a device (like the keyboard) or a disk file and stores it as the current value of the specified variable. In the first of the following examples, the READ statement would store a number in the variable called Number. For our program (Listing 1), this includes

```
READ(Number);          {input a single real
                       number}
READLN(YourName);      {read an entire line}
```

Reading records from a disk file requires either a READ or a GET statement, depending on the compiler you use. The READLN statement operates in a manner similar to the READ statement, except that after the last variable is read, the remainder of the line is skipped; processing then continues at the beginning of the following line. These operations are part of Pascal's excellent file handling.

There is no point in processing data unless the results can be seen in the form of output. Pascal allows for numerous output devices, including printers and monitors. In Listing 1, examples of output statements include

```
Write('What is your name?');
Writeln(Hello, 'YourName,' press any
key to begin.');
```

These Pascal WRITE statements direct the messages to the monitor, but similar WRITE or PUT statements can output data to a disk file or a printer.

The WRITELN statement operates exactly like a WRITE statement except that a carriage return/line-feed signal is output after the last value on the line.

Pascal and BASIC have similar methods for programming calculations. The following expression will probably look familiar to BASIC programmers:

```
Average := TotalBucket / MaxNumber;
```

Notice the ":=" in the above expression. This assignment symbol is the equivalent of "make the value of the variable on the left of the symbol equal to the results of the expression on the right."

The magic of computer programs in any language is their ability to "loop" through a set of program statements, processing hundreds of records and numbers. A language is only as magical as the effectiveness and efficiency of its looping capacity. Pascal is excellent in this respect, offering four looping schemes.

By contrast, in BASIC you are largely limited to the FOR ... NEXT loop. Pascal's counterpart is FOR ... DO, whose format is

```
FOR X = 1 to 10 DO
      BEGIN
      program statements;
      END;
```

In addition, the Pascal REPEAT ... UNTIL statement enables you to repeat a set of program statements until a specific event occurs, such as a variable reaching a predetermined value. Another Pascal looping scheme is the WHILE ... DO statement. The most interesting and controversial of these built-in loops is the CASE ... END statement. A menu-driven program is a superb use for this loop, as the following example shows.

```
CASE   MenuSelection OF
'1'    : HelpScreen;
'2'    : PrintFile;
'3'    : UpdateFile;
'9'    : EndofJob;
END;
```

Controversy exists about this type of loop; some Pascal programmers feel the need for an option of a "goto" or "else" extension to the CASE ... END statement.

To complete our examination of the sample program (Listing 1), notice the absence of line numbers, the use of both upper- and lowercase letters, and the extensive program line indentation. All these attributes greatly improve the program's readability. In the hands of a true Pascal craftsperson, programs may even become works of art, resembling free-form poetry.

A Fight to the Finish?

With the growing popularity of Pascal for the PC and compatibles, are we witnessing a major battle between BASIC and Pascal? Probably not. Unlike the old western movie adage, there is room enough for both languages in this town.

At this point, however, you may be thinking that a BASIC program would be as simple (or simpler) to write than the sample program discussed here. Ease of use is perhaps BASIC's greatest strength. You can quickly code small programs that deal with limited input and output.

On the other hand, Pascal is second to none for developing larger programs. Its block structure makes debugging, maintenance, and enhancement vastly superior to most other languages, and it has exceptional file-handling capabilities and a variety of looping options.

Compilers–Where Do You Start?

Your next step in becoming a Pascal programmer will be to study the language further and to investigate the compilers available for the PC and compatibles. The reference list of compilers accompanying this article should provide a good starting place.

If you select a compiler carefully, you will enter the Pascal world that has been growing rapidly for more than a decade. Get your hands on some good books (see the reference list), maybe join a local Pascal user group, and start developing your own art of Pascal programming.

John Kearney is a senior programmer analyst for Inter-Regional Financial Group in Minneapolis, Minnesota. He is currently writing an extensive Pascal and Modula-2 programming guide.

Pascal Compilers

Turbo Pascal
Borland International
4113 Scotts Valley Dr.
Scotts Valley, CA 95066
408/438-8400
List price: $49.95
Requirements: 64K, one disk drive

Pascal/MT+
Digital Research, Inc.
160 Central Ave.
Pacific Grove, CA 93950
408/649-3896
List price: $600
Requirements: 192K, two disk drives

Pascal Compiler
IBM
Entry Systems Division
P.O. Box 1328
Boca Raton, FL 33442
305/998-6048
List price: standard version $175, total system $350
Requirements: standard version 64K, two disk drives; total system 160K, two disk drives

MS Pascal
Microsoft Corp.
10700 Northup Way
Bellevue, WA 98004
800/426-9400
List price: $300
Requirements: 160K, two disk drives

Professional Pascal
Microtec Research
3930 Freedom Circle
Santa Clara, CA 95054
408/733-2919
List price: $895
Requirements: 256K, hard disk

Concurrent Pascal Compiler
Soft Machines, Inc.
3802 Grennoch
Houston, TX 77025
713/667-7755
List price: $250
Requirements: 96K, two disk drives

UCSD Pascal
Softech Microsystems
16875 W. Bernardo Dr.
San Diego, CA 92127
619/451-1230
List price: $375
Requirements: 128K, one disk drive

SBB Pascal
Software Building Blocks, Inc.
P.O. Box 277
Newtonville, MA 02160
617/448-2364
List price: $350
Requirements: 128K, one disk drive

Pascal Compiler
Whitesmiths Ltd.
97 Lowell Rd.
Concord, MA 01742
617/369-8499
List price: $700
Requirements: 128K, one disk drive

Pascal Books

Turbo Tutor
Borland International, Inc., Scotts Valley, CA, 1984
210 pages, software; $34.95

Oh! Pascal!
Doug Cooper and Michael Clancy
W.W. Norton & Company, New York, 1982
476 pages; $14.95

Pascal From Basic
Peter Brown
Addison-Wesley Publishing Co., Reading, MA, 1982
182 pages; $12.95

Pascal for BASIC Programmers
Charles Seiter and Robert Weiss
Addison-Wesley Publishing Co., Reading, MA, 1983
242 pages; $11.40

Pascal User Manual and Report
Kathleen Jensen and Niklaus Wirth
Springer-Verlag, New York, 1978
167 pages; $11.95

Pascal With Style
Henry F. Ledgard, Paul A. Nagin, and John F. Hueras
Hayden Book Company, Inc., Rochelle Park, NJ, 1979
210 pages; $10.50

Algorithms + Data Structures = Programs
Niklaus Wirth
Prentice-Hall, Inc., Englewood Cliffs, NJ, 1976
266 pages; $34.95

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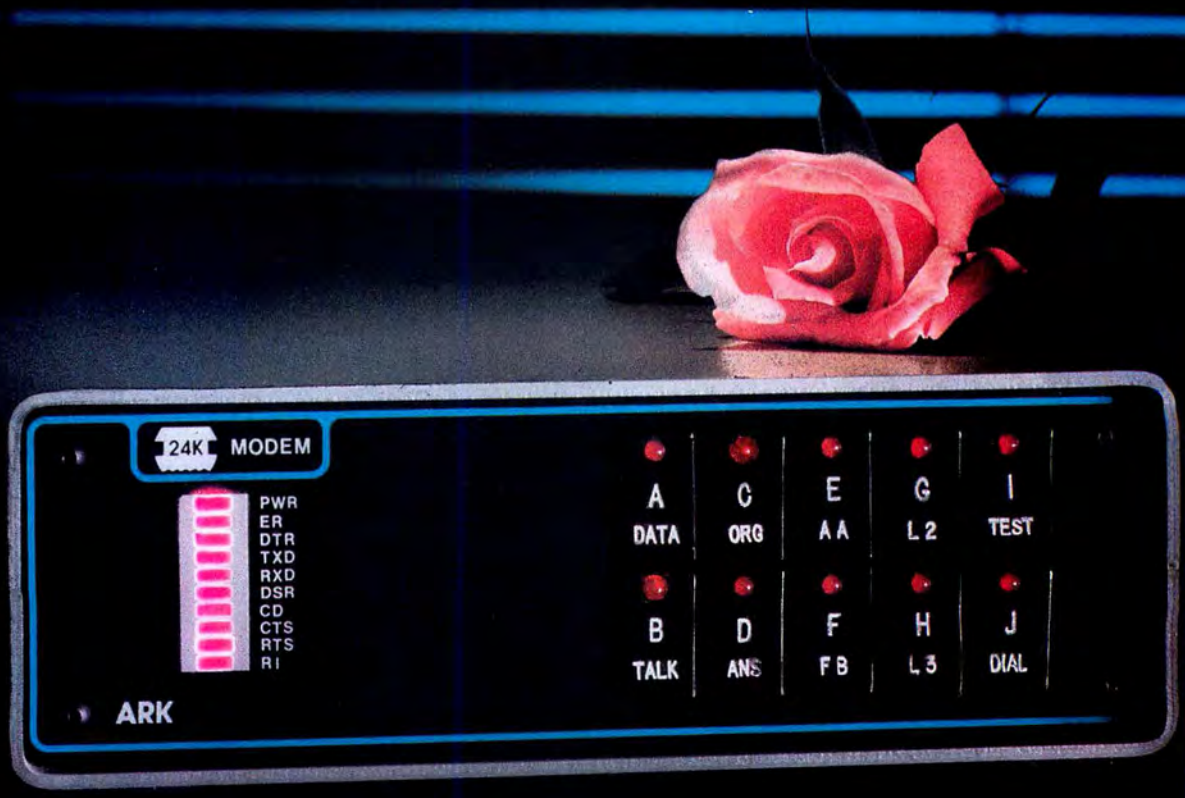

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(Source: "Ergonomic Principles in Office Automation" Pub. 1983 by E.I.S. AB, Sweden.)

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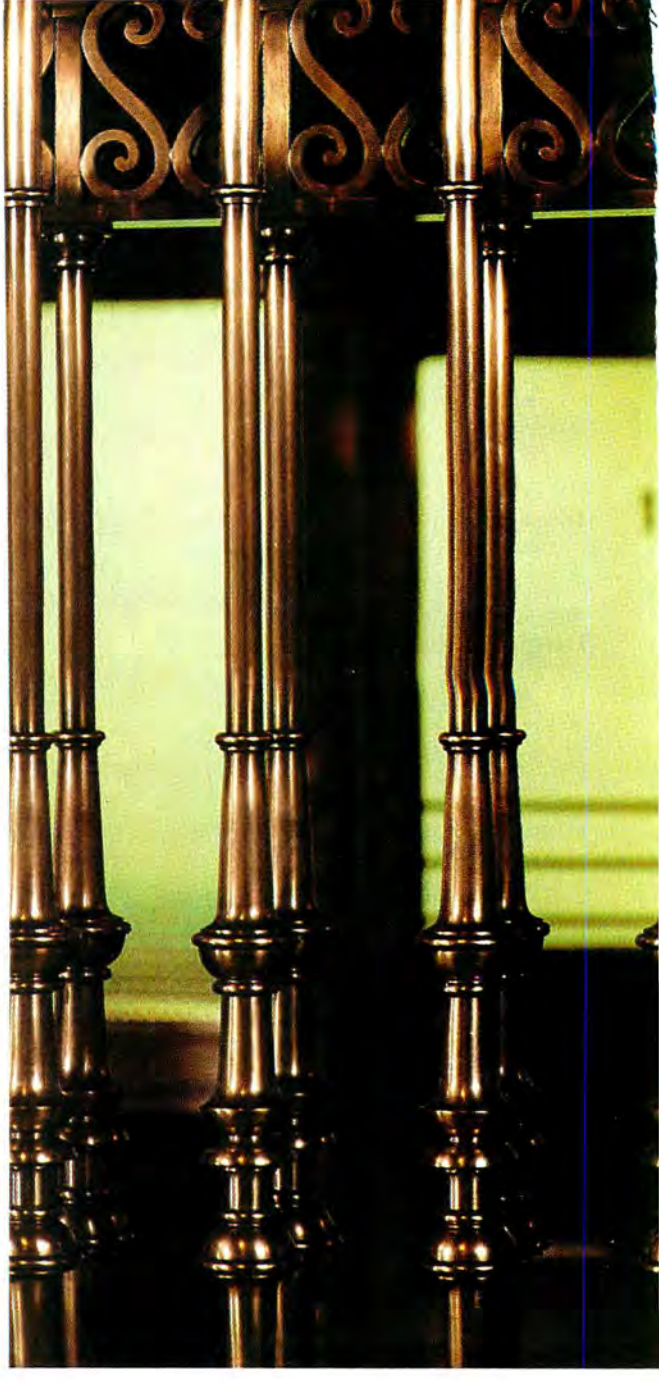


Life insurers shun risk, so it's big news when a giant insurance company puts a PC on every agent's desk from Seattle to St. Petersburg. Here's a look at how personal computing has begun to change the way in which a tradition-bound business is conducted.

Lindsy Van Gelder

Throughout most of this century, the life insurance business has been a bastion of conservatism. The industry continues to be based on the sensitive and often tenuous relationship between agent and client. Mortality is never a casual subject, and most successful insurance companies have built rock-solid reputations on sobriety and prudence.

In 1983, however, New York Life Insurance began rewriting its venerable rule book. Although the company's Manhattan headquarters, with its gold dome and oak-paneled offices, symbolizes an era in which things were meant to last, New York Life decided to plunge headfirst into the information age, an era defined by its volatility. The firm is currently engaged in an innovative effort to put a PC on the desk of every agent who wants one. This major corporate commitment, formally known as GOALS (General Office Agent Linkage System), is underscored by a creative blend of hardware and software customization, financing, communications, and training.

In this case innovation represents a change in tactics but not in corporate direction. New York Life's ambitious plans to automate are in sync with its desire to remain among the nation's five largest life insurers. As John H. Stimpson, the company's executive vice president in overall charge of marketing, ac-

For John Stimpson, New York Life executive vice president, and James Driscoll (left), marketing vice president and GOALS tender, installing PCs at the grass roots has been a rousing success.

knowledges, "Aside from policies, we're selling service. People may enjoy shopping for automobiles and comparing eight different models, but most people don't enjoy comparing eight different insurance companies, or eight different policies from the same company."

New York Life sees personal computing as a means of obtaining a competitive edge in the industry while enabling agents to cut through the drudgery of calculating policy options. Thus liberated, agents can devote more time to selling insurance. So far, this venture into uncharted waters has paid off, not only in participation among agents but in dramatically rising sales curves for some program participants.

In sign-ups alone, GOALS has far exceeded initial expectations: nearly 3000 of the company's 10,000 agents are participating. Systems continue to be shipped to agents at a rate of about 15 to 20 per week. But GOALS' success lies less in its numbers than in the way it has cushioned agents from the future shock that so frequently accosts novice computer users.

Encouraging Entrepreneurs

The New York Life endeavor would be noteworthy if it merely involved outfitting the home office with truckloads of PCs. In this case, however, the home office isn't the target. Instead, there's a distinctly grass roots cast to GOALS. What makes the project remarkable is the entrepreneurial nature and geographic dispersal of New York Life's sales force.

At New York Life, agents are independent contractors, not employees. After the company has recruited and trained them, agents are on their own. They establish their own offices, which they run with a high degree of autonomy, and procure their own office equipment. Essentially, then, the GOALS nerve center in Manhattan is dealing with thousands of idiosyncratic small businesses.

Since its inception GOALS has lured participants with attractive financing. Working with Whirlpool Acceptance Corporation, New York Life arranges for bulk, discounted purchases of hardware; the down payment is $250 and agents have three years to pay at a meager 6 percent annually. That's almost a no-risk investment, even for those who aren't convinced that increased productivity will recoup the outlay.

New York Life is embracing PCs in a highly calculated way. For now, the firm is not slipping *Multiplan* to every agent in need of a spreadsheet or sliding *dBASE* disks under doorjambs. These and most other off-the-shelf packages are conspicuously–and deliberately–absent from GOALS. New York Life is zeroing in on customer service and is sponsoring the (largely) proprietary software that supports it. Conversely, GOALS is soft-pedaling specific housekeeping or productivity tools in favor of leaving such acquisition and training decisions to the agents themselves. The reason has to do with which side of "the counter" you're on. The "counter" metaphor carries great weight within the company; it refers to the distinction between direct sales (in front of the counter) and back-office (behind the counter) tasks.

Taking the Hard Out of Hardware

New York Life's hardware list is short and sweet. Agents going with GOALS can opt for a dual floppy PC or an XT. Every machine is outfitted with 256K, a monochrome monitor, a serial port, and a printer port. Also tossed into the pot are a Hayes modem and an IBM graphics printer. Agents interested in snappier output can request a Toshiba 1351 high-quality dot matrix printer or a NEC 3550 letter quality printer.

Although the company offers both the PC and the XT, an overwhelming majority of agents have opted for the XT, and most of the program's training and support systems have been created with that machine in mind. The XT, of course, presents a few challenges of its own, notably disk organization and backup chores. Still, with an assemblage of standard GOALS software dispersed among some 20 floppy disks, the logic of acquiring an XT has proved inescapable.

Screen 1: A homegrown batch file sets up the GOALS main menu.

```
          NEW YORK LIFE INSURANCE COMPANY
                GOALS MAIN MENU

     PROGRAMS                        UTILITIES

A = Asynch Communications       B = Backup Utilities
C = Client File                 F = Format Diskettes
I = IWS/Series1                 L = Load Software
S = Sales Illustrations         P = Dial Phone Book
T = Target Life Illustrations   R = Restore the Hard Disk
W = Word Processing

ENTER ONE OF THE ABOVE OR ANY DOS COMMAND AT THE C> PROMPT.
```

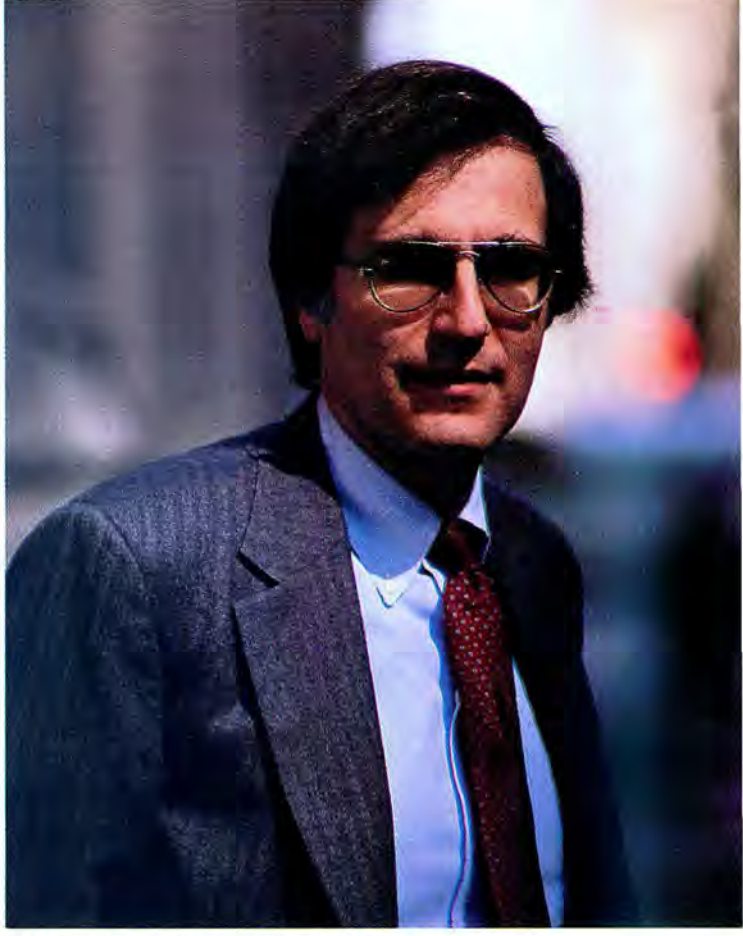
The GOALS setup disk includes a series of batch files written by the company's technical staff; one batch file formats and partitions the XT's hard disk, loads DOS, and displays a main menu itemizing each program in the GOALS package (see Screen 1). Other batch files on the setup disk assist in copying application programs to the XT's hard disk and adding to hard disk storage. The word processing batch file is effortlessness itself; invoked by striking *W*, the routine clears the screen, copies the client file merge document to the word processing directory, adjusts the word processing directory, begins word processing, and recalls the GOALS main menu when word processing is concluded.

A Compleat Package

If the cliché that software determines hardware is true, then the heart of the GOALS project is the collection of programs that New York Life has assembled for its agents.

The two familiar names here are *MultiMate*, the popular word processor that, ironically, was born at Connecticut Mutual Life, and the *IBM Asynchronous Communications Support* program, version 2.00, used primarily to pass data to agents from IBM Series/1 minicomputers in the hinterlands and New York Life's mainframes in Clifton, New Jersey. New York Life also enlisted several software developers to customize or create products for the GOALS program. Informatics obliged with a client file data base management system that enables agents to track a maximum of 2000 clients and 6000 policies. Meanwhile, Sigma, CompuTone Systems, and R&R Newkirk prepared sales illustration packages. In all cases, the guiding principle of software selection was ease of instruction and use.

For *MultiMate* and the IBM communications program, New York Life bypassed the increasingly popular practice of site licensing–paying a flat fee for the right to copy a program–in favor of single-copy purchases. Other than writing the XT setup routines, New York Life's only in-house tinkering consisted of patching IBM's communications program to make it friendly and to ensure that it meshed with the company's telecommunications procedures.

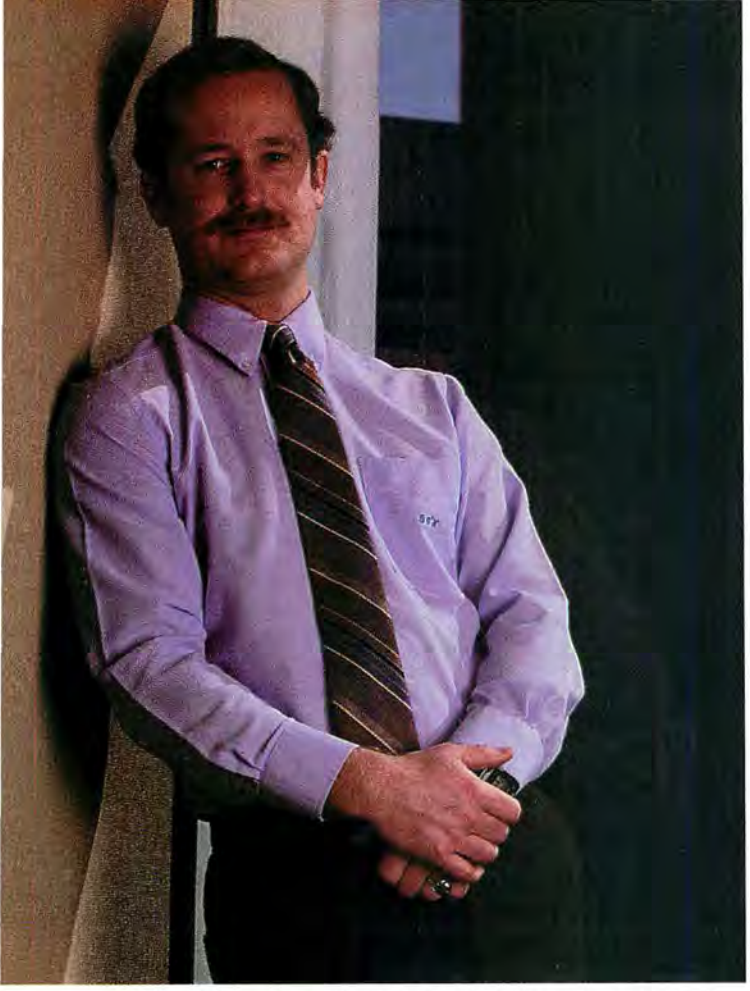


Marketing assistant vice president Victor Mutnick, a GOALS enthusiast, predicts a continued rise in the number and sophistication of program participants.

The Soft(ware) Sell

It is in front of the counter, where sales are made or delayed, that GOALS truly excels. Indeed, the hefty sales illustration/case study component appears to be validating the entire experiment (see Screen 2). A third participant is now part of the sales equation: agent and prospective client meet in front of the XT's monochrome monitor, feeding the machine the necessary vital statistics (income, debts, number of dependents, mortgage data, investments, and so on). In seconds, they both view a full picture of the appropriate policies and policy options. Alter any variable, or introduce a new one, and the picture changes immediately.

Before GOALS, agents were forced to retreat to the company mainframes for such calculations, and obtaining results as early as the following day was evidence of divine intervention. Agents occasionally found that a sale delayed was a sale denied, so it's no surprise that the PC-based "what if" game has become a hit among participating agents. "This makes



GOALS trainer Gary O'Neill helps tame the technology for often-wary New York Life agents.

our agents much more powerful," says New York Life assistant vice president Victor Mutnick. "It gives them the ability to be more independent–they don't have to rely on the home office to prepare a sales illustration."

Just a Call Away

Thanks to GOALS, however, the home office may come to expand the agents' role in the field to an unprecedented degree. The communications component is currently running behind the sales programs in popularity, but that situation is certain to change in the months ahead.

As the *L,* for "linkage," in the GOALS acronym suggests, every participating agent has access to the company's mainframes, whether or not the agent's office has a Series/1. For the most part, the agents initiate the flow of data to and from the home office and the general sales offices.

This measured approach to communications is proving a boon to agent and company alike. Properly equipped GOALS participants can use the Clientfile Download option to dial up master files on the company's mainframes in New Jersey (or place a local call to a Series/1 mini), retrieve client information, then feed it to their data bases. Such on-line data might include the current account balance, the status and value of a policy, the premium payment date, or the last dividend. Data security is enforced through the use of two levels of access codes, provided to GOALS agents by the program's technical staff.

Mutnick explains that the company is weighing a pilot program that will enable agents, through GOALS, to key in new policy information or changes directly to a mainframe. When that occurs agents will not only have instantaneous access to a client's policy, they'll be the primary link in keeping client data current.

A Question of Support

To paraphrase the old adage, how can you keep 'em down on the farm once they've seen *1-2-3?* Given the specific aims of GOALS, New York Life is grappling with that very question. Some newly computer-literate agents, bent on discovery, are using products that have not received the program's blessing: Hewlett-Packard laser printers, *WordStar, dBASE II,* and certainly, *1-2-3.* According to James P. Driscoll, New York Life vice president and head of the GOALS project, "We're taking the position that our umbrella opens just so wide, and we can't give something official support if it turns out to be inconsistent with the program."

Within GOALS, support has both technical and procedural ramifications, and this is where the "counter" metaphor fits in. The sales illustration programs and client files exemplify front-of-the-counter thinking. *1-2-3* and *SuperCalc 3* may be technically satisfactory for agents, but as behind-the-counter applications they don't garner official New York Life support. And that means there's no need to bother consulting the GOALS hot line about fixing a wayward *1-2-3* macro.

They Want to Hold Your Hand

If the technicians at New York Life had their way, the PC would even turn itself on. The GOALS program has elevated hand-holding to an art through an elaborate training and support system.

Every last cable and clip bound for an agent passes through the GOALS office in New York. There, the computer is unpacked, "burned in" (left on for 24 hours), and connected to a printer and a modem. If boards or chips must be added or motherboard switches reset, GOALS techies do it. When the complete system passes muster, staffers color-code all cable connections, making assembly trouble-free.

A cynic might accuse New York Life of coddling, since every menu and prompt assumes absolutely no prior knowledge of computing–but it's paying off. Agents, after all, are accomplished salespeople, but few had orchestrated a <Ctrl>-<Alt>-<Del> movement before the XT arrived. Mutnick estimates that fewer than 1 percent of all participants have complained about GOALS' elementary tone–or its hardware. Bill Adler, an active GOALS user in Phoeniz, Arizona, describes the client file system as "cumbersome" and claims that it doesn't contain enough fields, but he sees this as a rare glitch in an otherwise effective package. (GOALS listens too: New client file software is on the way.) "I consider myself a born-again insurance agent," he says enthusiastically (for a day-in-the-life look at Bill Adler, see the sidebar "Rising in Phoenix").

GOALS is pitched on the basis of the bucks it can generate, but the secret of the program's popularity may be training. "You can't just send a computer to an agent and say good luck," warns Gary O'Neill. Lester L. Schoenberg, former GOALS head and currently general office manager in Shaker Heights, Ohio, offers this tip: "My principal advice to any company thinking of taking the approach we did is to have a training program in place before beginning, and to make sure that users will have time to really put their hands on the computer."

Some newly computer-literate agents, bent on discovery, are using products that have not received the program's blessing.

New York Life was fortunate to have an accomplished training force of more than 200 professionals who normally introduce newly recruited agents to the intricacies of the insurance business. The very notion of training is entrenched at the company, where most

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POLICY TYPE, PREMIUM, INCOME                                  DEFAULT 2

1.  POLICY TYPE (1=DISABILITY INCOME, 2=INCOME INS.)      _/      1
2.  PREMIUM MODE (1=C&N, 2=QUARTERLY, 3=SEMI, 4=ANN)      _/      1
3.  PREMIUM TYPE 1=LEVEL
                 2=STEP RATE FOR 4A & 3A ONLY             _/      1
4.  NON-SMOKER RATE (1=YES, 2=NO)                         _/      1
5.  LIST BILLING (1=YES, 2=NO)                            _/      2
6.  PAID BY (1=INDIVIDUAL, 2=EMPLOYER)                    _/      1
7.  ANNUAL EARNED INCOME (0-999999)
    999999=CALC. MAXIMUM BENEFIT                          ____/   999999
8.  ANNUAL UNEARNED INCOME (0-999999)                     ____/   0
```

Screen 2: Data entry for the Disability Income and Income Insurance illustrations–a component of the GOALS Income Replacement Proposal System–is a simple fill-in-the-blanks exercise. Note the on-screen listing of defaults.

Rising in Phoenix

Rick Altman

It's shortly after 8 a.m. when the phone rings in the Phoenix, Arizona, office of Bill Adler, New York Life agent and GOALS enthusiast. On the line is Jerry Wilson, a customer who wants to take a second look at his insurance policy. Wilson says his retirement situation may be changing and wonders whether the policy needs updating.

Adler urges Wilson to drive to his office. "Now I have an excuse to tell them to come here," Adler says with a grin. Wilson agrees to stop by.

At 52, Jerry Wilson is at a crossroads. His company has given him two months to make certain retirement decisions, and he needs to know how much life insurance coverage is appropriate. Wilson holds a policy valued at $30,000; Adler estimates that $50,000 would be suitable. These days, however, he doesn't need to rely on guesswork.

Wilson and Adler sit at Adler's desk. Wilson is a longtime friend, but he seems ill-at-ease in dealing with the boxy contraption staring at him. "Here," Adler says, offering his client the keyboard, "type in your name. Go ahead–you can't break it, I promise." Wilson tentatively fingers the keys, making a few mistakes along the way.

"That's one of my favorite tactics," Adler later confides. "Clients get the feeling that they're part of the entire process. Hey, I've walked in their shoes–I know how scary computers can be."

In no time, Wilson's anxiety disappears. He begins to delight in his first foray into personal computing. Having plugged in some personal data, he reluctantly surrenders the keyboard to Adler, who then goes to work. Term or whole life? What's the current value of the policy? What's the balance? How about his wife? Suppose he dies before she does? Any other dependents?

Adler keys in the relevant figures, then sits back as the PC translates seemingly unrelated numbers into meaningful information. It's all there: everything Wilson would want to know about his policy but hadn't thought to ask. "Want to change any of the variables?" Adler poses, but doesn't bother to wait for an answer. He adds a second mortgage to Wilson's home. The picture changes. Wilson's eyes light up; he's like a kid let loose in a candy store. Two hours later, Wilson leaves with a new policy bearing a face value of $200,000.

It's little wonder that Adler now does more than 80 percent of his business in the office (that's up from an estimated 50 percent in his pre-GOALS days), with the XT playing a big supporting role. Adler closes the door and whirls around. "Had I gone to the mainframe with a request for a $50,000 policy, that's probably what I would have sold him–and never mind the $200,000. I would have had to wait overnight for the results, and they might not have been quite right. Had he not accepted the policy, the whole thing might have just died on the vine.

"You know what the difference is?" he asks rhetorically. "Today, I'm a tailor. I used to sell a fine ready-to-wear product. It would fit reasonably well with a few modifications, but it wasn't a custom job. Now I don't have to sell anything off the rack–it's all custom-made."

The GOALS project has left Adler with a pleasant problem–excess paperwork. "I wrote 25 policies in January," he explains. "I hadn't written 25 in one month during my 22 years in the business. But I've never been too comfortable with the books, so I began working on a way to track all the new entries." Adler devised his own tracking system, using *Multi-Mate* and an off-the-shelf data base manager. He customized the entire system and, working with a programmer, is eyeing its commercial potential. He intends to call it *Making Tracs*.

While Adler's initiative is exceptional, he's quick to shift the credit. "I wouldn't own a computer if someone hadn't taken the bull by the horns–doing the homework, going to the suppliers, producing and financing the package. A friend of mine was given a PC at work and kidded me that New York Life should have given me one, too. Well, he left that job and they took his back. I still have mine."

The phone rings again. It's a woman who recently remarried and wants to reevaluate her policy. "Come on in," Adler says, "and we'll play a game of 'What if'...."

agents attend seminars up to two days a week during their first few years in business. Because GOALS required that the instructors themselves return to the classroom, the first challenge was training the trainers.

More than two dozen user groups have sprung up within the company and are receiving strong encouragement from top management.

New York Life quickly established three levels of training. The technical staff in New York–level one–designated 10 people to oversee field training, level two. These 10 converged on New York for three days of intensive hands-on instruction, then went back to their regions to conduct their own training sessions. This field training for some 32 level three trainers-in-training lasted four days. The home office also distributed a disk that walked trainers through the agent tutorial.

Total Training

There's nothing one-shot about the training. O'Neill notes that as GOALS continues to be revised and enhanced, refresher sessions have become a permanent feature. Beyond this formal curriculum, the company offers a number of other handy training avenues.

"Putting It All Together," a 45-minute videotape, portrays system setup from unpacking styrofoam to plugging in and powering up. (If an agent needs a VCR, a call to the nearest general sales office will produce one.) Even as it urges agents to "enjoy the adventure" of computing, the tape is painstakingly specific, illustrating every cable connection and turn of the screwdriver, running through system diagnostics, and devoting extensive time to the thorny matter of printer setup.

GOALS is big on print as well. The *GOALS Gazette,* a monthly newsletter, features troubleshooting tips from users (from how to tell if your hard disk is malfunctioning to when to use DOS's COPY and DISKCOPY commands), news on software updates, and articles on training strategies. Indeed, PC fever is virulent; more than two dozen user groups have sprung up within the company and are, according to Driscoll, receiving strong encouragement from top management.

But the most important bit of training/support is surely the GOALS telephone hot line. Based in the company's New York office, the hot line is staffed by six technicians who handle 100 to 150 calls daily.

Being the Last on the Block

As more agents give GOALS a try, New York Life may be dodging an unexpected bullet: Is the program really "voluntary" if so many of one's peers (and potential competitors) are involved? Does an agent move closer to becoming an outcast by not joining in? GOALS chief Driscoll steadfastly maintains that agents who haven't signed on are not held in lower esteem or regarded as less committed to the job. The company has installed several "community" PCs in its more than 220 local offices, presumably so agents currently without computers can discover what all the fuss is about.

For the ambivalent, the days of indecision may be numbered as GOALS becomes increasingly easy to use. System managers are involved in an ongoing purge of commands that even remotely resemble computer syntax. Last year, starting a program required typing *S V* <Enter>; today, an agent need only touch the <Space> bar. O'Neill envisions a plan in which agents invest in lap computers to take on visits to clients. From a client's office the agent could dial up a New York Life mainframe and download files and illustrations immediately.

Dollars Make Sense

Bill Adler was wary at first. A veteran of New York Life since 1962, he initially had trouble accepting the then-$6500 investment. "The last major purchase I made was my desk and chair 20 years ago," he says. "But then I began to ask questions and look at the figures. At the monthly rate for the XT, I realized I could pay for the computer by selling just one more policy a month for the next three years." He sold considerably more than that. Adler's gross income doubled; sales of policies swelled to 86 in 1984, up from 44 the previous year.

"What we preach is that the computer involves time," says Gary O'Neill. "In the beginning, when they're learning the system, they're not going to be as fast, and during the first month a lot of agents really do want to throw the machine out, even with all this support. But by the second month, we couldn't dislodge it from their offices with dynamite."

Lindsy Van Gelder is a freelance writer and a contributing editor for Ms. *magazine who lives in New York City. Research assistance on this article was provided by Rick Altman.*

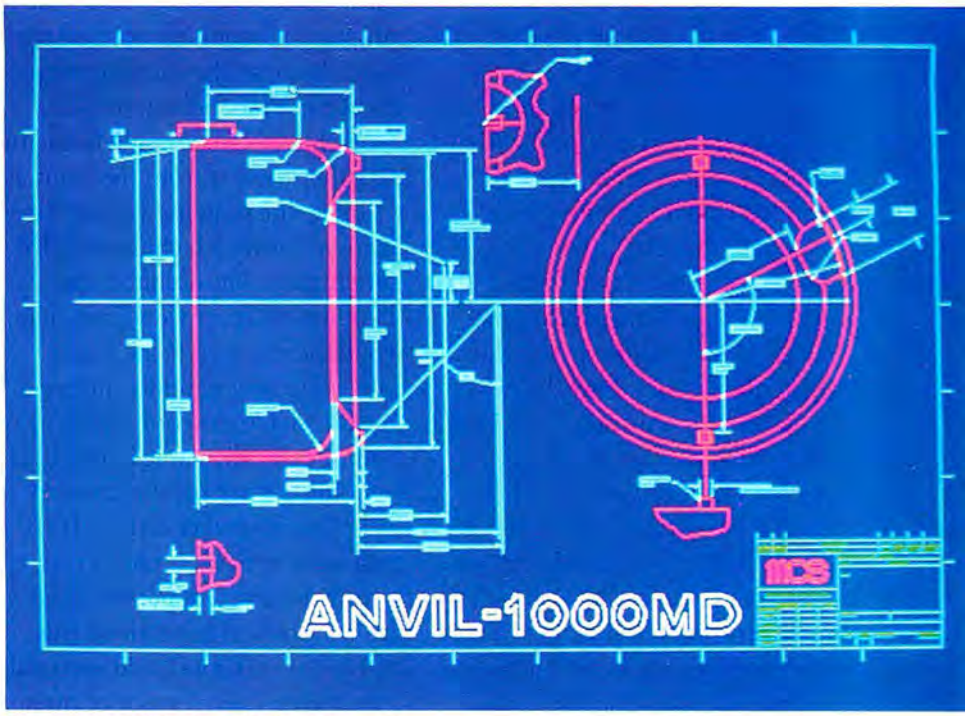
IBM Asynchronous Communications Support
IBM
Systems Products Division
P.O. Box 1328
Boca Raton, FL 33432
800/447-4700
List price: $60
Requirements: 64K, one disk drive, modem

MultiMate
Multimate International
52 Oakland Ave. N
East Hartford, CT 06108
203/522-2116
List price: $495
Requirements: 256K, two disk drives

Dynamic Design

PC-based computer-aided design is bringing the convenience and productivity of personal computing to new segments of the marketplace and pushing back the boundaries of graphics technology. Here's a cross section of innovative applications of computers in design.

Janette Martin



Screen 1: This detail drafting of a foam insert was produced using Anvil 1000MD. Note that the program generates dimensioning on all five views.

Bob Bilbrey, mechanical engineer with 25 years at the drafting board, has all but given up his rulers and hand drafting machine. Bilbrey has spent the past two years teaching himself to design and draft on a PC. His advice to engineers who have yet to take the leap into computer-aided design (CAD) is short and simple: "Do it!"

The relatively low cost of CAD systems is swelling the ranks of those who design by computer. For large companies, running CAD systems on PCs can free up minis and mainframes for other work. For independent designers and engineers, the new systems make it possible to place competitive bids for jobs and produce high-quality work quickly.

PC-based CAD software is finding its way into the hands of professionals whose applications vary as widely as their interests. Landscape designers, architects, technical illustrators, theatrical designers, television and film animators, and even artists are all putting aside their Rapidograph pens in favor of drawing by mouse, joystick, and keyboard. Currently, mechanical engineers and designers account for about 50 percent of all CAD users.

According to Davis Inc., a Washington, D.C.-based consulting firm, 250,000 organizations and more than 2 million graphic artists are potential users of computer graphics in the commercial art marketplace. By 1990, the study predicts, more than 20 percent of all artists, designers, and draftspeople will be using computer graphics regularly to produce commercial art, constituting a mass market.

CAD Primer

CAD is a special type of graphics software written to do more than produce bar graphs and pie charts from spreadsheets. It's related to several other types of software: CADD (computer-aided design and drafting), CAE (computer-aided engineering), and CAM (computer-aided manufacturing). CADD software lets you design objects and draft the design on a plotter or a printer. CAE performs such analyses as calculating stress factors and volumes of objects; it transforms drafted material into hard copy. CAM, not yet widely available for PCs, provides subsequent "machining" of a design through a direct link between the computer running the CAM program and devices such as milling equipment.

Architects, illustrators, animators, and artists are putting aside their Rapidograph pens in favor of drawing by mouse, joystick, and keyboard.

CAD programs are designed to represent images in either two or three dimensions. The 2-D approach, which is far more common, enables you to trace or draw any object you could represent on a piece of paper; 3-D programs let you create an object with height, width, and depth on screen, then work on it from any perspective.

It's easy to see why designers are excited about personal computer CAD systems. CAD's wide-ranging functions are particularly useful because they closely mirror the conventional design process. An architect can design a house in 3-D, then view it from the front as a simple line drawing with all lines exposed (using a technique called wire frame). The architect can then remove from view lines that would not be seen if the house were solid (using hidden-line removal); shade the roof (cross-hatch); color the garage door blue (solid fill); mark off the chimney and make it smaller (scale); turn the house around (rotate) to view it from a corner, in perspective; use windows to focus in on the corner eaves (zoom), and even pull a drainpipe from a stock of often-used symbols (library) and install it under the eaves.

Although not every microcomputer CAD system includes this battery of features, CAD is extending designers' ability to create alternatives and reproduce repetitive images quickly.

Relief for the Drawing Bored

At his Motion West office in Berkeley, California, Bob Bilbrey uses a mouse and *AutoCAD* to create mechanical designs on his PC. The mouse itself is a product of the CAD process. Bilbrey estimates that the CAD system in his office speeds design and drafting by 30 percent. As a bonus, the plotted result is cleaner and looks more professional than if rendered by hand; clients are impressed by such high-tech efficiency.

Necessity Is an Inventive Mother

In late 1984 IBM released its Professional Graphics Display and Controller, setting the stage for powerful new CAD software. Manufacturing & Consulting Services (MCS) was among the first companies to provide a product that takes advantage of IBM's new hardware–*Anvil 1000MD,* a 2-D CAD system optimally suited for the PC AT but usable on a PC XT equipped with an 8087 math coprocessor. *Anvil 1000MD* is a scaled-down version of MCS's 3-D CAD/CAM systems, which have run on minicomputers and superminis for more than a decade (see Screen 1).

Nathan Stewart, a mechanical designer with Racal-Dana in California, has been using *Anvil 1000MD* on a fully loaded XT for just a few months. Stewart designs instrumentation housings and electromechanical packaging. The company was forced to look into microcomputer CAD when faced with a pressing deadline for a large design project. By itself, the company's minicomputer CAD system could not get the job completed on time, yet the cost of purchasing another mini was prohibitive.

Stewart had no previous computer experience, but he did have ten years of drawing board experience. After 60 hours using *Anvil,* he was producing complex, detailed figures equivalent to those

Cinematte's Robert Dohrendorf (left) and James Byfield relied on Artwork to generate a 3-D wire frame of a Black and Decker hand drill.

he could do by hand. He estimates that the system enables him to work about 25 percent faster and predicts he'll save even more time as he gains experience with the system.

Industrial-Strength CAD

Mike Mehlhaff, president of Automated Graphics Systems (AGS) in Benicia, California, has worked in CAD for the past five years but became involved with PC-based CAD only a year and a half ago. Mehlhaff's program of choice is *CAD Master,* which AGS uses to design and draft pipeways, electrical systems, and enclosures for control systems in petrochemical plants.

Mehlhaff is especially impressed with his CAD system's quick redraw time, line-arc editor, and circular grid, which is useful in the design of piping. Building on the program's basic features, he has customized *CAD Master* for specific applications such as mechanical piping design. AGS sells the customized add-on programs to other companies.

A landscape design program that uses *CAD Master* as its core is due out this year. The program will enable designers to draw an environment and then test the cost-effectiveness of various sprinkler system configurations or select and place plants according to their growth pattern. A designer can determine, for example, whether in five years a specific plant will throw too much shadow over a sun deck.

Shade and shadow studies are also an important part of an architect's CAD work. A proposed building must be viewed with sun positions calculated for different seasons and times of day to see whether the structure will interfere with someone else's access to the sun.

By simulating an environment and taking snapshot views of dynamic processes, CAD helps architects avoid the duplication of existing microclimatic sore spots like the chilly wind-tunnel canyons found in some urban financial districts. As a result, architecture is entering an era of technology in which computers will help designers make better building decisions.

The architecture department at the University of California at Berkeley plans to put PC XTs equipped with *AutoCAD* and *Versacad,* a professional quality 2-D

CAD program, in students' hands. The aim is to expose students to the CAD systems they are likely to encounter on the job. The department's decision to buy XTs rather than dedicated CAD workstations was primarily economic, but the versatility of PC-based systems–their ability to run a CAD program one afternoon and word processing or accounting software the next–will make them a clear winner for small architectural firms.

Creativity Unleashed

Even if CAD were used only by mechanical engineers, landscape designers, and architects, it would rank among the most significant PC applications. But CAD programs are proving to be as versatile as duct tape, with apparently unlimited applications. Although these systems are often hailed for such specialized features as auto-dimensioning, tolerance setting, schematic layering, and automatic bill-of-materials generation, their real strength is their general utility. Anyone who needs to draw objects, move them around, change them, take them apart, and put them back together will find CAD not only a time-saver but a catalyst for creativity.

Technical illustrator George Omura of Omura Illustration in Albany, California, designs company logos, product brochures, and science textbook illustrations of flasks, tubes, and other laboratory paraphernalia.

Demonstrating his system–*AutoCAD* on a Leading Edge PC with a hard disk–Omura draws a triple-beam scale and zooms in on one of the beams to mark and number each unit of weight. With *AutoCAD* he can generate and compare many such designs before committing one to paper on his Hewlett-Packard HP 7475 plotter. Doing the same comparison by hand would be difficult, if not impossible, under deadline constraints.

Screen 2: Cinematte of San Francisco created this image with Artwork.

Theatrical Plotting

Mike Brooks designs theatrical stage sets at the University of Nebraska's dramatic arts department in Omaha, using *Microcad*, a 3-D CAD program, on a Compaq with a Bausch & Lomb DMP-42 plotter. He designs on-screen wire frame models of stage props and then groups them for viewing in various perspectives until he and the director agree on a specific integrated set. Brooks then drafts plans of each prop for the construction crew.

By creating his own symbol libraries, Brooks can easily display such stock stage set pieces as stairs, flats (vertical surfaces), and platforms (plywood rectangles used to raise floor levels). The flexibility made possible by electronic design, says Brooks, breaks down creative barriers, making it easy to create and change designs. He predicts the adoption of CAD systems in theatrical stage design courses and possibly for costume design as well.

Moving Pictures

At Cinematte in San Francisco, company president Robert Dohrendorf bought a PC and West End Film's 3-D CAD animation program, *Artwork*, for jobs such as television station identification spots and product advertisements (see Screen 2). Given TV's compressed deadlines, CAD is becoming a competitive necessity.

Screen 3: Berkeley artist Margaret d'Hamer used Polycad/10 to create these three-dimensional images.

"It took three months," says Dohrendorf, "to figure out we didn't know what the hell we were doing." By the fourth month the crew had the system flying, and Dohrendorf's faith in personal-computer-based CAD began to pay off. Together with animation consultant James Byfield, Cinematte produced a Black and Decker hand drill advertisement in just four days.

In the ad, the hand drill moves across the screen in fully detailed 3-D wire frame. Byfield uses *Artwork*'s draw mode to model an object and then uses the move mode to animate it. To create the effect of movement through space, the scale of the object is adjusted frame by frame. Cinematte uses a photographic processing machine to produce line negatives of each plotted frame–24 frames for each second of finished animation. The negatives are then photographed with a 35mm film animation camera whose movements are programmed on an Apple computer. Prior to shooting, the crew can also show roughs of the animated commercial frame by frame on screen, enabling clients to request changes before frames are photographed.

Computer-Aided Sci-Fi

Personal computer CAD has had dramatic impact on the film industry as well. Richard Hollander, John Wash, Rhonda Gunner, and Gregory McMurry are partners in Video Image, a Los Angeles company. Using PC XTs, *Polycad/10* 3-D CAD software, *Lumena* graphics software, and an in-house program fondly named *HAL*, the company produced the images displayed on the instrumentation panels of the spaceships in the movie *2010*. The system was also used to create images for *Starman*.

Animated views of the spaceship *Leonov*, which appear on the ship's own screens in *2010*, required the longest design time.

Using actual blueprints of the *Leonov*, the crew produced frame images that could be transferred to 35mm film, animated, and displayed from various angles. Other graphics within the ship show information such as the crew's daily schedules in Russian.

CAD for Art's Sake

Back on planet earth, Margaret d'Hamer uses *Polycad/10* to express her creative fantasies (see Screen 3). By day d'Hamer teaches photography and visual studies at U.C. Berkeley, but when working at home, she can try out a new idea on her system even if the muse happens to call in the middle of the night.

Although her computer literacy is the product of self-instruction, d'Hamer pushes *Polycad/10* to its limits, using it not only as a tool but as a source of inspiration. d'Hamer doesn't agree with some of her colleagues, who feel that using a computer puts distance between the artist and the finished

work. She sees the relationship between the artist and the computer as akin to the photographer's interaction with a camera. Speaking not only for artists but for all who use computers to aid in their creative designs, d'Hamer confesses to being "thrilled–I just can't imagine living in a more exciting time."

Janette Martin is a Contributing Editor for PC World. *She specializes in PC training.*

Software

Anvil 1000MD
Manufacturing & Consulting Services, Inc. (MCS)
9500 Toledo Way
Irvine, CA 92718
714/951-8858
List price: $2995
Requirements: 640K, two disk drives, IBM Professional Graphics Controller, IBM Professional Graphics Display, game control board, Kraft Joystick or equivalent; with AT, 80287 coprocessor, DOS 3.00; with XT, 8087 coprocessor, DOS 2.10

Artwork
West End Film, Inc.
2121 Newport Place NW
Washington, DC 20037
202/223-2938
List price: $495-$2450 (depending on graphics board used)
Requirements: 256K, two disk drives, graphics board

AutoCAD
Autodesk, Inc.
2320 Marinship
Sausalito, CA 94965
415/332-2344
List price: $1000-$2000 (depending on option purchased)
Requirements: 384K, two disk drives, DOS 2.00, graphics board; hard disk, 8087 coprocessor, high-resolution monitor, mouse or digitizing tablet recommended

Caddraft
P-CAD Personal CAD Systems, Inc.
981 University Avenue
Los Gatos, CA 95030
800/882-7535, 408/354-7193 California
List price: $495
Requirements: 256K, IBM Color/Graphics Adapter, color monitor; hard disk, mouse or digitizing tablet recommended

CAD Master
Datagraphic Systems
9101 General Dr.
Plymouth, MI 48170
313/451-7025
List price: $2495
Requirements: 512K, two disk drives, DOS 2.10, monochrome monitor and monochrome board, graphics monitor and graphics board; hard disk, mouse or digitizing tablet recommended

Microcad
Imagimedia Technologies, Inc.
7650 Geary Blvd.
San Francisco, CA 94121
415/387-0263
List price: $500 and up (depending on options purchased)
Requirements: 256K, two disk drives, graphics board, color or monochrome monitor with Hercules board

Polycad/10
Cubicomp Corp.
3165 Adeline St.
Berkeley, CA 94703
415/540-5733
List price: $11,900 (includes frame buffer)
Requirements: 512K, two disk drives, 8087 coprocessor (with AT, 80287 coprocessor), monochrome or graphics board, high-resolution RGB monitor (connects to Cubicomp's frame buffer); hard disk, two monitors recommended

Versacad
T & W Systems, Inc.
7372 Prince Dr. #106
Huntington Beach, CA 92647
714/847-9960
List price: $1995
Requirements: 192K, two disk drives, IBM Color/Graphics Adapter, multifunction board with two serial ports, digitizing tablet or joystick, Houston Instrument DM/PL series or Hewlett-Packard HP-GL series plotter; 320K, 8087 coprocessor, a color and a monochrome monitor recommended

Hardware

HP7475A Plotter
Hewlett-Packard
16399 W. Bernardo Dr.
San Diego, CA 92127
619/487-4100
List price: $1995
Requirements: serial port

DMP-42 Plotter
Houston Instruments
Division of Bausch & Lomb
8500 Cameron Rd.
Austin, TX 78753
512/835-0900
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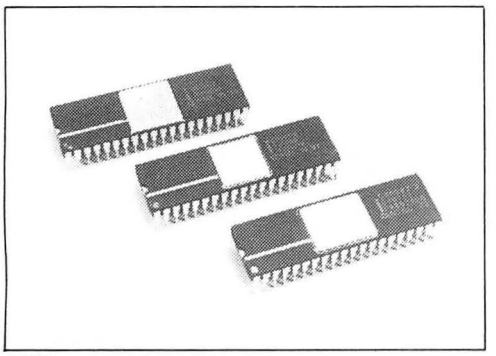

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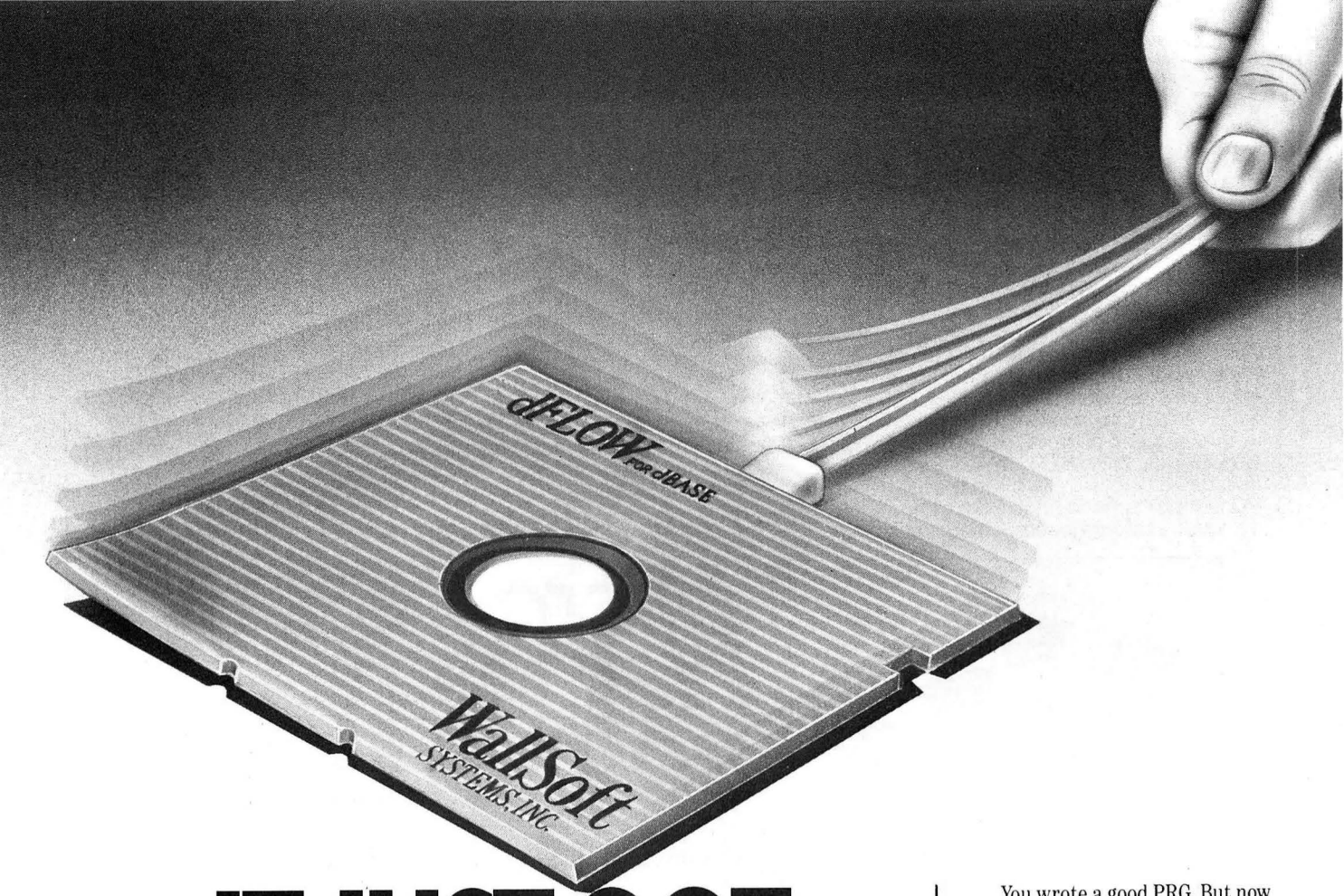

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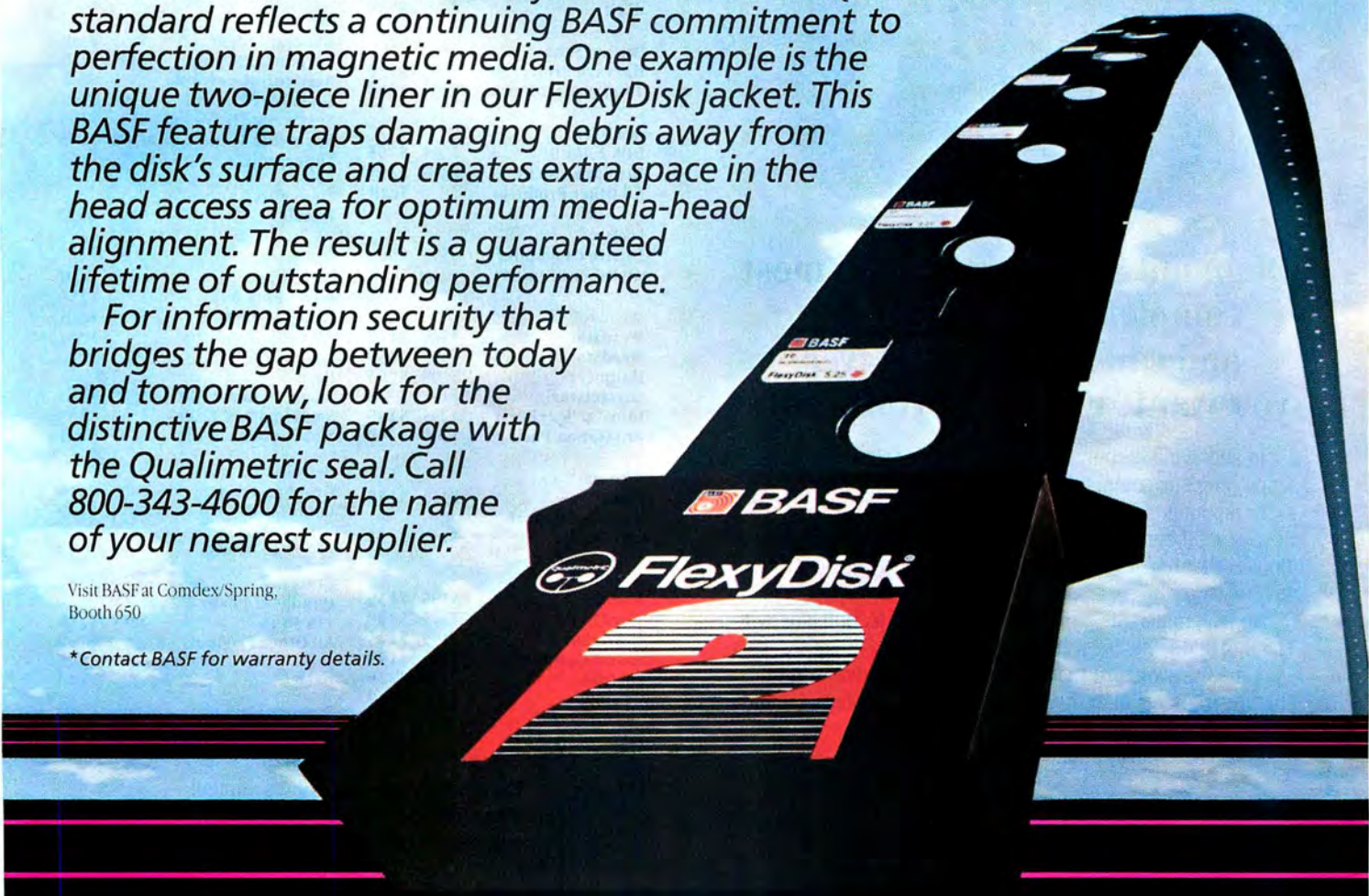

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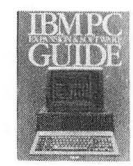

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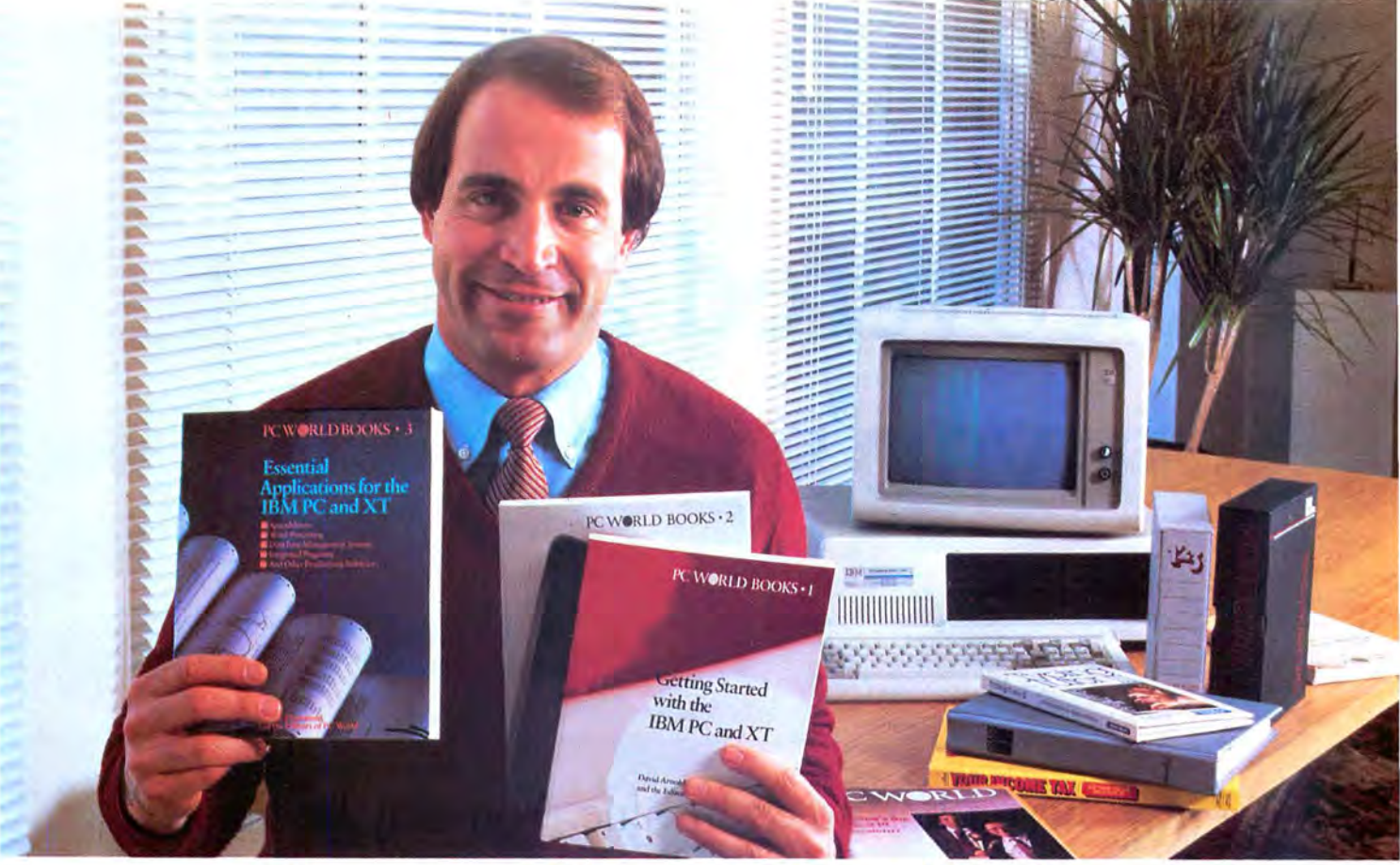

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Inertia has no cash value. You may be financially savvy in the abstract, but try this quick quiz: What's your monthly cash flow? How liquid are you? How near are you to a budgetary precipice? What's your tax bracket? (Shall I go on?)

Fortunately, there's hope for those of us who have customarily counted on serendipity to order our monetary houses. *Financial Independence,* from discount broker Charles Schwab & Company and Multisoft, is a very capable—and relatively inexpensive—antidote to inertia of the fiscal kind. The package addresses so many aspects of personal financial life, it looks as though Schwab stuffed the proverbial ten pounds into a one-pound bag.

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The Schwab knapsack is brimming with tools for personal budgeting, tax planning, technical and fundamental stock market analyses, portfolio management, and in a module called Goal Analyzer, evaluation of alternative investments. *Financial Independence* is primarily geared to those just beginning to manage personal finances, but tosses a few bones to the financially seasoned (see the sidebar "A Conversation With Charles Schwab").

Criteria to Live By

The most versatile personal accounting and money management packages automate check ledgers, budgets, and net worth statements. Such software should also handle automatic monthly and recurring transactions, monitor multiple money accounts (cash, checking, IRAs), compare actual to budgeted expenditures, print checks, permit variable budget amounts each month, and split transactions among various categories. The better programs generate income and expense reports, asset and liability statements, lists of tax-deductible expenses, and net worth and net cash flow reports (see "Holding Yourself Accountable," *PCW*, Vol. 2, No. 13).

Financial Independence satisfies each of those criteria and many more. On the other side of the ledger, however, it relies on a cumbersome menu structure, is bound by some apparently inviolable limits on transaction categories, offers minimal online help, and is sluggish in retrieving and formatting data. In addition, its stock module is apt to hand novice users much more than they bargained for.

The Integrated Approach

Integration may be the most salient feature of *Financial Independence*. The program consists of four distinct miniprograms, three of which communicate with each other when they have something to say. In order of appearance, the components are Budget Manager, Stock Manager, Tax Estimator, and Goal Analyzer. With the exception of Goal Analyzer, these elements draw data from each other automatically, eliminating the need to key in information repeatedly. An adjustment to one value is reflected throughout the program in the appropriate places.

This is integration of a different stripe than that found in programs like *Symphony*. You don't manually transfer entire reports or files between modules. However, for integration to work smoothly, you must be scrupulous when assigning names to budget categories. That's because each module checks the name of the category to determine whether data should be transferred to a sibling portion of the program. Boat expenses, for example, aren't ordinarily tax deductible and won't be picked up by the Tax Manager unless you designate them as a business expense. Although this kind of integration brings with it some slight rigidity, it's a small price to pay. Overall, the program massages data nicely and provides solid information about the firmness of the financial ground you tread.

All *Financial Independence* modules are menu-driven, relying on the <Space> bar and the cursor keys for movement around and through a series of menus. Filling in every last category and subcategory does take some time, and there is no convenient way to override the menu tree. Curiously, although not an import from the CP/M world, *Financial Independence* makes no use of the PC's function keys.

The program consists of four distinct miniprograms, three of which communicate with each other when they have something to say.

The *Financial Independence* start-up disk is copy protected, but the program can be installed on a hard disk fairly easily. Obviously, hard disk installation eliminates the bothersome process of juggling the program's seven disks, but it doesn't speed things up tremendously. Moving within a module or between modules can be irritatingly slow. Though *Financial Independence* isn't quick, at least it's courteous: it issues an occasional 'thanks for waiting' message.

Balancing the Budget

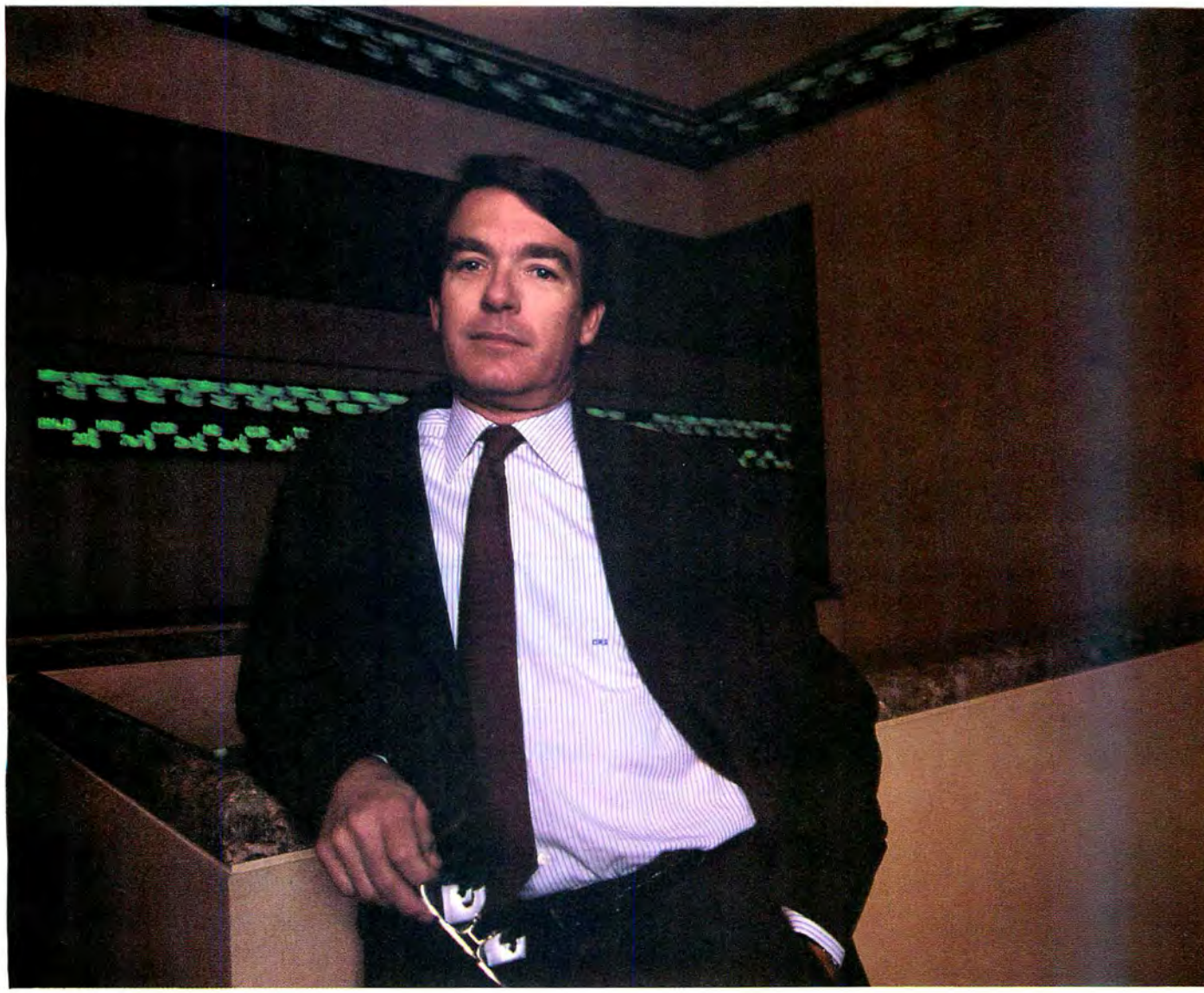
Budget Manager isn't as much fun as the other components, but its scope designates it as first among equals in the package. It's also the logical starting place for any user.

The best personal budgeting packages help you organize data, then derive projections and reports from it. No program, unfortunately, is capable of short-circuiting the initial, laborious process of collecting paper and keying in numbers from canceled checks, credit card bills, mortgage payment receipts, and so on. Using Budget Manager takes some diligence, and you'll have to save receipts from every expenditure and enter the information daily, weekly, or monthly, according to your preference.

As with most personal accounting programs, you create categories of income and expenses and fill them with actual or projected expenditures. Budget Manager enables you to track nearly 150 accounts and enter a total of 1100 transactions. But size isn't the story here: The ease with which you select categories and enter data is what sets this component apart.

When it's time to fill in the details, the Budget Manager menu tree mixes its metaphors, using a window-like motif to suggest budget categories. The module is organized around seven broad account

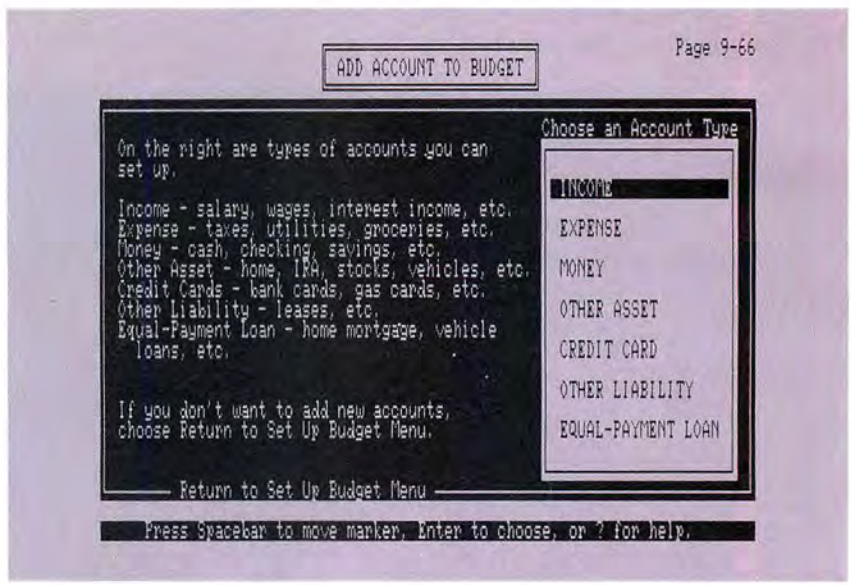
Framed by an electric stream of ticker symbols, Charles Schwab pauses in the lobby of the new San Francisco highrise that bears his name.



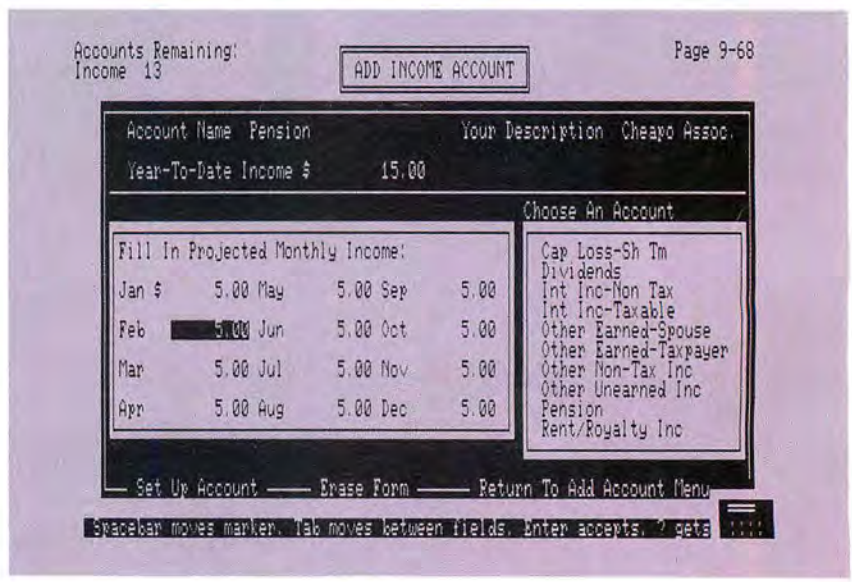
types: Income; Expense; Money (cash, checking accounts, savings, and so on); Other Asset (home, stocks, cars); Credit Card; Other Liability (for example, leases); and Equal-Payment Loan, such as a mortgage (see Screen 1).

Selecting an Income account from this array, for instance, opens a window that lists Income subcategories, such as Alimony Received, Business Income: Spouse, and Business Income: Taxpayer. Striking the <Space> bar produces a list of additional subcategories–up to 20 under Income alone (see Screen 2). There's a do-it-yourself quality to the account creation process: for each account you can use a 14-character field to identify its owner or special nature; there's also a 12-digit field, excluding decimals, for monetary data. If you don't assign a specific name to your subcategory, the program defaults to the name of the category (that is, Liability #1 rather than Liability: Lease).

Financial Independence arbitrarily assigns each of the seven primary account categories a total number of accounts and transactions (see Table 1). The program keeps tabs on that total with a counter in the upper left corner of the screen. When the allotment of accounts is used up, you can make room for new accounts only by deleting old ones; the limits are inherent in the program's architecture rather than related to disk space.



Screen 1: The Budget Manager's Add Account menu is the backbone of that module, enabling you to structure your financial housekeeping around the seven major account categories.



Screen 2: This step in the budget process lets you home in on a specified type of income account, identify it to your liking, and extrapolate totals for the balance of the year.

The virtue of this fill-in-the-blanks approach to budget development is the comprehensive nature of the program's predefined subcategories. Try as I might, I was unable to concoct an expense for which I did not find an existing category. Even if I'd come up empty, I'd just have needed to think of a new subcategory name. Equally important, the division of the account pie is strictly up to you; checking accounts, for instance, are limited only by the total number of accounts in the Money category.

Where program flexibility is concerned, however, it's possible to have too much of a good thing. *Financial Independence* lacks an error-detection feature–that is, a means of recognizing or aggregating accounts with similar names–so there's nothing but your memory stopping you from giving different accounts identical titles.

Tallying Transactions

Dollar values can be entered into the budget individually or, if they are repetitive monthly figures, automatically. Budget Manager adeptly handles both recurring variable and equal-payment outlays. Should your monthly expenses or income change, you can write over the automatic entry for each month as needed. Appending an automatic transaction can be trying, however, since there's no means of scrolling through the list.

You can also split a transaction among several budget categories–that is, one entry can be broken down under different expense headings. When amortizing a loan, for instance, the program records the transaction in the Loan Account: Home Mortgage and Interest Expense Account: Home Mortgage columns.

For most categories, you can enter current or year-to-date balances. This is a nice touch if you begin budgeting in June and would rather not rehash all the income and expense transactions since January. If you're starting at the beginning of the year, Budget Manager will project your monthly income for the year by extrapolating from the January forecast.

Collecting all this information won't do you much good if the program doesn't create useful output. Budget Manager does yeoman's work in producing and printing dandy summary reports of your net worth, projected monthly cash flow, income, and expenses, as well as a list of the year's transactions. You can exult or anguish over a monthly or yearly summary of one account or a year-to-date summary of all accounts. Particularly impressive is Budget Manager's ability to generate reports that include such items as check numbers and dates, tax status, names of the accounts from which or to which payments were made, and running balances calculated after individual transactions. These records form an effective audit trail.

If you find numbers too dry, *Financial Independence* graphs data as easily as any program I've used. A couple of keystrokes is all it takes to produce bar graphs of virtually any account family, replete with labels, shading, and cross-hatching.

Table 1: Financial Independence account totals

	Maximum number
Budget Manager module	
Income accounts	16
Expense accounts	50
Money accounts	19
Other asset accounts	19
Credit card accounts	20
Other liability accounts	8
Equal-payment loans (each uses one expense account)	12
Account total	144
Transactions per year	unlimited
Transactions before archiving	900
Recurring transactions	50
Accounts per transaction–transfer from	1
Accounts per transaction–transfer to	7
Stock Manager module	
Portfolios	3
Different stocks per portfolio	30
Separate positions per portfolio	135
Stocks to follow for charting	55
Stocks to follow for screening	100

A Conversation With Charles Schwab

Ken Greenberg and Harry Miller

In an industry peppered with commercials featuring steer on the rampage and sheep that stop everything to eavesdrop on a broker's latest tidbit, Charles Schwab is an anomaly. Thanks to a highly personal ad campaign, Schwab, 47, has become a household face. His name, on the other hand, suggests both innovation and a touch of controversy.

A decade ago, Schwab pioneered cut-rate stock brokerage–no advice, just 24-hour order entry and execution. In 1981, Schwab joined forces with San Francisco-based BankAmerica, parent corporation of the nation's biggest commercial bank. That alliance irked mainline brokerage houses, tested the limits of bank holding company involvement in the securities business, and was eventually blessed by the U.S. Supreme Court. Now, according to a brochure for Schwab Financial Software, "The man who saved millions for the smart investor has created a way to make those investments even smarter." With his company's PC-based releases, Schwab is nudging discount brokerage service even closer to the Merrill Lynches and Dean Witters of the world.

Although that surely sounds like a challenge, Charles Schwab's demeanor is relaxed, and his office atop a new downtown San Francisco high rise is small, almost spare. Three thousand miles from Wall Street, in a city only a fraction as frenetic, Schwab reflects on an impending revolution in financial services.

PCW: Management consultant Tom Peters urges companies to "stick to the knitting." Why enter the software game at a time when even established software firms are finding it tough sledding?

Schwab: We've gone into software because it's a vehicle. Intrinsically, it's a way to do things better, quicker, cheaper–and that's what our firm is all about. In this case, the vehicles are *Financial Independence* and *The Equalizer*, our new software packages that perform tasks that would otherwise be performed by a high-priced sales agent. There is a strong trend among individual investors to take personal control over their finances, budgeting and estimating their taxes as well as performing research that relates to their stock portfolios. With IRAs, for example, the government is encouraging individuals to take care of their financial affairs. This trend makes our entry into the software arena easy to understand.

But there's another reason why we're now in the software business. Shortly after we started this company, it became clear that we had to really go high-tech in order to do high volume at low cost–and move the savings to our client base. We then made

huge commitments to back office and on-line systems. More recently, we created Schwab Technology Services, a division responsible for developing these new products during the past two or three years.

PCW: Several money center banks–Chase and Citibank, to name just two–are also touting their investment software offerings. Since you're attached to a major bank as well, are your products part of a strategy to turn the PC into an electronic window on the entire range of financial services, including home banking?

Schwab: We certainly will take advantage of any opportunities to provide the highest-quality services to our customers. Home banking products that exist today do a fine job debiting and crediting accounts and balancing your checkbook. When it comes to managing a stock portfolio, however, the tasks are more complicated. There is the need for more sophisticated software, which is why we've opted for the personal computer. We're actively investigating the best way to merge home banking and home brokerage while reducing the cost to the customer, especially in the area of connect-time charges.

PCW: The Equalizer *seems to represent an attempt to offer investors the equivalent of full-service brokerage on a disk. But even with these tools, isn't there a risk that the average investor, unskilled in the use of such tools, will be set adrift?*

Schwab: *The Equalizer* gives the investor, at his or her election, a range of research capabilities. But who's average? We're certain that our average customers will be able to make sense of the information. Understand that they're not getting just raw data: Over and above the portfolio management and the technical and fundamental analyses, investors will get analyst recommendations.

What's unique about *The Equalizer* is, in part, the research from Standard & Poor's MarketScope. You can call it, if you will, "push-button research." By just typing in a company's ticker symbol you'll get a four-page report covering the company's performance over the past five years. And that's true for more than 4600 companies. You get several opinions, perhaps even five or six on a single issue, some of which may conflict. You can weigh them and most likely do better in the long run by making your own decisions.

PCW: The Equalizer *is joining a somewhat lackluster crew. From what we can determine, on-line trading services–such as C.D. Anderson's Desktop Broker, Fidelity's Investor's Express, and The Source Investor Service–haven't been rousing successes yet. Why the sluggish beginning?*

Schwab: You're right, they haven't been. I don't know specifically why that is, since I don't stand in the

(continues)

shoes of any of the firms offering those services. We have chosen not to go that precise route–principally because of some inherent deficiencies in the way these services are administered–for the clients' sake. There's a seemingly endless succession of steps between order, execution, and reporting. One big advantage of having direct access to the Schwab system is that our customers will get full access to their accounts. Our on-line approach keeps their accounts always up-to-date so what they receive at home is complete and accurate. This is a major benefit for high-velocity traders. It's all there–account balances, buying power, order status–totally up-to-date.

PCW: Still, with PCs abounding, are we moving toward a "brokerless" society? Will there come a time when investors bypass brokers entirely, inputting buy/sell orders into the exchange or national market computers directly?

Schwab: I think brokers will always be around because financial transactions need a responsible intermediary. You can't have just anyone accessing the national markets, since someone must serve as guarantor to ensure that settlement–the delivery of either cash or stock–occurs between buyer and seller. It's possible that the exchanges might usurp this position from the broker, but my guess is that they won't.

PCW: Thomas Meyers, the head of the American Institute of Microcomputer Investors, suggests that full-service brokerage firms will eventually offer services at discount rates, and that they'll enable investors to purchase research, investment advice, and transaction services via PC, paying for only what they use. Do you buy that?

Schwab: Anything's possible. The major firms are already discounting to their institutional customers and will knock 5 to 10 percent off if you say, I'm heading for Schwab unless you do something for me. But full-commission brokers have an Achilles heel. Their organizations are built upon a completely different, very expensive kind of delivery system–the salesperson. Everything is one on one, face to face. If your contact at E.F. Hutton leaves because Hutton is about to undercut him, you'll probably follow him. In the Schwab organization more than 95 percent of our activity is via telephone and telecommunications, not face to face. We're already perfectly set up to go with an intensive electronic client interface. The economics allow us to do it–and the benefits for our customers make it worthwhile.

Taking Stock

Considering that *Financial Independence* is the handiwork of the largest discount broker in the nation, it's ironic that Stock Manager is its weakest component.

The first section of the module seems innocent enough. It's a limited portfolio management program, adequate for novice investors. You set up taxable, nontaxable, and hypothetical portfolios, fill them with the stocks you own or wish to follow, and then update the portfolios with each purchase or sale. *Financial Independence* can be linked to CompuServe's Executive Information Service (EIS), sparing you the tedium of manually inputting stock-related information. (For good measure, Schwab throws in a free EIS subscription plus 2½ hours of connect time.)

Even though Stock Manager lacks the sophistication of Schwab's *The Equalizer*, Dow Jones's *Market Manager Plus*, or a similar stand-alone package, it is part of a fairly extensive personal financial software offering, and thus perhaps acceptable.

Perhaps is the key word here because the module is accurately entitled *Stock*, not *Securities*, Manager. Securities encompasses bonds, options, and limited partnerships as well as stocks; the portfolios of many people who use this program will be similarly constituted. They'll be forced to improvise, since the module lacks a means of properly recording these only slightly esoteric transactions.

This "stock only" orientation severely limits the module's utility. Here, integration is a double-edged sword; while it's a hit within Budget Manager, the integration of the tax and budget modules with Stock Manager actually exacerbates the stock-only problem. Conspicuously absent is a feature dealing with the tax consequences of relatively common options strategies or limited partnerships. So long as you want an entry-level financial organizer, you can make do with the portfolio manager.

Troubling Analysis

There is, however, nothing entry level about Stock Manager's fundamental and technical analyses elements, and that can mean trouble. Fundamental analysis is the process of attempting to select stocks based on their earnings histories, price/earnings ratios, and other company-specific characteristics. Technical analysis looks at the market as a whole, scrutinizing trading volume, specific stock performance compared to market volume, industrywide performance, and a host of broad-based market indicators. For the program's modest price, the market analysis portion is extremely advanced, and that frightens me. Would you toss your 17-year-old the keys to the Ferrari?

Stock Manager obeys all the rules of fundamental and technical analyses, but that's not enough. The program strangely assumes that the novice investor, armed with little more than the *Financial Independence* documentation, will become proficient at dissecting the market. In practice, neither analysis element of the program is appropriate; only those with some analytical smarts are apt to know they need more than an ability to manipulate numbers. Making trades on the basis of homemade stock charts—without a major investment in education—is likely to transform the program's analytical tools into time bombs.

For the program's modest price, the market analysis portion is extremely advanced, and that frightens me. Would you toss your 17-year-old the keys to the Ferrari?

Should you opt to do your own analysis, however, you'll quickly bump up against the limitations of the first part of Stock Manager. Pursuit of either the technical or fundamental analysis path to stock trading should be accompanied by a knowledge of hedging techniques, some of which have tax implications. That in turn dictates a more powerful portfolio manager than *Financial Independence* provides.

Like its budget counterpart, Stock Manager lacks an error detection scheme for data entry; you can, for instance, insert any alphanumeric combination as a stock ticker symbol. In addition, on-line help is weak. Indeed, the program is mute on how many stocks a single portfolio can contain.

My impression is that Stock Manager may be used by amateurs or professionals, but it might be used by neither. The wisest approach is to play with the portfolio management feature and approach the rest with some trepidation.

Home on the Exchange

Wes Nihei

Charles Schwab & Company has brought the major stock exchanges of the United States one step closer to the "average investor" with *The Equalizer*. This on-line order entry/portfolio management tool teams up with SchwabQuotes, an automated stock quotation and news service; the SchwabLine Printer Service, a programmable printer/telephone that automatically retrieves stock information; and *Financial Independence* to form the Schwab Market Analysis Research and Trading (SMART) System. The system is part of Schwab's bid to narrow the gap between full-service and so-called discount brokers and to serve as a conduit for, if not a primary source of, investment advice.

William Gillis, executive vice president and head of the Schwab Technology Services unit, sees *The Equalizer* as a direct outgrowth of the company's experience in providing services to the individual investor. "We know how people trade, and we know the type of information they request of us," he says. "We're also aware of the services and information that our customers have said they'd need to do all their trading with us."

Gillis calls *The Equalizer*, a stand-alone product, the "complete electronic broker." It provides account information, company profile reports by Warner Computer Systems (a computer services firm specializing in financial and investment data bases), news and quotes from Dow Jones, Standard & Poor's MarketScope, portfolio management, and a direct link to the Schwab On-Line Trading System (a mainframe computer system with lines to the major stock exchanges).

Developed by Teleware, the company that created Dow Jones's *Market Manager Plus* (see "The Portfolio Masters," *PCW*, March 1985), *The Equalizer* runs under the UCSD p-System and contains a run-time version of that operating system on the program disk. The disk has two distinct systems: the Electronic Broker, for strategic decision making, research, and trading; and the Portfolio Accountant, for record keeping and portfolio maintenance. Using a required Hayes-compatible modem, the program automatically dials all on-line services.

At $199, *The Equalizer* consists of a program disk, reference material, and $168.50 worth of services. The services include a subscription to Dow Jones News/Retrieval, one hour's use of the service, one company profile report, one month's subscription to Standard & Poor's MarketScope, up to 15 viewings of MarketScope, and free access to the Schwab On-Line Trading System.

Taking advantage of all *The Equalizer*'s features entails certain ongoing costs. An annual subscription to Standard & Poor's MarketScope runs $36, a fee of $1.50 is levied for every 15 pages viewed after the 15 free viewings, and telecommunications network charges range from $5.50 to $15 per hour depending on geographic location and time of use. Obtaining Warner's company profile

reports means incurring similar communications charges, and reports themselves cost $3.50 each. Dow Jones prices vary according to service, modem bits-per-second rate, and time of use.

While a Schwab brokerage account is necessary to access the On-Line Trading System, it isn't mandatory with *The Equalizer*. "Without a Schwab account," Gillis says, "*The Equalizer* still provides access to valuable research and other financial information, as well as portfolio management. If the customer uses the program for just those two purposes, it's still a viable product. The trading module is the icing on the cake."

The program's Electronic Broker and Portfolio Accountant systems are each composed of three modules. Research, Trading, and Alerts make up the Electronic Broker; the Portfolio Accountant contains Maintenance, Reporting, and Data Updating. A single-screen menu lists the functions of each module in the systems.

Through an arrangement with Standard & Poor, MarketScope is available via the Electronic Broker's Research module. MarketScope is a real-time, on-line data delivery system that supplies information on more than 4600 corporations. It provides everything from current and historical statistics to market trends and price/earnings ratios, as well as Standard & Poor's stock recommendations and views.

The Full Report function in this module supplies a company profile report, a fiscal "snapshot" created by Warner Computer Systems that's compiled from four principal sources. Standard & Poor supplies a company description and a business summary. Information on valuation, profitability, financials, growth statistics, balance sheets, and annual and quarterly financial data is furnished by Standard & Poor's Compustat. Warner itself provides a 52-week price and volume chart, while the Wall Street firm of Lynch, Jones & Ryan contributes estimated earnings for the current year.

The Dow Jones Quotes function provides quotes, on a 15-minute delay, for up to five securities at a time. Current headlines and their associated stories from the *Wall Street Journal*, *Barrons*, and *Dow News* are accessed via the Dow Jones News function. And the Dow Jones Terminal function gives direct access to the Dow Jones News/Retrieval service data base.

Via an auto-dial feature, the Electronic Broker's Trading module connects with the Schwab On-Line Trading System to let users enter or cancel orders, view open orders and account information, receive notification of all trades that Schwab executes, update portfolios automatically when trades are made, and display a real-time quote for each security being traded.

The Portfolio Accountant provides the features of a stand-alone portfolio management program. It is a much more sophisticated portfolio maintenance tool than *Financial Independence*'s Stock Manager—the Portfolio Accountant handles securities of all types, not just common stocks.

The CompuServe Connection

If you're the sort who lives dangerously (and insists on doing research), you'll need more than last year's earnings to track an issue. *Financial Independence* enables you to key in closing prices, price/earnings ratios, and other information about your favorite stock. Fortunately, you can use the program's software link to CompuServe's Executive Information Service, which enables you to download up to 14 attributes of your chosen stock, among them current price, earnings, and yield; 52-week highs and lows; 12-month earnings per share; annual dividend; debt/equity ratio; and return on equity. You can also download and chart up to 90 days' information on closing price and volume.

These attributes are quite specific, so if you have other pertinent company data from CompuServe, The Source, or Dow Jones, *Financial Independence* won't be able to make use of it. Analysis must be done within the four corners of the program, and to the extent that the categories are limited, so is your analysis. Unfortunately, 90 days' worth of stock information forms a meaningless snapshot; most technical analysis requires data from a six-month to one-year period, and the best programs assess performance over five years. I have a hunch most people will use the CompuServe connection only to download that day's closing prices. (Where the market is concerned, Schwab may be saving his best for another package; see the sidebar "Home on the Exhange").

Anticipating the Tax Man

Unlike Stock Manager, Tax Estimator is accessible, easy to use, and reasonably informative. This third module is designed to help you complete Form 1040, your federal income tax return. Tax Estimator also enables you to predict, at any time during the year, just how painful your tax bite will be next April 15.

This component of *Financial Independence* is also an invaluable aid in refining any investment scenario that has income tax side effects. Should you take a profit on a stock or hold on until it goes long term? Should you purchase a tax-free municipal bond or a taxable bond paying a higher interest rate? Should you pay a higher loan fee to get a lower interest rate on a mortgage, or pay a higher rate of deductible interest to avoid the (usually) nondeductible fee?

Tax Estimator distills versions of eight IRS forms to a single screen each, and you simply fill in the blanks. The program estimates tax liability based on data you enter as well as on transactions originally recorded in Budget Manager and Stock Manager. Tax information is ultimately displayed in reports formatted to resemble the 1040 form itself. Reports also match IRS forms for itemized deductions, interest and dividend income, capital gains and losses, income averaging, working married couple deduction, child care credit, and alternative minimum tax.

Tax Estimator also draws from your budget forecasts for the remainder of the calendar year, and you're free to add any deductions not included in the budget module. When you alter a value in a tax-related report anywhere in the program, the effect ripples through to the portion of Tax Estimator that monitors your overall tax liability. In other words, you'll be able to see exactly how much more Uncle Sam gets if you sell that stock for a $5000 short-term gain.

Oddly, however, the tax component lacks worksheets and does not contain Schedule C (personally owned business) or Form 2106 (employee business expense). In addition, the tax component remains hamstrung by Stock Manager's inability to handle such mildly offbeat financial vehicles as bonds, limited partnerships, and other assorted tax shelters.

Grappling With Goals

The *Financial Independence* Goal Analyzer module has nothing to do with psychology and everything to do with quantifying and weighing hard alternatives. It's a financial calculator with certain functions–such as net present value, present and future values of an annuity, and internal rate of return–preprogrammed and ready to go. In theory, these functions can be applied to almost any situation, but the *Financial Independence* menu hints strongly at a few popular, personal "what ifs."

High on the list are planning for a child's college education, comparing whole-life to term insurance, and assessing the true costs of adjustable versus fixed-rate loans. This handy component also provides such budgetary essentials as rate of return on savings, estimated marginal tax rates, impact of interest compounding, and present and future value of annuities. An open-ended option lets you play with unequal cash flows and lump-sum payments.

Once again, the program offers a fill-in-the-blanks exercise that leaves the thinking to your PC. You supply the data, whether speculative or concrete. In each scenario, the level of detail is impressive. The college education case study, for example, factors in the inflation rate, tuition costs, the child's current age, estimated time in college, and other sources of funding. The retirement scenario estimates your nest egg on the basis of IRAs, other income, and projected tax rates until retirement, among other considerations.

Goal Analyzer, which is not integrated with its compadres and initially seems like just a helpful afterthought, illustrates some of the most demanding decisions people make. Sophisticated as it is, this module doesn't offer much in the way of guidance. A thorough on-line discussion of goal analysis strategies would add value to an already worthwhile component.

Uppity Documentation

Aside from reservations about Stock Manager, my major complaint about this otherwise highly useful package concerns documentation. The manual—and, to a lesser extent, the tone of the program itself—is a distinct turnoff. My impression is that the developers are a wee bit condescending and don't really trust us users.

Certainly, they've taken a novel, if lazy, approach to on-line help, skipping copious help screens in favor of a system that cross-references the documentation. On the top right corner of virtually every screen is a prompt that cites chapter and verse in the manual. In a program that assumes you can do your own technical market analysis, this approach strikes me as misguided.

Clearing the Books

Overall, *Financial Independence* is a snap to learn and use. With such packages sprouting up here and there, it's becoming increasingly difficult to fabricate excuses for not knowing the state of your personal finances at any given time.

You've got to hand it to the Schwab organization. *Financial Independence* may lack some of the versatility and detail of stand-alone portfolio manager, stock analysis, tax analysis, and budget programs, but its comprehensive approach makes it a good value at $300. If you're careful to use it within its and your own limitations, the program might just help you make or keep some money. If you're careless, that's another story. The financial markets do not suffer fools gladly.

James Buttonwood is an investment banker and part-time computer consultant based in New York City.

Financial Independence
Schwab Technology Services
Charles Schwab & Co., Inc.
101 Montgomery St.
San Francisco, CA 94104
415/627-7000
List price: $299
Requirements: 256K, two disk drives

The Equalizer
Schwab Technology Services
Charles Schwab & Co., Inc.
800/334-4455
List price: $199
Requirements: 128K, one disk drive, serial port, Hayes-compatible modem

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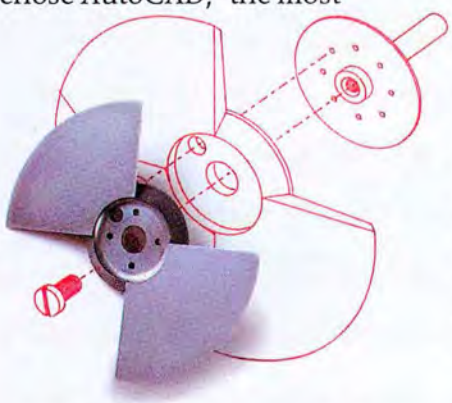

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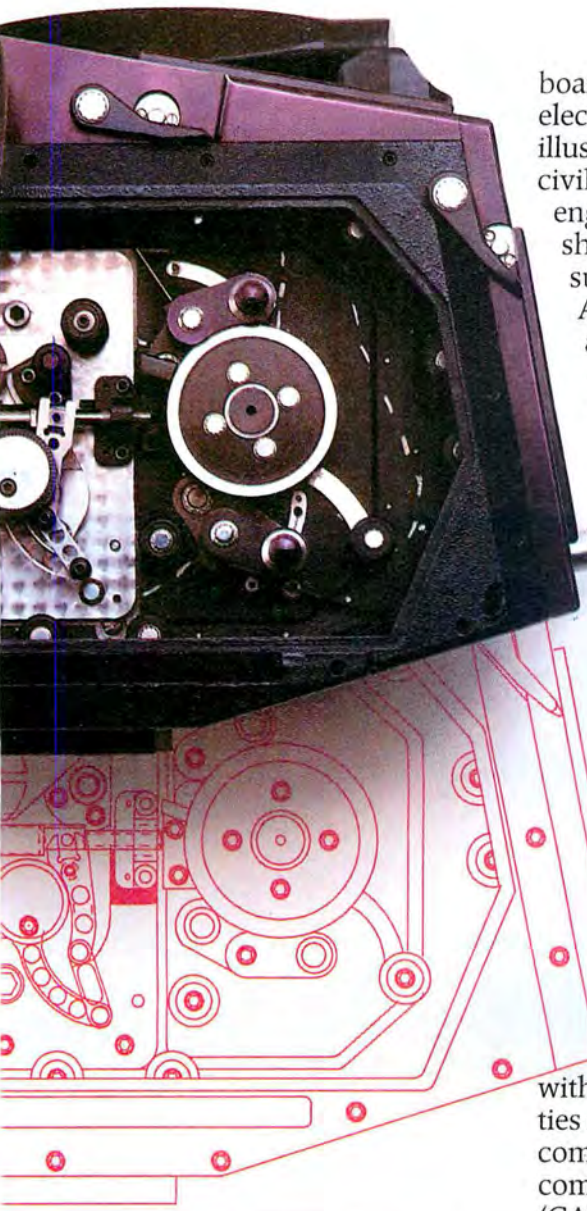

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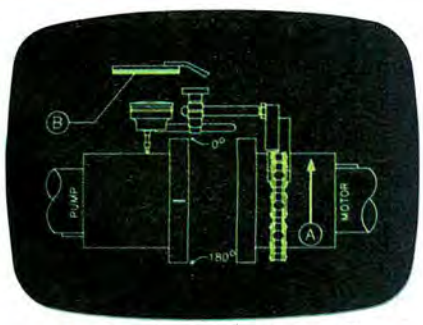

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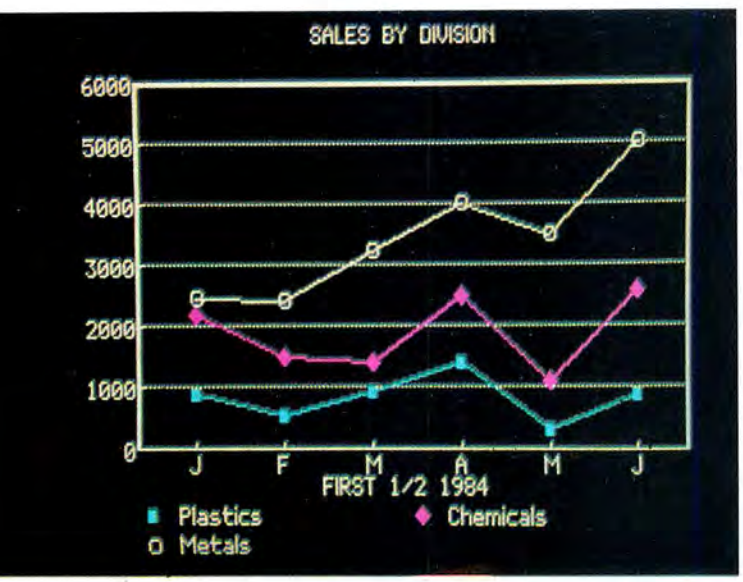
Circle 28 on reader service card

Graphics: Before and After



Are your 1-2-3 graphs listless? Your bar charts boring? Is your presentation graphics budget hurting? Imigit and Grafix Partner can give your weary images a boost—and then some.

Jay Alperson

A large part of the PC's charm and usefuless lies in its chameleon-like nature. With the right software and hardware, the PC can by turns be an accountant's helper or masquerade as a mainframe terminal. In the graphics realm, however, the PC is not so easily or cheaply adapted.

Transforming the PC into a graphics device takes a bit more hardware muscle—and a wealth of programming intellect. It's no coincidence that until recently, graphics software for creating, manipulating, and capturing images didn't exist or required a small bank loan.

Luckily the graphics drought is over. Graphics programs of every stripe are pelting the PC market (see "Icon Painting" and "Show Business" in this issue). Yet as

most PC users discover, graphics and frustration often go hand in hand. Though churning out a *1-2-3* bar chart is easy enough, adding color, shading, or text in several fonts is for all practical purposes impossible. If you want to merge the chart with even the simplest image–such as a company logo–it's back to scissors and paste.

Two new graphics packages for the PC, *Grafix Partner* and *Imigit*, should keep those ancient implements of construction in your drawer. *Grafix Partner*, from Brightbill-Roberts, is designed to enhance graphs, charts, and similar workaday images produced by *1-2-3*, *Symphony*, *Framework*, *ExecuVision*, and other programs that create IBM-standard medium- and high-resolution graphics. Those who use the PC in sales presentations or lectures will especially appreciate *Grafix Partner*'s ability to display images in timed sequence much as a slide projector does.

Imigit, from Chorus Data Systems, couples a *MacPaint*-like interface with the power not only to spruce up images generated by other application programs and create new ones but to capture images with an expansion board in combination with any video camera. This setup, called the *PC-Eye Video Capture System*, can also use images stored on videotape.

Image Basics

At their simplest, graphics programs generate various geometric shapes such as circles, squares, and lines. Processing those images is not unlike word processing: shapes are moved, copied, and deleted, and of course, colors and texture are added as well. Most contemporary graphics software for the PC also allows you to overlay images and do pixel-by-pixel touch-up. Beyond image generation and processing lies image capture. With *Grafix Partner*, images are filched from other programs; with *Imigit* you can cast your net further afield, capturing and digitizing images with an inexpensive video camera. Once captive, these images can be manipulated like any other.

Image quality–resolution and color–is a function of both software and hardware. If a graphics package supports only IBM's standard graphics modes, there's little point in buying a higher-resolution color graphics board such as the Tecmar Graphics Master. Conversely, a package capable of greater resolution and a multitude of colors can't deliver the goods if drivers for the appropriate graphics boards aren't available.

Given the abundance of "standards" in the graphics market (for further information see "The Myth of the Virtual Device," *PCW*, April 1985), it's not surprising that most graphics programs for the PC seldom deviate from IBM specifications. Both *Grafix*

Table 1: Hardware supported by Grafix Partner and Imigit

	Grafix Partner	Imigit
Graphics boards supported	IBM Color/Graphics Adapter Plantronics [1] ColorPak [2]	IBM Color/Graphics Adapter Amdek Number Nine Revolution Hercules Tecmar monochrome and color Quadcolor II Orchid Technology Quadscreen Conographics TI Pro
Input devices supported	Keyboard Joystick Touchpad	Keyboard Joystick Touchpad Microsoft Mouse Summagraphics Mouse Mouse Systems Mouse All graphics tablets using Bit1
Graphics printers supported	IBM and Epson C. Itoh Prowriter Toshiba T 1310 DEC LA-50, 100 NEC PC-8023AC Okidata Microline 92, 93 IDS Prism Data Products SPG-8050 HP Thinkjet	IBM and Epson IDS Prism Quadjet Act II Diablo Ink Jet
Plotters supported	Calcomp M-84 Sweetpea 100 HP 7470A, 7475A Houston Instruments DMP-29, DMP-40, PC 595, PC 695 IBM 7372, XY 749	

[1]Only with Grafix Partner, Plantronics edition
[2]Only with Grafix Partner packages sold with the ColorPak board

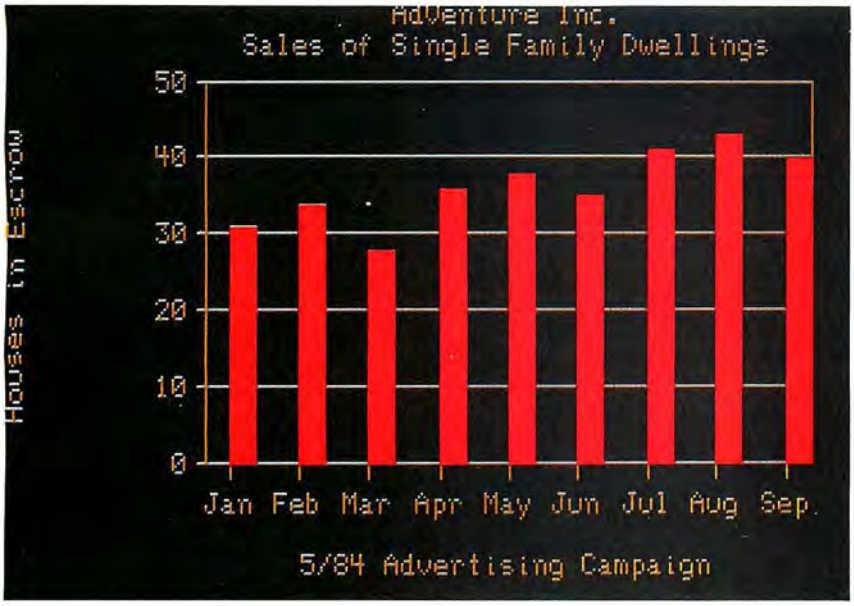
Partner and *Imigit* are circumspect in this regard. However, *Imigit* takes advantage of more sophisticated graphics hardware; *Grafix Partner* is also issued in versions sculpted for the Plantronics and ColorPak extended graphics boards.

A Limited Partnership

At first blush *Grafix Partner* appears to be an ideal program for business users anxious to perk up their meat-and-potatoes graphics. Since *Grafix Partner* is a memory-resident program, it can be fetched quickly from "behind" any application program running in graphics mode and used on the spot. The program's command menu is only a keystroke away, and the handful of commands is simple to master. For example, to have *Grafix Partner* create a circle, you enter the circle mode by typing C, locate the center of the circle with the cursor, confirm the choice with the <Space> bar, then move the cursor to the desired radius and press the <Space> bar again, and the circle is drawn. Once you've taken *Grafix Partner* for a few spins around the keyboard, you can usually bypass the command menu and issue direct commands from within a session. Images enhanced or created by the program can be printed on a variety of color graphics and ink jet printers or output to a number of color plotters (see Tables 1 and 2).

When confined to an IBM Color/Graphics Adapter or a compatible graphics board, *Grafix Partner* is limited to a choice of two colors in high-resolution mode and four colors in medium resolution, with three four-color palettes available. Because the program lacks any true drawing or painting features, the images it creates are essentially a combination of circles, straight lines, and boxes. Images can be filled with colors or patterns, edited pixel by pixel in zoom mode, flipped upside down, and mirrored. The program also includes a handy Undo command that will rescind the last operation performed.

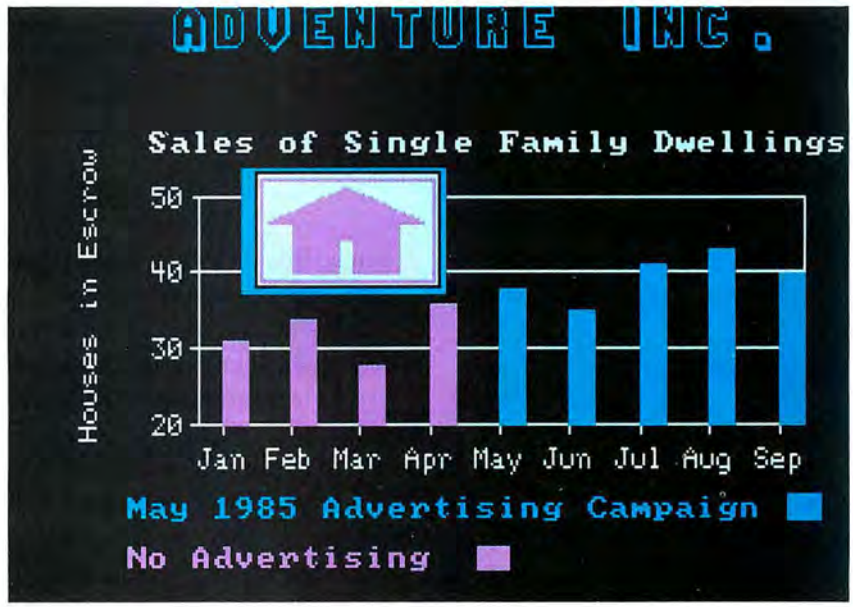
Unfortunately, the program will not switch color dominance, or precedence, during an enhancement session, a particularly important task if you are overlaying different-colored images. For example, if you specify at the



Screen 1 (left): Before enhancement: a typical 1-2-3 bar chart

Screen 2 (below): After enhancement with Grafix Partner. The 1-2-3 chart is rescaled, a clip art image of a house is inserted, shading and colors are added, and additional text appears in two different fonts.

command menu that blue has first precedence, a red image will always be masked by an overlayed blue image. But in the middle of an enhancement session you may want to place a red bar over a blue one. Instead of automatically switching color precedence as most graphics programs do, *Grafix Partner* has you return to the command menu to manually reset color precedence. If you don't reset precedence, *Grafix Partner* will mangle the image. This quirk alone significantly slows enhancement.



Initially, the *Grafix Partner* image enhancement process seems relatively straightforward. To remold a *1-2-3* graph, for example, I loaded *Grafix Partner,* removed the disk, loaded *1-2-3,* and displayed the graph (see Screen 1). Activating *Grafix Partner* with <Ctrl>-<Alt>-<GrayPlus> only replaces *1-2-3*'s cursor with a cross hair; pressing <GrayPlus> again replaces the graph with *Grafix Partner*'s command menu. I set color precedence from the menu and used the erase function and the cursor keys to shade each bar selectively for effect. To complete the metamorphosis, I entered the company's name in an ersatz three-dimensional font, colored some bars blue, and superimposed a house symbol taken from a clip art file on the *Grafix Partner* disk. Although a statistician might wince at these embellishments, the resulting image is decidedly more captivating (see Screen 2). The enhanced graph is saved to a data disk; the original *1-2-3* image is left unchanged.

Viewing the enhanced graph is a matter of running *Grafix Partner,* putting the data disk in drive

B:, and loading the image; *1-2-3*, which cannot access the image, is not needed. To print the image, select '?' from *Grafix Partner*'s opening menu. Although the printing process is simple, it is staggeringly slow: an Epson FX-80 takes nearly 10 minutes to print Screen 2. If you use graphics in business presentations as well as in reports (see Figure 1), you will find *Grafix Partner*'s C :le utility particularly useful. Cycle transforms the PC into a slide projector, displaying any sequence of saved screens. Pressing the <Space> bar displays the next screen; <Enter> backs up the sequence one step. If you've seen a presentation all too many times or must leave the keyboard, you can make *Grafix Partner* operate unattended. To specify which images are displayed and for how long, you must load the Cycle utility separately and specify manual or automatic operation, screen sequence, and screen display time.

Table 2: Features comparison

		Grafix Partner	Imigit
Image Generation	Circles	●	●
	Straight lines	●	●
	Polygons	●	●
	Ovals		●
	Curves		●
	Airbrush		●
	Pixel touch-up	●	●
	Freehand drawing		●
Image Processing	Move	●	●
	Copy	●	●
	Erase	●	●
	Fill	●	●
	Zoom	●	●
	Rotate	●	●
	Lasso		●
	Overlay	●	●
	Mirror	●	
	Undo	●	●
	Negative imaging		●
	Grids		●
	Slide show	●	●
Text		Three fonts, three sizes	Eight fonts, any size

Cursor Curses

Though *Grafix Partner* gets the job done, it rivals changing a flat tire for frustration. The primary culprit is the program's inability to use a mouse. As a result, defining a circle, lining up characters in a label, shading a bar, or any other on-screen manipulation must be performed via the cursor keys. (*Grafix Partner* accepts joystick or touchpad input, though neither device is well suited to precise cursor control.) In an attempt to compensate for this grievous oversight, *Grafix Partner* allows you to reset the cursor's rate of travel across the screen. Unfortunately, this creates as many problems as it solves. For example, moving images around the screen requires fast cursor movement, yet precisely positioning text is difficult at even the slowest cursor setting. Thus, to accomplish any series of tasks, you must continually stop and change cursor speed. Enhancing as simple an image as Screen 1 took me almost 35 minutes. The company stresses that the new version 1.7 will support the Microsoft Mouse, so enhancement may accelerate.

The program has several other significant limitations to keep in mind. Although *Grafix Partner* comes with three text fonts in three sizes, text can be entered only from left to right–which makes labeling the *y*-axis of a graph maddening work. The twin bugaboos of copy protection and program compatibility also await. If you use an XT or a similar hard disk system, the *Grafix Partner* disk must always be loaded from drive A:. (The company sells an unprotected version for an additional $25.) If you're wedded to *Sidekick*, *ProKey*, and other memory-resident programs, be forewarned: *Grafix Partner* is seldom hospitable and may lock up your system whenever it encounters a fellow traveler. While you can overcome some of these problems with experimentation and a full measure of patience, you might ponder whether the picture you get is worth the thousand swearwords it takes to create it.

Imigit: Beyond Graphs

It's clear from the first screen that *Imigit*'s designers had more than a passing acquaintance with Apple's *MacPaint*. The program is designed to use a mouse; as with *MacPaint*, program colors, patterns, and functions are represented by icons that line a drawing area. *Imigit*'s paint kit is also well stocked with a variety of artists' tools. You can draw freehand, slap bold colors and patterns across the screen with a custom-made or program-supplied airbrush, and capture obstreperous, irregular shapes with a very neat rendition of *MacPaint*'s lasso. The brush varies from *MacPaint*'s in that it can plot a series of shapes as long as the left mouse button is held down. Thus, if you choose a circle and move the mouse, a cylinder is generated. In short, you can not only perform an entire face-lift on a graph but use *Imigit* as a stand-alone graphics package.

Imigit is also well endowed in the image generation and processing departments. The program can generate boxes and circles; fill and texture shapes; produce a "negative"; and move, rotate, mirror, erase, and zoom images. Beyond these standard processing functions, *Imigit* can produce a variety of images using a clever procedure that draws a smooth curve between plotted points. Unlike *Grafix Partner, Imigit* changes color precedence automatically when necessary and gives you the option of superimposing translucent images over one another. Text in eight fonts can be sized according to your whim and entered from left to right and top to bottom and vice versa. The program will even lay down a grid–visible or invisible–to guide text placement.

Mice can be bothersome rodents, but here they speed input and improve accuracy. Although the sequences I followed for enhancing the *1-2-3* graph with *Grafix Partner* and *Imigit* were essentially identical, with *Imigit* I shaved my time from 35 minutes to 7 minutes (see Screen 3). My attitude also improved–blasphemies seldom escaped my lips as I effortlessly moved the graph, aligned labels, and tackled other tasks with the aid of a mouse. As with most mouse-oriented graphics programs, functions are selected with the left mouse button and modified with the right; pressing both buttons displays a pull-down menu with further options.

Once a picture is complete, you print it by moving the mouse pointer to the printer icon and clicking the mouse. Though *Imigit*'s print routines are no speed demons, my Epson printer completed the graph in Screen 2 in just under 3 minutes. *Imigit* will send its handiwork not only to Epson and IBM graphics printers, but to a number of four-color ink jet printers.

Imigit Spacemaker

Though *Imigit* is mostly problem-free, its design does present obstacles for the sophisticated graphics user. Most graphics programs save a screen image to disk in a standard file of approximately 16K. *Imigit*, however, uses a proprietary compression technique that squeezes the same data into 4K to 10K. This compression has

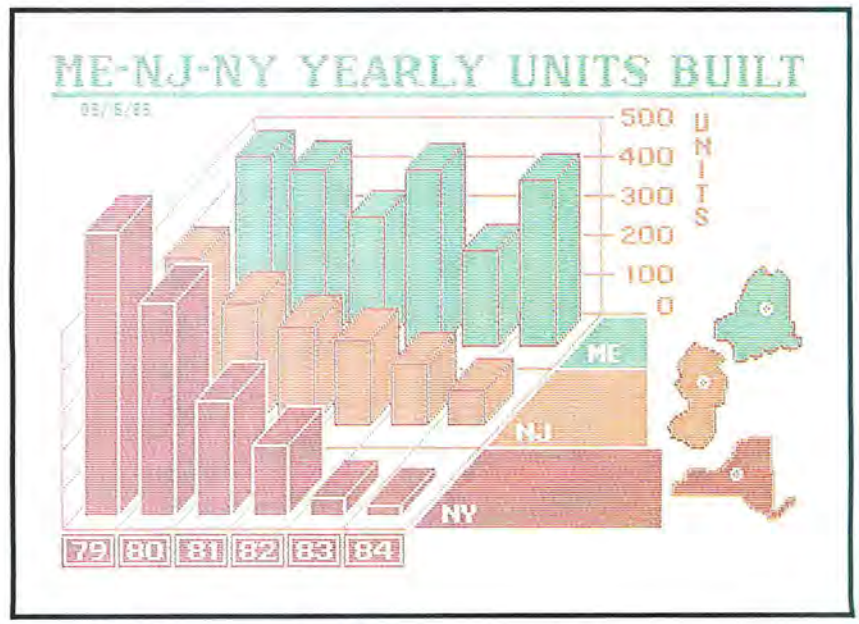
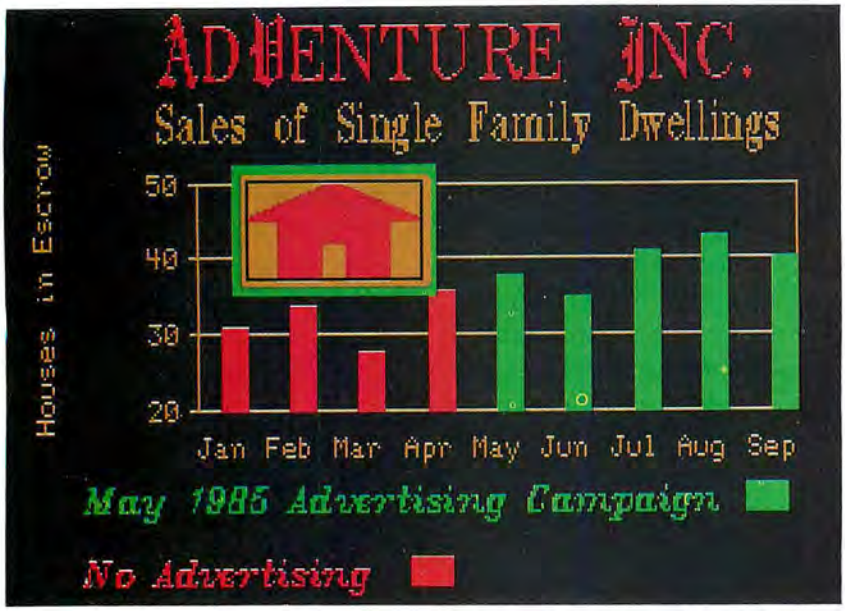


Figure 1: Like any good graphics program, Grafix Partner supports a number of graphics printers and plotters. This enhanced bar chart was produced on a color ink jet printer.



Screen 3: Imigit tackles 1-2-3. The graph from Screen 1 is rescaled, colors are changed, and a house image is created with a shaded polygon.

two advantages: you can store more images per disk and spend less time telecommunicating them to another computer system. Unfortunately, compression complicates accessing and modifying *Imigit*'s image files with a high-level language. The simplest solution is to use a screen dump routine from another graphics package and save the image to disk in the 16K format. Otherwise, you can resort to some software trickery, provided your system has both monochrome and color monitors. When you end an *Imigit* session with <Ctrl>-X, control returns to DOS and to the monochrome board. However, the last displayed *Imigit* screen is held in the color graphics board's memory. To save the image to disk with BASIC, you would load BASIC and type

def seg = &HB800:
BSAVE *"image filename"*,**0,&H4000**

Tapping Imigit's Power

When *Imigit* is tied to a system that uses the IBM Color/Graphics Adapter, it can produce adequate presentation graphics. If your taste runs to professional graphic arts, CAD/CAM, thermography, or even X-ray imaging, consider tapping into *Imigit*'s powers of color and resolution with the Tecmar Graphics Master or Number Nine Revolution graphics board, which respectively expand resolution to 640 by 400 pixels in 16 colors, and 512 by 512 pixels in 256 colors. Chorus Data Systems recommends these two devices and wisely provides the *Imigit* owner with the necessary driver programs for these and ten other extended graphics boards. Keep in mind that all this fancy and expensive hardware is for naught if the original graphics software does not support extended graphics. For example, you can change any of the four colors in a *1-2-3* graph, but you cannot add a fifth color. So if a 16-color graph is imperative, you have to create one from scratch using *Imigit*'s paint kit.

Shooting With PC-Eye

With the *PC-Eye Video Capture System*, *Imigit* offers something most graphics enhancement programs can't: the ability to capture and digitize images. If you want to combine images such as logos, graphs, text, and product shots for illustration, advertising copy, preliminary CAD work, and other applications, this feature alone may justify *Imigit*'s cost. *PC-Eye* is essentially an expansion board that takes images captured by a video camera or a VCR and imports them into the *Imigit* environment. Most VCRs with good freeze-frame capability work with the system; almost any inexpensive color or black-and-white video camera can be used.

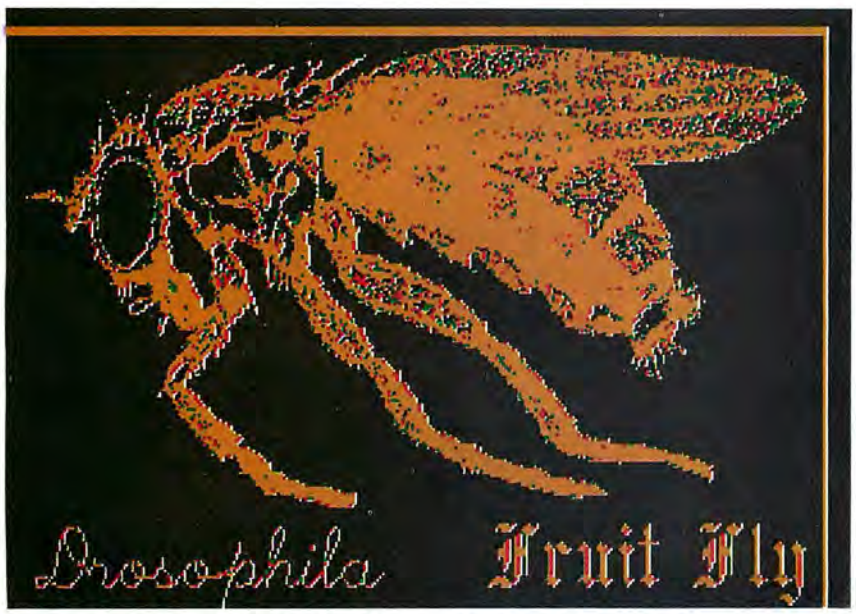
PC-Eye is remarkably easy to set up. Install the full-length board in any of the PC's open slots and plug the video camera or VCR into the socket mounted on the back of the board. Taking a usable shot, however, requires a little experimentation—typically five to ten shots. A cheap video monitor will help you center the camera on your subject; as with any photographic process, you must pay attention to lighting and field of

view, for these factors greatly affect the quality of the image. Once the scene is set, merely load *Imigit* and click the camera icon to capture the picture.

Using *PC-Eye* with a minimally configured PC is not unlike hooking a compact disk player to a transistor radio. The combination works, but strengths of the system are masked. In the case of *Imigit* and *PC-Eye*, the weak link is the graphics board. In medium-resolution mode, the IBM Color/Graphics Adapter sends to the screen captured color images that bear little resemblance to reality. With this setup you can achieve better results by capturing only high-contrast, black-and-white-images in the high-resolution mode (see Screen 4). Taking full advantage of *PC-Eye*'s powers–and those of *Imigit*–means buying a more sophisticated graphics board and, of course, a monitor to match. Without these accoutrements, *PC-Eye* is an expensive toy.

Parting Shots

Grafix Partner is caught in a dilemma. Businesspeople who desire graphics enhancement will find the keyboard input slow and frustrating, while advanced users will find its imaging capabilities limiting. *Imigit* is indeed the more flexible product, and the one most likely to satisfy users who are anxious to enhance graphics or make their own without ransacking their personal or professional treasuries. Best of all, *Imigit* grows with your graphics budget, and therein lies its strength–but be prepared to spend a tidy sum along the way.



Screen 4: A pen-and-ink sketch captured and digitized by the PC-Eye system and embellished with Imigit. The caption is produced with Imigit's freehand drawing function and a standard text font. With a standard IBM system, best results are produced by using high-contrast images.

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Grafix Partner, Version 1.6
Brightbill-Roberts and Co., Ltd.
120 E. Washington St. #421
Syracuse, NY 13202
315/474-3400
List price: $149, unprotected version $174
Requirements: 128K, one disk drive, IBM or compatible video board
Copy protected

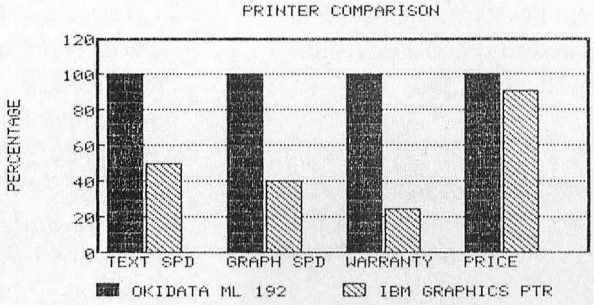
Imigit
PC-Eye Video Capture System
Chorus Data Systems, Inc.
P.O. Box 370
6 Continental Blvd.
Merrimack, NH 03054
800/624-6787, 603/424-2900
List price: Imigit $250, PC-Eye $495, $695 for both
Requirements: 256K, two disk drives
Not copy protected

Got a minute?

The folks who make very modern personal computers would have you accept a very old fashioned idea. Namely that you should buy everything else from them, too.
Including their printers.

But IBM owners everywhere are finding that while the IBM PC may be the right tool for their business, the ideal tool for putting their business on paper is the all new Microline 192 from Okidata. And it isn't taking them long to find out.

First there's speed. The Microline 192 is twice as fast as the IBM Graphics Printer. But IBM PC owners are finding some other very remarkable features about the Microline 192 that the Graphics Printer doesn't have.

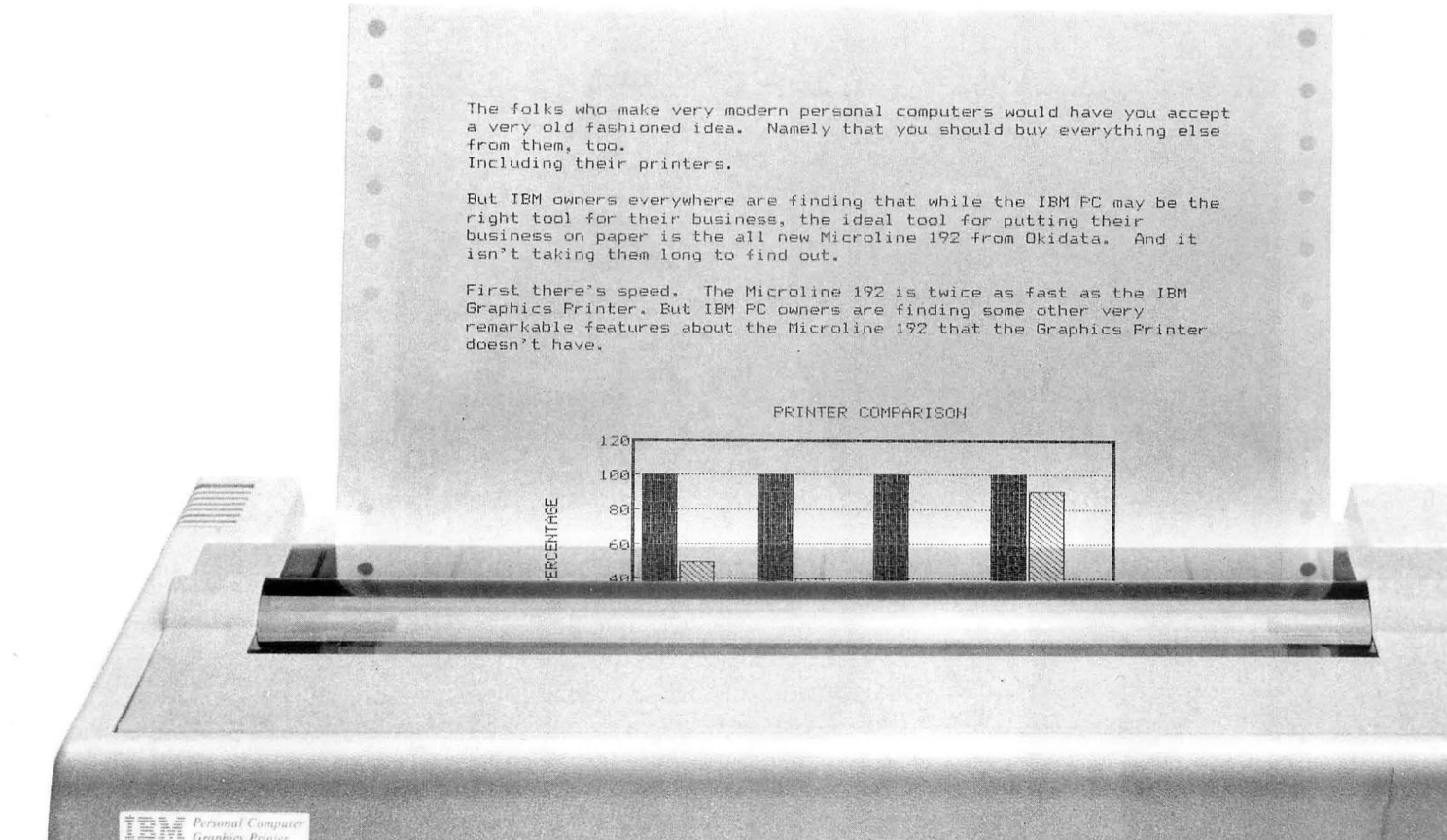


FEATURE	OKIDATA	IBM
SPEED	160 CPS	80 CPS
CORRESPONDENCE QUALITY	**YES**	**NO**
FREE FONT SOFTWARE	YES	NO
BIDIRECTIONAL GRAPHICS	YES	NO
MENU SELECT MODE	YES	NO
CUT SHEET FEEDER	OPTIONAL	NO
WIDE CARRIAGE MODEL	YES (ML-193 $699)	NO
WARRANTY	1 FULL YEAR	90 DAYS
WEIGHT	9 LBS	13 LBS
SUGGESTED LIST PRICE	$499	$449

Oh, one other comparison worth repeating. In the minute and ten seconds it took the Microline 192 to print what you've just read, the IBM Graphics Printer wouldn't have told half the story.

OKIDATA, an OKI AMERICA company

That's about all it takes to discover why Okidata's new printer beats the IBM® Graphics Printer.



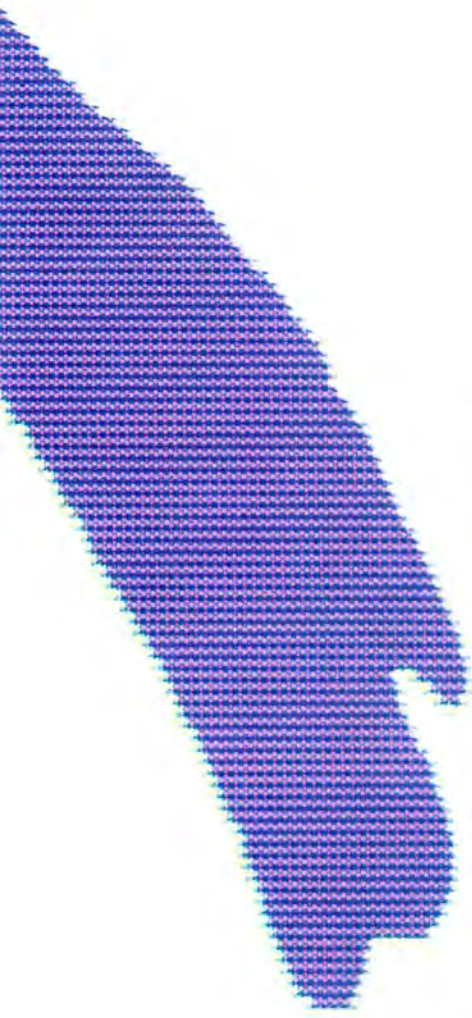
IBM Personal Computer Graphics Printer

OKIDATA
an OKI AMERICA company
Mt. Laurel, NJ 08054, 1-800-OKIDATA

IBM is a registered trademark of International Business Machines, Inc.

Circle 273 on reader service card

Icon Painting



Apple's MacPaint made graphics not only fun but useful. The crush of MacPaint clones in the PC market is just beginning, and already two are elbowing their way to prominence: Mouse Systems' PC Paint and IMSI's PC Paintbrush.

Christine Whyte

Legend has it there was a golden age of personal computing, when hackers were hackers and computers were fun. Now that we've entered the blue-suit era, computing has turned serious. As if in response to IBM's stodginess and our waning spirit of creative computing, Apple Computer unleashed the Macintosh—a cream-colored computing Cuisinart that sings, chirps, and further woos the computer-wary with icons, pull-down menus, and a well-behaved mouse. The Mac's biggest lure is probably *MacPaint*, a mouse-driven program that takes personal computing graphics into the realm of the artist and the professional designer. *MacPaint* has made computing easy and fun—and has naturally spawned imitators in the MS-DOS world who know that the PC's colorful talents can deliver more than just another bar chart.

Two inspired imitators, with nearly identical names, are *PC Paintbrush*, from IMSI (International Microcomputer Software, Inc.), and *PC Paint*, from Mouse Systems. Both transform the PC into a painter's canvas or a graphic artist's drafting table. You can draw or paint freehand in different colors and patterns, compose pictures using geometric or wholly unique shapes, and add text to the results in various font styles and sizes.

Graphic artists will appreciate how easy it is to cut and paste selected images or entire drawings. Instead of starting from scratch when you make mistakes, you can reverse your last hasty decision

with an Undo command or selectively rub out errors with an Eraser function.

Businesspeople can make graphs and charts from scratch with both of these programs but will find it easier to import previously generated graphs from other programs such as *1-2-3*, and then enhance them. (For information on enhancement programs, see "Graphics: Before and After" in this issue.) Additional practical business applications include generating illustrations for presentations, creating stylish letterheads and company logos, and generally jazzing up staid business announcements and brochures.

Lineal Descendants

Both *PC Paint* and *Paintbrush* closely conform to *MacPaint*'s interface. A two-column border with icons representing program functions is displayed on the left side of the screen; pull-down menu names appear across the top of the screen; pattern choices are set in two rows running along the bottom, where *Paintbrush* colors are also located. *PC Paint* places colors on the right side of the screen.

The drawing area consists of the visible part of the screen plus the area underneath the borders. By contrast, *MacPaint*'s screen represents only a third of the total possible drawing area. Both *PC Paint* and *Paintbrush* can display a drawing minus the borders, although you cannot draw in this mode.

Like *MacPaint*, *PC Paint* lets you double-click some of the icons as a shortcut to program functions, instead of using menu commands. (*Click* means to press and release the mouse button.) This program also has two keyboard shortcuts that let you press one key instead of using the mouse. *Paintbrush* has no double-clicking shortcuts and confines the keyboard primarily to text entry.

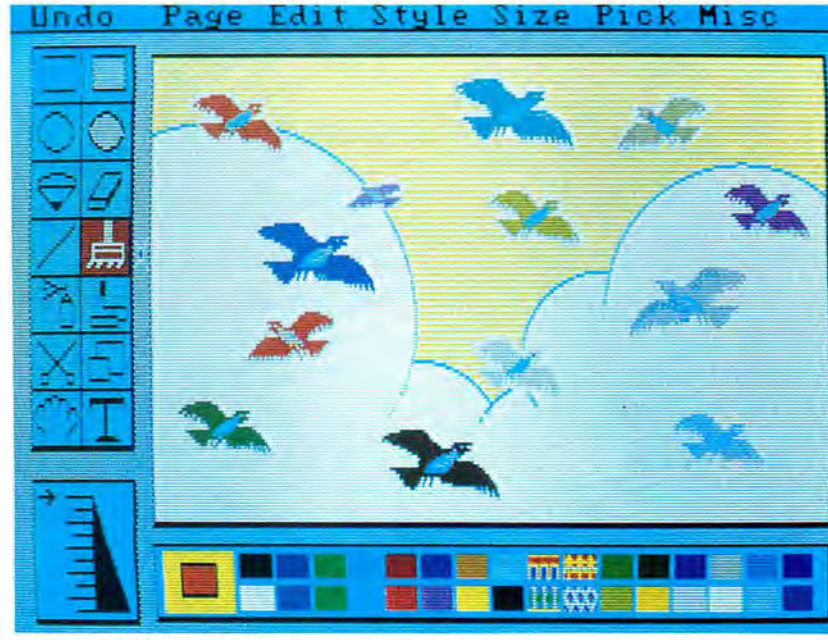
Both programs are available with or without a mouse. *Paintbrush* also supports a digitizing pad, which may be preferable for detailed drawing.

PC Paint

Getting up and running with *PC Paint* is a breeze. Installation is a single step, and the user manual is illustrated with sample screens that introduce the program's most important operations. *PC Paint*'s simple, logical screen design and literal icons also promote learning. Manipulating even a three-button mouse is simple, since most functions are reserved for the leftmost button.

PC Paint's main drawback is its adherence to the graphics standard imposed by IBM. Pictures are always limited to medium-resolution mode (320 by 200 pixels). Pictures are also restricted to four colors, with two exceptions: you can display 16 colors simultaneously on a PC with an STB Graphix Plus II board or on a PCjr (see Screen 1). The Change Colors function listed on the Tools menu lets you choose one of six three-color palettes and a fourth color from the 16 available on a PC.

Four-color images need not be drab. You can enhance a picture by combining two colors to create a third, using, for example, alternating red and yellow dots in a finely meshed pattern to simulate orange. *PC Paint* comes with 22 patterns; the company claims the new version (available by the time this article is published) will feature 44. Unfortunately, the program does not allow you to create custom patterns, a serious constraint for artists.



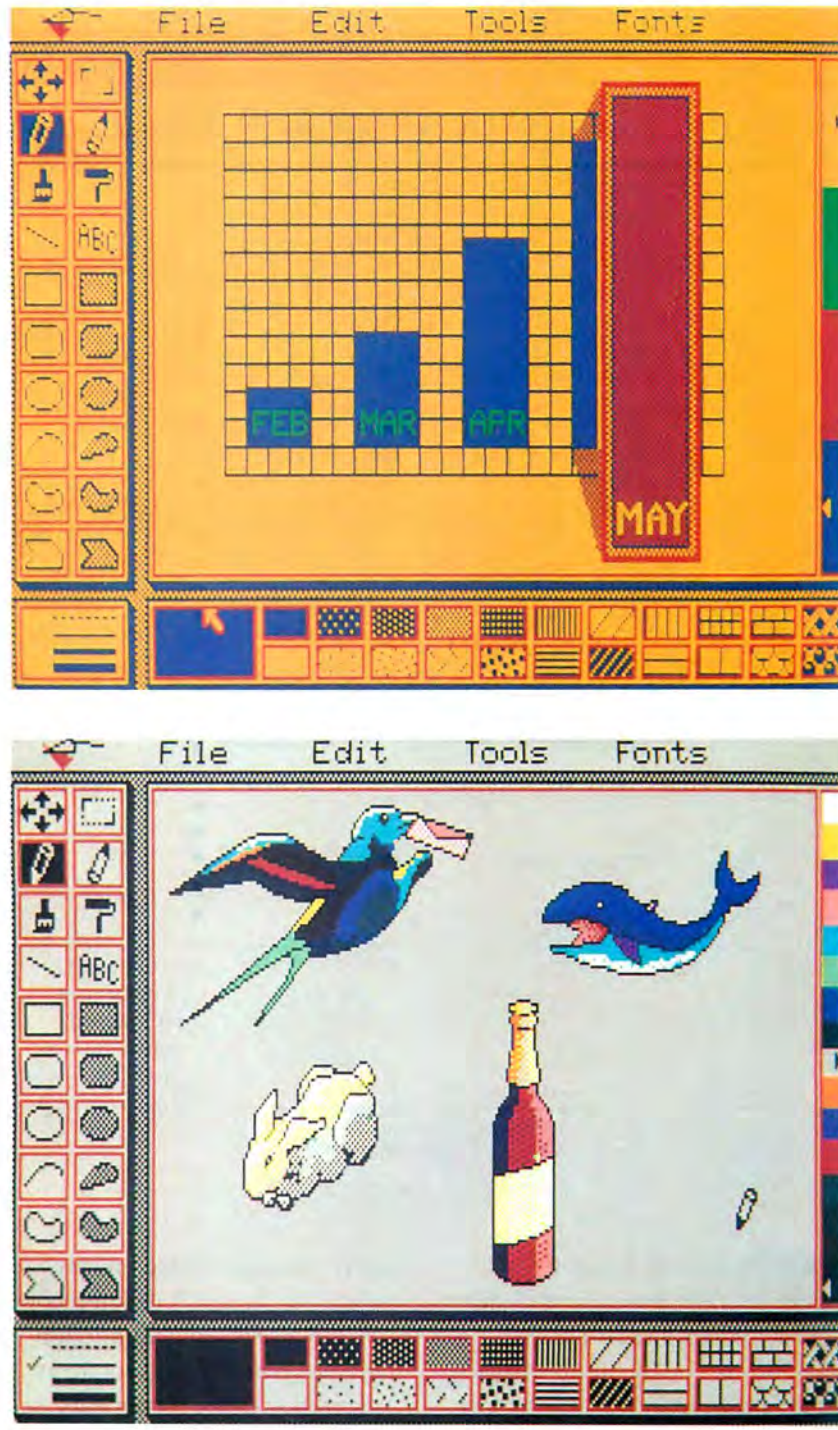
Created with PC Paintbrush by Mick Wiggins

Tools of the Trade

PC Paint's main thrust is drawing and painting. The program comes equipped with a Pencil for drawing freehand lines; a Spraypaint function, which sprays speckled colors or patterns; and a Paintbrush function, which slaps colors or patterns on the screen. The Set Brush function in the Tools menus provides a selection of brush shapes and sizes, but you cannot create your own. The new version will add a Paintroller function that fills the screen or any enclosed figure with the selected color or pattern.

The Straightline function lets you draw just that in various widths, and the ABC text icon enables you to add words to drawings. You can also easily create empty or filled shapes, including rectangles with or without rounded corners, circles, ovals, a polygon with any number of sides–you can even rubberband a curved line between two points. The Picture Mover function, represented by an icon with four arrows, lets you move a picture around so you can work on the part of the drawing area normally hidden under the *PC Paint* borders.

Clicking the Eraser icon, an inverted pencil, lets you "wipe" off mistakes by painting in the background color. As in *MacPaint*, double-clicking this icon clears the entire screen. An important function for saving time and effort is the Undo command, found in the *Edit* menu, which removes any changes made by the immediately preceding command. A warning appears on the screen for any command, such as Erase Picture, that cannot be undone in this manner.



Screen 1: The 4-color PC Paint chart was created using the PC; the 16-color illustrations were created on the PCjr.

Table 1: Features comparison

		PC Paint	PC Paintbrush
Image generation	Circles	●	●
	Straight lines	●	●
	Polygons	●	
	Ovals	●	●
	Curves	●	
	Rectangles	●	●
	Spraypaint	●	●
	Freehand drawing	●	●
Image processing	Move	●	●
	Quick-Move	●	
	Copy	●	●
	Quick-Copy	●	
	Fill	*	●
	Edit Pattern		●
	Zoom	●	●
	Rotate	●	●
	Flip Horizontal and Vertical	●	●
	Overlay: no background	*	●
	Overlay: background	●	●
	Tilt		●
	Shrink and Grow		●
	Erase	●	●
	Undo	●	●
	Inverse Colors	●	●
	Grid	●	●
	Slide Show	**	●
Text		5 fonts, 3 sizes	8 stroke fonts, 9 point sizes 5 bit-mapped fonts, variable sizes

* Manufacturer claims new version will have this function.
** Manufacturer will supply a BASIC program upon request.

Processing Images

PC Paint has four pull-down menus: File, Edit, Tools, and Fonts. The File menu performs mundane operations such as saving and printing files.

From the Edit menu you have access to functions that work on any part of a picture you enclose with an elastic frame called the Edit Box. These functions cut, copy, paste, and erase images, switch (or "invert") existing colors, flip a selected area horizontally or vertically, and rotate an area in 90-degree increments (see Table 1).

Two real time-savers are the Quick-Move and Quick-Copy functions. They let you move or copy a selected image in one motion by simply dragging it to another part of the picture. To make continuous copies instead of just one at a time, hold down the <Alt> key as the image is dragged. According to the manufacturer, the new version will have a Transparent Mode function that will move an image without the background attached.

Extra Tools

PC Paint's Tools menu gives you access to a number of functions, the most important being Magnify, Grid, and Constrain. Magnify is similar to *MacPaint*'s FatBits function; it zooms a portion of a picture so you can make pixel-by- pixel changes in a detailed drawing or shave away the rough edges.

With the Grid command, you can lay a fixed, invisible grid on the screen, which restricts the drawing of lines to the points on the grid. The grid is useful for aligning text and objects, such as rectangles. You can also display it to give a chart a "graph paper" look.

The Constrain command limits lines, shapes, and movements in various ways. For example, it restricts Pencil and Paintbrush movements to horizontal or vertical lines and confines straight lines to horizontal, vertical, or 45-degree angles.

Fonts

PC Paint offers a limited selection of five font types–Normal, Roman, Bold, Old English, and Special–and three sizes–small, medium, and large. Font names are displayed in their fonts so you can preview them before making your selection.

In the hope of keeping up with its competition, the next version of *PC Paint* will import any of the 110 fonts supplied by *Fontrix*, from Data Transforms. Like *MacPaint*, *PC Paint* has no word wrap feature to prevent text from disappearing off the right side of the screen.

Paint 1-2-3!

Mouse Systems claims that with *PC Paint*'s Capture program, you can capture, enhance, save, and print medium-resolution graphics screens from any program. The manufacturer has tested *1-2-3*, *Symphony*, *Framework*, and *SuperCalc 3* among others.

Once Capture is loaded, you can run an application program, such as *1-2-3*, and capture any graphics screen by pressing <Alt>-<PrtSc>. This saves the screen image to disk in a form compatible with *PC Paint*. Next, enter *PC Paint*, use the Load As command from the File menu, and specify the drive and the name of the file you want to enhance. You can use any of *PC Paint*'s functions to change the picture, although adding color freehand to pie and bar charts is almost impossible, because the current version lacks the Paintroller function.

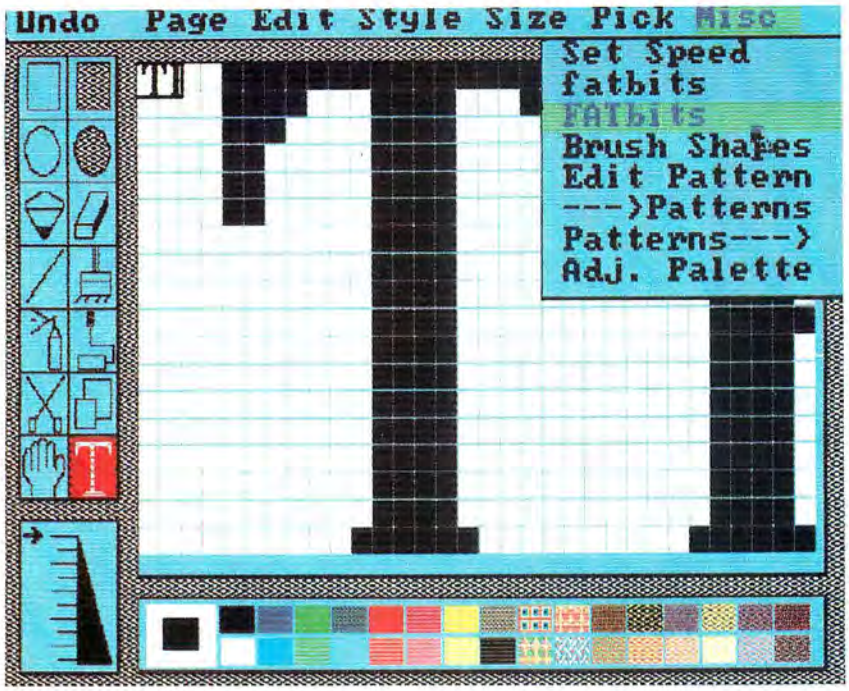
Print a Painting

PC Paint currently supports eight printers, including the Quadjet color ink jet printer, but does not work with any plotters (see Table 2). The new version will support the Epson JX-80 color printer and the IBM PC Color Printer. *PC Paint*'s Print command sends the entire screen to the printer, but unlike *Paintbrush*, it won't send a portion of a picture.

Table 2: Supported hardware

	PC Paint	PC Paintbrush
Graphics boards	Hercules Color Card IBM Color/Graphics Adapter IBM Enhanced Graphics Adapter * Paradise Modular Graphics Card Plantronics PC+ Colorplus Quadram Quadcolor II Sigma Designs Color 400 STB Graphix Plus II Tecmar Graphics Master	Amdek MAI AT&T High Resolution Board Hercules Graphics Card IBM Color/Graphics Adapter IBM Enhanced Graphics Adapter * Quadram Quadcolor I/II Scion PC640 STB Graphix Plus II Tandy 1000 Tecmar Graphics Master Tseng Labs UltraPAK
Input devices	Logitech Logimouse Mouse Systems PC Mouse (and compatibles)	Logitech Logimouse Microsoft Mouse Mouse Systems PC Mouse D.E. Touchscreen GTCO Digi-Pad Joystick (any brand) Summapad series
Graphics printers	Epson MX, FX, and RX series IBM Graphics Printer Okidata 84 Step 2, 92, 93 Quadram Quadjet Epson JX-80 ** IBM PC Color Printer**	Anadex 9500A, Inteq LP-5100A Dataproducts 8050 Diablo C150 Ink Jet Epson MX, FX, JX series Gemini 10-X, 15-X HP ThinkJet IBM PC Color Printer IDS Non-Color Printer IDS Prism Color Printer NEC PC-8023 or C. Itoh 8510 Okidata 80 or 90 series Panasonic KX-P 1090 PrintaColor TC1040 Quadram Quadjet Tektronix 4695 Ink Jet TI-855 Printer Transtar 315 Color Printer
Plotters	None	Hiplot DMP29 HP 7475A Graphics Plotter

* Program does not support enhanced (640-by-350) mode.
** Program will support with new version.



Screen 2: PC Paintbrush's FATbits function zooms a portion of a picture (displayed in a box in the upper left corner of the screen) for pixel-by-pixel editing.

Note that you cannot reassign printer colors, though the resulting printout usually matches what you see on the screen. A full-screen printout is only 5½ by 8 inches–a limitation when compared to *Paintbrush*'s print size options.

PC Paintbrush

Paintbrush improves on *PC Paint* by offering a wider range of simultaneous colors and higher resolution with the 11 graphics boards it supports (see Table 2). But you'll need matching accessories. For example, using the Tecmar Graphics Master board to obtain 640-by-400 resolution requires a monitor capable of producing 400 lines.

Paintbrush also embraces more input devices than *PC Paint,* including mice, digitizing pads (it comes bundled with the Summapad MM961), joysticks, and a touch screen. Output is not ignored either; 23 devices, including color dot matrix and ink jet printers as well as plotters, are supported.

In the Beginning

Installing *Paintbrush* is straightforward, but learning to use the program takes a bit of doing. A share of the blame lies with the program's poorly organized and inelegant user manual–sloppiness that is evident in the screen interface as well. Icons are illogically arranged; the most important icons–the painting and editing tools–are located below the less frequently used icons that generate geometric shapes.

Some icons such as the Color Eraser, the Scissors, and the Pick (portrayed as two overlaid boxes) are maddeningly vague. The program also requires that you click the Scissors or Pick icon before you can use the Edit or Pick menu commands. Another screen design flaw: The line-width selection box does not adequately differentiate among the ten line widths that the program so generously offers.

As a result of this less-than-intuitive interface, learning *Paintbrush* is slow going; you must frequently refer to the documentation for explanations. Not surprisingly, *Paintbrush* requires more practice than *PC Paint.* The program has six pull-down menus–Page, Edit, Style, Size, Pick, and Miscellaneous–so it takes a while before you can easily locate the commands you want. The benefits of this complexity are more processing functions and a more extensive font selection than *PC Paint* supplies–certainly a trade-off many graphic artists can accept.

An Artist's Perspective

Paintbrush has the same draw, brush, and pattern features found in *PC Paint,* such as Paintbrush, Spray Can, and Line (for straight lines), but it lacks functions that automatically generate polygons, curved lines, or rectangles with rounded corners (see Table 1).

Unlike *PC Paint, Paintbrush* has a Paint Roller function which, like *MacPaint*'s Paintbucket, leaks through the tiniest of openings. You can stem any leakage by plugging holes using one of the two zoom functions, fatbits and FATbits, with the second zooming the picture to a greater degree than the first (see Screen 2).

No matter how many colors your graphics board supports, the Adjust Palette function in the Miscellaneous menu limits you to a spectrum of 16 colors. *Paintbrush* currently provides 32 patterns but, more important, lets you edit these to create an unlimited number of customized patterns that can be saved and used in drawing. Any new pattern you save to disk will replace the original pattern in the palette; to regain the original you must recreate it.

Paintbrush also offers both Eraser and Color Eraser. The latter is unusual because it selectively erases areas in the active color only, preventing you from accidentally erasing adjoining areas that have a different color. An Undo function works for all program commands, with one glaring exception: You cannot reverse the Clear Screen function, so you may lose a picture if you're not careful.

Another error-correction feature is the Local Undo command, which works with all icon-activated functions except Hand and Text. Invoked with a press of the <Backspace> key, Local Undo turns the cursor into a box that encloses the area you want to erase.

The Image Process

Once you've created a work of art, you may decide it hasn't reached the desired state of perfection. Luckily, the Edit menu functions let you cut and paste images within a picture and between pictures.

To move or copy part of a picture you must first click the Scissors icon, pull down the Edit menu, and click either the Move or Copy option. Next, select the Name Is option and assign a file name to your picture.

Frame the picture with the Edit Box that appears on screen, and press the right mouse button to save it. The Move function deletes the original image from the screen, while Copy leaves it intact.

Note that if the captured image is not given a unique name before it's saved, it overwrites whichever image was saved last—and with no warning and no way to undo the blunder. The final steps are to move the Edit Box to where you want the image moved or copied, and to press the mouse button to paste in the image. Needless to say, this procedure is not for the impatient.

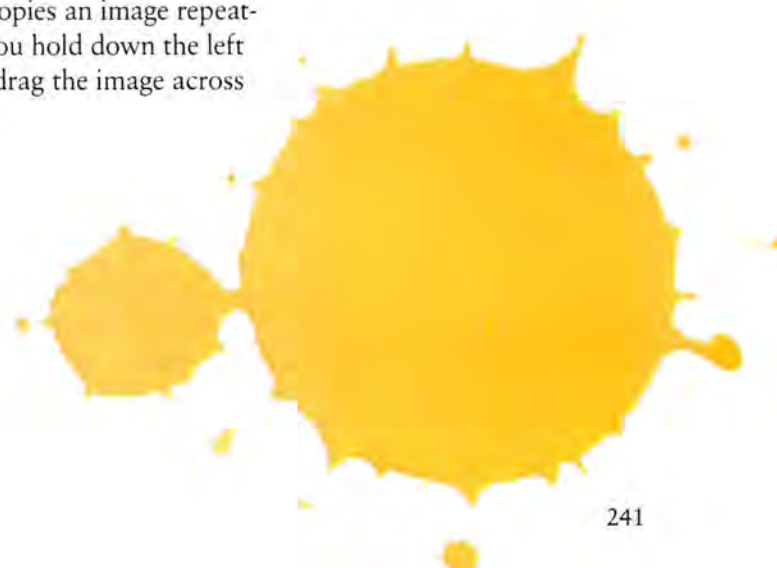
The Paste and Brush functions are used with the Name Is option to import saved images into the current picture. With both functions you can retrieve an image with or without its background. Brush also copies an image repeatedly when you hold down the left button and drag the image across the screen.

In addition to functions that rotate selected areas of a drawing in 90-degree increments, flip them horizontally and vertically, and reverse colors, the Pick menu features three capabilities that *PC Paint* lacks. The two Shrink and Grow functions, not to be confused with the zoom functions, let you change the size of any selected area on screen and save the image. The Tilt function creates three-dimensional effects by attaching a parallelogram to a selected area of the drawing, which is then tilted to the desired angle and filled with a mirrored image of the original.

Paintbrush *lets you create an unlimited number of customized patterns.*

Fonts

Paintbrush offers a generous selection of font styles and sizes. Stroke fonts (created with vectors and fills) come in eight styles, including Greek and Script; five bitmapped character fonts that resemble the standard IBM character fonts are also available. Generally speaking, stroke fonts



look best in high-resolution mode because they often create jagged edges in lower resolutions, while bit-mapped fonts are appropriate in medium resolution.

You can select various attributes depending on the font type used. Stroke fonts can be in light, medium, or bold typeface and can be italicized, underlined, outlined, shadowed, and kerned (characters moved closer together). For bit-mapped fonts, you can select proportional character spacing and a function in which text characters are highlighted by the background color. The Size menu lists nine point sizes for stroke fonts and four scaling factors for height and width of the bit-mapped fonts.

For help in aligning text and geometric shapes, you can choose from two grid sizes using the <F5> and <F6> keys. The <F7> or <F8> key toggles a Constrain function that confines cursor movement to the grid points.

Captivating Graphics

Paintbrush's Frieze utility lets you capture, enhance, save, and print graphics and text from other programs such as Lotus's *1-2-3, Microsoft Word, WordPerfect, SuperCalc 3, PC Paint,* and *DR Draw. Paintbrush* is not *WordStar* compatible. The important requirement is that Frieze be in the same mode as the screen you want to import. To import a *1-2-3* graph, load Frieze and then select the correct Setmode command according to the *Paintbrush* manual's instructions.

Once you are working in *1-2-3,* press <Shift>-<PrtSc> to display Frieze's one-line command menu at the top of a graphics screen. Choose Save to save the screen in a disk file for *Paintbrush.* Be sure to add a .PCX extension when you name the file. Reenter *Paintbrush* to bring in the graphs for enhancement, and use the Paste function to combine the enhanced screen with another picture.

Frieze is of particular interest because it lets you choose parameters for printing an image. You can select an entire screen or a portion of it, then set the height and width (the latter can be up to 24 feet) of the printed copy. You also have the option of printing an image sideways. A chart in the user manual shows how to assign new print colors to the on-screen colors.

A slide show program comes with *Paintbrush,* but before using it you must first create an ASCII file that lists the names of your "slide" files. Each slide file name may be followed by the word *FOR* and the number of seconds you want that slide to be displayed. Next, load Frieze and then BASICA, and type **RUN Slide.** Answer the prompt for the name of your ASCII slide show file, and the show will begin.

Drawn Conclusions

If your painting is mostly for fun, then *PC Paint* is the better program. It's easier to use, its documentation is clearly superior, and it anticipates blunders on the part of the user with on-screen warnings.

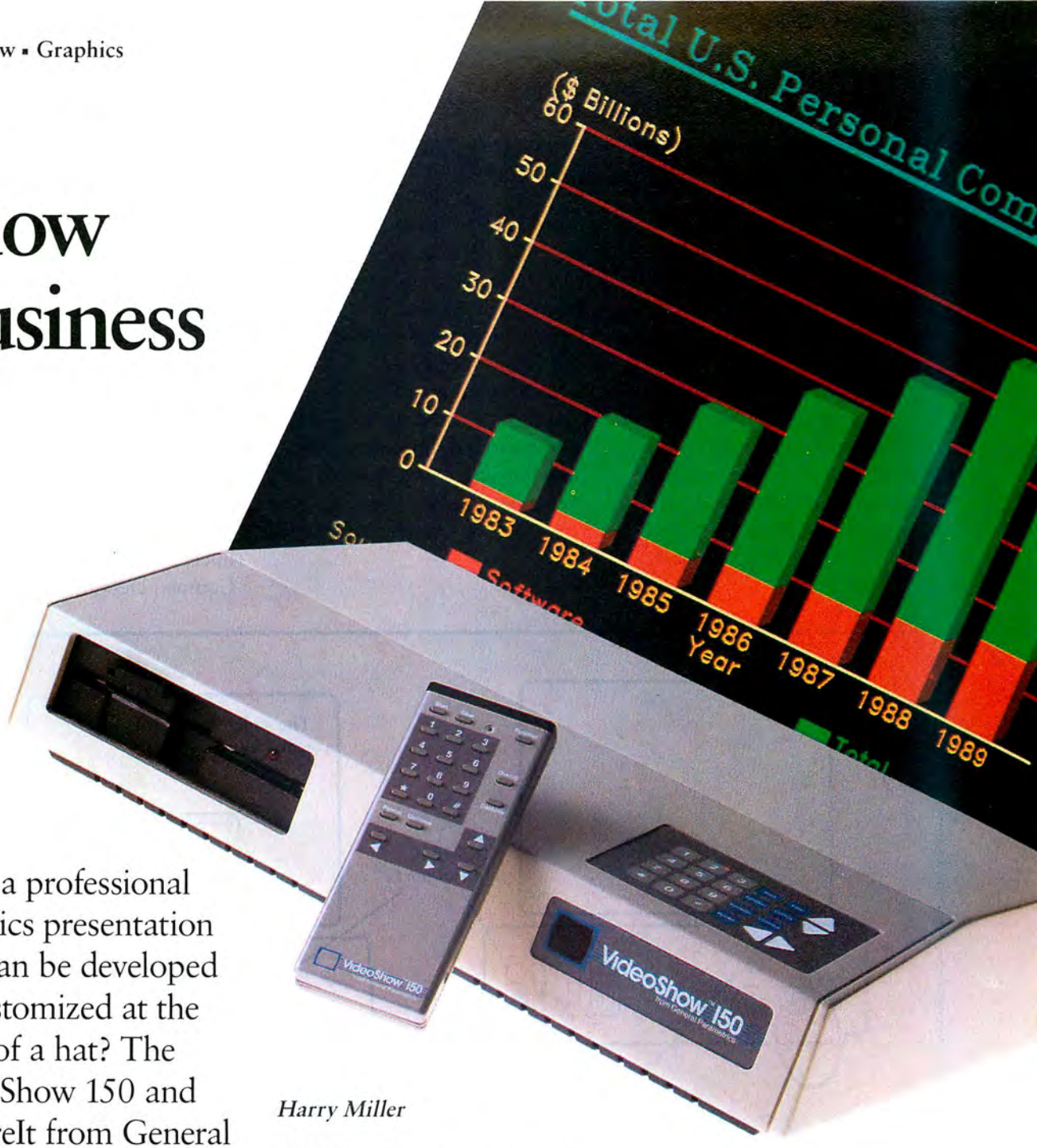
For more serious graphic arts and business applications, *Paintbrush* is the better choice. The higher resolution quality available with the variety of supported graphics boards, the wider assortment of font styles and sizes, the capacity to use digitizing pads, and Frieze's printing capabilities make it the preferred art and business tool.

Christine Whyte is Product Review Editor for PC World.

PC Paint, Version 1.01
Mouse Systems
2336H Walsh Ave.
Santa Clara, CA 95051
408/988-0211
List price: $99, with Mouse Systems Mouse $220
Requirements: 256K, one disk drive, IBM Color/Graphics Adapter or equivalent, RS-232C serial port for mouse

PC Paintbrush, Version 2.5
International Microcomputer Software, Inc. (IMSI)
1299 Fourth St.
San Rafael, CA 94901
800/562-4723 in California, 800/222-4723 outside California, 415/454-7101
List price: $139, with Logitech Mouse $189, with 6- by 9-inch Summapad MM961 $495
Requirements: 192K, one disk drive, any supported color graphics board, color monitor

Show Business



Need a professional graphics presentation that can be developed or customized at the drop of a hat? The VideoShow 150 and PictureIt from General Parametrics take advantage of a new technology to provide breakthroughs in color and clarity.

Harry Miller

Give the entire graphics department a year off? Well, that might be a little rash. But after using the VideoShow 150 to whip up a last-minute presentation, you may not be so quick to call in the graphics experts next time.

PC-based graphics usually perform one of two functions: analysis, used to better understand the data at hand; or presentation, used to pass along that understanding to others. With the introduction of its new line of products, General Parametrics is providing tools that may bring some added polish, productivity, cost savings, and fun to the presentation part of the task.

Produced conventionally, a typical slide for a business presentation runs $35 to $100, takes three to seven days to produce, and involves at least three or four

people. Using a PC, you could reduce the strain on all those resources, but until now the quality of the final product was still second rate at best–the resolution of the slide was limited by the capabilities of the graphics board and monitor. With the VideoShow 150 and *PictureIt*, its accompanying business graphics software, you can prepare a high-quality video display "slide show" in less than an hour–a show that can display many more simultaneous colors (up to 1000) and produce much higher resolution than standard PC graphics systems.

You start by using *PictureIt* on any 128K PC to enter the data you want to present into on-screen forms. That data is stored in the form of picture files–instructions that enable the VideoShow 150 to create images–on a VideoShow data disk. If you connect a color monitor to the VideoShow and hook the unit to the PC via a simple serial cable (see Figure 1), you can preview the pictures as you create the picture file. You can then remove the data disk from the PC and use it in the VideoShow 150, which can independently read the disk and drive a color monitor. You no longer need the PC.

Showing Off

The VideoShow 150 is essentially a small, dedicated graphics computer. Its compact 16-pound console contains an 8086 microprocessor (also used by the Compaq Deskpro and the AT&T

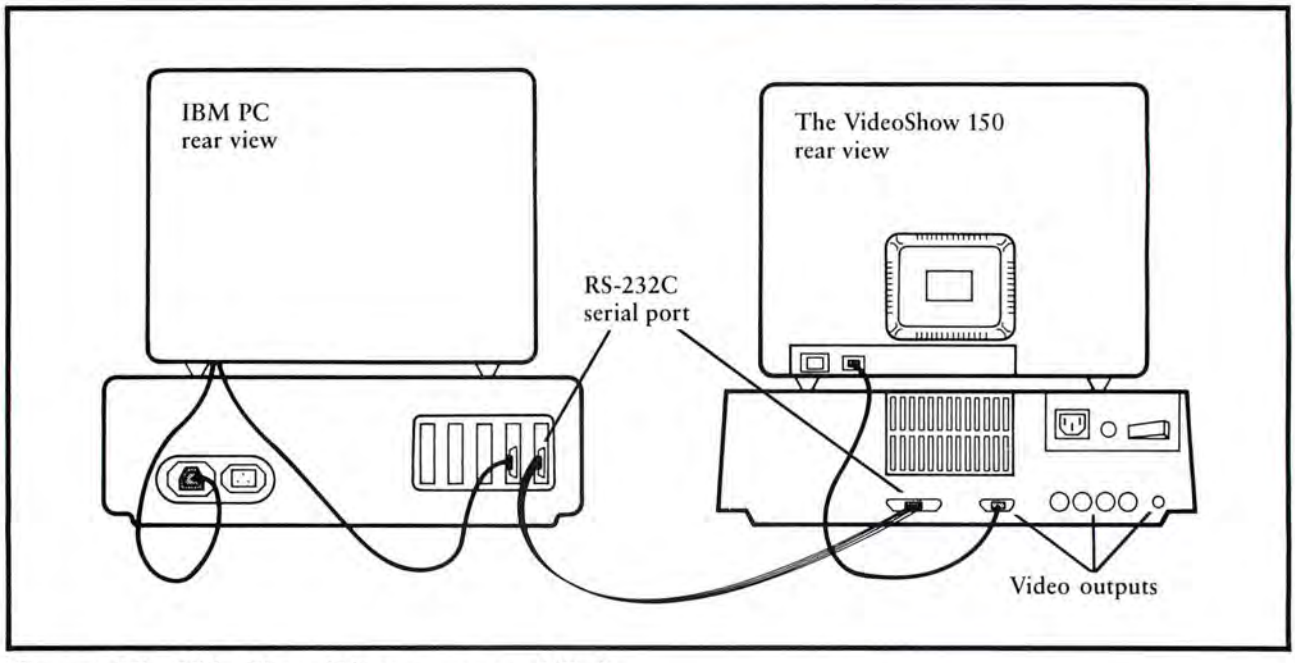


Figure 1: The VideoShow 150 connects to a PC via a serial cable to let you preview PictureIt images as you create them. The color monitor is connected directly to the VideoShow 150. The PictureIt program disk is in the PC's drive A:, and a VideoShow data disk is in drive B:. Moving the VideoShow data disk to the VideoShow's disk drive allows the VideoShow to operate independently.

Figure 2: A pixel, composed of several phosphor dots, is the smallest screen area that the PC's graphics controllers can normally address.

PC 6300), 256K of RAM, 16K of ROM, an RS-232C serial interface, and a PC-compatible 5¼-inch 360K floppy disk drive. The system is controlled by a 23-key touchpad, which is duplicated on an infrared remote control device much like the kind used with a television set. The system is so simple that if you know how to watch TV, you know how to operate the VideoShow 150. Within half an hour of placing the tutorial disk in the VideoShow's disk drive, you'll be familiar with all the techniques you need for a professional presentation. The tutorial's hands-on approach complements this step-by-step orientation to the VideoShow's capabilities.

The console also features video outputs for a normal PC color monitor (TTL-RGB), a high-quality RGB video monitor, or, through a video cassette recorder (VCR) or an RF modulator, a standard color television set. As you'd imagine, the image resolution on a TV is much less impressive than on an RGB monitor, but the legibility and definition are more than adequate.

A graphics monitor is the primary display medium for this system; in normal use the VideoShow 150 depends on the availability of some type of color video device at the presentation site. Presentation to more than a few people requires an expensive, large-screen video projection system or multiple monitors. Using video as a display medium enables you to leave the lights on during the presentation. The system can produce 35mm slides that capture the screen display and rival professional slide-making services in quality, but that function requires an optional slide camera (see the sidebar "Picture This").

Introducing MacroVision

What makes this box of chips and wires unique and useful is its innovative, proprietary MacroVision technology, which effectively triples the resolution of a color graphics monitor. MacroVision uses a form of virtual device interface (VDI) with images composed of vector graphics and fills

Highlighted text set using the VideoShow 150 and PictureIt from General Parametrics

(see "The Myth of the Virtual Device," *PCW*, April 1985), rather than addressing the screen pixel by pixel as most systems do (a pixel is a picture element—the smallest addressable screen area). The PC's pixel is actually composed of several phosphor dots (see Figure 2). The VideoShow's higher-precision graphics controller can illuminate individual phosphor dots.

Since the picture file consists of a set of instructions for creating a picture rather than a bit-by-bit map of the screen, each picture file occupies only about 1K, and each floppy disk holds up to 280 pictures. (The VideoShow's proprietary operating system and its font library claim about 70K of the disk.) The picture files follow the North American Presentation Level Protocol Syntax (NAPLPS—see "Toward a Graphics Standard," *PCW*, Vol. 2, No. 12). As the NAPLPS standard gains acceptance, you can expect to use *PictureIt* files with other graphics devices and to drive the VideoShow 150 with files created by other programs.

Picture This

Wes Nihei

General Parametrics has surrounded its VideoShow 150 system with a number of products designed to take advantage of the system's high-resolution image quality and range of colors.

The company bills two of these, PhotoMaker 150 and *PrintMaker 130*, as components of a system that enables users to create high-quality business graphics in the office for on-the-spot presentation.

The PhotoMaker 150 package captures the VideoShow's graphics images on film, producing either slides or color prints. The unit incorporates a modified version of the Polaroid Palette that connects a video image recorder directly to the VideoShow console rather than to a PC.

The PhotoMaker software, loaded into the VideoShow system memory, selects *PictureIt* graphics and enables the recorder to match the system's hues and images precisely. *PhotoMaker* can capture single graphs or every picture on a presentation disk. Using interchangeable camera backs, it produces either conventional 35mm slides or, with Polaroid film, instant color prints and slides.

The $2999 PhotoMaker kit includes the video image recorder, the PhotoMaker program disk, a 35mm autowind camera body, a Polaroid instant picture unit, and a Polaroid instant slide processor.

The *PrintMaker 130* program generates full-color or black-and-white hard copy from VideoShow images. With a color ink jet printer connected to the system unit's serial port, the *PrintMaker* program can paint the full range of VideoShow's 1000 colors. A program option that supports black-and-white and a dot matrix printer convert color into 16 shades of gray. *PrintMaker 130* also produces multiple copies and creates transparencies for overhead projectors.

It supports a variety of printers, including the HP LaserJet; the Canon A-1210 and PJ-1080A; the Diablo C150; Epson's FX, MX, and RX series; the Okidata Micro 84, 92, and 93; and the Quadjet QJ9000.

General Parametrics intends to market additional VideoShow peripherals and programs. Version 2.0 of the company's *PictureIt* expands the ear-

lier selection number of picture types and fonts, and several independent software developers have released products that endow the VideoShow with a range of new capabilities.

PC Presents by IMEDIA imports data from *1-2-3*. Decision Resources Corporation has developed a device driver that links the VideoShow with the ISSCO mainframe graphics system. *Orgchart* by Quam Development Group can create customized VideoShow formats, including organizational charts. *Picture Pack* from Riddick Communications is a series of clip art libraries for various vertical market industries; they contain 100 different images, borders, symbols, highlights, and backgrounds. No doubt more products are in the works for VideoShow's unique presentation system.

Built-In Functions

The VideoShow 150 provides a full complement of features. Both keypad and remote control directly access a table of contents that lists and describes all pictures on the disk in the VideoShow drive. A picture number is listed for each image, and the numeric keypad allows random access to any image.

A special Function key activates automatic mode, in which pictures advance without user intervention. The same key lets you specify the duration of pauses between pictures and use special effects (i.e., fancy screen wipes such as "venetian blind" wipes) between pictures. Images change at a perceptibly faster clip without special effects.

The VideoShow 150 enables you to overlay images (see Screen 1). Although the system doesn't impose a limit on the number of images that can be piled atop one another, the useful limit is about three, and even that number requires a good deal of planning during the image-creation process. One example of the VideoShow's impressive intelligence—the system automatically makes the background color of subsequent overlays transparent.

The Pointer key produces a white arrow on the screen. The touchpad's movement keys move the pointer up, down, left, or right; the number keys control the direction the arrow points, and the 5 key toggles the color of the arrow to black and back to white again.

The Continue key enables you to complete images that are drawn in stages and fill them in during pauses in the presentation. The VideoShow 150 paints part of the image, then waits for the go-ahead signal (see Screens 2a and 2b). To remind you that part of the slide remains hidden, the VideoShow displays a small white square in the lower left corner. The square disappears when the picture is complete.

The keypad has some currently unused keys, including several Function key number combinations, an asterisk, and a pound sign, indicating the likelihood of enhancements of the VideoShow 150.

Video Hardware Tricks

All three of the console's video outputs are available simultaneously, so you can document your presentation as you give it. It's possible, for example, to record the presentation on videocassettes while projecting it on a large-screen display and viewing the graphics on a PC monitor at the podium. Simply feeding the video signal to a VCR so that you can record a presentation with a voice-over on videotape is in itself a useful capability. Be aware, however, that if you use a standard color television set, the VideoShow's remote control could change the TV's channel setting from the one dedicated to the RF modulator or the VCR (usually

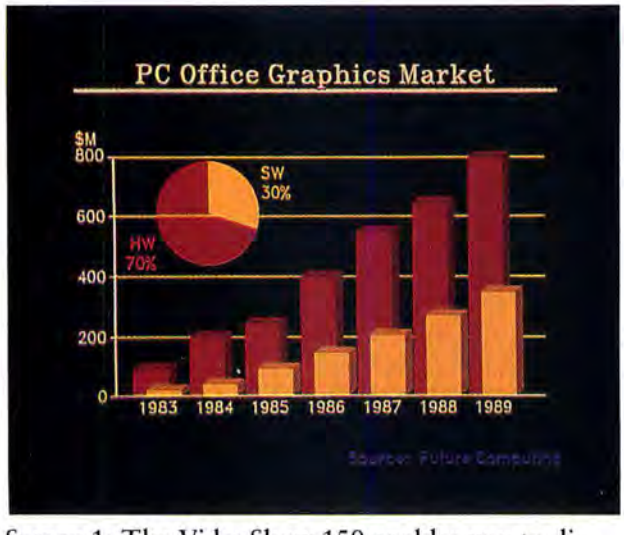
channel 3 or 4). Such a mishap could easily turn your carefully crafted image into black and white raster noise at show time.

The Software Side

PictureIt provides a simple way to input data for VideoShow pictures. The program's first release offers a choice of 25 picture types: 8 bar charts, 4 line or area graphs, 5 pie charts, and 8 styles of word charts (see Figure 3). While that number might initially seem ample, it doesn't take many presentations to make you yearn for more. Clearly, the limited number of graph types is one of the program's major drawbacks. Flowcharts and scatter plots–among the chief presentation vehicles–are missing. Also conspicuously absent are formats for organization, Gantt, and PERT (Program Evaluation and Review Technique) charts.

At press time, however, General Parametrics was preparing to release version 2.0 of *PictureIt*. As described by Herb Baskin, the company's president, the new version eliminates some of version 1.1's shortcomings. Included in version 2.0 are new formats ORG1 and GANTT1 for organization and Gantt charts, and WORD for better control of text.

This is not a surprising development, since the program's design facilitates future expansion. Each picture type is controlled by a file on the *PictureIt* program disk. Thus, to add picture types, all General Parametrics has to do is create a new driver (a disk file) and a fill-in form. The on-screen forms (see Figure 4) provide a simple means of creating picture files. Each picture type has its own form, but all the forms are similar in design. The program will prompt you for the picture type (the manual contains a complete list). A short version of the form for that picture type then asks only for the data to be displayed; it uses the program's built-in defaults for color, type font, type size, justification (left, right, or centered), special effects, and styles. The best part of this program is that the defaults for color and style make your picture look good as soon as you type in the data.



Screen 1: The VideoShow 150 enables you to display different types of graphs simultaneously by overlaying images. The VideoShow automatically makes the background of subsequent slides transparent. In this case the 3-D bar chart was created first, and the pie chart was added as an overlay.

The long format, displayed in the manual, lets you select the full range of options, including outlining, underlining, three-dimensional display, and up to 20 background styles (grids, rules, or text frames). You can also change the color of almost anything, basing your selection on the 105 colors displayed in the documentation or specifying any of up to 1000 colors using a three-digit code. The code is very logical, if somewhat challenging. The three digits represent the amount of red, green, and blue, respectively, contained in the specified color. Specifying color by codes is not an intuitive process. In addition, a minor increase or decrease of any of the three numbers can trigger a radically different color. Unfortunately, the code bears no resemblance to the PMS (Pantone Matching System) that graphic artists have been using for years.

As you build the picture, you can preview it at any time by pressing <F8>. Previewing your work on a normal color monitor

connected to an IBM Color/ Graphics Adapter provides only the sketchiest idea of the end product. The IBM graphics board limits the colors and resolution, so the preview reveals merely spatial factors such as positioning and scaling. The only meaningful preview occurs when the color monitor is connected to the VideoShow 150, which in turn is connected to the PC via serial cable.

Not Picture Perfect

PictureIt 1.1's 25 picture types are listed in Figure 3. Testing most of the picture types uncovered few real problems. The software generally performed as intended.

Version 2.0 reportedly corrects some of the design awkwardness of the first release. In the earlier version, several pictures required sleight of hand to achieve results that look deceptively simple in the manual's examples. The need for tricks indicated a certain lack of elegance in the program's design.

For example, to reposition elements of a picture, you'd have to figure out how to fool the program. Lowering a line of text required inserting a blank line above it. But when you copied a line (with the <F5> copy key), the blank line would be appended after the current line, so you'd have to erase the text and reenter it on the subsequent line. If this is starting to bore you, you're getting the idea.

On pie charts and bar graphs, text labels can overlap (even though they are limited to a certain number of characters). In the early version, the inability to control placement of the offending labels was especially frustrating.

PictureIt version 2.0 eliminates these problems with a combination of a new word chart format and the capability to create composite pictures from several graph types. The new word format enables you to place any sized text

Screen 2a: The VideoShow 150 draws part of a picture and pauses, waiting while you make your point.

Screen 2b: When you press the Continue key, the VideoShow 150 completes the image.

anywhere on the screen. The screen positions are addressed in coordinates of 2000 by 2000 picture dots. This word chart format may be the only way a skilled user will want to enter text on the screen. With the new format, you can create the graphic elements first and, using the composite image feature, position the text exactly where you want it.

The composite feature also promises to correct another weakness of the earlier version—difficulty in predicting and controlling space allocations for overlays that use graphs of different types.

Compromising Convenience

PictureIt is easy to learn, but not especially convenient to use. Perhaps the program's most annoying problem is that you can't change the picture type without rekeying all the data and options (color, pauses, justification, special effects, and so on). You'd expect to be able to load the data from one type of form to another, but the program design does not permit it.

Although the new version doesn't correct this problem, it does allow some limited importing of data from *1-2-3*, DIF, and ASCII files. Reportedly, you'll be able to link data in a file of one of those types with a specific field in a fill-in form. This feature will be useful primarily for repetitive presentations, where changing data can be retrieved from a fixed location in a spreadsheet.

PictureIt's main menu illustrates the program's design philosophy: the menu is very airy, leaving lots of space between options. As a result the main menu occupies two pages; you have to press a key to toggle between the pages and wait while the program redraws the screen each time. The amount of information on that menu doesn't warrant two pages and the extra effort. Even if you agreed with the premise of a two-page menu, you'd want the 'Exit PictureIt (to DOS)' option on the first page. No such convenience is to be found here.

A less severe problem is that the meanings of the function keys change according to your location in the program. This is not a disastrous flaw, but it adds to the feeling of awkwardness that permeates the program.

This type of software design might have been acceptable a few years ago, but at this stage of soft-

Bar charts

3-D vertical	BAR 1
Basic vertical	BAR 2
Histogram	BAR 3
Grouped vertical	BAR 4
Stacked vertical	BAR 5
Overlapped grouped vertical	BAR 6
Individual vertical	BAR 7
Basic horizontal	BAR 8

Graphs

Basic three-line	GRAPH 1
Two-line filled	GRAPH 2
Three-line filled	GRAPH 3
Dual vertical axes	GRAPH 4

Pie charts

Basic pie	PIE 1
Basic with long label	PIE 2
Exploded segments	PIE 3
Expanded segments	PIE 4
Multiple pies	PIE 5

Word charts

Basic with 7-line text area	WORD 1
Basic with 14-line text area	WORD 2
Variable format	WORD 3
Long-short columns	WORD 4
Short-long columns	WORD 5
Highlighted text	WORD 6
Multiple text pages	WORD 7
Framed text areas	WORD 8

Figure 3: PictureIt offers 25 chart and graph formats.

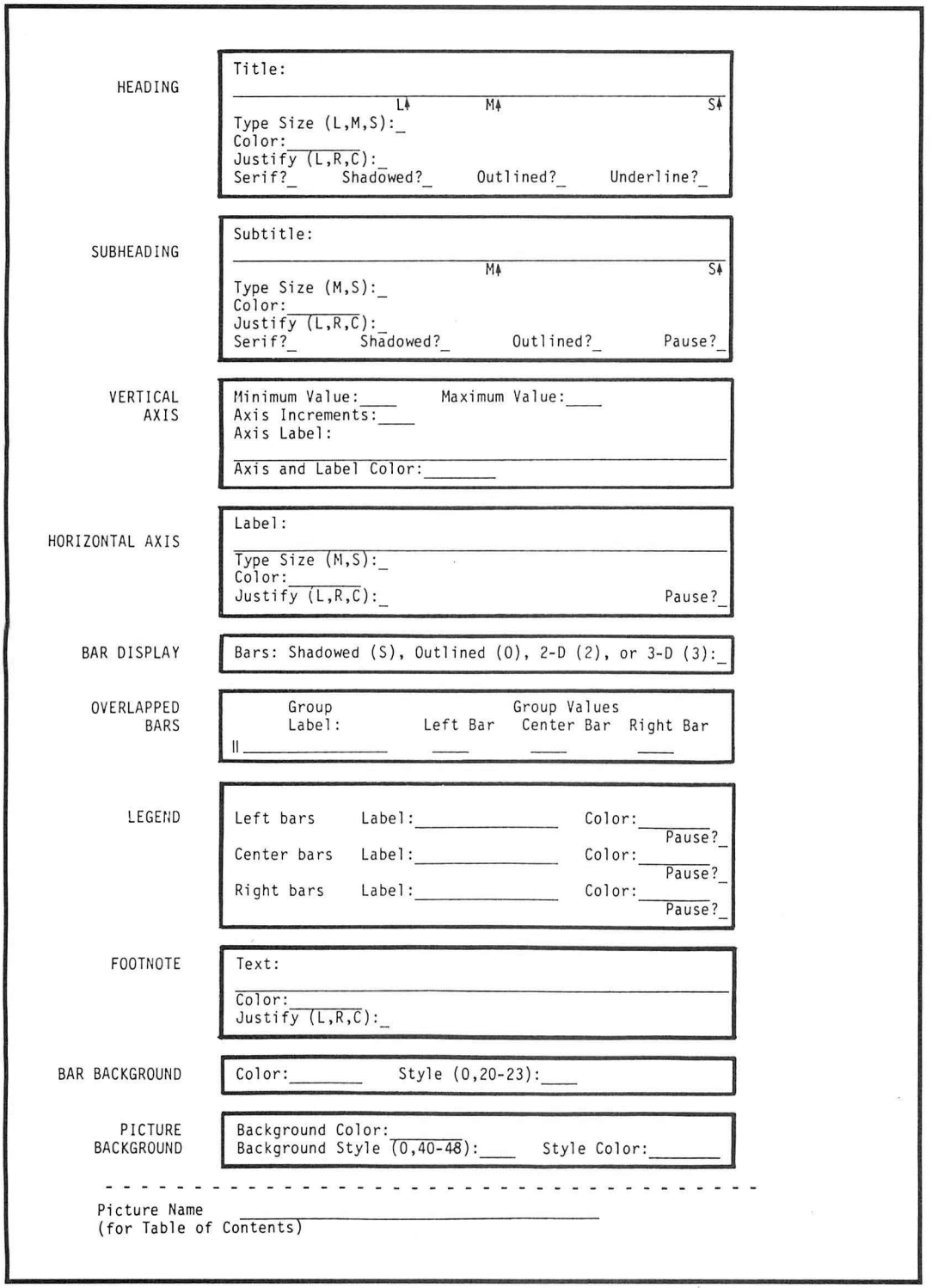


Figure 4: A fill-in form from the PictureIt manual. The program allows you to choose large, medium, or small type and left, right, or centered justification. Any frame that displays a double vertical line at the left can be duplicated to accommodate additional data.

ware development, it seems unnecessarily primitive. The menu functions should be handled by pull-down or moving menus (as in *Framework* or *1-2-3* respectively), and the fill-in forms could be redesigned to resemble a spreadsheet, simplifying moves between fields.

The program just misses other opportunities to be convenient. For example, from the main menu <F1> allows you to 'Create a new picture from scratch' and prompts you for the 'Format of the new picture'. Looking for a list of the formats on screen? Good luck. You'll find it only in the manual.

It's not as though the program's authors don't know how be efficient. When you select <F3> to modify an existing picture, the program prompts you for the picture number and graciously offers a list of current numbers (the disk's table of contents). You move the cursor to select the picture you want. If the program can use this approach in one place, it should be able to use it throughout.

It would also be useful if the fill-in forms would list the default colors to make matching them easier. You'd want to repeat the default colors in the sleight of hand mentioned earlier or in the new version's composite mode. Once again, the defaults are listed in the manual's appendix, but this seems a needlessly time-consuming approach. I'm convinced that businesspeople want things to be smooth–not just in the output or final product, but also in the process by which that product is created.

Looking for Help

On-line help is available only when you have the Electronic Guide to *PictureIt* disk in the VideoShow disk drive. When you ask for help on a basic topic (how to select a graph type, for example) the program directs the VideoShow 150 to display the banner that starts the appropriate section of the Electronic Guide.

Unfortunately, the version of *PictureIt* that I reviewed had a limited selection of help topics–the menu was one sparse page of very basic material. The help system doesn't reach beyond the fundamentals. It is not context-sensitive; once you've selected the graph type, you're on your own.

The hardware provides a level of polish--in color choices and resolution--that other systems in this price range simply can't touch.

It's Show Time

What we have here is a package consisting of excellent, state-of-the-art hardware supported by software that is adequate at best. The hardware provides a level of polish–in color choices and resolution–that other systems in this price range simply can't touch. Its compact design and flexibility of output make the VideoShow 150 a well-conceived and truly useful presentation tool.

While the VideoShow's price tag may seem high for what looks like a peripheral, you could buy five or ten of these for what you'd pay a graphic arts service to duplicate its capabilities. Viewed more broadly, if the spiffy graphics this box easily produces make the point–close the sale, get the votes, keep the client–the price tag is apt to seem far less imposing.

The exciting nature of the hardware may be part of the reason why the software seems so weak. When one piece of the package shines, you expect the rest to live up to that standard. What *PictureIt* delivers is simple access to the full range of VideoShow features. You don't need to be an artist to appear to be a graphics whiz; a good deal of slick preparation has gone on behind the scenes–making the choices simple and the defaults attractive.

The Stuff That Dreams Are Made Of

This technology is sufficiently exciting to make you wonder about the future of advanced graphics machines. For example, why not add a keyboard to the VideoShow and call it a dedicated graphics computer (which it is)? And, since

the VideoShow 150 already has a serial port and understands NAPLPS files, couldn't it double as a high-quality videotex terminal?

Better yet, why couldn't this technology be built into a lap-size PC? The machine would still be portable, and, for the same effort of schlepping the thing around (this might be a good place to admit that the macho value of lugging a Compaq gets old quickly), you'd have all the other advantages of personal computing. You'd also eliminate the duplication of CPU, disk drive, video display controller, and so on, that the current system requires. Ah, that's the trouble with editors—give 'em an inch and they ask for a light year.

Harry Miller is the Editor of PC World.

ISSCO/ VideoShow Driver
Decision Resources Corp.
1701 K St. NW
Washington, DC 20006
202/296-0770
List price: $5000
Requirements: 192K, one disk drive

Orgchart
Quam Development Group
5113 Leesburg Pike #302
Falls Church, VA 22041
703/379 8200
List price: $495
Requirements: 256K, two disk drives, graphics board, color monitor

PC Presents
IMEDIA
10441 Bandley Dr.
Cupertino, CA 95014
408/255-5500
List price: $495
Requirements: 192K, two disk drives, graphics board, color monitor

PhotoMaker 150
General Parametrics Corp.
1505 Solano Ave.
Berkeley, CA 94707
415/524-3950
List price: $2999

PictureIt
General Parametrics
List price: $595
Requirements: 128K, two disk drives

Picture Pack
Riddick Communications
401 E. Main St.
Richmond, VA 23219
804/788-8844
List price: $200
Requirements: 128K, two disk drives

PrintMaker 130
General Parametrics
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VideoShow 150
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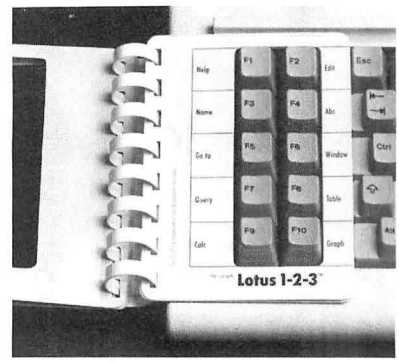

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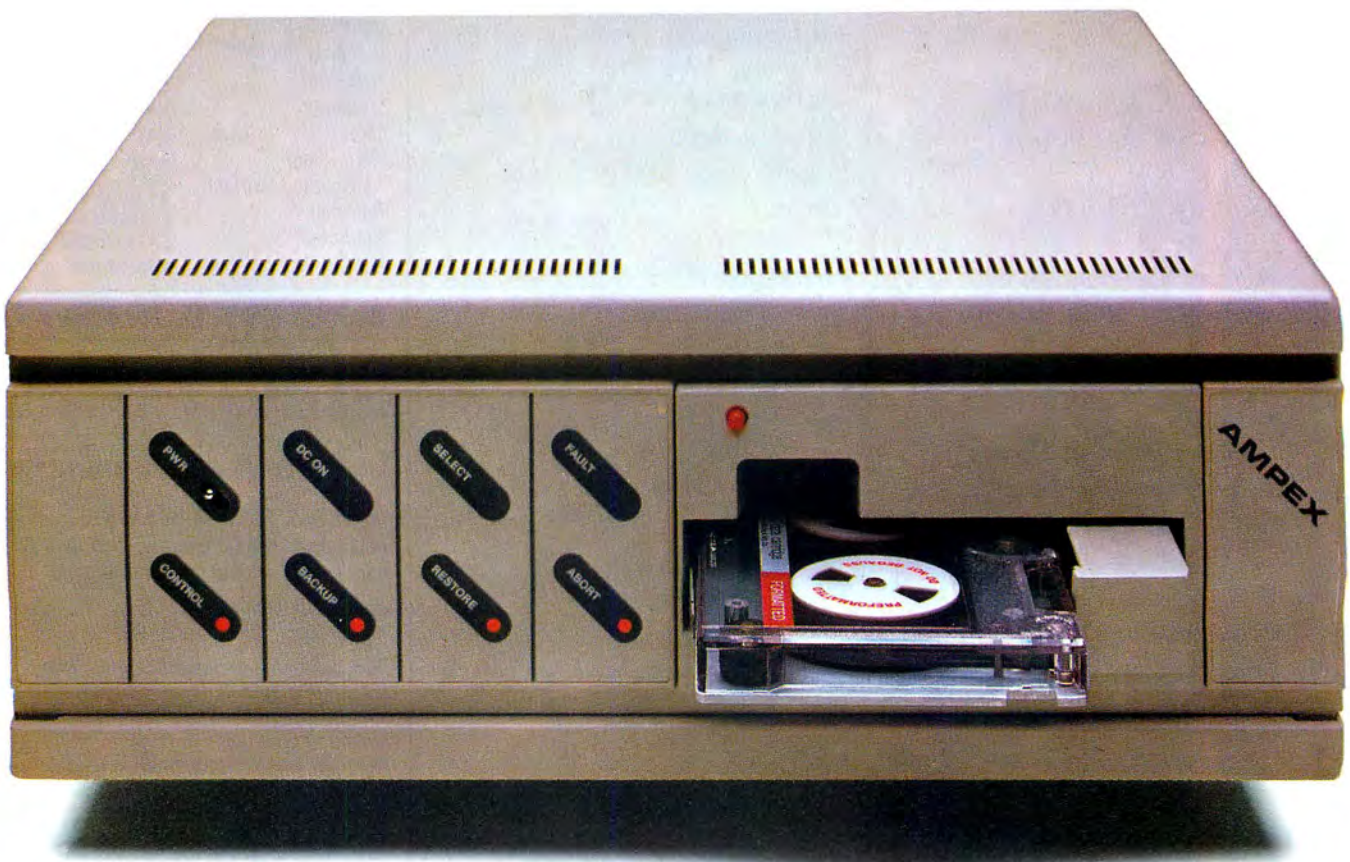

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Clearly Resolved

Graphics fans can breathe a sigh of relief–IBM has finally put its stamp on a graphics standard that keeps pace with industry developments. The new Enhanced Graphics Adapter and Enhanced Color Display promise to become a cornerstone for the graphics market.

Karl Koessel and Darcy DiNucci

IBM's new Enhanced Graphics Adapter (EGA) seems too tasty a morsel to leave in the dealer's showroom. It not only supports current IBM graphics modes, it offers a near-monochrome-quality text mode font in color, an enhanced graphics resolution of 640 by 350 pixels, and support for monochrome graphics. As an IBM product, the EGA will most likely be supported by all major software–an important consideration when you purchase graphics hardware. When you're offered specs like these, the temptation is to acquire the gadget with all speed and at any cost. Should you?

Options Unlimited

Look closer. The purchase of the EGA is a fairly complicated matter. The product consists of three modules, sold separately: the EGA itself, a full-slot board; the Graphics Memory Expansion Card (GMEC), which piggybacks onto the EGA; and the Graphics Memory Module Kit (GMM), RAM chips to fill out the GMEC. The EGA by itself has 64K of onboard memory; the addition of the GMEC brings video RAM to 128K; and the GMM adds another 128K for a total of 256K. Table 1 shows the cost of each configuration. One detail not listed in the table, but worth considering if your graphics requirements are modest: IBM is still offering the Color/Graphics Adapter for $250, $274 less than the EGA.

Table 2 shows what you get for your money. The EGA does not support composite monitors and does not have a printer port. What it does do is supply high-quality graphics and text to the Monochrome Display, the Color Display, or the new Enhanced Color Display. To unleash the board's most stunning advantages, you must use it in tandem with the Enhanced Color Display.

Graphics à la Mode

The EGA will generate some impressive new effects on a monochrome monitor, including, finally, monochrome graphics. You might also be tempted by a new text mode that deepens your view of data.

The monochrome graphics support seems to be a clear advantage. Don't, however, expect to boot up *1-2-3* and start creating graphs on your monochrome monitor as soon as the EGA board is installed. The hardware support is there, but before graphics become available, Lotus and other

Screen 1: The EGA supports a 43-line text mode on the Monochrome Display.

software manufacturers will have to supply drivers for the board. When software is available, the monochrome monitor will provide respectable 640- by 350-pixel monochrome graphics.

The EGA also offers both the familiar 25-line text mode with the crisp 9- by 14-pixel character box and a new text mode that displays 43 lines of text. That's a refreshingly deep view of a spreadsheet or almost a full page of a document, but its 8- by 8-pixel character box sacrifices some legibility (see Screen 1).

If you hook the EGA to a Color Display, all the software that ran with the Color/Graphics Adapter will continue to work, and a light pen will be as useful as ever. In addition, you'll be dazzled by a new spectrum in medium and high resolution; two new modes offer 16 colors in 320 by 200 and 640 by 200 pixels.

Another bonus is less obvious. Unlike the Monochrome Adapter and the Color/Graphics Adapter, whose character definitions are stored in and used from ROM, the EGA copies its characters from its ROM into RAM and uses the RAM copy. This makes it possible to replace those 256 characters with customized characters of your own.

Another of the board's dormant but tantalizing features is its split-screen capability. Future programs will be able to divide the screen into top and bottom halves that can scroll independently.

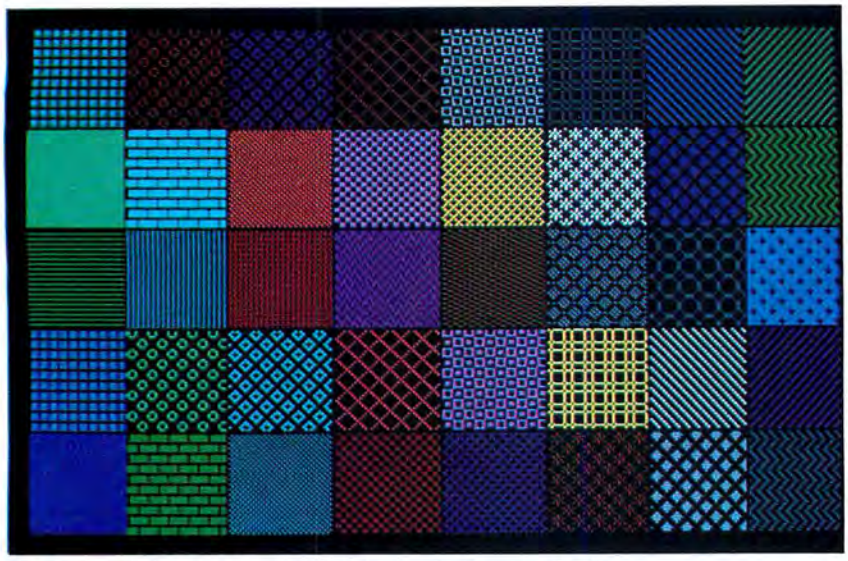
The board also sports a *Feature Connector,* mentioned only in passing in the *Technical Reference Manual.* This 32-pin I/O connector is wired to two RCA plugs–labeled *Reserved* in the installation instructions–that poke through the board's rear bracket. Their design suggests some upcoming bidirectional video interface.

The Crowning Touch

If you opt to complete your graphics kit with the Enhanced Color Display, you'll see more startling results. In addition to the old graphics modes, the combination of the EGA and the Enhanced Color Display offers sharp versions of the new 16-color medium- and high-resolution modes (see Screen 2) and an enhanced graphics mode with a resolution of 640 by 350 pixels. The new mode displays 4 colors simultaneously, chosen from a palette of 64.

All the graphics modes use an 8- by 8-pixel character box. In the enhanced mode this produces well-formed, tightly drawn, but tiny characters. Standard text mode produces an 8- by 14-pixel character box, a resolution readable enough to finally allow word processing in color (see Screen 3)–a vision-threatening proposition with the old Color Display's 8- by 8-pixel text characters. The Enhanced Color Display also supports the new 43-line text mode, with the small 8- by 8-pixel character box, in 16 colors (see Screen 5).

Before graphics become available, Lotus and other software manufacturers will have to supply drivers for the board.



Screen 2: The EGA's new high-resolution (640- by 200-pixel) mode flaunts 16 colors.

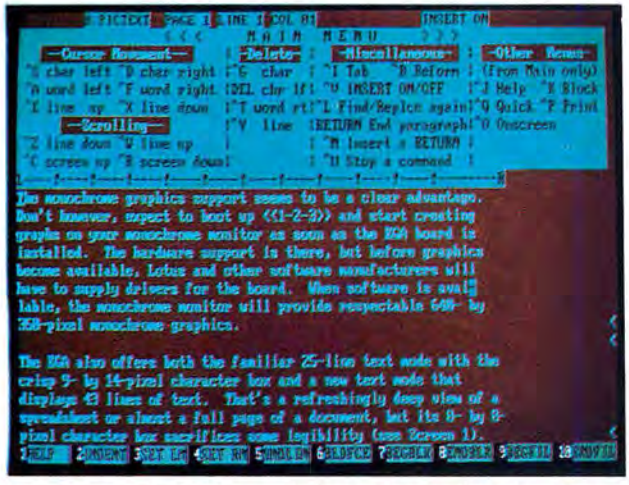
Improve Your Memory

Piggybacking the GMEC brings only one visible difference but plenty of potential to the display. If you have the Enhanced Color Display, you can witness a dazzling 16 simultaneous colors in the enhanced 640 by 350 resolution (see Screen 6), up from the 4 offered by the unaugmented EGA. The GMEC also adds room for 256 more user-defined characters. All 512 characters can be displayed at once, although no printer can currently produce more than 256.

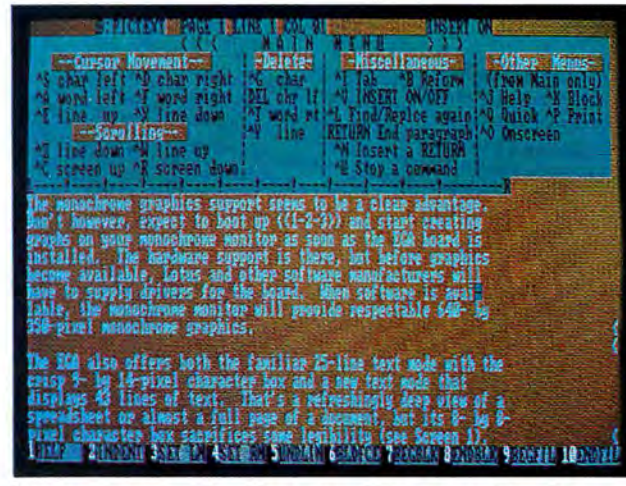
The GMM tops it all off. The module consists of 16 standard 64K-bit RAM chips that can be added to the empty sockets on the GMEC to bring total graphics memory to 256K, all in one slot. The extra 128K gives you hardware support for smooth scrolling and panning plus memory space for four sets of 256 characters; two sets can be on the screen at any one time. The GMM costs $259. The equivalent set of chips from an electronics supply house would cost about $60.

Ready and Waiting

IBM's product announcements highlight the company's new virtual device interface (VDI), implemented through the Graphical Kernel System (GKS) protocol (see "The Myth of the Virtual Device," *PCW*, April 1985). A VDI enables software manufacturers to create graphics programs that are device independent. Programmers can use GKS calls to implement graphics routines. In response, hardware manufacturers can write drivers to read those routines and translate them for their own devices. But standard use of any VDI protocol is still some time off. Because several layers of software—and therefore extra processing



Screen 3: The EGA and the Enhanced Color Display combine to produce a near-monochrome-quality, 8- by 14-pixel color text suitable for word processing.



Screen 4: Text mode on the Color/Graphics Display retains its 8- by 8-pixel character box.

Table 1: Cost of each EGA configuration

Graphics Memory	EGA		GMEC		GMM		Total
64K	$524					=	$524
128K	$524	+	$199			=	$723
256K	$524	+	$199	+	$259	=	$982

Table 2: Comparison of the IBM Graphics Adapters

	Color/Graphics Adapter			Enhanced Graphics Adapter		
	Monochrome Display	IBM Color Display	Enhanced Color Display	Monochrome Display	IBM Color Display	Enhanced Color Display
Character box matrix						
Text mode[1] (25 lines)	–	8 by 8	8 by 8	9 by 14	8 by 8	8 by 14
(43 lines)	–	–	–	9 by 8	–	8 by 8
Graphics mode[2] (25 lines)	–	8 by 8	8 by 8	8 by 14	8 by 8	8 by 8
(43 lines)	–	–	–	8 by 8	–	8 by 8
Graphics resolution						
Medium resolution	–	320 by 200	320 by 200	–	320 by 200	320 by 200
High resolution	–	640 by 200	640 by 200	–	640 by 200	640 by 200
Enhanced resolution	–	–	–	640 by 350	–	640 by 350
Colors (simultaneous/available)						
Medium resolution	–	4/16	4/16	–	16/16	16/64
High resolution	–	2/2	2/2	–	16/16	16/64
Enhanced resolution	–	–	–	4[3]	–	4/64 (16/64 with GMEC)

– = Not supported = Additional capability of EGA

[1]40 or 80 columns on color displays

[2]40 columns in medium resolution; 80 columns in high resolution except on the Monochrome Display

[3]Off, on, blinking, intensified

time—are necessary to implement a VDI, software developers may continue to write as they always have, directly to and for specific hardware.

For Alan Cooper, an independent graphics software author, the convenience of the GKS routines doesn't justify the extra padding that programs require to use them. "If I were selling to OEMs [original equipment manufacturers], I'd have to confront a wide variety of hardware. Going to the retail marketplace, I don't," he explains. He already uses his own VDI in his software and writes his own drivers for the few boards he needs to support, including the EGA.

Major software developers are also bypassing the VDI for the time being. Version 2.0 of *Microsoft Word* already supports the EGA, and to good effect. The new 350-line graphics resolution allows on-screen display of boldface and underlining. Microsoft's other products will support the EGA in new releases. "We think this is a

High Tech

Installing the EGA in your PC is a bit more complicated than installing its predecessors. If your PC was manufactured prior to April 1984, you'll need to install the ROM BIOS Upgrade Kit, available from dealers for $30. You can determine which ROM version you have by running the following BASIC program:

```
10 DEF SEG = &HF000
20 FOR I = &HFFF5 TO &HFFFF
30 PRINT CHR$(PEEK(I));
40 NEXT
```

If the date that is then displayed is earlier than 10/27/82, you'll need the new ROMs before installing the EGA.

You'll also need to pay attention to two jumpers on the EGA, designated P1 and P3. These jumpers must be set to one position if the EGA is to run the Enhanced Color Display and to another if it is to drive the Color Display or the Monochrome Display. Running any monitor when the jumpers are not properly set may damage your EGA, your monitor, or both. Refer to page 25 of the *EGA Installation Instructions* for more information.

very important board," says Microsoft applications marketing director Jeff Raikes. Digital Research's GEM operating environment uses the GSX VDI protocol, a first cousin to IBM's GKS. According to spokesperson Trish Colby of Regis McKenna, DRI's public relations firm, the protocols are close enough for compatibility. Both software publishers are paying attention. Says Colby, "DRI policy is to support anything that is an IBM standard."

Graphics applications are expanding at an exciting clip, and IBM's stamp on both a new hardware standard and a VDI protocol can only fuel the explosion. The new IBM hardware is eminently suited to take on the upcoming challenges. Its enhanced resolution and array of available colors seem almost superfluous for the current state of PC graphics but will put the new hardware in good stead for the looming graphics revolution.

Measuring Your Needs

In the past, equipping an IBM system with display boards presented a dilemma. If you wanted graphics, you bought the color monitor and board; if not, you chose the monochrome board and monitor. But to get more colors and higher resolution, you had to venture out from under the IBM umbrella to a third-party graphics board with less support. If you wanted both graphics and high-quality text, you had to either spring for both IBM boards and monitors or go to a standby like the Hercules board, which could generate graphics on your monochrome monitor. IBM now covers all those needs.

According to IBM's literature, users who need a "partial upgrade in graphics and text quality" would do well to keep their old Color Display but buy the EGA. The claim for a graphics text quality upgrade–even a "partial" one–is questionable, since the result is still the old 8- by 8-pixel character box. Graphics do improve with the addition of new colors. IBM's analysis is that users who need "high-use text, high-quality graphics, motion/animation, and the state of the art" should move up to the EGA and the Enhanced Color Display.

Buying the new monitor but keeping the old color board would be futile: IBM calls that configuration suitable for "entry-level graphics," only slightly different from the "price-sensitive graphics" it claims for its old combination, the Color/Graphics Adapter and the Color Display. The subtle wording suggests that at that mundane level of graphics, the old board and monitor have the price advantage, but ownership of the new monitor holds out hope of a later blossoming.

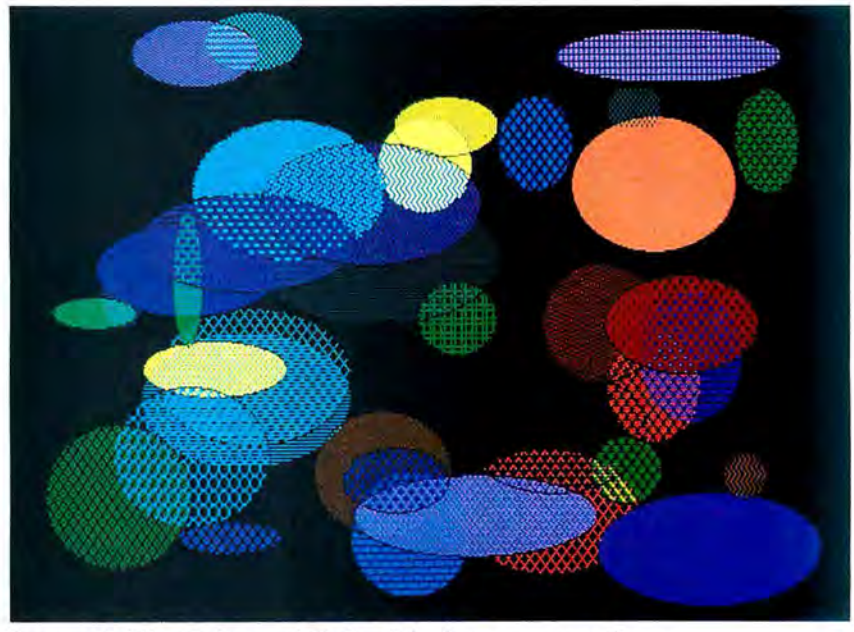
So if you're just setting up a system, you're in luck; you can start out with a top-of-the-line single-monitor system with the new

board and monitor. Given this configuration's superior text characters, you may not need a monochrome monitor at all.

If you don't often long for a prettier screen, and four-color bar charts suit you fine, hold on to your old color board and save your money. As graphics become more sophisticated, the enhanced capabilities of the new IBM hardware may become more desirable. The Color/Graphics Adapter is, of course, backed by an enormous software library, and the price of the new hardware can only come down.

But if graphics are important to you, you've probably been wanting something better than the IBM Color/Graphics Adapter and Color Display. If up to now you've held back from investing in one of the more impressive third-party boards because of compatibility questions, the green light may be at hand.

Screen 5: The new 43-line text mode is available in 16 colors on the Enhanced Color Display.



Screen 6: The Enhanced Color Display augmented by the GMEC supports 16 simultaneous colors in the enhanced 640 by 350 resolution.

Karl Koessel is the Technical Editor for PC World, *and Darcy DiNucci is the Assistant Editor.*

IBM Enhanced Graphics Adapter
IBM
Entry Systems Division
P.O. Box 1328
Boca Raton, FL 33432
800/447-4700, 800/447-0890
Alaska and Hawaii,
800/322-4400 Illinois
List price: $524, Graphics Memory Expansion Card $199, Graphics Memory Module Kit $259
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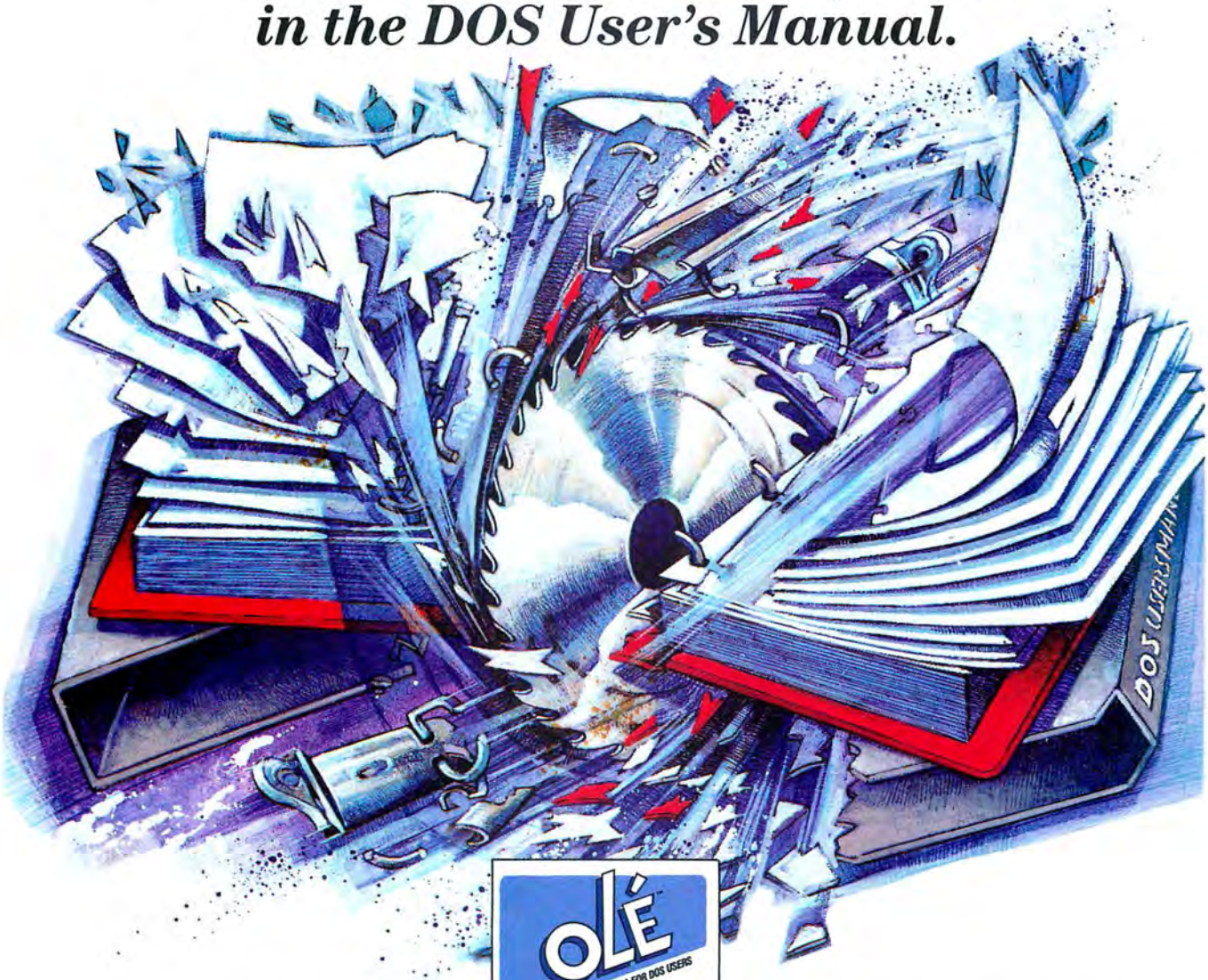

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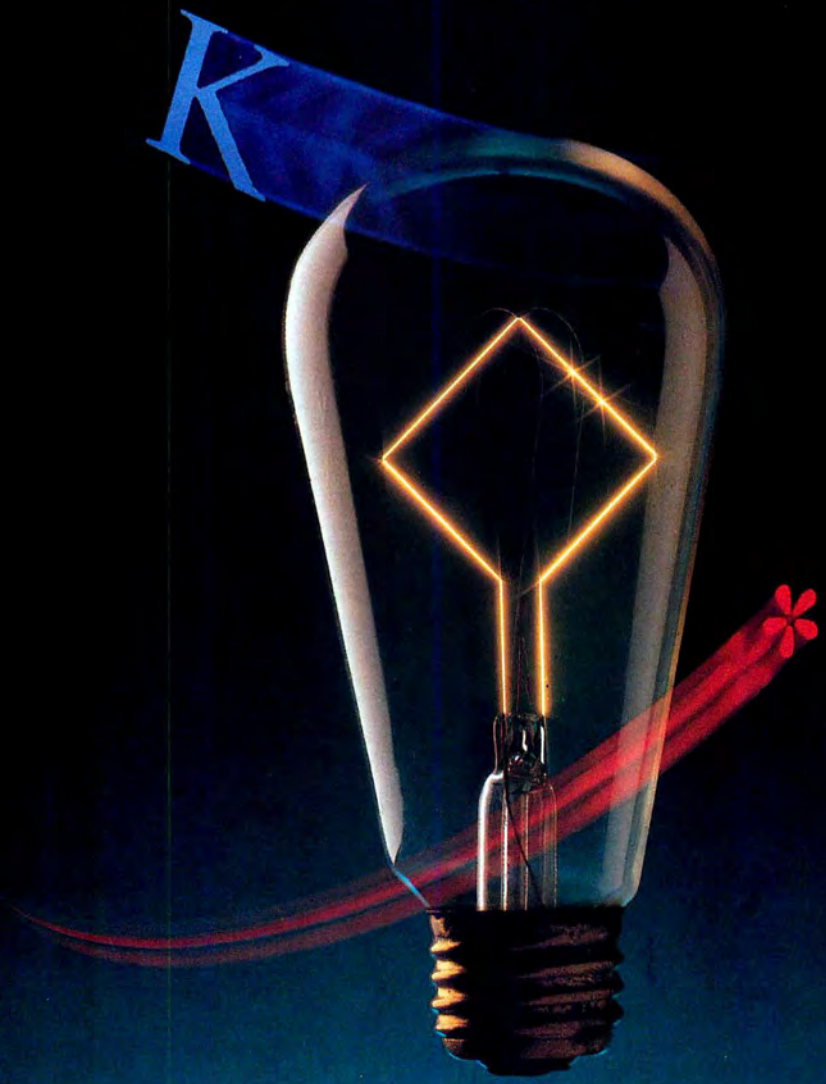

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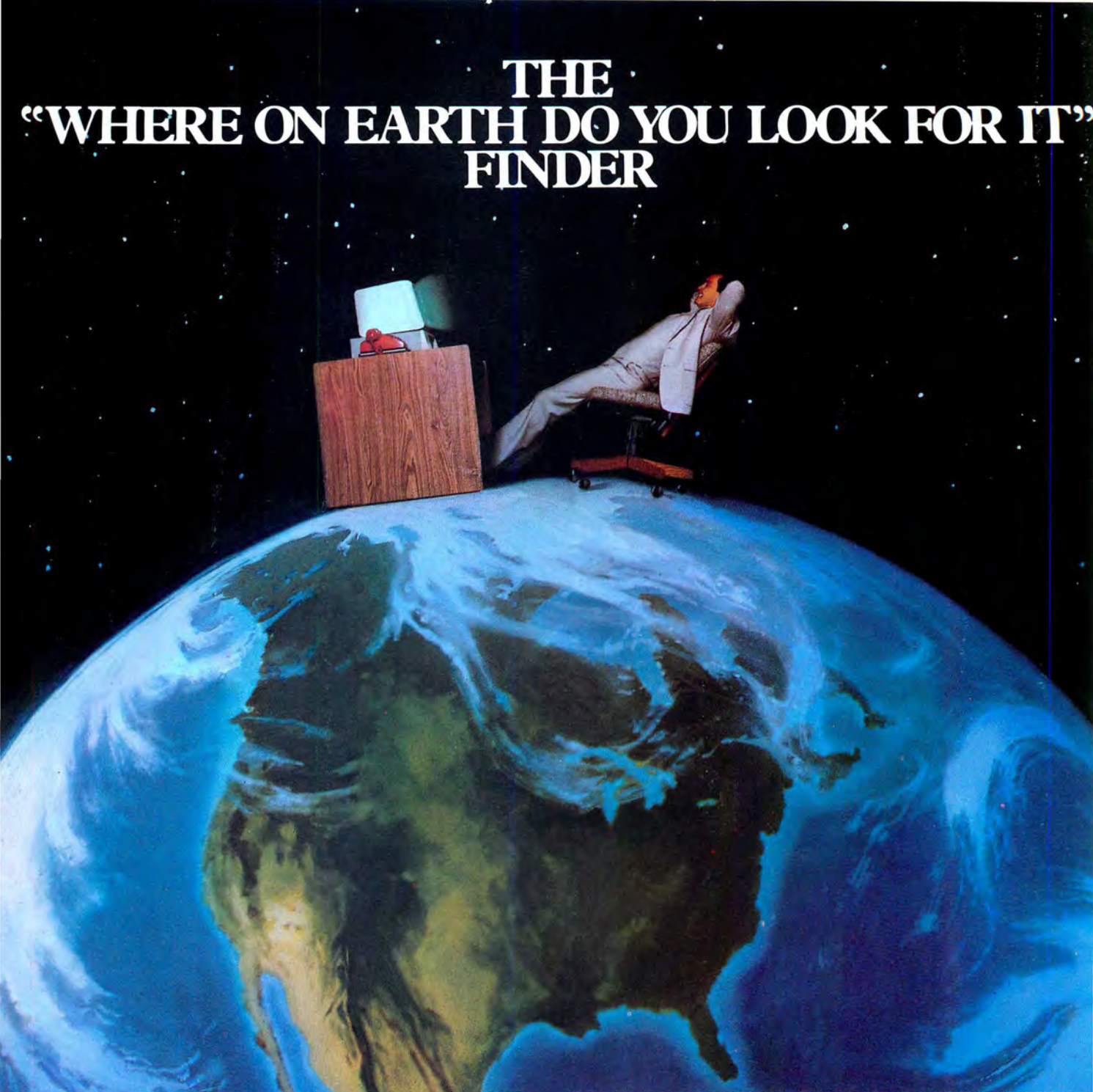

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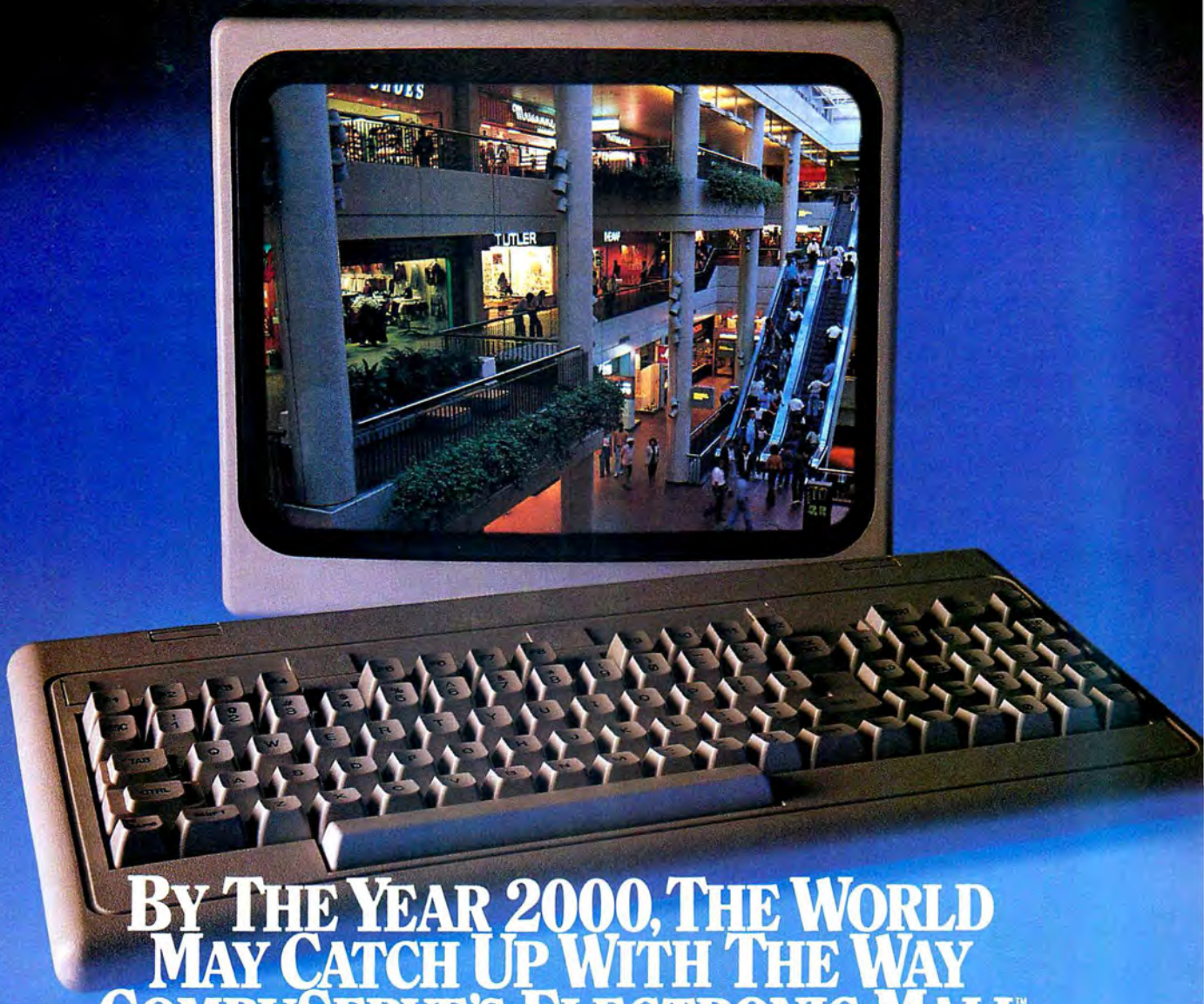

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Alfred Glossbrenner
PC Magazine
April 2, 1985

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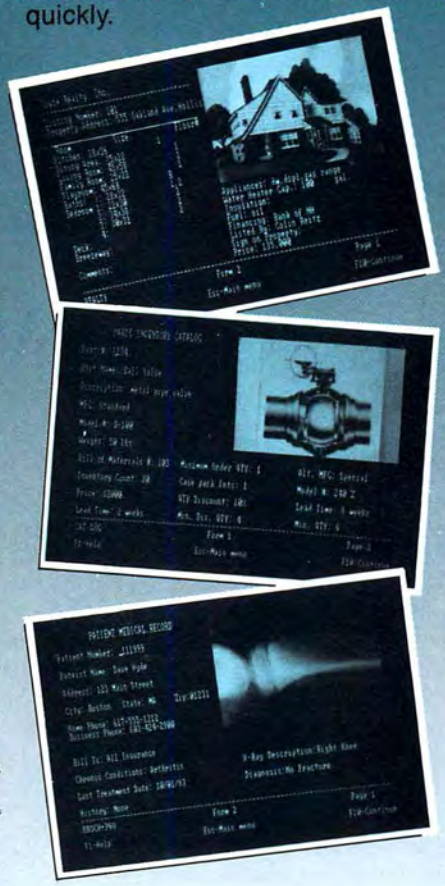

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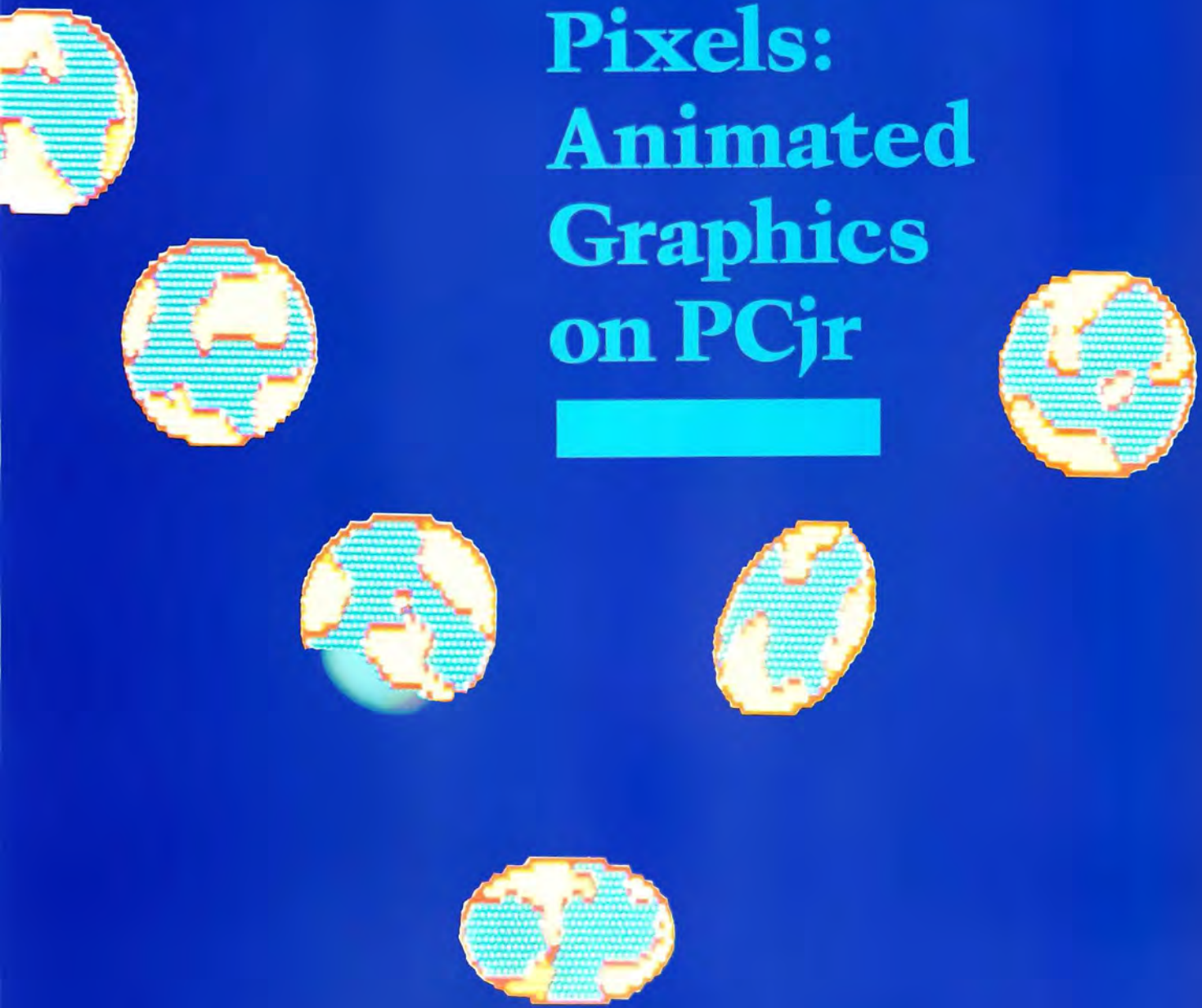
PCjr WORLD

June 1985

The PCjr Magazine

Action-Packed Pixels: Animated Graphics on PCjr



Use the GET and PUT statements to make your BASIC graphics soar.

Action-Packed Pixels

Sandra Markle and William Markle

In 1830 W. G. Horner invented the zoetrope, a drum with a sequence of images drawn inside. When the drum revolved, the images appeared to move. The zoetrope took advantage of a simple phenomenon: Our perception of an image lingers for an instant after our eyes have registered it. Thus the art of animation was born.

Some time after, the introduction of the movie camera brought animation to the public eye. Cinematic animation divided action into a sequence of moves, one per frame, projected at high speeds to create the illusion of fast-paced, fluid action.

As animated films, especially cartoons, grew in popularity, animators looked for techniques to simplify production. Earl Hurd and J. R. Bray developed a process for drawing directly on clear celluloid. By overlaying parts that moved on a static background, the method eliminated the need to redraw entire images. Max Fleischer developed the rotoscope, which traced live action for use in cartoons. But even with these improvements, the process was still painstaking. To create the effect of motion, a separate picture had to be drawn to show each subtle movement. Creating Walt Disney's *Pinocchio,* for example, kept the Disney staff busy for three years.

You probably would never consider trying your hand at animation if you had to go about it the old-fashioned way. Now, however, you can explore its magic with your PCjr, using two BASIC commands, GET and PUT, to handle the tedious job of drawing and redrawing each step of a sequence. How about making a flying saucer soar across space for your first project?

BASIC Drawing

You'll be working in SCREEN 1, BASIC's medium-resolution graphics mode. This mode allows you to use one of 16 colors (see Table 1) for the screen's background and one of two palettes, each with three colors, for creating images. (See "The Graphics Advantage," *PCW*, January 1985, or the explanation of the SCREEN statement in your BASIC manual for a description of the available screen modes.)

The aspect *parameter can be used to turn a circle into an ellipse.*

Load Cartridge BASIC and type **SCREEN 1 < Enter >** . Then type **COLOR 1,0 < Enter >** to select a blue background and palette 0. (In medium-resolution color graphics, the first parameter of the COLOR statement specifies the background color, while the second specifies the palette to be used.) Once the palette is chosen, you use graphics statements to specify the color for each shape you want drawn. A parameter of 0 specifies the background color; 1, 2, or 3 calls for one of the palette's foreground colors (see Table 2).

In animating a scene, the first step is to draw the basic shapes that make the picture. To create a computer-generated image, think of it as a combination of simple shapes. A flying saucer is typically pictured as an ellipse, a shape the PCjr can create with the CIRCLE statement. This statement has seven parameters, of which the last four are optional. The format is CIRCLE(*x,y*),*radius*[,*color*[,*start*,*end*[,*aspect*]]]

The *aspect* parameter at the end of the statement can be used to turn the circle into an ellipse. The aspect affects the ratio of the *y*-axis to the *x*-axis. For values less than 1, increasingly smaller aspects produce increasingly flatter ellipses. For values greater than 1, increasingly greater aspects produce increasingly narrower ellipses.

The *x,y* in the statement represents the coordinates at the center of the ellipse. Think of the computer screen as divided into vertical columns and horizontal rows of pixels. You "name" each pixel by its location. SCREEN 1 has 320 columns, numbered 0 through 319 from left to right, and 200 rows, numbered 0 through 199 from top to bottom. Therefore, the coordinates 160,100 name the approximate center of the screen.

The *radius* parameter indicates the radius of the ellipse, measured in pixels. When the aspect is less than 1, *radius* is the *x*-radius, that is, the horizontal radius of the ellipse. When the aspect is greater than 1, *radius* is the *y*-radius, that is, the vertical radius.

The *color* parameter is the number of the color you want used to draw the ellipse. Remember, you select the color from your chosen palette, using a number from 0 to 3 as shown in Table 2. If you do not specify a color, color 3 is used.

The *start* and *end* parameters are used to draw portions of ellipses, including arcs and sectors. Those parameters won't be used in this exercise.

To draw a cyan ellipse with a radius of 30 at the center of the screen, type **CIRCLE (160,100),30,1,,,4/18 < Enter >** . Notice that although not all of the optional parameters are given, commas must be typed as placeholders to let BASIC know that 4/18 is the aspect ratio, that is, the seventh parameter in the statement.

To fill the ellipse with color, type the statement **PAINT (160,100),3,1 < Enter >** . As in the CIRCLE statement, the parameters 160,100 specify the *x-y* coordinates. The *x-y* coordinates specify any point inside the area to be filled. The 3 indicates the fill color, while the 1 specifies the outline color. The PAINT statement colors the screen in all directions from the specified *x-y* coordinates to the border of the outline color. If at any time you isssue a PAINT command and are surprised to see the whole screen flooded with color, look for a leak–a spot in the figure that has no limiting outline color.

Use your imagination to create the saucer. Add a skinny rectangle for a color stripe or add a rocket blaster tail or supersonic wing fins. Table 3 lists the BASIC statements for different shapes you can use to draw the image.

Listing 1 is a sample program for creating a flying saucer, including statements to clear the screen, set the background color, and select a palette. Type lines 100 through 160 of the program, or your own variation of these lines. Then type **RUN < Enter >** . Your craft will appear, ready for travel (see Screen 1).

Background color number	Color
0	Black
1	Blue
2	Green
3	Cyan
4	Red
5	Magenta
6	Brown
7	White
8	Gray
9	Light blue
10	Light green
11	Light cyan
12	Light red
13	Light magenta
14	Yellow
15	High-intensity white

Table 1: Available background colors

The DIM Statement: Packing for Travel

Take a close look at the extraterrestrial vehicle you've designed, picturing it neatly tucked inside a rectangular frame. That's the way the PCjr will store this image in memory, and that entire frame of information is what the program animates. The PCjr stores this information as an *array variable*. (More information about array variables can be found in IBM's *Basic Handbook* under the chapter covering general information about programming in BASIC.) But before an image can be stored as an array, a DIM (for *dimension*) statement must be executed. The DIM statement reserves a portion of RAM to hold the array.

Picture the extraterrestrial vehicle you've designed neatly tucked inside a rectangular frame. That's the way the PCjr will store this image in memory.

The DIM statement includes an array name and the amount of memory, expressed in *elements*, to reserve for the array. For the saucer, which uses the default, *single-precision elements*, each element consists of 4 bytes. The statement DIM SAUCER(84) in line 170 of Listing 1 reserves 340 bytes for the array Saucer–85 4-byte elements (85 instead of 84 because elements are numbered from 0).

To determine how many elements to reserve for your array, count the number of horizontal pixels used to display your image on the screen. Multiply that number by the number of bits per pixel (2 in SCREEN 1), and divide the product by 8 (the number of bits in a

Color number	Palette 0	Palette 1
0	Background color	Background color
1	Green	Cyan
2	Red	Magenta
3	Brown	White

Table 2: Palette color choices

byte). Multiply your result (rounded up if the result is not an integer) by the number of lines in the image, add 4 bytes for overhead, and divide by 4, the number of bytes per element.

If you don't want to go through all that, you can guess, reserving 32, 50, 128, or more bytes for your design. If you don't reserve enough memory, you'll get the message 'Illegal function call in *line number*' when you run the program. You can correct the problem then by reserving additional elements.

Taking Off

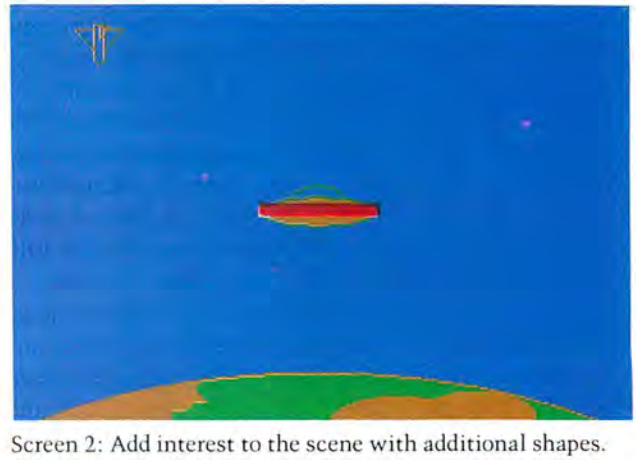
Lines 180 through 250 of Listing 1 contain the code that animates the flying saucer. Line 180 GETs the rectangular image, that is, stores it in RAM in the space reserved for it by the DIM statement. Next comes the PUT statement—and a little computer magic. PUT has an optional *action* parameter that determines how an array image is integrated with any images already on the screen. When no action parameter is specified, PUT uses the default action XOR (for *exclusive or*, a logic function). XOR was designed specifically for animation.

When an image is PUT on the screen using XOR, the colors of the array image replace existing background pixels. If an array image is superimposed on an image already on the screen, the PCjr chooses a color that is different from either the on-screen color or the array color. This means that when the array image is PUT twice at the same location, the original on-screen background and foreground colors are restored—the array image disappears, leaving the original screen undisturbed. Therefore, when line 190 PUTs the information contained in the array Saucer on screen with the upper left corner of the frame at the coordinates 130,87—where the saucer image already exists—the saucer disappears.

Repeating this two-PUT sequence at a neighboring location makes the image appear to move. That's what happens in lines 200 through 250. The FOR statement in line 200 increments the variable XLOC (for *x-axis location*) by the amount specified by the STEP value (that is, 2). The PUT statement in line 210 uses XLOC,87 to specify screen coordinates for the upper left corner of the array image. Line 220 is a delay loop that holds the image on the screen long enough for you to see it before line 230 PUTs Saucer at the same location, making the image disappear. Without this delay loop, the PUTs would happen so quickly that the moving image would appear as just a blur. The *y*-axis value remains unchanged at 87, so the saucer flies across the screen in a horizontal line. The image disappears from one location and appears in the next so quickly that the movement seems fluid—that is, animated.

The image's width and height must be considered when you calculate the values for the *x* and *y* coordinates in your PUT statements. If you attempt to PUT an array image where it would extend beyond the right or bottom edge of the screen, you'll get an 'Illegal function call' error message. Because the saucer image is 61 pixels wide, the largest acceptable value for the *x*-coordinate, XLOC, is 259. Similarly, if you move the saucer vertically, you must take into account the image's height of 21 pixels.

Screen 1: You can create a flying saucer with a few simple BASIC statements.



Screen 2: Add interest to the scene with additional shapes. Add drama by saving the new shapes in an array and moving them with the GET and PUT statements.

Shape	Format	Comments
Point	PSET (*x,y*)[,*color*]	*x,y* specify the screen coordinates.
Line	LINE [(*x1,y1*)]-(*x2,y2*)[,*color*]	*x1,y1* are the starting coordinates; *x2,y2* the ending coordinates.
Box	LINE [(*x1,y1*)]-(*x2,y2*),[*color*],B	*x1,y1* are coordinates of the top left corner; *x2,y2,* of the bottom right.
Solid box	LINE [(*x1,y1*)]-(*x2,y2*),[*color*],BF	Adding the F fills the box.
Circle	CIRCLE (*x,y*),*radius*[,*color*]	*x,y* specify the coordinates at the center of the circle.
Ellipse	CIRCLE (*x,y*),*radius*,[*color*],,,*aspect*	The aspect ratio can be changed to flatten or broaden the ellipse.
Arc	CIRCLE (*x,y*),*radius,color*],*start,end*	Alter the *start,end* parameters to draw arcs of different degrees.
Sector	CIRCLE (*x,y*),*radius*,[*color*],*-start,-end*	Using negative values for the *start,end* parameters creates a sector rather than an arc. You cannot use a value of 0 for the *start,end* parameters.

Table 3: Shape statements

Exploring New Worlds

Now that you've put your ideas into action, you can really take control. Try changing the program so the saucer first appears at the bottom of the screen and then soars to the top. For a special effect, add sound to set an eerie mood while the saucer patrols the pixeled heavens.

For an idea of further possibilities, type in and run Listing 2. The result is the new picture shown in Screen 2. You can make the saucer move up, down, left, or right by pressing the cursor keys. The subroutine called by line 1000 (lines 2000 through 2070) checks for a key being pressed. When a cursor key is pressed, XLOC or YLOC is appropriately altered (unless the variable's value is already at the limit of its acceptable range), and program flow returns to line 1010, which calls for the sound routine in line 3000. Line 1020 causes the saucer to disappear; line 1030 makes it reappear at its new location, determined by the values of XLOC and YLOC. Line 1040 then resets the values of XOLD and YOLD to match those of XLOC and YLOC. Line 1050 is the delay loop that holds the image in place before line 1060 sends program flow back though the main loop (lines 1000 through 1060). When you're ready to stop the action, press <Esc>.

Try your hand at some freewheeling animation. Send the jet in the new picture to contact the alien visitor. Pack some action into pictures you've already produced or create new images. Let your imagination soar. With the GET and PUT statements, creating graphics on your PCjr can be a moving experience.

Sandra Markle writes books, television programs, and monthly columns on science for children. William Markle is an author of accounting software. The two recently cowrote the book In Search of Graphics *(Lothrop, Lee & Shepard Books, New York, 1985).*

```
100 CLS : KEY OFF
110 SCREEN 1,0 : COLOR 1,0
120 PI=3.141593
130 CIRCLE (160,100),30,1,,,4/18
140 PAINT (160,100),3,1
150 LINE (130,98)-(190,102),2,BF
160 CIRCLE (160,93),12,1,0,PI,7/18
170 DIM SAUCER(84)
180 GET (130,87)-(190,107), SAUCER
190 PUT (130,87), SAUCER
200 FOR XLOC=0 TO 259 STEP 2
210    PUT (XLOC,87), SAUCER
220    FOR I=1 TO 20 : NEXT
230    PUT (XLOC,87), SAUCER
240 NEXT
250 END
```

Listing 1: SAUCER1.BAS

```
100 CLS : KEY OFF
110 SCREEN 1,0 : COLOR 1,0
120 PI=3.141593
130 CIRCLE (160,100),30,1,,,4/18                              'Saucer
140 PAINT (160,100),3,1
150 LINE (130,98)-(190,102),2,BF
160 CIRCLE (160,93),12,1,0,PI,7/18
200 CIRCLE (160,300),250,3,,,4/8 : PAINT (160,199),1,3        'Earth
210 CIRCLE (80,195),30,3,,,3/8 : PAINT (80,195),3,3           'Clouds
220 CIRCLE (120,199),35,3,,,3/8 : PAINT (120,199),3,3
230 PSET (220,178),3 : DRAW "F4G6R6F4R8D10BU12P3,3" : PSET (270,30),3
240 DRAW
"U16R5D16G2L1H2U4H10R10U2R5D2R10G10BL3BU6H5R5D5"       'Spaceship
500 DIM SAUCER (84)                          'Reserve memory for image array
510 GET (130,87)-(190,107), SAUCER           'Store saucer image
520 XLOC=130 : XOLD=XLOC : YLOC=87 : YOLD=YLOC  'Set x and y coordinates
999  'Main loop
1000 GOSUB 2000                              'Derive new location from key
1010 GOSUB 3000                              'Make sound
1020 PUT (XOLD,YOLD), SAUCER                 'Disappear from old location
1030 PUT (XLOC,YLOC), SAUCER                 'Appear at new location
1040 XOLD=XLOC : YOLD=YLOC                   'Set old location to new values
1050 FOR I=1 TO 30 : NEXT                    'Display image for a moment
1060 GOTO 1000
1999 'Key routine
2000 KB$=INKEY$ : IF KB$="" THEN 2000        'Wait for a key press
2010 KB=ASC(KB$) : IF KB=27 THEN END         'Exit if ESCape is pressed
2020 IF KB<>0 THEN BEEP : GOTO 2000          'Look for keypad keys only
2030 KB=ASC(RIGHT$(KB$,1))                   'Use right byte only
2040 IF KB=72 THEN IF YLOC>0 THEN YLOC=YLOC-1 : RETURN          'Up
2050 IF KB=80 THEN IF YLOC<179 THEN YLOC=YLOC+1 : RETURN        'Down
2060 IF KB=75 THEN IF XLOC>1 THEN XLOC=XLOC-2 : RETURN          'Left
2070 IF KB=77 THEN IF XLOC<258 THEN XLOC=XLOC+2 : RETURN        'Right
2080 BEEP : GOTO 2000                        'Invalid key
2999 'Sound routine
3000 SOUND XLOC*10+YLOC*10+37,.5 : RETURN
```

Listing 2: SAUCER2.BAS

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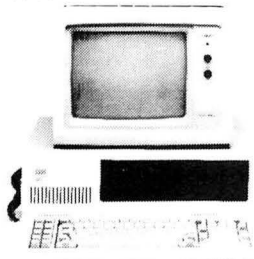

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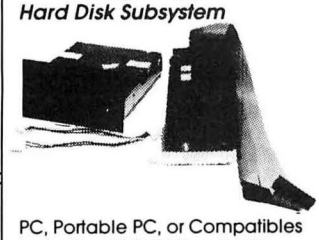

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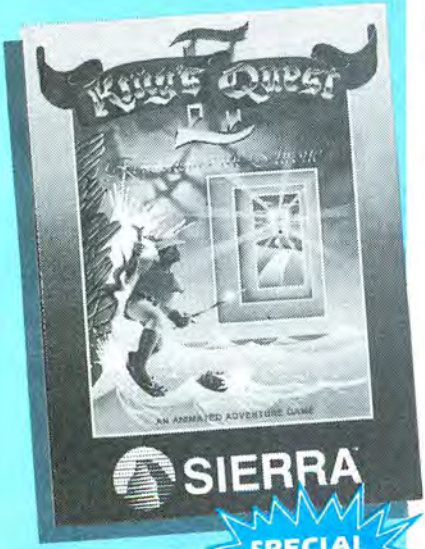

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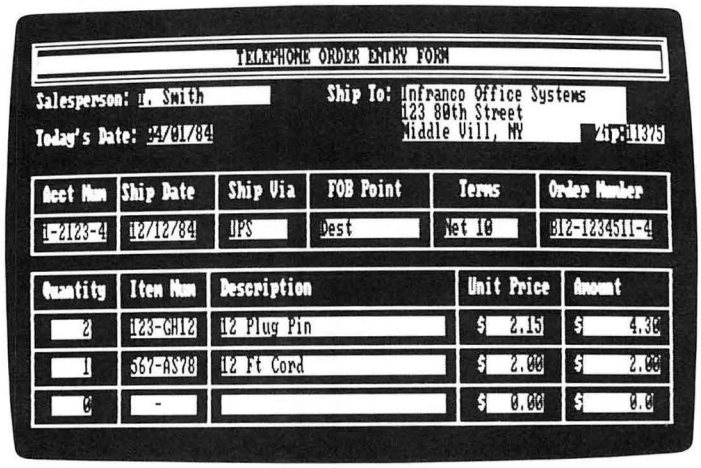

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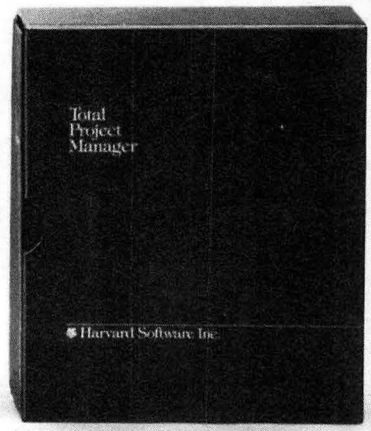

Harvard Total Project Manager

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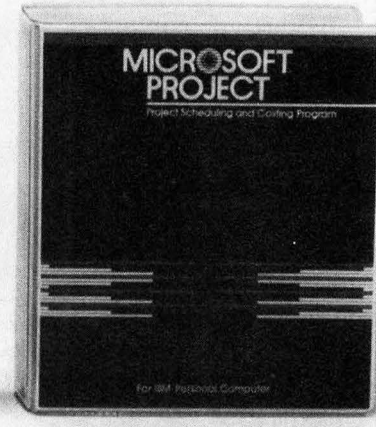

Microsoft Project

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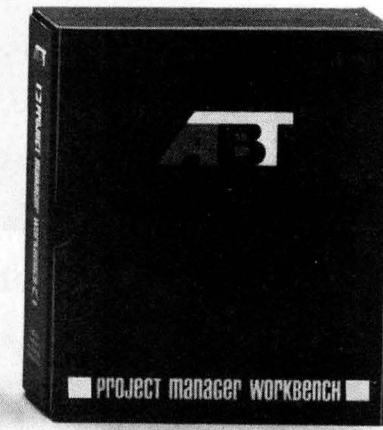

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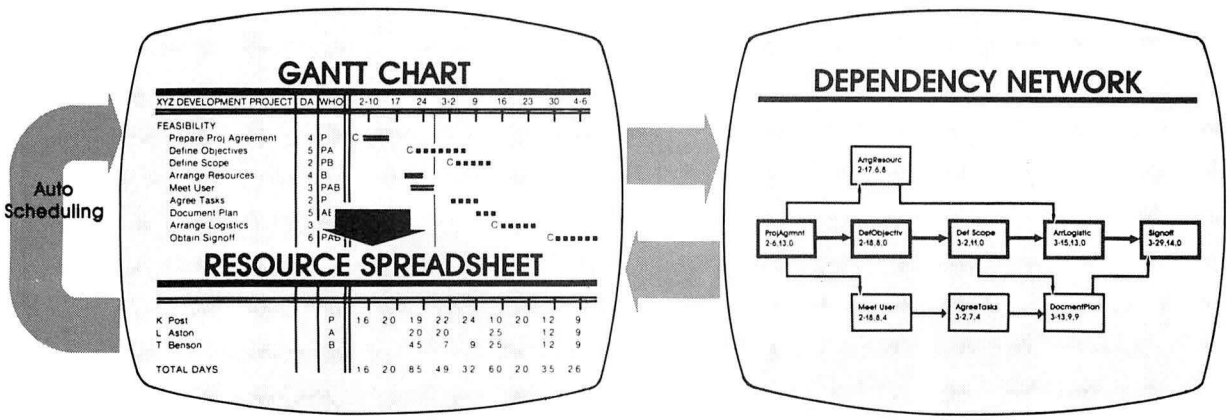

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Circle 283 on reader service card

Personal Publishing

Getting from inspiration to the last typeset page has traditionally been a lengthy and expensive process. With a PC, a laser printer, and the proper software, typesetting and printing are now at hand for the masses.

Bill Crider

If you could chart the history of the technology for creating the printed page, it might resemble an electrocardiogram. The spikes would represent major upheavals in technology; each valley, a long period of consolidation as innovations were refined and polished.

Printing technology, made possible in Europe by the introduction of papermaking from Asia in the 1200s and the invention of movable type in the 1400s, progressed slowly at first. But in the past two centuries, the pulse of change has quickened, the spikes on the graph moving closer and closer together. In the 1800s the introduction of the typewriter and the Linotype typesetter led to an unprecedented surge in the demand for books, newspapers, and other printed materials. The high-speed offset press arrived in the first decade of this century, followed in the 1940s by phototypesetting, a blanket term for a variety of technologies in which photographic processes replace metal type. By the early 1970s computers were running the phototypesetters.

A Niche as Big as a Barn Door

Despite these advances, the creation of the printed page has remained the province of highly trained specialists operating very expensive machines. Now, four innovations–personal computers, digitizers, inexpensive laser printers, and personal-computer-driven typesetting software–are making it possible to put together a low-end publishing system for under $10,000. By any reckoning, the market for such systems is huge; according to one estimate, upwards of 380,000 organizations in the United States currently produce some kind of printed material, such as newsletters, technical manuals, and forms. For many of these kinds of modest applications, the cost of commercial typesetting is prohibitive. Not everyone needs to match the graphics quality of, say, *PC World*.

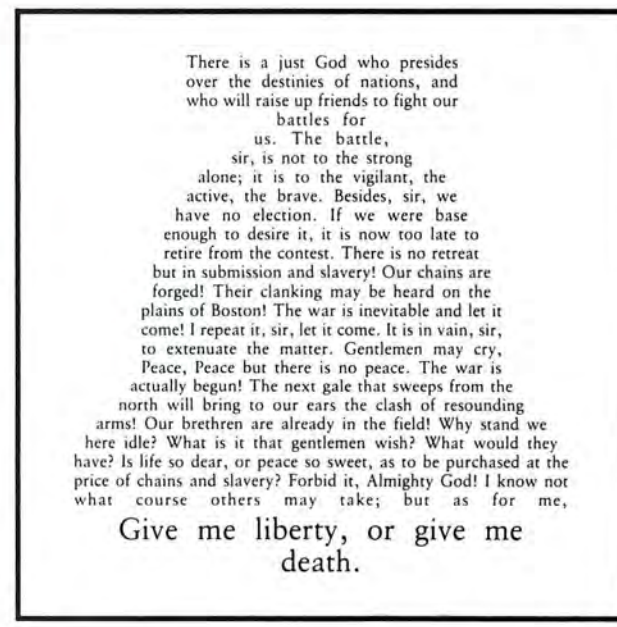
Will those new publishing systems put the specialists and their equipment out of business? Undoubtedly not. Some low-end business will surely be lost as desktop publishing becomes prevalent. But probably just as much professional typesetting business will be created by customers who can save some expense by doing their own typographical coding and page makeup. Examining the changes in the computer industry since the arrival of the PC may shed light on the future of printing.

Figure 1: Type Processor One lets you draw a form on the screen with the cursor, then "pour" text into it. On the left is the screen display, showing the generic fonts used by the program on screen. On the right is the typeset output.

Before the PC and other personal computers became popular, people processed large amounts of data in batches on large computer systems with the aid of computer specialists.

Today, the personal computer offers users a more convenient alternative, but the mainframe has hardly been rendered obsolete; rather, the use of computers has simply expanded to include more people and more applications. Likewise, the new PC-based publishing systems will open the arcane provinces of typesetting and computerized page makeup to nonspecialists and enhance those processes for specialists and nonspecialists alike by making the processes faster, more interactive, and less expensive.

For example, with currently available page makeup software for the PC, you can format a page of text on screen, perhaps incorporating a digitized picture in the middle of a column of text or shaping the text into an unusual shape, such as the bell shown in Figure 1. You can then quickly print out the page on a laser printer. When the result is satisfactory, you can send it off on a floppy disk or via modem to a



commercial phototypesetter. If a somewhat lower quality is acceptable for documents such as internal company reports or newsletters, you can bypass the typesetting shop altogether and simply use the laser printer output.

The Traditional Process

The degree of flexibility and convenience afforded by new page makeup systems is striking in contrast to the traditional complicated, multistage method of creating printed materials. In that process edited materials are keyed into a typesetting terminal or transferred from disk. Codes are embedded in the text to indicate such information as font style, size, column measure, and interline spacing (see "Typeset It Yourself," *PCW,* Vol. 1, No. 5). A dedicated minicomputer, known as a front end, interprets the embedded codes, performs such functions as hyphenation and justification, and controls the typesetting *engine* (sometimes called the back end), which forms letter images and places them on film or photosensitive paper. The entire system must be operated by a specialist familiar with typesetting procedures and with the codes used by a particular system.

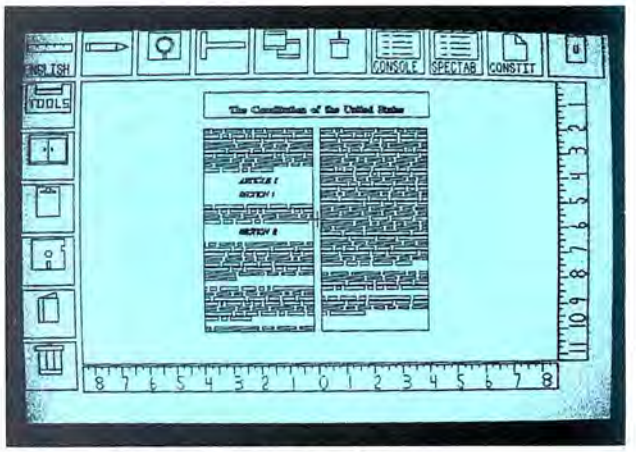
The phototypesetter's output consists of columns of typeset copy, or galleys. With the galleys in hand, as well as photographs or illustrations that accompany the text, a layout designer then pastes each page on thin cardboard. The boards are then proofed and sent to a printer, who creates the photographic plates from which the piece is printed.

Using a microcomputer-based editing system makes it possible to include some typesetting codes in a manuscript and telecommunicate the file to the typesetting shop. Using the personal computer will result in savings of time and money, but the savings would be even greater if you were able to preview the typeset pages on the PC before they were sent off to the typesetter. Without that capability you would have to wait for the galleys to come back from the typesetter and then lay out each page by hand. Contemporary galley-oriented packages for the PC, such as *CTextSetter II, Modtek,* and *MagnaType,* when tied to laser printers, are useful for galley composition but are not terribly efficient for true, paginated page make-up. The flexibility to produce more aesthetically pleasing results–and spending less time in doing so–is still best accomplished by pasting up galleys by hand.

What You See Is . . .

Today, page makeup software can turn a PC into a substitute front end for a commercial typesetter and also allow you to format entire pages of text on your monitor. The ideal of on-screen previewing is referred to as "what you see is what you get." One of the closest realizations of this ideal on the PC is *Do-It,* by Studio Software.

Do-It uses the metaphor of a drawing board; icons arranged on the borders of the display represent graphic arts tools–a ruler, a pencil, glue, a trash can, and so forth (see Screen 1). You can zoom in on individual page elements (words, paragraphs, graphics



Screen 1: Do-It uses the familiar orientation of the drawing board. The icons represent artists' tools that you select with a mouse.

windows) or view an entire page at once. Using the mouse, you can position text or graphics and select the functions represented by the icons.

Although *Do-It* has limited text processing capabilities, normally you first create a text file with a standard PC word processor, embedding a few generic typesetting commands within the file. For example, after defining type specs in a series of style sheets, inserting *\headline* in a document tells *Do-It* to use the predefined headline type style, while *\body* specifies the body type style. If you decide later that you want to change the font or type size, you don't have to go back and edit the document–merely revise the style sheet.

Do-It can be used as a front end for various devices. It can be used with a QMS laser printer to output type on regular paper, and it can also drive an Allied Linotype (née Mergenthaler Linotype) 202 or Compugraphic 8400 phototypesetter. Thus, you can use the laser printer to create draft copies of a document for previewing and later have the document output at a typesetter's shop.

Type Processor One

Like *Do-It, Type Processor One* by Bestinfo also can substitute for the front end of an Allied Linotype or a Compugraphic. Instead of using icons, *Type Processor One* uses keyboard-generated commands in the manner of traditional typesetting systems. In many respects the program resembles an advanced word processor, but it is slower due to the large amount of computation necessary to produce a what-you-see-is-what-you-get display and perform hyphenation and justification.

Type Processor One makes easy work of changing the type size or font. You can use the cursor keys to perform *kerning*–moving individual letters closer together. *Type Processor One,* like *Do-It,* does not completely live up to the what-you-see-is-what-you-get ideal, but it comes close. It shows cursor location, line endings, relative font sizes, and fonts in use. To save computing time and speed up the display, characters appear as generic fonts on the screen in either upright or oblique style. By displaying these two styles in light, regular, bold, and extra bold, the program represents as many as eight different fonts that will be generated by the output device.

Unfortunately *Type Processor One* is limited to processing one 8- by 18-inch page at a time, and each page must be stored as a separate document. After creating a text file in the program's Compose mode, you "pour" the file into a page. The program indicates where the file is cut off, so you know where to begin pouring the next page. Bestinfo has promised a "big brother" to *Type Processor One* called *SuperPage,* which will permit the pagination of multipage documents and will automatically insert forward references ("continued on page . . . "). *Type Processor One* currently supports several laser printers, for previewing documents before sending them to a typesetter.

The Datacopy scanner has the ability to digitize any image–such as a photograph–and turn it into PC-usable data.

Neither *Do-It* nor *Type Processor One* can incorporate any graphics elements beyond simple lines and boxes, but a third page-makeup program fills that gap. *WIPS (Word Image Processing System)* works in conjunction with a scanner, the latest in a series of digitizing devices that can capture images like a copier does and pass them on to the PC in digital form. Digitizing cameras have also appeared on the scene, but they lack the resolution required by most commercial graphics applications.

The Datacopy scanner has the ability to digitize any image–such as a photograph–and turn it into PC-usable data. With *WIPS* you can also edit the picture somewhat after it has been scanned. Scanned images can be incorporated into any ASCII document or data base file; *WIPS* requires you to put an electronic tag in the file to specify where the graphic is to

appear. The file can then be printed with a laser printer. The resulting output is quite acceptable for in-house reports, technical journals, or newsletters (see Figure 2). Granted, the resolution does not match magazine or book art, but it is nevertheless impressive.

Laser Printers

In 1984 the inexpensive (under $4000) laser printer made its debut, and it came none too soon. The price differential between laser printers and commercial phototypesetting systems is dramatic. A low-end phototypesetter costs at least $15,000 and typically much more. Add to that the price of the phototypesetting chemicals, plus someone with the knowledge to run the system, and the price tag becomes substantial. In comparison, the price of a laser printer–as little as $3400–is quite acceptable; moreover, a laser printer uses no developer or other chemicals and can be run without extensive operator training.

The first of this new breed, the Hewlett-Packard LaserJet, has a limited number of fonts and modest graphics capabilities. In the same price range is the Corona Laser printer, which offers splendid graphics and greater flexibility in an assortment of fonts. Although the quality of typesetting produced by a laser printer is generally inadequate for books and magazines (see the sidebar "What Is Typeset Quality?"), a laser printer and a good word processor will suffice for a great deal of the printed material that is currently typeset. Since typeset copy occupies about 40 percent less space on the page than daisy wheel output, a company can also save significant printing costs by typesetting with a laser printer. For many companies, the cumulative savings from decreased professional typesetting and printing costs easily justify the purchase of a laser printer and software.

But the economy of the new low-end typesetting is not the only force likely to speed its adoption. Typeset copy is easier to read than daisy wheel or dot matrix output and conveys a more professional image. The pressure to keep up with the competition–or with the person in the next cubicle–may make proportionally spaced fonts from commercial typeface libraries the norm for routine memos and correspondence. But in the final analysis, it may be the quietness of laser printers that wins the hearts of office workers.

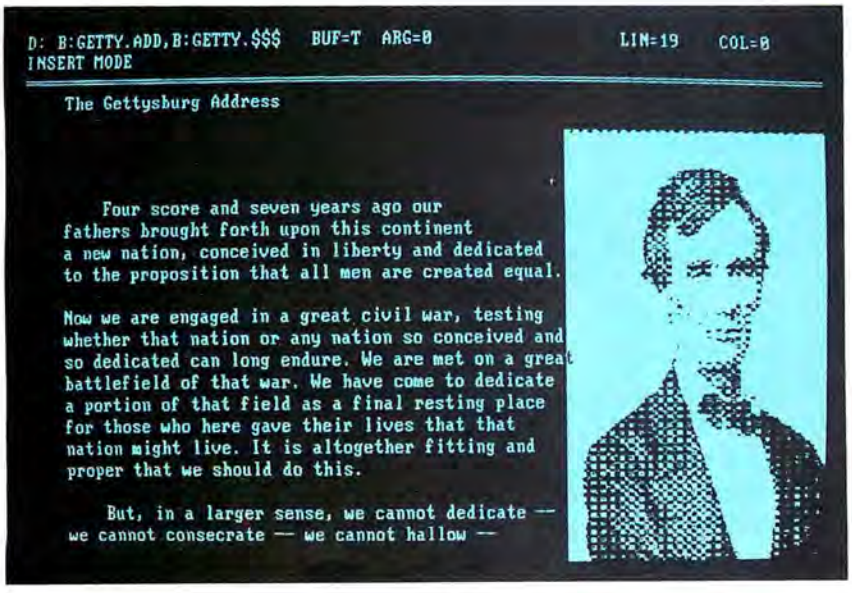


Figure 2: The photograph of Abraham Lincoln in the document on the left was digitized with a Datacopy scanner, reduced in size, and printed as part of the document on a QMS Lasergrafix printer using WIPS software. The printed result on the right was magnified 400 percent.

What Is Typeset Quality?

James Felici

By any criteria, documents created by a typesetter have an unmistakable appeal, an aesthetic quality deriving from techniques developed by graphics artists over centuries. But if typography is an art form, it is one with a determined practical motive: to make printed documents that are easy to read.

With the arrival of a new generation of desktop printing technology, the definition of "typeset quality," once unassailably clear, is beginning to erode. Laser printers, for example, make possible the creation of documents with many of the surface features of typesetting, such as proportional spacing and a variety of fonts. But is the output of a laser printer really on a par with that of a typesetting shop? As it becomes feasible for companies to use laser printers to perform their own low-end typesetting, they will need to make informed decisions about whether the loss in quality is justified by the advantages of speed, economy, and better control over the entire process. Thus, it will pay to learn at least a few basics of the typesetting trade.

The standard for comparison, of course, is the type produced by commercial typographic systems. The quality of modern phototype is the product of several critical sources:

Resolution. Typeset quality is most evident in the crispness and clarity of the letters themselves. Character clarity is a function of the fineness of the matrix from which the character is generated. Digitized type is exposed to a target substrate (usually photographic film) as a series of small dots or strokes; as these marks become smaller and closer together, smoother curves and crisper outlines can be produced. At the extreme low end of the resolution spectrum is the dot matrix printer, which lays down about 60 dots per inch, just enough to create recognizable letters. Laser printers such as the HP LaserJet resolve at 300 dots per inch, which is fine enough to reflect the true outlines and proportions of most typefaces but still leaves characters–particularly curved ones–with rough edges.

Commercial typeset quality starts at about 600 dots per inch (dpi); a typical resolution is about 1000 dpi. Having a fine resolution becomes critical at very small type sizes, where cruder resolution may cause the white space in many characters to fill in. The type used in this article has a resolution of 950 dpi.

The photographic paper used by commercial typesetters as the substrate also boosts resolution. Because the particles of photosensitive silver compounds on the paper are so fine and densely packed, they are capable of precisely resolving small images that have little margin for error. Laser printers, by contrast, use a xerographic method, in which a drum struck by the laser lays down toner particles in the shapes of letters. The resolution of these characters is lower than that produced by a commercial typesetter because of the paper's texture and the irregular size of the toner particles.

Hyphenation and Justification. Known in the trade as *h&j*, the phrase *hyphenation and justification* describes the creation of the full set of commands used by typesetting software to control the output of the typesetting engine. Most of the commands determine where and how lines should be broken to create the desired column width and margins. Some of the major tasks included in h&j are hyphenation, kerning, and white-space reduction.

In order to best fill lines with type, some words that end lines must be hyphenated. Hyphenation routines are usually dictionary-based; when the computer must end a line by breaking a word, it looks up the word in an internal dictionary to discover a legitimate break point. On minicomputer typesetter front ends, dictionaries usually range from 20,000 to 50,000 words and are user expandable. If the computer cannot find a word in the dictionary, it determines the appropriate break point by using a set of algorithms that analyze the word according to grammatical rules about prefixes, suffixes, and syllables.

Kerning. This process makes small adjustments in the spacing between certain characters to avoid a choppy appearance. In the word *Toward* for example, the *o* should tuck under the crossbar of the *T* and the *w* should snuggle up against the *o*. A good kerning program gives the user the ability to define kerning values and create a table of at least several hundred character pairs that the computer can refer to on a character-by-character basis. Currently under development are kerning shortcuts that use general character shapes instead of specific character combinations.

White-space reduction. Also called tracking, this function causes tighter character spacing overall; more type is set in less space, and the general color of the typeset block is controlled. Interletter spacing increases proportionally as type size grows, although in larger sizes the characters appear to be too far apart. The ability to reduce white space counteracts this illusion.

A variation on tracking is definable character spacing, which gives the computer a range of character spacings to choose from, often expressed as minimum, maximum, and optimum interletter values. This function allows the hyphenation program to vary both character and word spacing when filling a line with type. Definable character spacing is important in producing evenly spaced, justified text.

Some laser printers can create output very close in quality to commercially typeset material, but these machines cost nearly as much as full-blown professional typesetters. They do, however, eliminate the need for costly silver-based film and the chemicals and processors needed to develop it. For now, typeset quality is beyond the reach of desktop laser printers, but near typeset quality is not. The question is just how near you can get.

James Felici is Production Editor of PC World *and* Macworld.

Clouds on the Horizon

With both software and hardware improving so rapidly, it is easy to become euphoric. But though the visions of typesetting and printing for the masses are close to realization, problems still impede the widespread use of page makeup systems. Lack of standardization afflicts typesetting software, graphics files, and printer drivers.

This incompatibility among typesetting systems derives from the structure of the printing industry. Vendors of typesetting machines have no incentive to provide their customers with systems that can potentially be replaced by a competitor's. With typesetting codes and logic varying from system to system, the designers of page makeup software are forced to make difficult choices about which commercial phototypesetters to support.

Vendors of typesetting machines have no incentive to provide their customers with systems that can potentially be replaced by a competitor's.

The compatibility problem is exacerbated by the diversity of graphics formats–a natural result of differing user needs. Memory-image files, for example, are easy to manipulate on a pixel-by-pixel basis, but cannot be scaled. The vector files created by CAD/CAM systems, on the other hand, are easily scaled but are very slowly generated. The virtual device metafile (VDM), a format defined by the American National Standards Institute (ANSI), is less flexible than other graphics files but has the great advantage of being a standardized file structure compatible with a wide variety of hardware and software.

Device drivers, the third source of difficulty, tell an output device, such as a laser printer, how to receive instructions from software. Since drivers must usually be written in machine language specific to each piece of hardware, they are difficult to create; not surprisingly, most application programs are restricted to widely used output devices. ANSI's virtual device interface (VDI) was conceived to address device driver compatibility, creating a common ground where software and hardware can meet. Fortunately, IBM has elected to support the VDI and VDM standards, a fact that will undoubtedly increase their commercial acceptance (see "The Myth of the Virtual Device," *PCW,* April 1985).

An alternative solution to the problem of device driver and graphics file standardization is PostScript, a programming language specifically designed for page description. PostScript is licensed by Adobe Systems to printer and typesetter manufacturers. Apple's LaserWriter printer, for example, has a built-in 68000 microprocessor running PostScript. Once a word processor or any other application has been adapted to meet the PostScript standard, it need not be rewritten. Thus, the result can be previewed on a dot matrix or laser printer and then sent for final typesetting to an Allied Linotype typesetter running PostScript. Moreover, the program handles graphics, images, and typesetting output in a coherent fashion, making it well suited for page makeup applications.

Getting the Cookies

My grandfather used to irritate my grandmother by putting the cookies on the bottom shelf where his grandchildren could reach them. "After all," he would tell her, "that's who they're for. Why make them reach so far?" Typesetting and graphic arts goodies are now on the bottom shelf, within economic reach of the average small business–and the next batch is already in the oven.

Bill Crider is a Contributing Editor for PC World.

Software

Do-It
Studio Software Corp.
3001 Red Hill #2-210
Costa Mesa, CA 92626
800/821-7816, 714/957-0458
List price: starter system $995, intermediate level $1495, complete package $2495
Requirements: 512K, 8087 coprocessor, Hercules Graphics Adapter, Mouse Systems Mouse, two disk drives (hard disk recommended)
Supports: QMS Lasergrafix and Epson printers, Compugraphic and Allied Linotype typesetters

Type Processor One
Bestinfo, Inc.
33 Chester Pike
Ridley Park, PA 19078
215/521-0757
List price: $5000 (includes training)
Requirements: 256K, Hercules Graphics Adapter, hard disk
Supports: IBM graphics printers, Epson FX-80, FX-100, and Okidata 92/93 (dot matrix printers); HP LaserJet and Xerox 2700 Model 2 (laser printers); Varityper and Itek (typographic output devices); Quadritek, Digitek, Editwriter, Compset, Compedit, and MCS (direct entry phototypesetters); Allied Linotype 101 and 202, Compugraphic 8400 and 8600, APS 5, and Micro 5 (slave typesetters); CCI, Penta, Atex, Alphatype, and Quadex (working as front ends).

Hardware

Datacopy Model 700 Scanner
Datacopy Corp.
1215 Terra Bella Ave.
Mountain View, CA 94043
415/965-7900
List price: (includes WIPS software) $3950
Requirements: 512K, Hercules Graphics Adapter, hard disk
Suppports: QMS Lasergrafix, HP LaserJet, and Epson printers

HP LaserJet Printer
Hewlett-Packard Co.
P.O. Box 15
11311 Chinden Blvd.
Boise, ID 83707
208/323-6000
List price: $3495
Requirements: serial port or one expansion slot

Corona Laser Printer
Corona Data Systems, Inc.
275 E. Hillcrest Dr.
Thousand Oaks, CA 91360
805/495-5800
List price: $3395
Requirements: one expansion slot

Lasergrafix 800 Printer
Quality Micro Systems
P.O. Box 81250
Mobile, AL 36689
205/633-4300
List price: $9995
Requirements: parallel port

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SAMNA blows them all away.

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Until recently, PC word processing didn't run at hare-racing speed.

But SAMNA's Turbo-powered software is fast enough for even the most demanding word processing users. One demonstration will prove it to you. Very quickly.

ABOUT WORD PROCESSING.

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Integrated software packages fall down on the job because they're just spreadsheets with a little word processing tacked on. And that's not how you work.

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A Graphics Overture

Lotus Development bills Symphony as a brassier version of 1-2-3, a claim justified by its graphics capabilities. Explore Symphony's sophisticated techniques to graph numerical data in ways not possible with 1-2-3.

Stephen A. Blumenthal

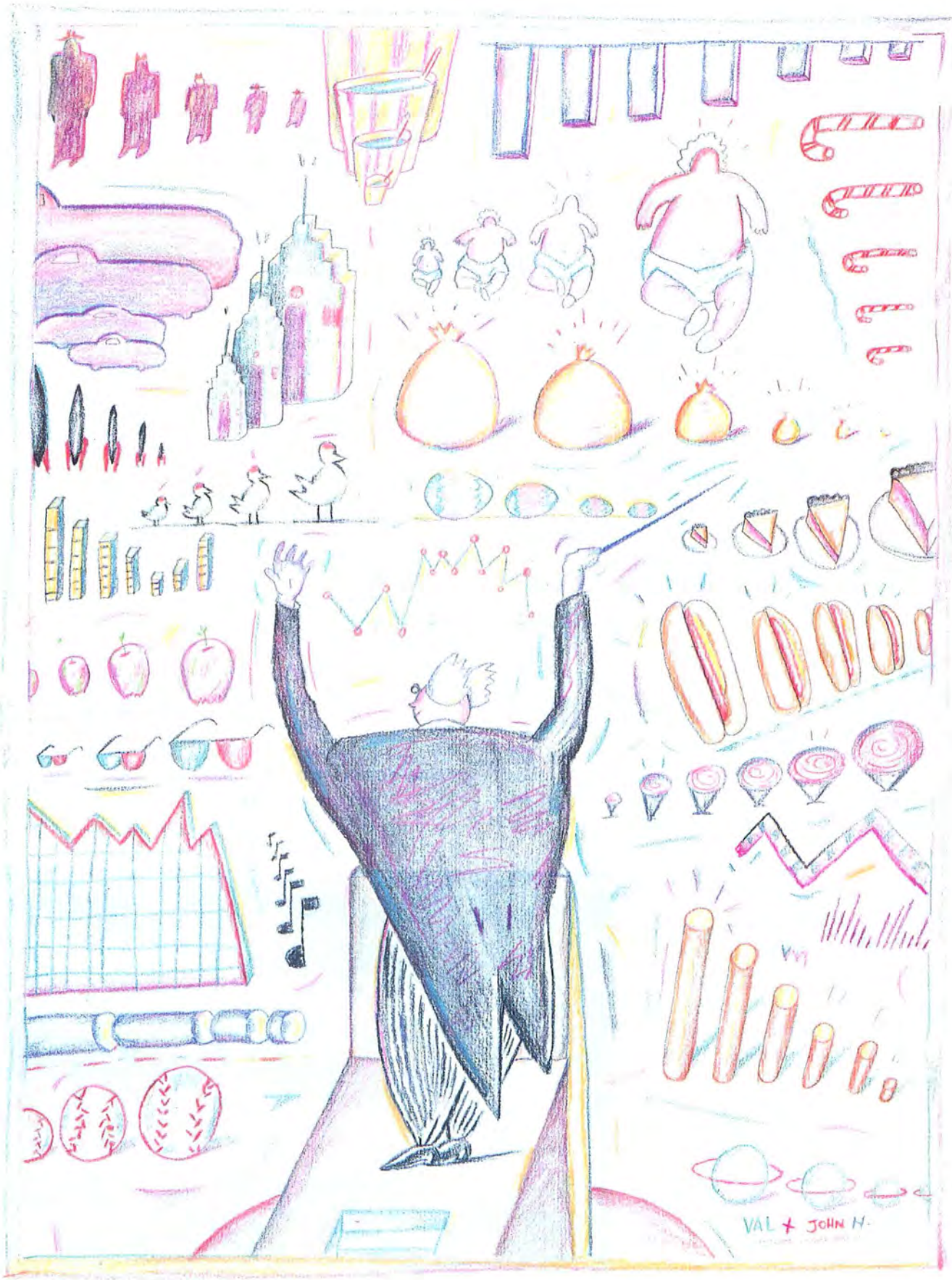
Like *1-2-3, Symphony* can draw graphs from data contained in its own spreadsheets, but Lotus's hefty new integrated package contains design tools that make its graphs easier to create and understand. In our example we start with a spreadsheet that contains tax-related information sent to stockholders of history's most widely held New York Stock Exchange security, American Telephone and Telegraph. In January 1984, "old" AT&T was broken up into "new" AT&T and seven regional phone companies. Stockholders of the old company exchanged their shares for stock in the new ones, and later many individuals sold those new shares at a profit. The IRS participated in their good fortune; using our sample spreadsheet to calculate the tax basis for the stock sold helps determine the size of the government's windfall. No attempt is made here to explore conflicting legal theories on taxation of gains in the transactions.

We are going to do some graphing, and Ma Bell is going to provide the data. The spreadsheet we'll use is deliberately simple, allowing us to concentrate on *Symphony*'s graphing techniques (see "Lotus's Symphony: Three User Reports," *PCW,* Vol. 2, No. 7). Whether or not you own AT&T stock, the exercise of graphing the divested Baby Bells is worthwhile.

A Word About the Broken Bell

If you do not understand the logic behind forcing corporations to compete but not allowing any one to win, you have a blind spot that prevents you from understanding the workings of United States antitrust law. And if you don't see the sense in fixing something that is not broken, you will never understand the AT&T divestiture. If, however, you exchanged your stock in the old AT&T for shares in the new Regional Bell Operating Companies, whether by accident or design, you did well—and your gains are probably long term. Now comes the fun part. Sooner or later, when you sell your stock, you will have to apportion your gain among the seven companies and pay your Uncle.

In order to calculate your gain on the investment, you must first know your cost, or basis, in the old AT&T stock (a determination that a portfolio management program makes effortless). In our example we'll use an original basis of $50 per share.


VAL + JOHN H.

The next step is to allocate that basis among the seven Regional Bell Operating Companies and the new, slimmed-down AT&T. The allocation factor figures used in the spreadsheet in Screen 1 were probably calculated in some government basement by IRS lawyers who wear blue pin-striped socks–and are also very touchy about people questioning their work. A New York law firm retained as tax counsel by AT&T did just that, and came up with another tax theory. The IRS seems more scary than New York law firms, so we used the IRS calculations in the spreadsheet example.

The allocation process isn't too difficult. The allocation factors are calculated on the basis of one share of the new AT&T and one-tenth of a share of each of the regionals. The value of the shares was determined by taking the average of the high and low sale prices of each of the component companies on December 31, 1983, the day before divestiture.

Once you have calculated the new tax basis per share, you can subtract the figure from the proceeds of your sale; the remainder, if your accountant and lawyer agree, is your capital gain.

Pretty Pictures

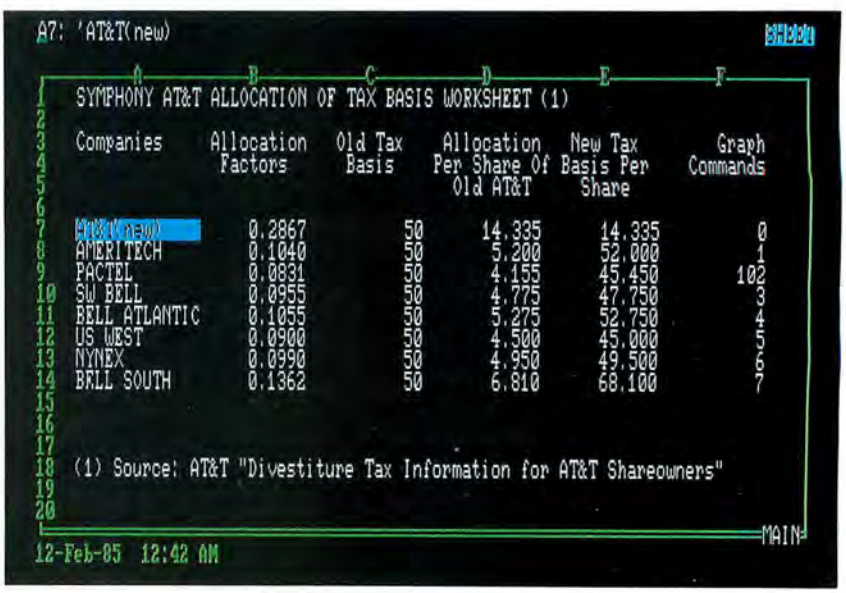
Now for the graphics. Assume you wish to illustrate the relationship between each individual Bell company's tax basis and the basis of the divested companies taken as a whole. A pie chart is the type of graph to use. *1-2-3* creates pie charts but cannot do much with them. In contrast, *Symphony* pie charts are not only more easily created and labeled, they can be varied with cross-hatching and highlighted dramatically by the explosion (displacement) of individual component sections. If that's not exciting enough, *Symphony*'s windows enable you to display more than one graph at a time. Following is a walk through one wing of the *Symphony* graphics gallery.

Try It–You'll Like It

After you have created the spreadsheet in Screen 1, press the <F10> (Menu) function key. By selecting the *Graph* option, you move from the spreadsheet environment to the graph window and are set to travel through the graphics command levels. Next, select the *Symphony* command *1st-Settings* to begin establishing the primary characteristics of your graph. (*Symphony* commands are invoked by either pointing with the arrow keys, pressing the <Space> bar, or typing the first letter of the command. I'll simply refer to "selecting" the appropriate commands, and I'll set them off in italics.)

The most logical first setting is a name for the graph. *Symphony* automatically names the first graph MAIN, letting you pass through the graph-naming level (which we will use later when we create additional graphs using the same spreadsheet data).

Our first step is to define the illustrative characteristics of the graph. Select the command *Type*, which will display your options from among *Symphony*'s assortment of graphs: line, bar, stacked bar, XY, pie, and the stockbroker's favorite, high-low-open-close. Select the pie option.



Screen 1: A simple Symphony spreadsheet illustrating the allocation of bases of old AT&T shares among the new AT&T and the seven new Regional Bell Operating Companies. The numbers in column F are used to create graphics effects in the resulting pie chart.

Now select the commands *Range A;* you will be prompted for a range of cells containing the values to be displayed in the graph. A pie chart graphs only one data range, so in this case you enter **E7..E14**, the cells that contain the calculations of tax basis per share for each of the new companies. *Symphony* then returns to the range level and allows you to label the graph sections. Select *X* and enter the cell references corresponding to the company titles column, **A7..A14**. That's all there is to defining the graph. If you seek immediate gratification, select *Quit* twice and then *Preview*. Your screen should show the graph in Screen 2, a plain vanilla pie chart—no cross-hatching, no explosions. The X range labels correspond to the appropriate sections illustrating the basis of each company.

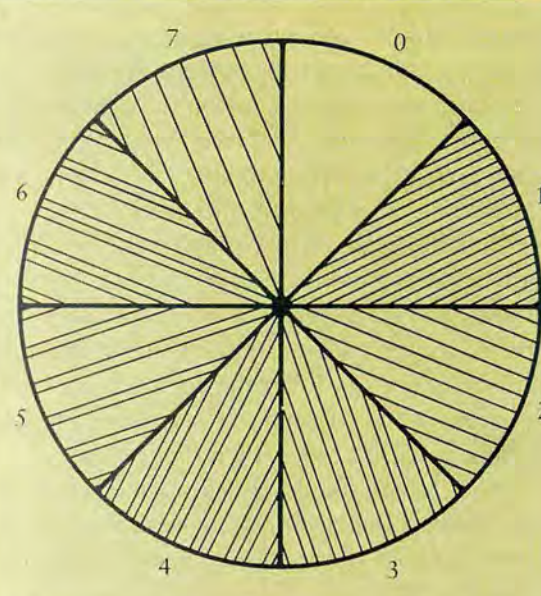
Symphony does not improve on *1-2-3* when it comes to printing graphs. (We won't be printing in this exercise, so you can skip the steps in this paragraph if you wish.) You are still required to save the picture in a separate graph file, swap disks, and start a separate printing program. If you want to save the graph for printing with *Symphony*'s Graph Print function, press <Esc>, select *Image Save*, and in response to the prompt, give the graph a name that lets you store it as a .PIC file.

Symphony's Improved Graphics

Symphony outshines *1-2-3* in its ability to distinguish pie chart sections with cross-hatching (on monochrome monitors) or hue (on color monitors) for improved graph clarity. The real showstopper is *Symphony*'s ability to explode the pie chart. We'll produce both effects.

Symphony's manual wins no prizes for clarity in the graphics department, but the process of creating special graphics effects is not difficult. Essentially, you set up a B range of empty cells and then fill them with numbers that correspond to crosshatch and explosion instructions. The values are set forth in Figure 1, reproduced from the *Symphony Reference Manual.*

Take to heart Lotus's advice about putting the B range of instructions in the column next to the A range to avoid confusion. In our sample spreadsheet the appropriate numbers have been entered in cells F7..F14 to demonstrate all the crosshatch patterns *Symphony* makes available to emphasize pie charts.



B-Range Value	Result	Hue
0	unexploded, no hatching	none
1	unexploded, hatching 1	1
2	unexploded, hatching 2	2
3	unexploded, hatching 3	3
4	unexploded, hatching 4	4
5	unexploded, hatching 5	5
6	unexploded, hatching 6	6
7	unexploded, hatching 7	7
100	exploded, no hatching	none
101	exploded, hatching 1	1
102	exploded, hatching 2	2
103	exploded, hatching 3	3
104	exploded, hatching 4	4
105	exploded, hatching 5	5
106	exploded, hatching 6	6
107	exploded, hatching 7	7

Figure 1: The cross-hatching and explosion values used to enhance Symphony pie graphs. These values are entered in the spreadsheet in column F and defined as graph range B.

To modify the settings of our graph, we'd better create a graph with a new name before we start changing the Graph settings sheets. Press the <Esc> key three times to make sure you've backed completely out of the command tree. Now select **< F10 >** (Menu) *Graph 1st-Settings Name Create*, type a name for this new graph, **SECOND**, and press <Enter>.

Having created a new graph name (incorporating the settings from the first graph), we can proceed to modify the graph further. You should be at the appropriate command level so that you can select the commands *Range B*. Enter the cell address of the accent codes, **F7..F14 < Enter >** . To see the graph, select the command *Quit* twice, then *Preview*.

Your screen should now look like Screen 3. All the cells except one demonstrate choices of crosshatch patterns, and one of the slices, corresponding to the tax basis for the Pacific Telesis Group, has been exploded away from the pie.

Serious Whizbang

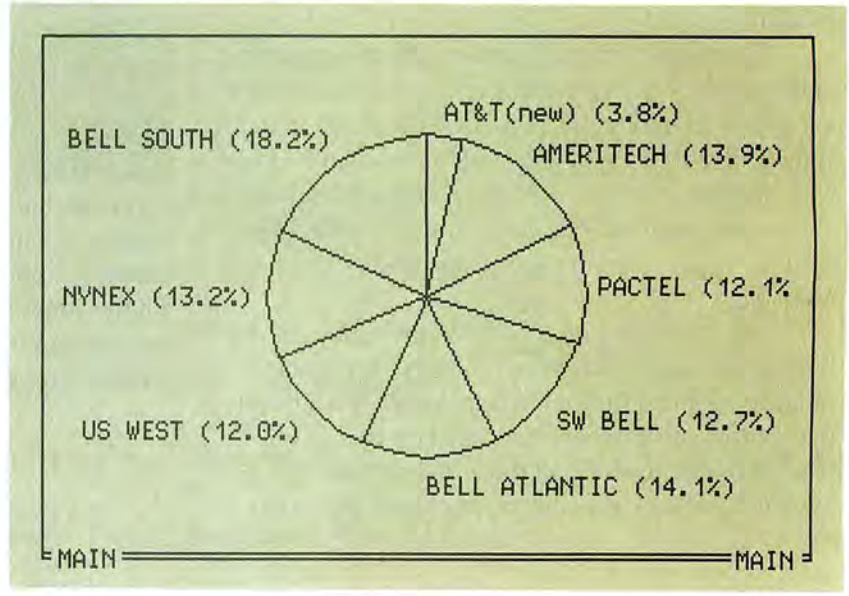
For the *pièce de résistance* of your graphic presentation, *Symphony* allows you to change the aspect ratio of your pie chart. The aspect ratio is simply the relationship of the width of the graph to its height. Combined with cross-hatching and explosion, a lower aspect ratio (a wider, flatter ellipse) makes for a professional-looking picture. To demonstrate, we will create a third graph by changing the aspect ratio of the second and assigning the resulting graph a new name.

Press <Esc> three times until you have backed out of the command tree. Then select **< F10 >** (Menu) *Graph 1st-Settings Name Create*. All you are doing with these commands is creating another copy of the settings of the last pie chart, SECOND, and telling *Symphony* the graph will have a new title. Name the graph THIRD and press <Enter>.

To change the aspect ratio you must travel down a separate command branch. Because the aspect ratio is not a primary characteristic of pie charts, it is hidden away in the command caves reached by the 2nd-Settings command. There are two ways to get there. The roundabout route is to select *Quit* and then *2nd-Settings*. The shortcut is to select the command *Switch* directly from the 1st-Settings command branch. Either way, in the best tradition of *Dungeons and Dragons*, once you walk through the 2nd-Settings door you are immediately lost.

It must have seemed logical to the programmers at Lotus to create a command option called Other. A lot of things that programmers find logical are mysteries to us mortals. If you want to change the aspect ratio of your graph, have faith and choose *Other*.

Now select *Aspect* and you will be prompted for a ratio from .1 to 1—the lower the number you choose, the flatter the graph will be. I found .6 worked well, but you can have fun experimenting with different values. After entering an aspect ratio value and pressing <Enter>, select *Quit Preview*, and Screen 4 should be on your screen.



Screen 2: A "plain vanilla" pie graph illustrating the relative bases of the new AT&T and its seven children

If you have a color monitor and a graphics board, you can enhance your graph further while you're at the 2nd-Settings command level. Select *Other Color Yes* and you'll get Technicolor (almost) as well as stereophonic sound.

Windows on the World

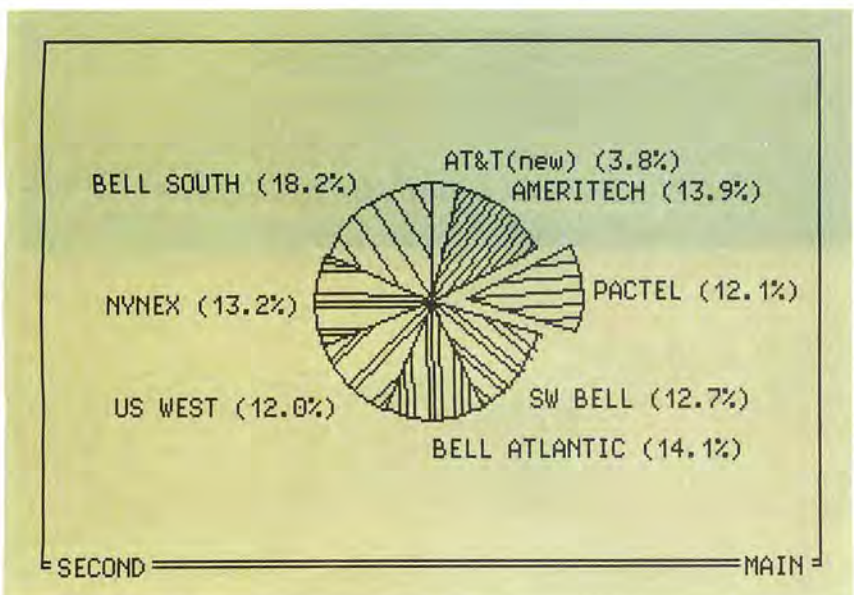
Symphony's ability to display more than one graph at a time through the use of windows represents an impressive improvement over *1-2-3*. Dynamic information is often best explained using graphs, and simultaneous comparison of several graphs can be dramatic. To demonstrate, we'll compare the first, plain graph we created with the third, whizbang version. Be forewarned that pie chart labels can clutter multiple windows, making them difficult to read. Our exercise will demonstrate the creation process and should underscore the value of multiple windows as a comparison tool (not to mention the value of keeping your labels concise).

To minimize potential confusion, we'll assume you have installed *Symphony* in the toggle mode, enabling the system to display graphics or spreadsheet information but not both at the same time. The process of creating windows would not change if you were in shared mode, but the output would be more difficult to understand. There are no free lunches–*Symphony* offers greater flexibility than *1-2-3* at the price of complexity.

In this example we'll use two windows to display simultaneously the graphs named MAIN and THIRD. First, back all the way out of the command tree by pressing <Esc> three times. Now select **< F9 >** (Services) *Window Create*. *Symphony* will request a new name for the window and promptly confuse you by displaying the word MAIN, which appears to be your first choice. MAIN is the name of both the spreadsheet (itself a window) and the first graph; it is not available as a window name. Assigning names relating to the graphs the windows will contain is a good idea.

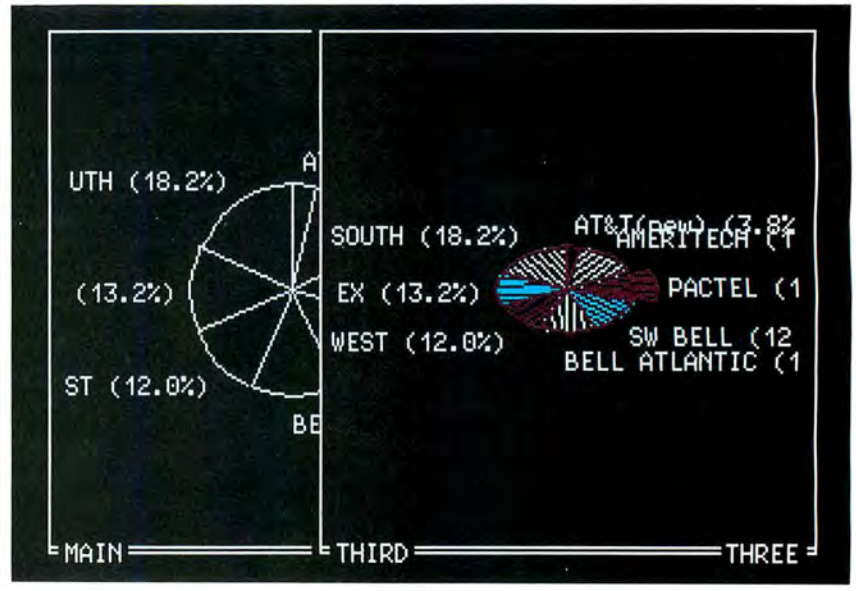
In response to the name prompt, type **ONE** (for the MAIN graph) and press <Enter>. *Symphony* will next prompt you for 'spreadsheet work environment', a fancy way of asking what type of window you want. Select the *Graph* option, and *Symphony* will display the entire screen in inverse video.

Next, define the amount of space to be covered by the window. The arrow keys reduce or expand the inversely highlighted area. For clarity's sake, we want our window to cover about two-thirds of the screen,

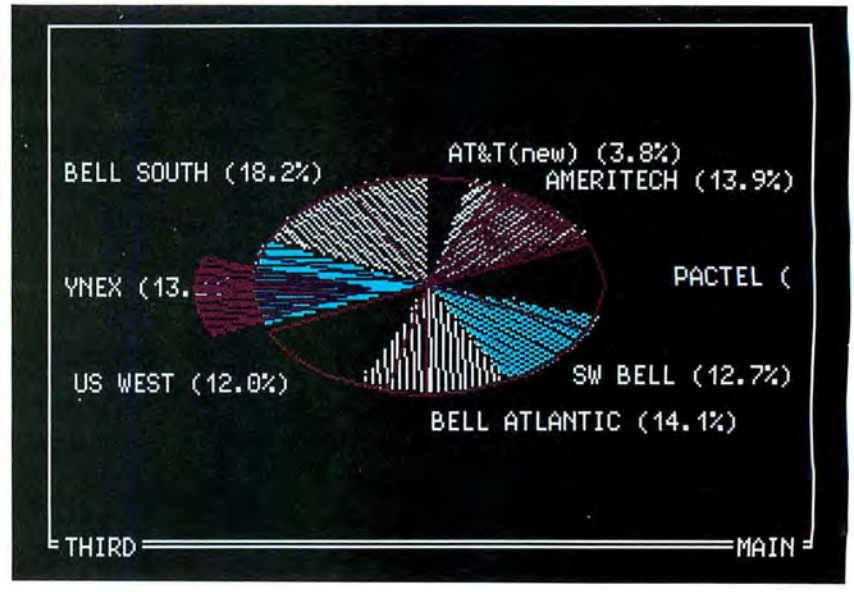


Screen 3: The pie chart from Screen 2 further enhanced with cross-hatching and an exploded slice

Screen 4: The pie chart from Screen 3 further enhanced by setting the aspect ratio to .6



Screen 5: The pie charts from Screens 2 and 4 displayed in slightly overlapping windows. Note that the labels obstruct much of the graph areas.



so press the left arrow key to reduce window ONE to include only columns A through D. Press <Enter> and select *Quit*, and *Symphony* will create the first window and draw a graph in it.

Symphony automatically attaches the graph corresponding to MAIN to the window just created. If you've been keeping pace with all the keystrokes, you should see the first graph filling the window.

You can create a second window (or any number of windows) by again selecting **< F9 >** (Services) *Window Create*. Name the second window **THREE** to correspond to the other graph you want to display, and at the prompt identify the window as a *Graph*. The area to be covered must now be identified, but because one window already exists, the process is a bit different. Press the <ScrollLock> key. Now pressing the right arrow key will shift the entire highlighted area on the screen. Move it to the far right edge of the screen. Press <Enter>, release <ScrollLock>, select *Quit*, and *Symphony* will take over.

Once again, the window displays the graph defined as *MAIN*. This is probably not what we expected and certainly not what we want. We can fix that, however, with a little extra effort. Press <F10> and you'll see a different form of command menu. Select *Attach* and choose the graph we named THIRD to attach to the window.

Symphony will redraw the two windows and fill them with the appropriate graphs, as illustrated by Screen 5. I warned you about those labels! They definitely get jumbled on the screen. (You can eliminate the X ranges from each graph, and with them, the labels. Select *1st-Settings Name Use*, then the name of the graph, and then *Cancel Range X*. By now you should know your way around the command tree like a chimpanzee.)

If you want to move back and forth between the graphic presentation and the underlying spreadsheet, press the **< F6 >** (Window) key. Each time you return to the graphic display, the two graphs switch positions, alternating as the top graph (indicated by a double-line border at the bottom of the window). This is important because the <Alt>-<F6> (Zoom) key combination will expand the top window to full-screen size. Windows allow for quick comparison through simultaneous display, and the Zoom feature enables you to make a closer analysis of individual graphic components. Graphic windows can be created within other graphic windows, and Zoom used to enlarge any of the windows to full-screen size.

If you installed *Symphony* in the shared mode, you can use windows to display the spreadsheet and graphs simultaneously. Changes you make in the spreadsheet are immediately reflected in the graphs, a useful technique for presentations. The Auto Display feature can be used on individual graphs in one of these multiple displays. Selected graphs will automatically reflect changes made in the spreadsheet, while others will not.

The Eyes Have It

What impact can different graphic presentations have? Decide for yourself by viewing the relative tax basis graphs displayed sequentially, then simultaneously and in Zoom. It may not be Mozart, but you can use *Symphony*'s graphics to make very pretty music for Ma Bell, your accountant, and the IRS.

Stephen A. Blumenthal is a Washington, D.C., attorney and the director of regulatory relations for the Securities Industry Association.

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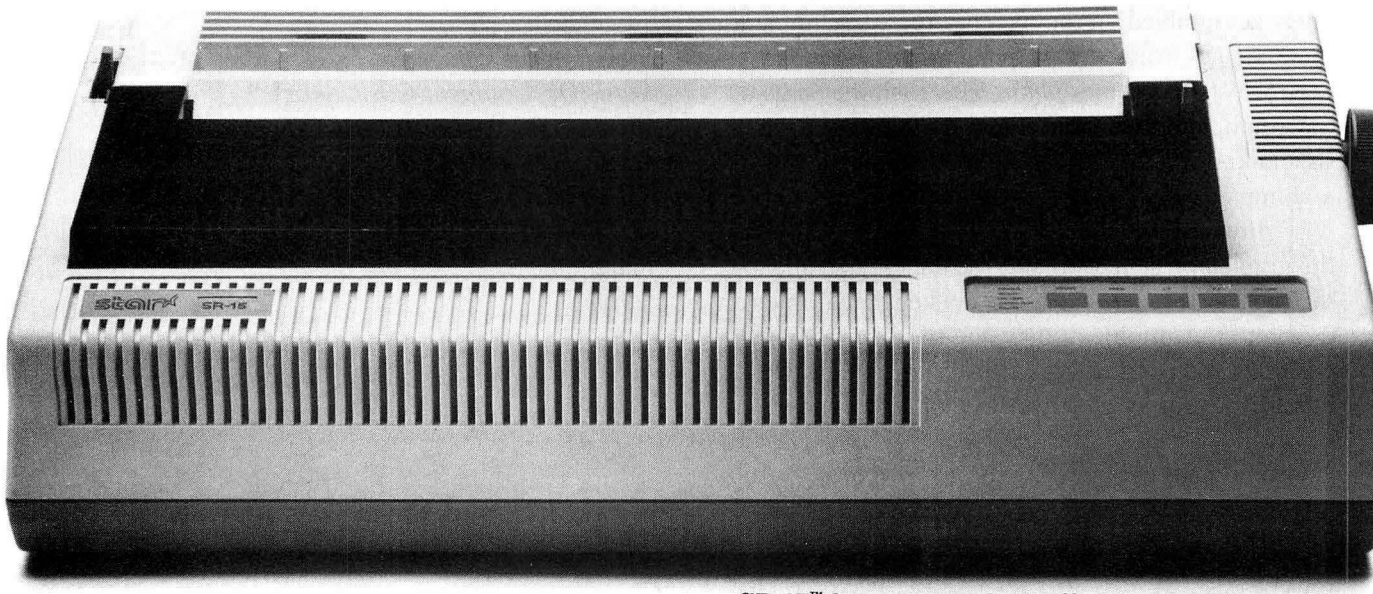

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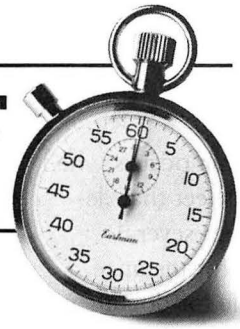

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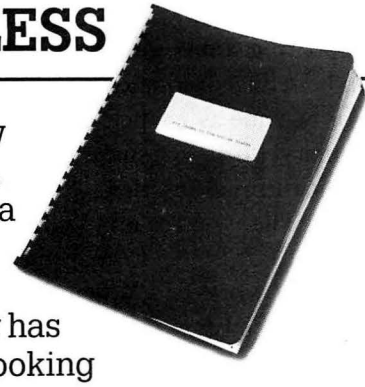

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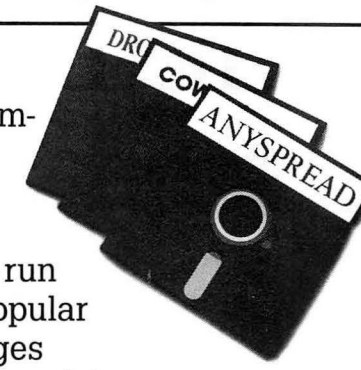

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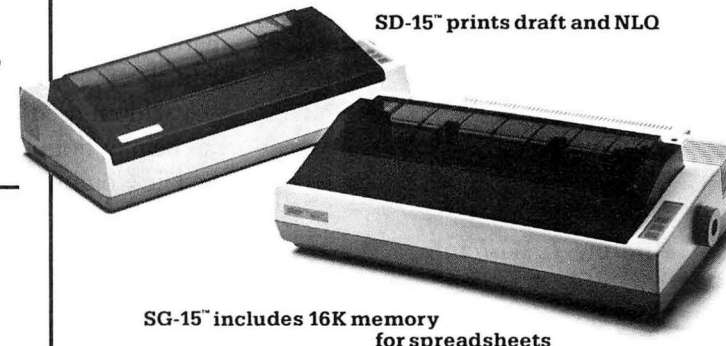

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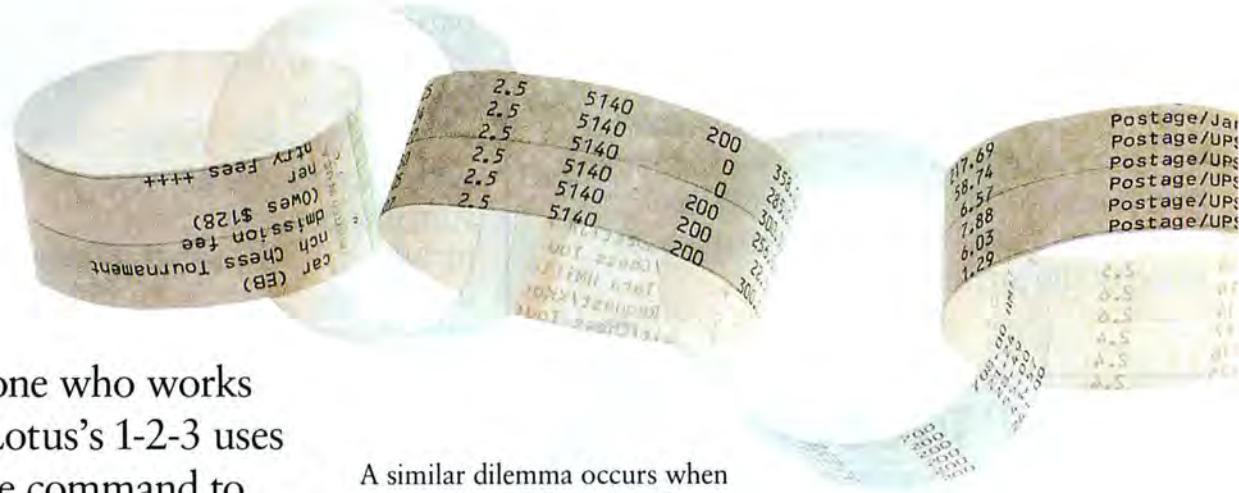


Everyone who works with Lotus's 1-2-3 uses the File command to save and retrieve worksheets, but what about the command's other options? Here's how the File Combine command can help you manage your files and your work load.

Andrew T. Williams

Sooner or later most spreadsheet users encounter a worksheet that has grown too large for their computer's memory—or their own. Splitting a giant worksheet into logical parts allows you to organize your work better as well as to circumvent electronic and human memory limitations. But doesn't that mean endless rekeying of data?

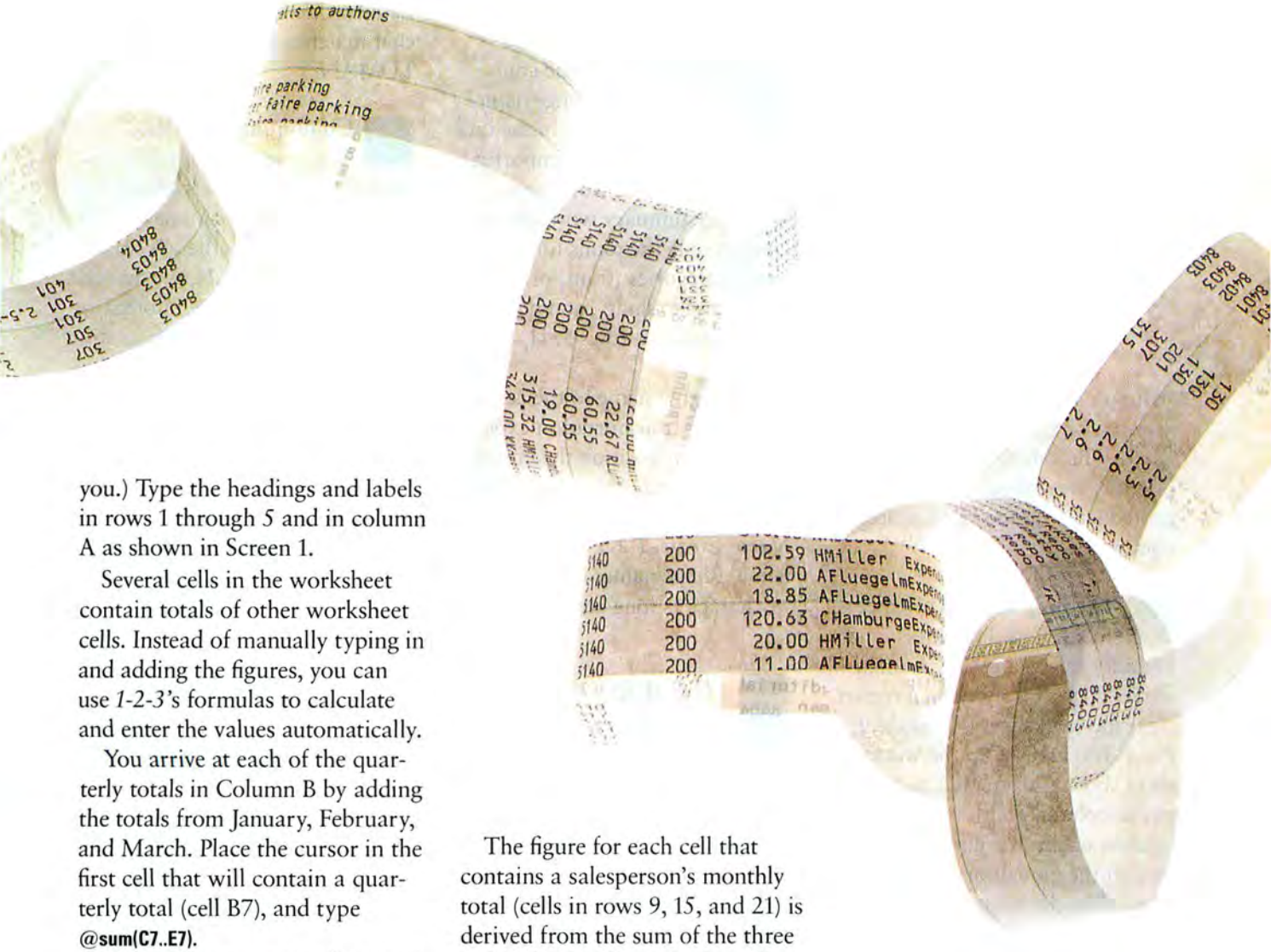
A similar dilemma occurs when you create a worksheet that depends on input from several sources. Suppose, for instance, you are responsible for documenting the quarterly expenses of your company's sales staff. The easiest way to obtain the necessary data is from individual spreadsheets created by each salesperson. How can you avoid rekeying this information into the summary worksheet?

A seldom-used *1-2-3* command can help in both situations. With the File Combine command, you can import data from several spreadsheets into a spreadsheet loaded in memory. With a little planning, the job of updating summary worksheets can be reduced to a few keystrokes, or become as easy as loading a summary worksheet into memory. This tutorial will show how to use the File Combine command and a *1-2-3* macro to create a summary worksheet automatically from expense figures supplied by several salespeople. (For an example of a more sophisticated operation, see "Linking Worksheets With Multiplan," *PCW*, Vol. 2, No. 10.)

Screen 1 shows a worksheet that summarizes the expenses for all salespeople in the Thankless Foundry Company. Screen 2 shows an individual salesperson's worksheet detailing job-related expenses. Here's how to combine the two.

The Summary Worksheet

To determine the information you'll need from each salesperson's worksheet, set up the summary worksheet first. On a new worksheet, set the global column width to 15 and the global format to currency, two decimals. (When the values for each category are eventually entered, you won't need to type the dollar signs; the currency format setting will automatically insert them for



you.) Type the headings and labels in rows 1 through 5 and in column A as shown in Screen 1.

Several cells in the worksheet contain totals of other worksheet cells. Instead of manually typing in and adding the figures, you can use *1-2-3*'s formulas to calculate and enter the values automatically.

You arrive at each of the quarterly totals in Column B by adding the totals from January, February, and March. Place the cursor in the first cell that will contain a quarterly total (cell B7), and type **@sum(C7..E7).**

Use the Copy command to copy that formula to each of the other quarterly total cells in Column B. Using relative cell references in the formulas further cuts your work. Notice that when you copy the formula, its cell references adjust to fit each new position. Unless you specify that cell references are absolute, *1-2-3* assumes they are relative.

The figure for each cell that contains a salesperson's monthly total (cells in rows 9, 15, and 21) is derived from the sum of the three cells below it. Enter the formula **@sum(C11..C13)** into cell C9. Then copy the formula to cells D9..E9, C15..E15, and C21..E21. Again, the formula will be adjusted to suit each new position in the worksheet.

The last totals to be calculated are the monthly sums for the entire sales staff, in row 7 of the worksheet. These totals are derived from the sum of the aggregates for each salesperson, in rows 9, 15, and 21. Create the first formula in cell C7 and copy it to cells D7..E7. You have finished the

structure of the worksheet; now save it with the */File Save* command. The values needed to complete the worksheet will be imported later via the File Combine command.

The Individual Worksheets

To see how Thankless Foundry salesman Willy Loman would create his individual report, clear the worksheet (*/Worksheet Erase Yes*) and set up the worksheet shown in Screen 2. Set a global column width of 15, set the column width of column A at 22, and set the global format to currency, two decimals.

Instead of typing the totals for transportation, meals, and lodging (in rows 5, 11, and 16), enter a formula in cell B5 that will calculate the values for you by adding the four cells below each total cell: **@sum(B6..B9)**. Then copy that formula into all the other cells that will contain totals (C5..D5, B11..D11, and B16..D16).

Loman's individual worksheet is now complete, but to transfer relevant information to the summary worksheet, a few extra steps are necessary. First, determine what information you'll need to transfer; then name the cell ranges that contain that information, using the Range Name Create command. The File Combine command will use those range names to find the information in the individual worksheets and import it into the summary worksheet. Since the summary worksheet will contain only the totals for the different categories (transportation, meals, and lodging), you need to assign names to rows 5, 11, and 16.

To assign a name to the cells containing transportation expense information, position the cursor on the first cell of the range, B5, and give the command */Range Name Create*. *1-2-3* will ask for a name. Range names can be up to 15 characters long and can contain blanks and special characters. Letters entered in lowercase are converted to uppercase.

It's a good idea to assign range names that are the same as the labels on the worksheet.

It's a good idea to assign range names that are the same as the labels on the worksheet. In this case, **TRANSPORTATION** is the logical choice. Type it and press **< Enter >**. *1-2-3* will ask for the range of cells to name. With the cell pointer at B5, use the **< CursorRight >** key to extend the range to D5. Press **< Enter >**, and you've assigned the name TRANSPORTATION to the range B5..D5.

Repeat the process to assign the name MEALS to cells B11..D11 and LODGING to B16..D16. The setup is now complete; store the detail worksheet under a file name that matches that of the salesman: LOMAN.

Combining the Files

You are now ready to complete the summary worksheet. Begin by loading the summary worksheet file created earlier. Position the cursor on cell C11, the first cell in which you want the information about Loman's transportation expenses to appear. The data you combine into the loaded worksheet will appear at the cursor position. Then give the command */File Combine*.

The status line will list three options: Copy, Add, and Subtract. Copy copies all the contents–labels, formulas, and values–of the named range, replacing anything that may be in the summary worksheet's target cells. Add merges the displayed values in the source worksheet with the contents of the cells in the summary worksheet; it bypasses labels and formulas, working only with the values. Subtract operates in the same manner as Add, but deducts the values in the source worksheet from the contents of the target cells.

Because the cells to be copied from the individual worksheets contain formulas that you do not want brought into the summary worksheet, use Add instead of Copy. This option adds information from the detail worksheet to values in cells in the summary worksheet, so be sure no values

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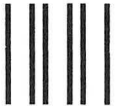

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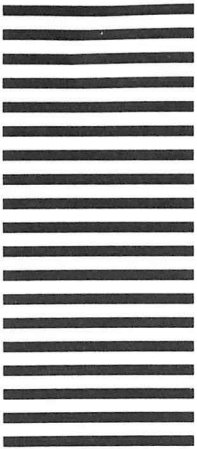

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from a previous update lurk in the target cells. If you find any, use the Range Erase command to erase them before you give the File Combine command.

Type **A** to select Add. Your next options are Entire File or Named Range. Since the only values you want from the LOMAN worksheet are those in the ranges that you have named, type **N** to select Named Range. When *1-2-3* asks for the name of the range, type **TRANSPORTATION** **<Enter>**. For the file name, type **LOMAN** **<Enter>**. The information from the detail worksheet will appear in the appropriate cells in the summary worksheet; the totals will be calculated automatically.

To complete Loman's category in the summary worksheet, simply position the cell pointer on each of the remaining rows and repeat the above steps, supplying the appropriate range and file names. The result should resemble Screen 3. To complete the summary worksheet, you would follow the same procedure for each of the other salespeople.

Automatic Updates

Once you've set up the worksheets, you'll probably use the File Combine procedure often. You can save time and avoid errors by going one step further and creating a keyboard macro in the summary worksheet to automate the process.

Before you begin creating in earnest, it's a good idea to run through the procedure you want to automate, writing down each keystroke as you make it.

	A	B	C	D	E
1		CONSOLIDATED EXPENSE RECORD			
2		First Quarter 1985			
3					
4		QUARTER-TO-	JANUARY	FEBRUARY	MARCH
5		DATE TOTAL			
6					
7	TOTAL EXPENSES	$0.00	$0.00	$0.00	$0.00
8					
9	LOMAN: TOTAL	$0.00	$0.00	$0.00	$0.00
10					
11	Transportation	$0.00			
12	Meals	$0.00			
13	Lodging	$0.00			
14					
15	SMITH: TOTAL	$0.00	$0.00	$0.00	$0.00
16					
17	Transportation	$0.00			
18	Meals	$0.00			
19	Lodging	$0.00			
20					
21	JONES: TOTAL	$0.00	$0.00	$0.00	$0.00
22					
23	Transportation	$0.00			
24	Meals	$0.00			
25	Lodging	$0.00			
26					

Screen 1: The first step is to set up the summary worksheet. After you enter the labels and formulas, all the necessary information can be imported via the File Combine command.

	A	B	C	D	E
1		EXPENSE RECORD: WILLY LOMAN			
2					
3		JANUARY	FEBRUARY	MARCH	
4					
5	TRANSPORTATION: TOTAL	$256.71	$0.00	$0.00	
6	tolls	$5.00			
7	gas	$35.79			
8	repairs	$142.42			
9	other	$73.50			
10					
11	MEALS: TOTAL	$46.89	$0.00	$0.00	
12	1/4	$15.75			
13	1/8	$13.62			
14	1/10	$17.52			
15					
16	LODGING: TOTAL	$138.50	$0.00	$0.00	
17	1/4	$32.50			
18	1/8	$73.50			
19	1/10	$32.50			
20					

Screen 2: Each salesperson enters his or her own figures into an individual worksheet. Hidden power lies in the range names assigned to the cells that will be imported into the summary worksheet.

The keystrokes for a macro must be entered as labels into a single column of cells on the worksheet. The column of macro text can be positioned anywhere in the worksheet, although it is typically positioned away from the primary work space. Long labels can extend beyond cell boundaries, provided that the labels are actually entered into successive cells in a single column.

To create the macro for the File Combine procedure you just performed, type each keystroke used, starting at cell A35, as follows:

/FCAN
TRANSPORTATION~
LOMAN~

Notice the tildes after the words *TRANSPORTATION* and *LOMAN*, indicating where you would press the <Enter> key. *1-2-3* uses special symbols like this to represent keys in a macro that produce an action rather than a character.

Because macros are entered as labels, if an entry begins with a character that would indicate a value, such as a mathematical operator, a slash, or a number, you must type one of the label-alignment characters (', ", or ^) to identify it as a label and not a value. For example, to enter /FCAN in a macro, you'd actually type **'/FCAN**.

After typing the keystrokes into the worksheet, you must assign a name to the macro. Macro names consist of the backslash character (\) followed by any letter. To name the macro, position the cursor on the first cell of the macro (the one containing /FCAN in the example) and give the */Range Name Create* command. When prompted for a name, type a backslash and any letter.

You need assign a name only to the first cell in a macro. When *1-2-3* finishes executing the keystrokes in the first cell, it automatically checks the next cell in the column and executes any keystrokes entered there. Execution continues cell by cell until the program reaches a nonlabeled cell–a blank cell or one containing a value. To begin execution of a macro, position the cursor on the cell where you want the action to begin. Then press <Alt> while you type the letter assigned to the macro.

Screen 4 contains the macro to integrate Willy Loman's worksheet totals into the summary worksheet automatically. Notice that the macro also contains commands to move the worksheet cursor to the appropriate cell and to erase the target range before executing the File Combine command.

Wherever possible, this macro uses named ranges instead of direct cell references. Named ranges are not only much easier to understand, they are unaffected by changes in the surrounding worksheet. If a named group of cells were moved to a different position in the worksheet, for example, the name given that range would move with them. In Screen 4, the cells on the summary worksheet that

	A	B	C	D	E
1		CONSOLIDATED EXPENSE RECORD			
2		First Quarter 1985			
3					
4		QUARTER-TO-	JANUARY	FEBRUARY	MARCH
5		DATE TOTAL			
6					
7	TOTAL EXPENSES	$442.10	$442.10	$0.00	$0.00
8					
9	LOMAN: TOTAL	$442.10	$442.10	$0.00	$0.00
10					
11	Transportation	$256.71	$256.71	$0.00	$0.00
12	Meals	$46.89	$46.89	$0.00	$0.00
13	Lodging	$138.50	$138.50	$0.00	$0.00
14					
15	SMITH: TOTAL	$0.00	$0.00	$0.00	$0.00
16					
17	Transportation	$0.00			
18	Meals	$0.00			
19	Lodging	$0.00			
20					
21	JONES: TOTAL	$0.00	$0.00	$0.00	$0.00
22					
23	Transportation	$0.00			
24	Meals	$0.00			
25	Lodging	$0.00			
26					

Screen 3: The summary worksheet after Loman's January expenses have been imported

receive information from the detail worksheet have been named L TRANSP, for Loman transportation, to distinguish them from J TRANSP and S TRANSP. (The range name L TRANSPORTATION would exceed the character limit for range names.) A {goto} statement uses these range names and positions the cursor at the appropriate location before each File Combine command is invoked.

Macro instructions consist only of keystrokes, which makes them difficult to decipher. To help you understand the macro in Screen 4, range names are typed in uppercase and commands in lowercase (*1-2-3* does not notice the difference). Breaking the macro into several lines, with each line containing a logically related set of keystrokes, also clarifies matters. In addition, you can place a short description of each command string in a cell next to each macro line.

Adding Salespeople

The macro in Screen 4 will copy only Willy Loman's totals into the summary worksheet. To extend the macro to include additional salespeople, copy it twice, adding the copies to the end of the original macro. Be sure not to leave a blank cell between copies—*1-2-3* stops executing a macro when it encounters a blank cell.

Edit the copies you just made, correcting references to named ranges and file names. Then name the appropriate ranges in the summary worksheet (J TRANSP for Jones's transportation, and so on). You now have a macro that will automatically fill in the summary worksheet with the specified information from all of the individual worksheets.

If you wish to take the automation one step further, you can give the macro a special name: \0. Macros with this name are executed automatically each time the worksheet containing it is loaded into memory. In this manner, each time you load the summary sheet, it will automatically be updated with the latest information. To be able to execute the macro from the keyboard, you must also assign it one of the conventional backslash/letter-key names (you can assign more than one name to any range).

With a little planning, creating reports can become a two-keystroke task. Plan a bit further, and it's as simple as loading a file in *1-2-3*. Managing a sales staff has never been so easy.

Andrew T. Williams is a Contributing Editor for PC World *who conducts* 1-2-3 *training for corporate clients. He is the author of several books on electronic spreadsheets, including* Lotus 1-2-3 from A to Z *(John Wiley, New York, 1985).*

	A	B	C	D	E	F
35	{goto}L TRANSP~		} positions cursor on first cell of L TRANSP			
36	/reL TRANSP~		} erases the range named L TRANSP			
37	/fcan		} File Combine Add Named Range command			
38	TRANSPORTATION~		} name of range to combine: TRANSPORTATION			
39	LOMAN~		} name of file to combine: LOMAN			
40	{goto}L MEALS~		|			
41	/reL MEALS~		|			
42	/fcan		|			
43	MEALS~		|			
44	LOMAN~		|			
45	{goto}L LODGING~		} repeats commands for MEALS and			
46	/reL LODGING~		} LODGING ranges			
47	/fcan		|			
48	LODGING~		|			
49	LOMAN~		|			

Screen 4: This macro will automatically import Loman's expenses every month with two keystrokes. To combine information from additional salespeople's worksheets automatically, simply copy and edit this macro.

Taking Stock With BASIC

The trickiest part of stock market investment is balancing risk against potential profit. This BASIC program calculates the risk and the expected rate of return for a small portfolio, allowing you to plan your investments like an expert.

J. H. Berk and S. H. Berk

It is a sad fact of the market that stocks with the highest potential payoff also carry the greatest risk. The secret of successful stock investment is a portfolio that contains the right proportion of risk and probable reward, with riskier stocks balanced by more stable investments. With careful calculation and the help of a few statistics, you can maximize the stability and payoff of your portfolio. The program described here (see Listing 1) performs some fundamental calculations on stock portfolios that may be too small to justify the purchase of a full-featured investment management program. The program will accommodate portfolios of up to 15 stocks. The article assumes that the reader understands how to enter and run a simple BASIC program.

Beta and Behavior

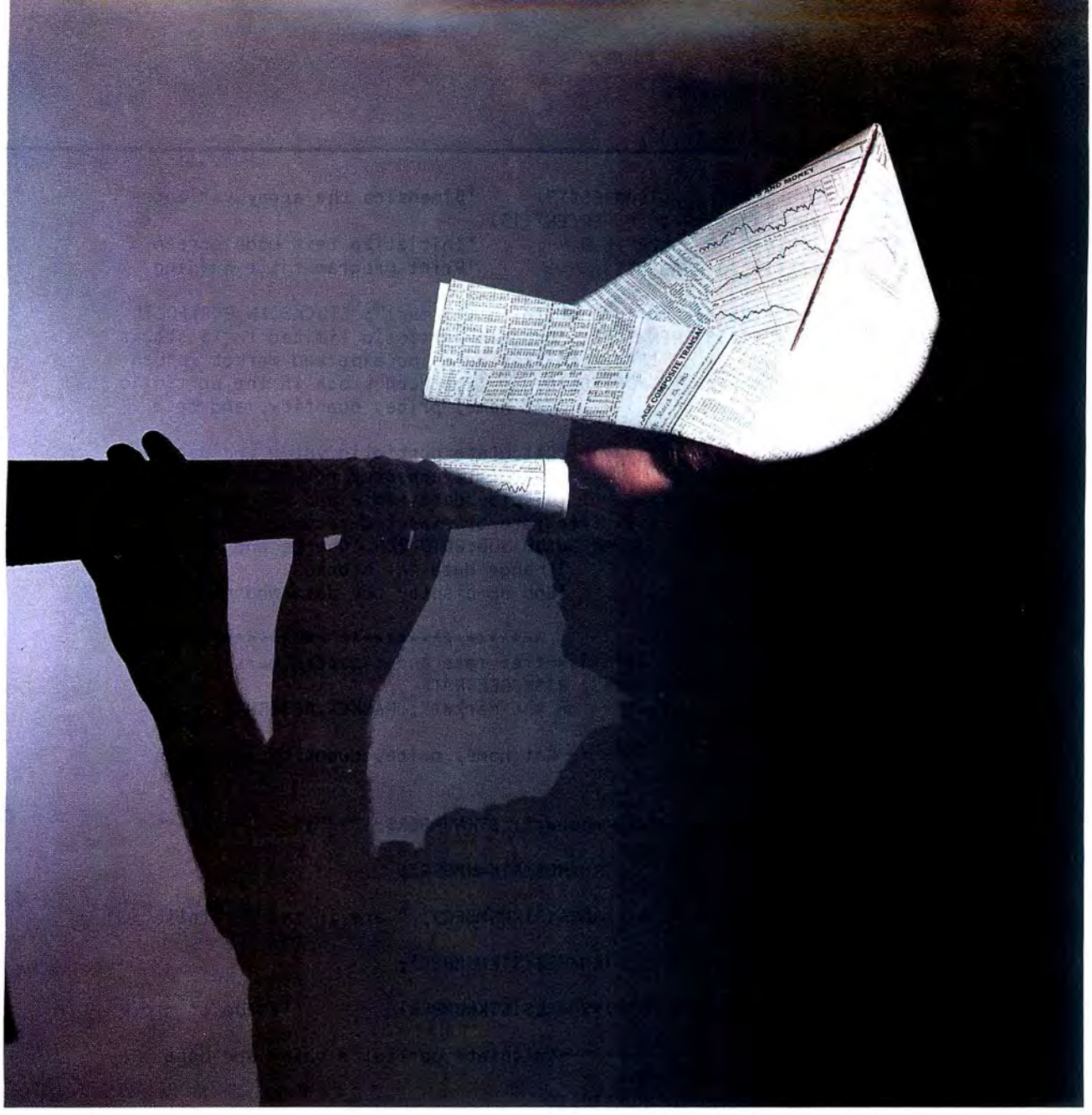
The key to a stock's behavior is its *beta coefficient*–a figure that tells how the stock is likely to react to changes in the overall market. Beta coefficients for individual stocks can be found in most stock indices and guides or obtained with a call to any stock brokerage house. The value of a stock's beta coefficient is based on the assumption that the market as a whole has a beta of 1.0. Therefore, if a stock has a beta exactly equal to 1.0, it will behave exactly as the market does. If the market goes up 10 percent, the price of the stock will go up 10 percent; if the market drops by 10 percent, the price of the stock will fall correspondingly.

If the stock has a beta greater than 1.0, it will generally move in the same direction the market does, but by a greater amount. When the market goes up, a stock with a beta of 1.1 will rise 10 percent higher than the market advance; when the market goes down, the same stock will show a 10 percent greater loss.

If the stock has a beta of less than 1.0 but greater than 0, 0.9 for example, it will go up when the market does, but only by 90 percent of the market's advance. Similarly, the stock will go down when the overall market declines, but only by 90 percent of the market decline.

Using the Beta to Gauge Risk

Generally speaking, betas significantly greater than 1.0 are associated with riskier stocks. This makes sense, because high-risk stocks generally overreact to market trends. New issues from highly leveraged companies generally fall into this category. Larger, more es-



tablished companies have betas closer to 1.0. These companies tend to react as the market does.

Some companies' stocks have negative betas and generally react in a manner opposite to that of the overall market. If the market declines, the value of these stocks increases; if the market advances, these stocks decline. Such companies are called countercyclical. Gold mines are a good example. When the stock market as a whole is falling, gold becomes more valuable, and the price of gold mine stock goes up. The stock of beer companies behaves similarly. During depressed economic conditions, people tend to drink more beer (and to substitute beer for more expensive drinks), which boosts the stock of breweries.

One thing to keep in mind, though, is that as the beta (and risk) of the portfolio increases, so will the expected return on the portfolio. That doesn't mean higher returns occur automatically with higher betas. If that were the case, we'd simply build a portfolio of the riskiest stocks we could find and wait for huge returns. A successful portfolio requires that increased risk be justified by a corresponding increase in the likelihood of reward.

The investor who owns multiple stocks will want some way to gauge the riskiness of the combined investment. Each stock in the portfolio will have a different

```
100 DIM STKNAME$(15), PRICE(15), SHARES(15)     'Dimension the array variables
110 DIM BETA(15), VALUE(15), PFOLIO.PERCENT(15)
120 CLS : KEY OFF : WIDTH 80 : SCREEN 0         'Initialize text mode screen
130 PRINT TAB(31)"PORTFOLIO ANALYSIS"           'Print program title heading
140 PRINT
150 INPUT "How many stocks are in the portfolio (15 max)"; STOCKS.IN.PORTFOLIO
160 IF STOCK.IN.PORTFOLIO>15 THEN 150   'Program portfolio limited to 15 stocks
170 GOSUB 310                   'Get risk-free rate and expected market return
180 FOR STKNUMBER=1 TO STOCKS.IN.PORTFOLIO     'For each stock in the portfolio
190    GOSUB 350                        'Get name, price, quantity, and beta
200 NEXT STKNUMBER
210 GOSUB 480                           'Calculate portfolio value and beta
220 GOSUB 580                           'Calculate expected return of portfolio
230 GOSUB 610                           'Display data table and program results
240 GOSUB 810           'Change risk-free rate or expected return of market?
250 IF CHANGE$="Y" OR CHANGE$="y" THEN GOSUB 300:GOTO 220 'Change and redisplay
260 GOSUB 870                           'Change data for stocks?
270 IF ALLDONE THEN 280 ELSE 210        'End or display new data and results
280 END
290 '***********        Subroutines       ************************************
300 '---------------------------Get risk-free rate and expected market return
310 INPUT "What is the risk-free rate"; RISKFREE.RATE
320 INPUT "What is the expected return on the market"; MARKET.RETURN
330 RETURN
340 '-----------------------------------Get name, price, quantity, and beta
350 STKNUMBER$=STR$(STKNUMBER)
360 PRINT
370 PRINT "What is the name of stock number"; STKNUMBER$; "? ";
380 LINE INPUT STKNAME$(STKNUMBER)
390 PRINT "What is the price of "; STKNAME$(STKNUMBER);
400 INPUT PRICE(STKNUMBER)
410 PRINT "How many shares of "; STKNAME$(STKNUMBER); " are in the portfolio";
420 INPUT SHARES(STKNUMBER)
430 PRINT "What is the beta for "; STKNAME$(STKNUMBER);
440 INPUT BETA(STKNUMBER)
450 VALUE(STKNUMBER)=PRICE(STKNUMBER)*SHARES(STKNUMBER)         'Value of stock
460 RETURN
470 '-----------------------------------Calculate portfolio value and beta
480 PFOLIO.VALUE=0 : PFOLIO.BETA=0
490 FOR STKNUMBER=1 TO STOCKS.IN.PORTFOLIO
500    PFOLIO.VALUE=PFOLIO.VALUE+VALUE(STKNUMBER)
510 NEXT STKNUMBER
520 FOR STKNUMBER=1 TO STOCKS.IN.PORTFOLIO
530    PFOLIO.PERCENT(STKNUMBER)=VALUE(STKNUMBER)/PFOLIO.VALUE
```

Listing 1

```
540    PFOLIO.BETA=PFOLIO.BETA+PFOLIO.PERCENT(STKNUMBER)*BETA(STKNUMBER)
550 NEXT STKNUMBER
560 RETURN
570 '-----------------------------------Calculate expected return of portfolio
580 PFOLIO.RETURN=RISKFREE.RATE+PFOLIO.BETA*(MARKET.RETURN-RISKFREE.RATE)
590 RETURN
600 '-----------------------------------Display data table and program results
610 PRINT
620 PRINT "No." TAB(11)"Name of Stock" TAB(37)"Price";
630 PRINT TAB(47)"Shares" TAB(65)"Value" TAB(75)"Beta"
640 FOR STKNUMBER=1 TO STOCKS.IN.PORTFOLIO
650    PRINT USING "##: "; STKNUMBER;
660    PRINT USING "\                          \   "; STKNAME$(STKNUMBER);
670    PRINT USING "$$,###.###   "; PRICE(STKNUMBER);
680    PRINT USING "###,###   "; SHARES(STKNUMBER);
690    PRINT USING "$$###,###,###.##   "; VALUE(STKNUMBER);
700    PRINT USING "##.###"; BETA(STKNUMBER)
710 NEXT
720 PRINT
730 PRINT "The total value and the beta of the portfolio are:"; TAB(56);
740 PRINT USING "$$###,###,###.##   ##.###"; PFOLIO.VALUE, PFOLIO.BETA
750 PRINT "Combining the portfolio beta with a ";
760 PRINT USING "risk-free rate of ##.## and an expected re-"; RISKFREE.RATE
770 PRINT USING "turn on the market of ##.## yields an "; MARKET.RETURN;
780 PRINT USING "expected return on the portfolio of ##.##"; PFOLIO.RETURN
790 RETURN
800 '--------------------Change risk-free rate or expected return of market?
810 PRINT
820 PRINT "Do you want to change the risk-free rate ";
830 INPUT "or expected return on the market"; CHANGE$
840 CHANGE$=LEFT$(CHANGE$,1)
850 RETURN
860 '-----------------------------------Change data for stocks?
870 PRINT "Do you want to change any of the stock data";
880 INPUT CHANGE$
890 CHANGE$=LEFT$(CHANGE$,1)
900 IF CHANGE$="Y" OR CHANGE$="y" THEN 930
910 ALLDONE=-1
920 GOTO 970
930 INPUT "Enter stock number to change (press <Enter> if none): ", STKNUMBER
940 IF STKNUMBER THEN 950 ELSE 970
950 GOSUB 350                          'Get name, price, quantity, and beta
960 GOTO 930
970 RETURN
```

Total value of a portfolio
(see program lines 450, 490-510)

$$Q = \sum_{i=1}^{SP} P_i * SH_i$$

where

Q = total value of portfolio
P_i = price of each stock in portfolio
SH_i = number of shares of each stock in portfolio
SP = number of shares in portfolio

Beta of a portfolio
(see program lines 520-550)

$$BP = \sum_{i=1}^{SP} PT_i * B_i$$

where

BP = beta of portfolio
PT_i = percent of each stock in portfolio
B_i = beta of each stock in portfolio
SP = number of shares in portfolio

Expected return of a portfolio
(see program line 580)

$$K = RF + BP*(KM - RF)$$

where

K = expected return of portfolio
RF = risk-free rate of return
BP = beta of portfolio
KM = expected return on market

Figure 1: Underlying financial equations used to develop the portfolio analysis program

Stock	Quantity	Price	Beta
Advanced Technology	500	$22.00	1.45
Solar Energy	350	18.75	1.80
Nuclear Medicine	500	32.00	1.75
Offshore Explorations	100	25.25	1.50
Hi-Tek Industries	400	13.75	1.85
Lunar Radiographics	350	15.00	1.70
Aluminum Recyclers	100	47.00	1.50
Oil Services	500	19.25	1.30
Tahoe Concepts	300	11.00	1.40
Nicholson Financial	500	22.50	1.25
Global Explorations	200	39.00	1.20
American Federated	500	42.00	1.35

Figure 2: Singer's portfolio–sample data for the portfolio analysis program

beta. Just as each individual stock has an assigned beta, a beta can be developed for the entire portfolio. The resulting overall beta will indicate how much the value of the entire portfolio will change with changes in the overall market, and in what direction.

Once the beta for the portfolio is known, the expected return of the portfolio can be developed. The portfolio analysis program in Listing 1 will provide both. Figure 1 describes the underlying financial equations used in the program.

Sample Analysis: Reducing the Risk

Stan Singer has a portfolio of fairly speculative stocks. He'd like to reduce his risk by selling some high-risk issues and replacing them with safer stocks. Singer's current portfolio consists of the 12 stocks listed in Figure 2.

To reduce his risk, Singer wants to sell Solar Energy, Nuclear Medicine, Hi-Tek Industries, and Lunar Radiographics and reinvest the proceeds in General American Industries. General American has a beta of 1.05, and currently sells for $62 per share.

What are the total value, the beta, and the expected rate of return for Singer's present portfolio? What will these factors be if he sells the four high-risk stocks and replaces them with General American? You can use the portfolio analysis program to answer these questions. Type in and run the program in Listing 1, supplying the data from Singer's current portfolio (Figure 2).

Screen 1 shows a portion of a question session. Remember that the largest allowable number of

```
PORTFOLIO ANALYSIS


How many stocks are in the portfolio (15 max)?  12
What is the risk-free rate?  10.9
What is the expected return on the market?  14.2

What is the name of stock number 1?  Advanced Technology
What is the price of Advanced Technology?  22.00
How many shares of Advanced Technology are in the portfolio?  500
What is the beta for Advanced Technology?  1.45

What is the name of stock number 2?  Solar Energy
What is the price of Solar Energy?  18.75
How many shares of Solar Energy are in the portfolio?  350
What is the beta for Solar Energy?  1.8

What is the name of stock number 3?  Nuclear Medicine
What is the price of Nuclear Medicine?  32.00
How many shares of Nuclear Medicine are in the portfolio?  500
What is the beta for Nuclear Medicine?  1.75
```

Screen 1: The portfolio analysis program queries the user for data about each stock in the portfolio.

stocks is 15. The program asks for the risk-free rate of return—the current rate of return on U.S. Treasury bills—and the expected rate of return on the market—the return on an average stock (see the sidebar "The Vocabulary of Portfolio Analysis" for definitions of the terms). For this example, answer **10.9** for the risk-free rate of return and **14.2** for the rate of return on the market. The results of the run show that the beta of the portfolio is 1.48, the expected return is 15.78 percent, and the total value is $104,512.50.

Next, let's find out what the beta, the expected rate of return, and the total portfolio value would be if Singer sold Solar Energy, Nuclear Medicine, Hi-Tek Industries, and Lunar Radiographics and replaced them with 500 shares of General American. (The value of the four stocks Singer would sell is actually enough to buy 537 shares of General American, but due to broker commissions, Singer would have only enough cash to buy 500 shares.)

The secret of successful stock investment is a portfolio that contains the right proportion of risk and probable reward.

Answer **Y** to the prompt 'Do you want to change any of the stock data?', and replace the data for Solar Energy with that for General American. Remove the data for Nuclear Medicine, Hi-Tek Industries, and Lunar Radiographics by pressing <Enter> instead of answering the questions requesting their new data. (Notice that though the program will allow you to change or delete stocks in the portfolio, the total number of stocks cannot exceed the answer given at the beginning of the program. To add stocks, you'd have to run the program again and rekey the data for the entire portfolio.) After you remove the data for Lunar Radiographics, the computer will display the final list of stocks and provide the results for the nine stocks that would be left in Singer's portfolio: the beta of the portfolio would be 1.25; the expected return, 15.04 percent; and the total value, $102,200.

The Vocabulary of Portfolio Analysis

Portfolio. A collection of stocks in a single account.

Risk. A factor indicating the probability of a decrease or increase in the value of a stock or a portfolio of stocks.

Beta. A measure of how a stock or a portfolio of stocks reacts to overall market performance. Beta coefficients quantify the expected magnitude and direction of this reaction.

Expected rate of return. The expected change in the value of a particular stock or a portfolio of stocks. Expected rate of return takes into account both capital appreciation and stock dividends.

Risk-free rate of return. The rate of return that can be realized if no risk is involved. Generally, this is the rate of return provided by U.S. Treasury securities.

Expected market rate of return. The average return of all stocks in the market.

The two analyses show that Singer would lower the expected rate of return of his portfolio only slightly if he sold the four riskiest stocks. At the same time, the riskiness of the portfolio would decrease significantly (from 1.48 to 1.25). Therefore, it is probably a good idea to replace the risky stocks with General American stock.

In this example, the portfolio analysis program helped Singer find a safer balance between his portfolio's expected rate of return and its risk. You can use the portfolio analysis program in the same way to attend to the details and calculations of your stocks, freeing you to concentrate on the broader dimensions of your investments.

J. H. Berk is an executive with Aerojet Ordnance Co. S. H. Berk manages information systems at TRW's Ballistic Missiles Division.

Excerpted from Chapter 10, "Portfolio Analysis," from Financial Analysis with IBM Microcomputers, *by J. H. Berk and S. H. Berk. Copyright ©1984 by the authors. Reprinted with the permission of the publisher, Chilton Book Company, Radnor, Pennsylvania.*

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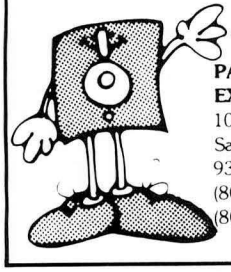

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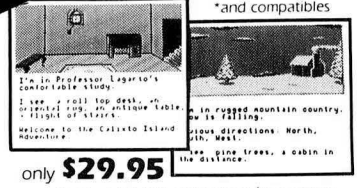

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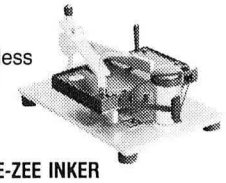

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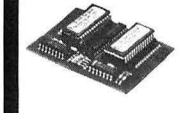

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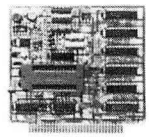

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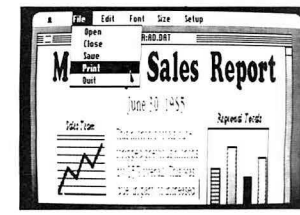

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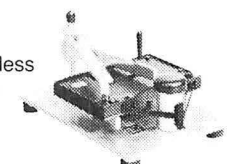

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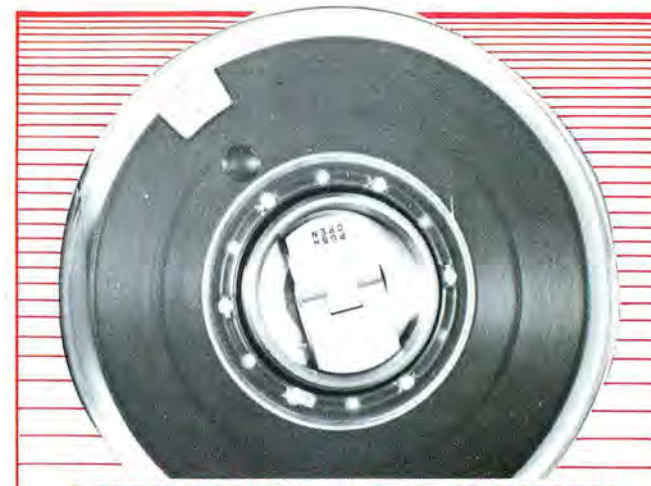

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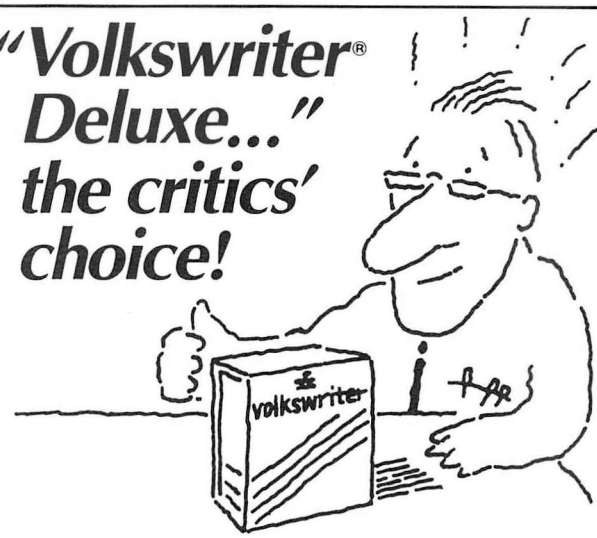

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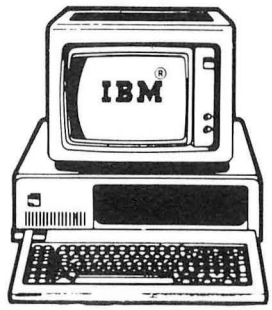

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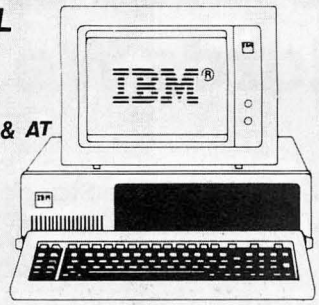

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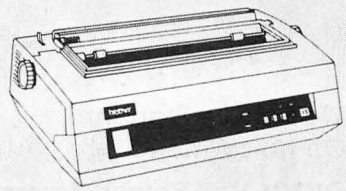

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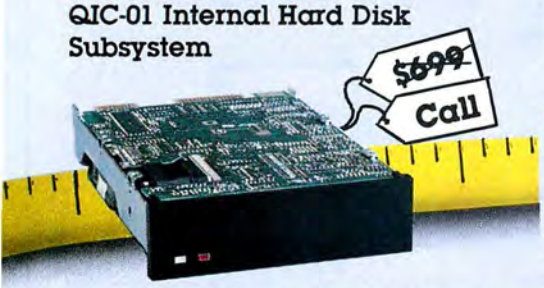

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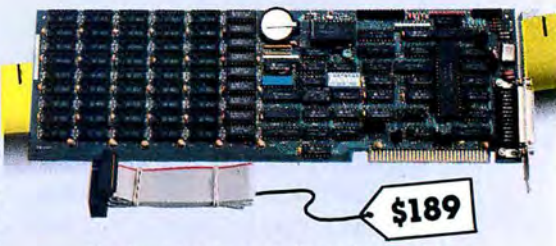

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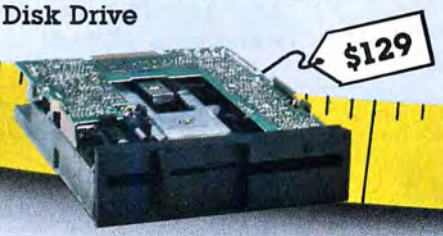

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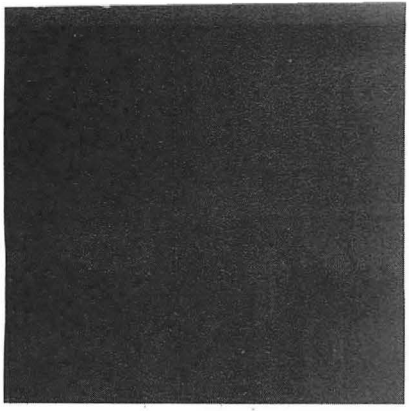

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Star-Dot-Star

A global exchange of personal computer discoveries

This month, more tips for drawing boxes and using colors with dBASE II and dBASE III, plus a helpful trick for programmers using Microsoft Word

Edited by Steven Cook

Getting a Line on Word

As a writer and programmer, I find *Microsoft Word* an excellent tool for both kinds of work, but it does have one failing for programming use: it cannot count lines. The compiler I use lists errors by line numbers. Finding the errors in the source file is a bit difficult with *Word*. To tell the truth, I've been using *Sidekick* for that.

Recently, a colleague who is learning *Word* asked me how to use it to find compiler errors by line number. I explained that *Word* could not count lines or paragraphs, only pages. I then figured that if I set the page length to a single line, it would count lines, right? Wrong—*Word* doesn't allow pages shorter than 1 inch. But that line of thinking led to the following solution.

In the Gallery, select or insert a Normal Division style in the style sheet you use for programming. Set page length to 1.67 inches, top and bottom margins to 0 inches, and page numbering to start at 0. Next, save the style sheet and return to the edit mode. From now on, when you load a source file, select Print/Repaginate, and your document will be paginated to 10 lines per page. To find line *x*, Jump to page *x*/10. For example, to find line 93, Jump to page 9, then move down 2 lines.

Russ Schnapp
San Diego, California

Faster dBOXes

SAMPLE.PRG is an enhancement of the dBOX program [*.*, *PCW*, February 1985], which draws boxes on *dBASE II* displays. SAMPLE.PRG calls the subroutine DRAWBOX.PRG, which uses substrings of predefined memory variables instead of a DO WHILE loop to draw the horizontal portions of boxes, resulting in a faster and more compact program.

The memory variables are RESTOREd from a previously created disk file, LINES.MEM. [Use MAKELINE.PRG to create the file LINES.MEM.] Unless the program RELEASEs them, the memory variables need be RESTOREd only once.

To draw single-line boxes, change the CHR values in DRAWBOX.PRG from 201, 187, 186, 200, and 188 to 218, 191, 179, 192, and 217, respectively, and change all occurrences of Lnedouble to Lnesingle.

The routines are intended for use with *dBASE II* but can be used with *dBASE III* by changing ERASE to CLEAR and $ to SUBSTR. If you use *dBASE III* you may also combine STORE and @ ... SAY commands, for example:

```
@ROW,COL SAY CHR(201) +
SUBSTR(LNEDOUBLE,1,WIDTH-2) +
CHR(187).
```

Kelly Dickens
Houston, Texas

Editor's note: You may wish to combine this technique with the following to draw boxes in color.

dBASE II in Color

The item "dBASE Displays" [*.*, *PCW*, February 1985] did not mention that the *dBASE II* SET COLOR command can produce 255 different color combinations. Table 1 shows the values for the various color combinations and attributes.

Fritz Lang
Houston, Texas

(continues)

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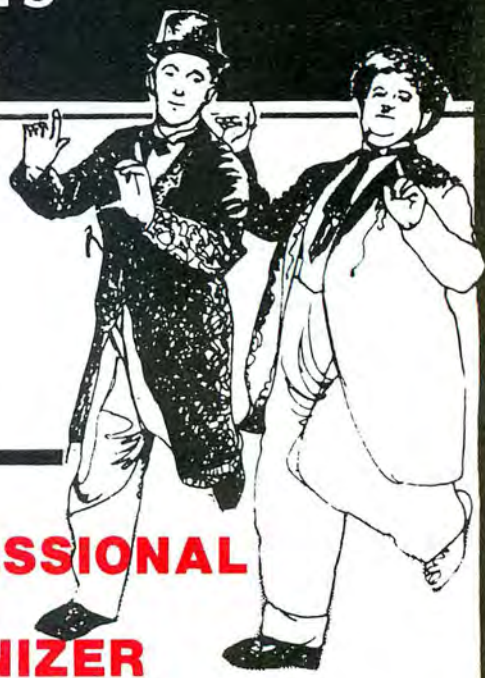

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.

```
*** SAMPLE.PRG
SET TALK OFF
RESTORE FROM LINES ADDITIVE
ERASE
@ 20,1 SAY " "
INPUT "Upper-left corner - ROW - " TO ROW
INPUT "Upper-left corner - COLUMN - " TO COL
INPUT "Number of columns wide - " TO WIDTH
INPUT "Number of rows deep - " TO DEPTH
DO DRAWBOX
RETURN
************************************************************
```

SAMPLE.PRG is an example of how to call DRAWBOX.PRG.

```
*** DRAWBOX.PRG
STORE CHR(201) + $(LNEDOUBLE,1,WIDTH-2) + CHR(187) TO LINE
@ ROW,COL SAY LINE
DO WHILE DEPTH >= 1
   STORE ROW + 1 TO ROW
   STORE DEPTH - 1 TO DEPTH
   STORE CHR(186) + $(LNESPACE,1,WIDTH-2) + CHR(186) TO LINE
   @ ROW,COL SAY LINE
ENDDO
STORE CHR(200) + $(LNEDOUBLE,1,WIDTH-2) + CHR(188) TO LINE
@ ROW,COL SAY LINE
RETURN
************************************************************
```

DRAWBOX.PRG draws the box using memory variables.

```
*** MAKELINE.PRG
STORE 0 TO ITER
STORE CHR(205) TO LNEDOUBLE
STORE CHR(196) TO LNESINGLE
STORE CHR(32) TO LNESPACE
DO WHILE ITER < 79
   STORE LNEDOUBLE + CHR(205) TO LNEDOUBLE
   STORE LNESINGLE + CHR(196) TO LNESINGLE
   STORE LNESPACE + CHR(32) TO LNESPACE
   STORE ITER + 1 TO ITER
ENDDO
RELEASE ITER
SAVE TO LINES
************************************************************
```

MAKELINE.PRG creates a .MEM file of line variables.

(continues)

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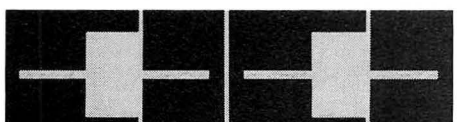

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Table 1: Colors for the dBASE II SET COLOR command

Foreground Colors		Background Colors		Intensity		Flashing	
0	Black	0	Black	0	Normal	0	Off
1	Blue	16	Blue	8	High	128	On
2	Green	32	Green				
3	Cyan	48	Cyan				
4	Red	64	Red				
5	Magenta	80	Magenta				
6	Brown	96	Brown				
7	White	112	White				

(value = foreground color + background color + intensity + flashing)

Example: To select green(2) on blue(16) for GET text, and red(4) on black(0) in high intensity(8) for SAY text:

```
SET COLOR TO 2+16+0+0,4+0+8+0
```

or,

```
SET COLOR TO 18,12
```

Date Pack Correction

The listing DATEPACK.BAS [*.*, *PCW*, January 1985] had one error, which should be corrected. Change line 90 to read **90 GOSUB 1000 : IF DX% < > -1 THEN 100.**

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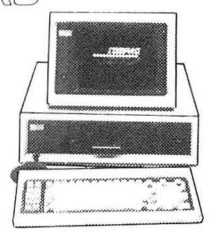

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PRICING MADNESS

Once again, as Federal Express picks up our ad at the very last millisecond before this issue's advertising deadline, ***here we sit with dozens of price reductions and new product announcements which have arrived too late for us to let you know.***

Why, our ad manager asks, do we always go through a last minute price update frenzy, just seconds before our ad is due at the publisher, when we know that despite our heroic effort, ***many of these products will cost even less by the time you read this ad.***

How, she asks, can we get a crystal ball to forecast what fantastic promotions and specials our suppliers are going to offer from now to the date ***this ad gets to the newsstand over two months from today?***

Well, we decided that she has a good point. While we'll still keep getting our grey hairs and ulcers from last minute revisions, we will start publishing this notice and ask our readers to make a simple check. Look at any four back issues of this magazine *(yes we're in every one)* and track the prices on the most popular products. ***You will see that many drop with every issue.*** Most of these price changes were instituted well before the issue was printed and ***our members always pay the lower price.*** This should prove that this notice is much more than hype.

Given the current madness in the PC industry with its spur of the moment pricing and instant product introductions, ***you will find it always pays to call for our latest prices.*** You will be glad you did.

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(Please add $1 shipping and handling for each title ordered from below.)

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► **Infocom** *Deadline, or Suspended*	27.00*
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► **Central Point** *Copy II PC*	20.00*
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†**8 OPTIONAL BUSINESS RENTAL LIBRARY**—All members can join our BUSINESS RENTAL LIBRARY ***featuring over 1000 available titles*** for just $25 PER YEAR above the base membership fee. **This entitles you to rent business software AT JUST 20% of the DISCOUNT PRICE FOR A 14 DAY PERIOD. If you decide to keep the software, the entire rental fee is deducted from the purchase price. VIP MEMBERS GET A FULL 30 DAYS for just $30 above the V.I.P. base fee. This also includes the game library privileges for a $5 combination savings.**

†**9 OPTIONAL GAME SOFTWARE RENTAL LIBRARY**—The Game Rental library is available to members for just $10 PER YEAR and permits evaluation (or just enjoyment) of any game or educational software product as above.

10 SPECIAL SAVINGS BULLETINS—THE PRINTOUT—Issued Quarterly at no charge to Network members only! The Printout contains all the New Product listings and price changes you need to keep your Catalog up to date. Also, we buy excess dealer inventories, and store bankruptcy closeouts, which we turn around and make available to our members at fantastic savings via *THE PRINTOUT.*

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14 QUANTITY DISCOUNTS—For large corporations, clubs, and repeat or quantity buyers The NETWORK can extend additional single order discounts, when available to us from our manufacturers and distributors.

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Circle 460 on reader service card

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Introducing Super Star Diskettes: the high quality diskette with the lowest price and the best LIFETIME WARRANTY!

In the course of selling more than a million diskettes every month, we've learned something: higher prices don't necessarily mean higher quality.

In fact, we've found that a good diskette manufacturer simply manufactures a good diskette...no matter what they charge for it. (By way of example, consider that none of the brands that we carry has a return rate of greater than 1/1,000th of 1 percent!)

In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality.

The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits.

But the extra money in a higher price isn't buying better quality.

All of the good manufacturers put out a good diskette. Period.

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Trouble is, most of them aren't manufacturers.

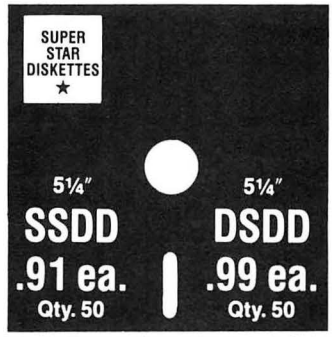
Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5¼" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications...specifications which are higher than most...and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.



Super Star diskettes are sold in multiples of 50 only. Diskettes are shipped with white Tyvec sleeves, reinforced hubs, user ID labels and write-protect tabs.

Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting.

We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes.

Instead, they concentrate their efforts on turning out the highest quality diskettes they can...because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them...and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they want it to work time after time, everytime. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

Super Star Diskettes. You already know how good they are. Now you can buy them...cheap.

Well, that's the story.

Super Star diskettes don't roll off the boat from Pago-Pago or emerge from a basement plant just east of Nowhere.

Super Star diskettes have been around for years...and you've used them for years as copy-protected software originals, unprotected originals. Sometimes, depending on which computer you own, the system master may have been on a Super Star diskette. And maybe more than once, you've bought a box or two or more of Super Star diskettes without knowing it. They just had some "big" company's name on them.

Super Star Diskettes are good. So good that a lot of major software publishers, computer manufacturers and other diskette marketers buy them in the tens or hundreds of thousands.

We buy them in the millions.

And than we sell them to you.

Cheap.

When every little bit counts, it's Super Star Diskettes.

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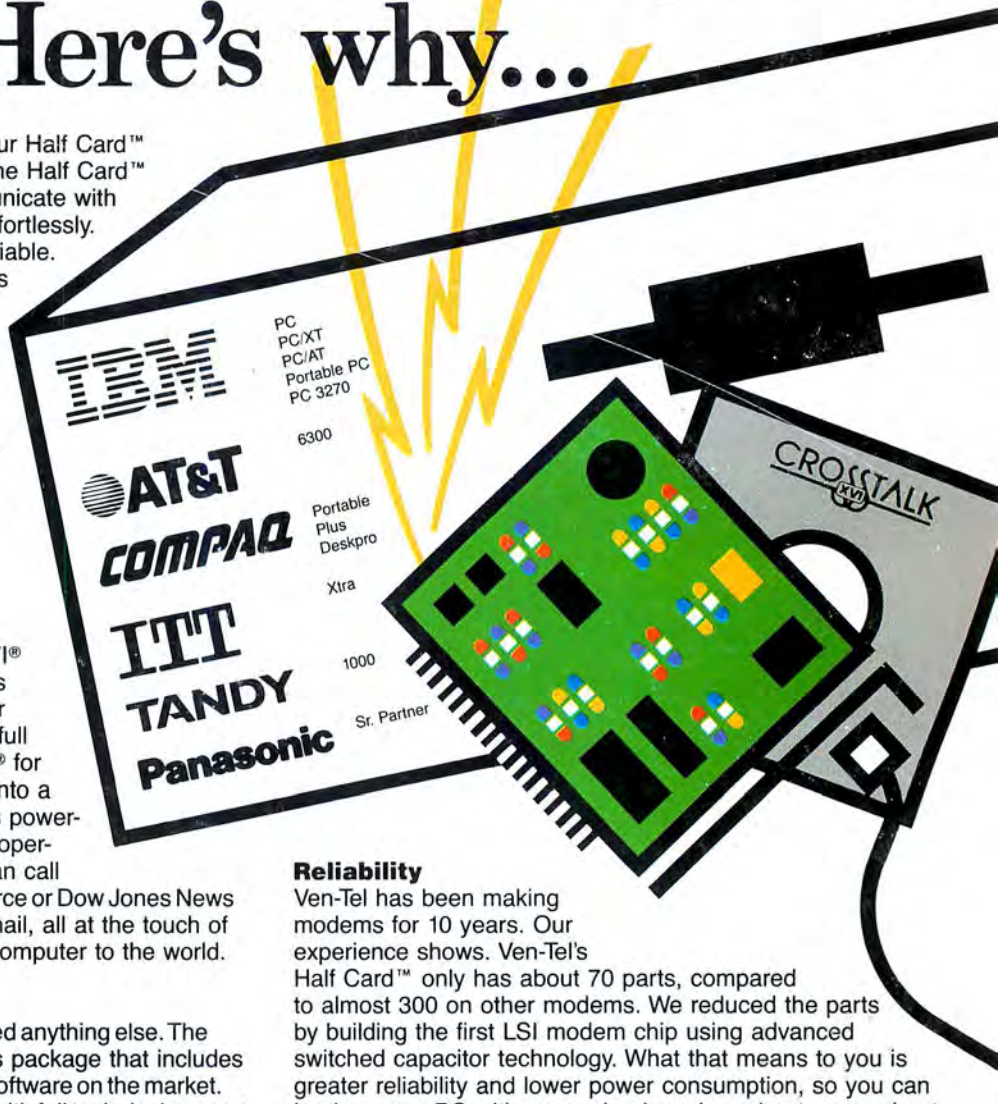

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