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Market Survey and Ten-Year Growth Plan

EXECUTIVE SUMMARY

BLUE YONDER AIRWAYS



Introduction

As Blue Yonder Airways moves from freight to passenger service, the Sales and Marketing Division is presented with a multitude of new challenges and opportunities. This report consists of a marketing proposal for the next ten years -- a virtual blueprint for growth in our critical first decade as a passenger carrier. Our

resulting from a series of focus groups conducted by the market research firm Crump & Graham. The growth plan includes specific suggestions for ways to leverage our track record in the freight arena, to grow out our share of single-passenger flights, and ultimately expand into cargo sales. A detailed analysis of costs

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BLUE YONDER AIRWAYS



November 1, 1989

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Dear Max:

I am happy to inform you that *Maximum Produce* is one of four finalists in our selection process. At this time, I would like to brief you on some of the areas where our people had questions or concerns. I would hope that these areas can be addressed in your final proposal due January 2, 1990.

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Donald Main
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Market Survey and Ten-Year Growth Plan

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EXECUTIVE SUMMARY

BLUE YONDER AIRWAYS



Introduction

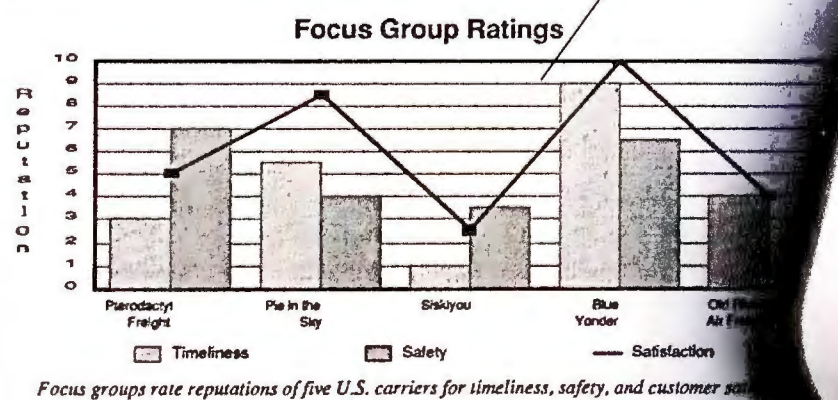
As Blue Yonder Airways moves from freight to passenger service, the Sales and Marketing Division is presented with a multitude of new challenges and opportunities. This report consists of a marketing proposal for the next ten years—a virtual blueprint for growth in our critical first decade as a passenger carrier. Our recommendations are based on data

resulting from a series of focus groups conducted by the market research firm of Crump & Graham. The growth plan makes specific suggestions for ways to leverage our track record in the freight arena, carve out our share of single-passenger bookings, and ultimately expand into group sales. A detailed analysis of costs and anticipated revenues is appended.

Research Overview

Crump & Graham held five focus groups between May and August of last year, two each in New York and Los Angeles and one in Chicago. The accompanying table shows the breakdown of participants at each session [figure 1]. Preliminary discussions at the sessions attempted to discover whether participants had heard of Blue Yonder Freight, especially in light of the publicity generated by approval of the changeover and the ensuing takeover attempt.¹ After a break, the moderator introduced the subject of the reputations for timeliness, safety, and customer satisfaction of three passenger and freight carriers [figure 2].

Focus Group Participants	
Chicago	Travel agents
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Cover photograph by
Fred Stimson

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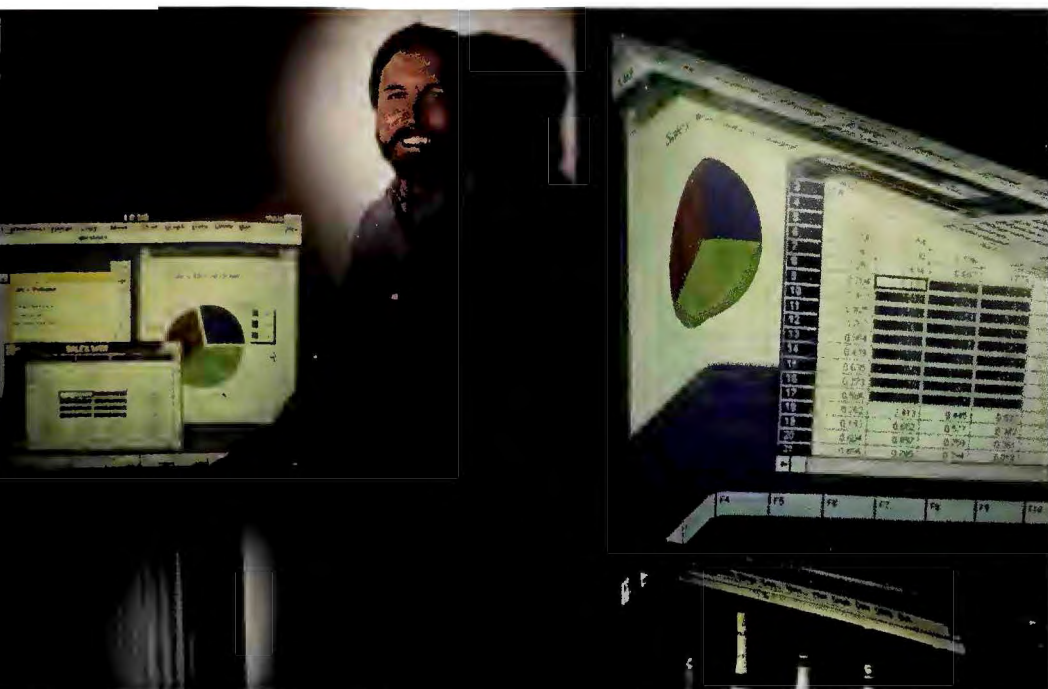
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Contributing Editor John Walkenbach, immersed in graphical spreadsheets

Contributing Editor John Walkenbach still can't believe it. "If someone had told me a year ago that I'd be hooked on a graphical environment, I'd have told them they were crazy. It's even crazier to think that it's *Windows*, not *OS/2*, that did the trick."

He's not alone. Judging by sales figures, plenty of *PC World* readers have embraced *Windows 3.0* since its introduction last May. And judging by the enthusiasm of the response, *Windows* has kicked *OS/2* off the top of an awful lot of "must buy" lists.

Last year at this time, migrating to *OS/2* seemed inevitable for most business users. The only questions were when to make the switch and how much extra memory to buy. *Windows 3.0* turned that conventional wisdom on its head, a fact that became abundantly clear during the research for this month's face-off between *Excel for OS/2* and *1-2-3/G*. Before you can compare graphical spreadsheets, you have to deal with a larger question: What does *OS/2* have that *Windows* doesn't?

There's no question we picked the right reviewer for the job. As vice president and market research manager for a large Southern California savings and loan, Walkenbach figures he spends better than three-quarters of every working day up to his neck in worksheets, dealing with product development scenarios, customer satisfaction surveys, and market share analyses. For this issue he put in some serious overtime—buried in still more worksheets.

"I was expecting great things from *OS/2*," Walkenbach admits. "But it's obvious *Windows 3.0* has big

Environmental Awareness

advantages over *OS/2*. It's faster, for starters, and more efficient in the way it handles memory, too." When shrink-wrapped copies of *Windows 3.0* hit the stores, Walkenbach—a longtime *1-2-3* user—decided it was "finally feasible" to switch to *Excel*. Retraining hands and eyes isn't such a simple process, though. "I still use *1-2-3*," Walkenbach admits. "For quick-and-dirty regression analysis, it's easier than *Excel*. And I keep *1-2-3* release 3 handy for when I have to work in three dimensions."

How do the leading Presentation Manager spreadsheets stack up? "*Excel for OS/2* does a few new things," Walkenbach reports, "but I was dumbfounded by some of the things *1-2-3/G* can do. Some people just won't be able to live without the Solver, for example. Of course, the vast majority of *1-2-3* users will never touch it." In the final analysis, he suggests, most spreadsheet jockeys will find *Excel for Windows* their best bet—for now.

On the graphical spreadsheet front, don't expect the pace of change to slow down. One double-barreled contender showed up just after our deadlines, as Informix shipped both *Windows* and PM versions of *Wingz* in a single box. A *Windows* release of *1-2-3/G* is rumored to be in the works. And, of course, Microsoft promises a more powerful *OS/2*—one that can handle multiple DOS applications—before the end of the year.

For now, Walkenbach concludes, *Windows* is the hands-down winner—as much for its own merits as for *OS/2*'s shortcomings. "At this stage," he reflects, "*OS/2* looks a lot like the early releases of *Windows*, which had all the makings of a great environment but took seven years to come together. Let's hope *OS/2* doesn't take that long!" ☺

Ed Bott

Ed Bott
Managing Editor



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Other manufacturers with their simple-minded direct-mapped cache architectures were obsessed with churning out the best benchmark numbers. We, however, were not convinced DOS and Power Meter 1.3 is any example of a typical real life application (registering at 8.003 MIPS, we are not too shabby either). With Two-Way Set Associative Cache capability, our 386 is also more attuned to run the emerging multi-tasking operating systems like OS/2® and UNIX™, where modular code sizes (of less than 32K) and frequent code-switching are the norms. Worrying about compatibility? Both IBM® and COMPAQ® endorsed the same INTEL® 82385 Cache Controller. Furthermore, we

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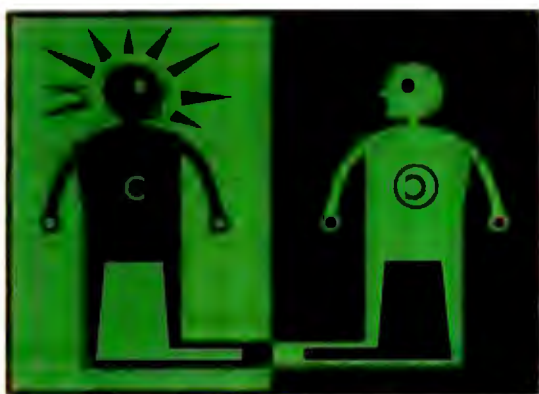
TOP OF THE NEWS

LOTUS SUES BORLAND

Attack on Quattro Follows Victory Over Paperback

With Borland's *Quattro Pro* spiriting away thousands of *1-2-3* customers, Lotus has sued for copyright infringement and asked a Boston federal court to temporarily halt sales of *Quattro*

Pro. A stop is unlikely, but Lotus's case is strengthened by a July judgment against Paperback Software that upheld copyright protection of *1-2-3*'s user interface—particularly its menu structure and commands. "The case [against Paperback] sends a pretty clear message: You can't copy menus lock, stock, and barrel," says Lotus counsel Thomas Lemberg, who claims that is precisely what *Quattro Pro* does.



Borland spokesperson Dick O'Donnell counters that *Quattro Pro* "is an original product and does not infringe on *1-2-3*." Unlike Paperback's *VP-Planner*, *Quattro Pro* offers Lotus-like menus only as an option, and O'Donnell claims that most users stick with *Quattro Pro*'s own windowed interface.

Even if Borland must remove *1-2-3*-like menus, analysts say, *Quattro Pro* will still be a strong contender.

More than 300,000 copies of this *PC World* Best Buy were sold between November and June, most through a campaign to woo *1-2-3* users by selling them the \$495 product for only \$100 and proof of *1-2-3* ownership. Dataquest estimates that *Quattro Pro*'s United States unit share will almost double to 14 percent this year—outpacing a projected 13 percent for *Microsoft Excel* but still far behind *1-2-3*'s 50 percent.

Borland plans a stout legal defense and continued aggressive marketing, but its stock price dropped more than 20 percent immediately after Lotus filed the suit. The Paperback decision is expected to spark more lawsuits, although computer law specialists say it broke no new legal ground. "The court took established copyright principles and applied them to a new situation," says Esther Roditti Schacter, editor of *Computer Law and Tax Report*.

GUI FOR THE MASSES

Graphical Multitasking on XT's



GeoWorks, a small company in Berkeley, California, is trying to accomplish what some of the largest software firms have failed to do: develop a graphical, multitasking environment that runs on XT's.

GEOS (Graphic Environment Operating System) will debut this month as both a retail package and preinstalled on new PCs for the home and small-business market. Based on a licensed version of the OSF/Motif interface, GEOS has a file manager that lets users start, print, or delete files by clicking on icons. Single DOS applications run full screen; only applications written for GEOS can run simultaneously. Still, the object-oriented environment will ship with a word processor, a draw program, a communications program, and utilities.

Early viewers of the product are enthusiastic. It's very small and fast, reports Everex Systems' Raymond Yu. His company is a potential OEM, as is laptop maker Grid Systems, whose Ken Dulaney says, "The demo I got could do anything you could do with higher-end GUIs."

But GEOS still lacks independent software support. No developer has yet committed to GEOS, although Lotus is rumored to be considering it. GeoWorks officials say their product should complement rather than compete with *Windows*, because most of the installed base and even most 286s now shipping are underpowered for *Windows*.

NEW NOTEBOOKS COMING

Alkaline-Equipped Models Offer Convenience, More Power



Both Chicago start-up Airis Computer Corporation and AST Research of Irvine, California, are poised to offer notebook PCs with novel power supplies and features beyond anything currently on the market.

The 286-based Airis VH-286, scheduled to ship in September, promises at least 6 hours of uninterrupted use, made possible primarily by its 10 C alkaline batteries, says designer Steve Valentor. That's more than most notebooks, but the VH-286 still

weighs a mere 6½ pounds. It also benefits from a dedicated processor to regulate component power usage; a separate power switch for its VGA display's backlighting; and a 256K cache to reduce the activity of its 20MB hard drive. Depending on that cache's efficacy, batteries could last up to 20 hours, says Valentor. The system comes with 2MB of RAM and will be sold by mail order for \$1899. A comparable Compaq LTE/286 lists for \$3999 but sells through dealers for considerably less.

Meanwhile, AST Research plans its debut in the portables

market before year-end with the introduction of two similarly configured notebooks driven by different processors. Executive Vice President Tom Yuen has said that one will be a 386SX-based model. Systems marketing director Genelle Trader would not, however, confirm reports that it will weigh less than 7 pounds, use alkaline batteries, and come equipped with a backlit VGA display. Such a machine would be a cut above anything currently on the market but would put special demands on the power supply. Trader would not comment on the power supply except to say that a desire to take advantage of new power management technology is one factor that's slowing introduction.

TANDY SHOWS HOME PC

Software Differentiates Consumer Computer



Tandy has introduced a PC that, like IBM's new PS/1, is intended to reach out to millions of consumers who've never found a good reason to buy a computer. But whereas IBM's 286- and VGA-equipped PS/1 can also be used by home-office workers, the 25 percent cheaper Tandy 1000 RL (\$749) is somewhat underequipped for business applications. Instead, the 1000 RL packs an extensive bundle of strictly home-oriented programs under a new version of Tandy's

DeskMate character-based graphical interface.

Its two dozen or so programs cover everything from creating recipes and shopping lists to planning travel, tracking collections, and managing personal finances—tasks long associated with the home computer bust of 1982 and avoided by business product suppliers. But a survey of 2500 homes by LINK Resources shows those to be the applications of interest to 88 percent of prospective home PC purchasers, a new class that Thomas Miller of LINK calls “home informa-

tion consumers.”

Powered by a 9.5-MHz 8086, the 1000 RL has CGA and most common I/O functions on the motherboard, *DeskMate* and DOS 3.3 in ROM, and room for at least one floppy and a hard drive. Also included are two joystick ports and an audio chip—home-oriented extras that IBM has been criticized for leaving out. Unlike the PS/1, the 1000 RL's modem is an option, since Tandy research shows that only half of consumers want access to bulletin boards.

Director of Market Plan-

ning Ed Juge says the small-footprint box is meant to become a kitchen or family room fixture that is used by the entire family. All keystrokes are saved automatically, and the screen and hard drive turn off after 5 minutes of inactivity, leaving the system to draw only as much power as a clock radio, says Juge. Miller, however, suggests that a portable system under \$500 would serve that market better. Surprisingly, IBM's 15 percent share of the home market is higher than Tandy's 13.3 percent, say Miller.

OS/2 LITE NEARLY READY

Microsoft and IBM Don't See Eye to Eye on 16-Bit Version



Responding to the unmistakable message from customers that OS/2 is just too big, IBM is beta testing a trimmer version of its operating system, expected to ship soon.

IBM says the unnamed 16-bit version will reduce memory requirements by about 1MB, so that an application like *1-2-3/G* can run in 3MB to 4MB of RAM. The new version also will perform 20 percent to 25 percent faster than OS/2 1.2 in memory-constrained setups, take about 10MB of hard disk space, and swap to disk better. Like IBM's upcoming 32-bit OS/2 2.0, it will support scalable PostScript fonts both on screen and in the printer.

But analysts like John Murphy of Wohl Associates argue that falling memory prices will ease concerns about OS/2's appetite, adding that by introducing yet another OS/2 variant, “IBM is really confus-

ing the issue.” Pat Bellamah, Microsoft's OS/2 product manager, also shrugs off the need for this 16-bit OS/2. Microsoft didn't contribute to its development because, says Bellamah, the company's time can be better spent “getting the 32-bit version out the door.”

The slow acceptance of OS/2 has prompted companies like WordPerfect to shift their emphasis from OS/2 to *Windows 3.0*, which Bellamah acknowledges “will outship OS/2 by a large multiple this year.” But she insists that Microsoft and hundreds of other corporations remain committed to OS/2.

Both IBM and Microsoft are pinning their long-term hopes on version 2.0, the 32-bit version. IBM's 2.0 will ship this year, but Microsoft's 2.0 won't be arrive before 1991. It will include the Microsoft/Apple TrueType font technology rather than IBM's choice, PostScript.

NEW COMPAQS DEBUT

Systempro, Deskpros at Highest of High End



On July 23, Compaq Computer launched new high-end computers designed to help solidify the EISA bus standard: The Deskpros 486/33L and 386/33L, and Systempro models using the 33-MHz version of Intel's 486 chip. These and other related announcements move the center of the Compaq line upward and enhance its competitiveness against mini-computers.

The Deskpros 486/33L and 386/33L include the EISA bus and are the first Deskpros to put CPU and supporting circuitry on an add-in card that resembles the Systempro's, making the systems easier to expand and cheaper to design and manufacture. Compaq also introduced the \$3999 486/33 Desktop Processor Board for upgrading the Deskpro 386/33L.

In another strategic move, the company stopped producing the Deskpros 386/33 and 286e, leaving Compaq without an ISA-bus computer among its high-end desktops and without a 286 desktop other than the Deskpro 286N LAN

workstation. Senior Vice President of System Engineering Gary Stimac explains that Compaq can now offer users EISA as cheaply as ISA, adding that customers are simply abandoning the 286 in favor of the 386 processor.

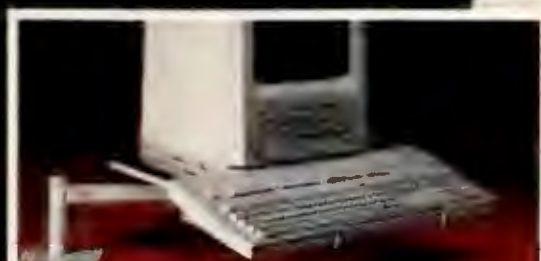
Compaq's new Systempro models include the 33-MHz version of the 486 chip. Starting at \$20,999 for a 240MB-equipped Model 486-240, the systems accommodate 1.68GB of storage internally and another 3.2GB with external ESDI drives. Designed for use as LAN servers, the new models ship with 8MB of 32-bit RAM expandable to 256MB, and 512K of cache memory.

Compaq reduced the price of 386-based Systempro models by \$2000 to \$3000, the entry machine becoming the \$13,999 Model 386-240. Systempro upgrades are possible using the \$6999 486/33 System Processor Board. According to StoreBoard/Computer Intelligence, the Systempro is off to a slow start, with only 1745 sold in the United States between its November introduction and April, and a comparable number sold overseas. ☛

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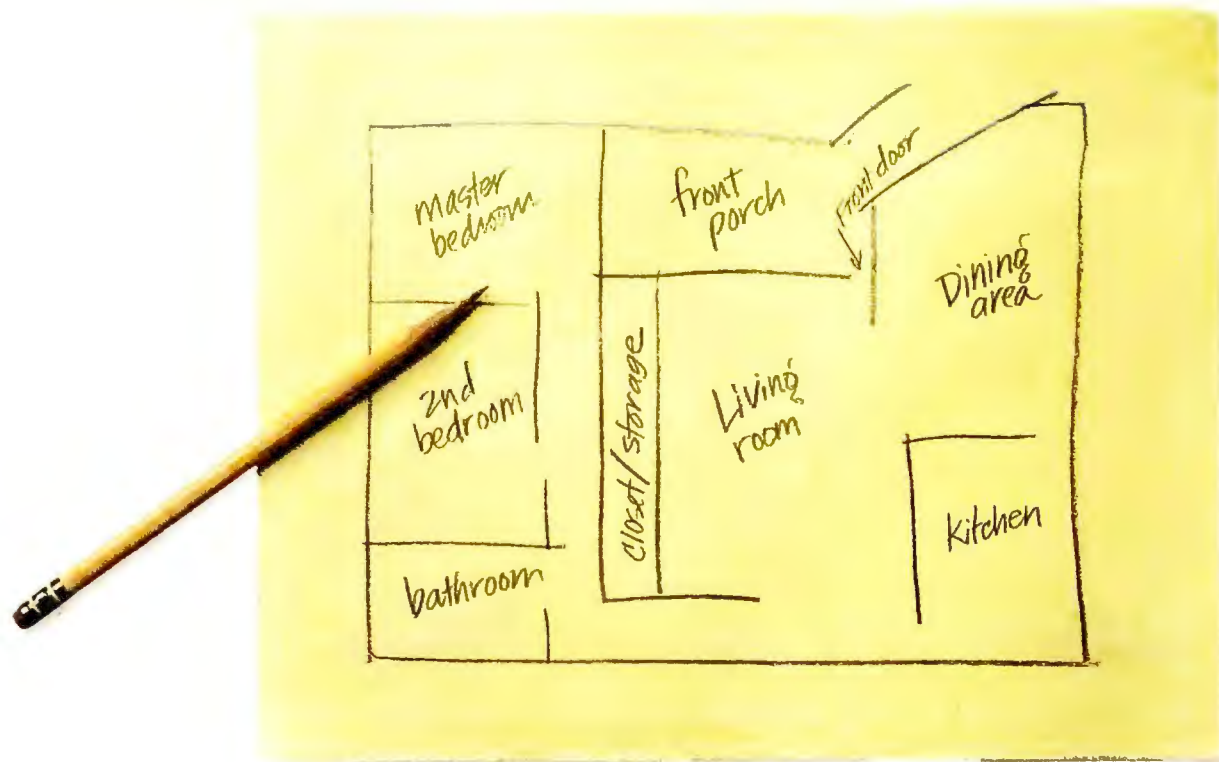
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Risky Business

Lotus and Borland play brinksmanship over a fading interface.

Borland's Philippe Kahn is a man with a mission. To hear him talk, Borland's battle with Lotus over the look and feel of the best-selling spreadsheet *Quattro Pro* is nothing less than a fight for users' right to choose the software they prefer, free from fear of losing their previous investments in training, support, applications, or data. "We want to help the installed base of users migrate to a better product," says Kahn. "If Lotus had the best spreadsheet, they wouldn't be attacking *Quattro Pro*."

Just days after Lotus won its three-year-old copyright lawsuit against Paperback Software over the *1-2-3* clone *VP-Planner*, Borland filed a court petition seeking clearance from claims that *Quattro Pro* violated *1-2-3* copyrights. Kahn says he was alerted to a possible Lotus lawsuit by Paperback Software founder Adam Osborne, so Borland acted quickly to prevent *Quattro Pro* from being judged by the same court that found *VP-Planner* on the wrong side of the law. And sure enough, a few days later Lotus filed suit against Borland for copyright infringement of *1-2-3* (see *Top of the News* in this issue).

Quattro Pro: Victim of Success?

Kahn says that the Lotus suit is simply a response to *Quattro Pro*'s success, and

he may be right. By some accounts, *Quattro Pro* is gobbling up as much as 25 percent of spreadsheet sales among users who otherwise might have upgraded to the latest version of *1-2-3*. That's more than any previous Lotus competitor, including *VP-Planner*, *SuperCalc*, and *Excel*.

Many agree there's good reason for *Quattro Pro*'s success. Its features easily match those of Lotus's most ambitious DOS effort to date, *1-2-3* release 3.1 (see the preview "1-2-3 Meets Windows Halfway" in this issue). Although *Quattro Pro* comes equipped with an optional *1-2-3*-style menu system, Kahn says most users select *Quattro Pro*'s built-in *Windows*-style menus, making the *1-2-3* look and feel only a minor part of *Quattro Pro*'s popularity. Points like these lead Kahn to suggest of Lotus: "They're trying to stop us in the court of law rather than by building a better product. Why can't they just compete in the marketplace?"

Who Does Copyright Law Protect?

On the face of it, Kahn's plea has plenty of appeal to anyone fed up with legal wrangling in the software industry. But obviously not everyone sees it his way. According to Lotus vice president and general counsel Tom Lemberg, *1-2-3* might not have become a spreadsheet standard without the protection that copyright law affords: "Lotus is now a big company. But in 1983, without copyright protection, there would have been

nothing to stop a big company from expropriating our work. And we probably would have ended up going to work for them, too."

Others see *Quattro Pro*'s grab at *1-2-3* menu compatibility as a marketing ploy that backfired. Says Jeffrey Tarter, editor of the industry newsletter *Softletter*: "Philippe is trying to win a PR

Why can't Lotus just compete in the marketplace? demands Kahn.

victory. He's had plenty of occasion to think about what would happen if Lotus won, and at any time in *Quattro*'s development he could have removed the offending feature. It's a throwaway feature. For a trivial advantage in the marketplace, he took an extraordinary risk. And on top of that, he built his whole marketing campaign around Lotus-baiting. It guarantees he'll have hostile people at the table if he ever has a showdown with them."

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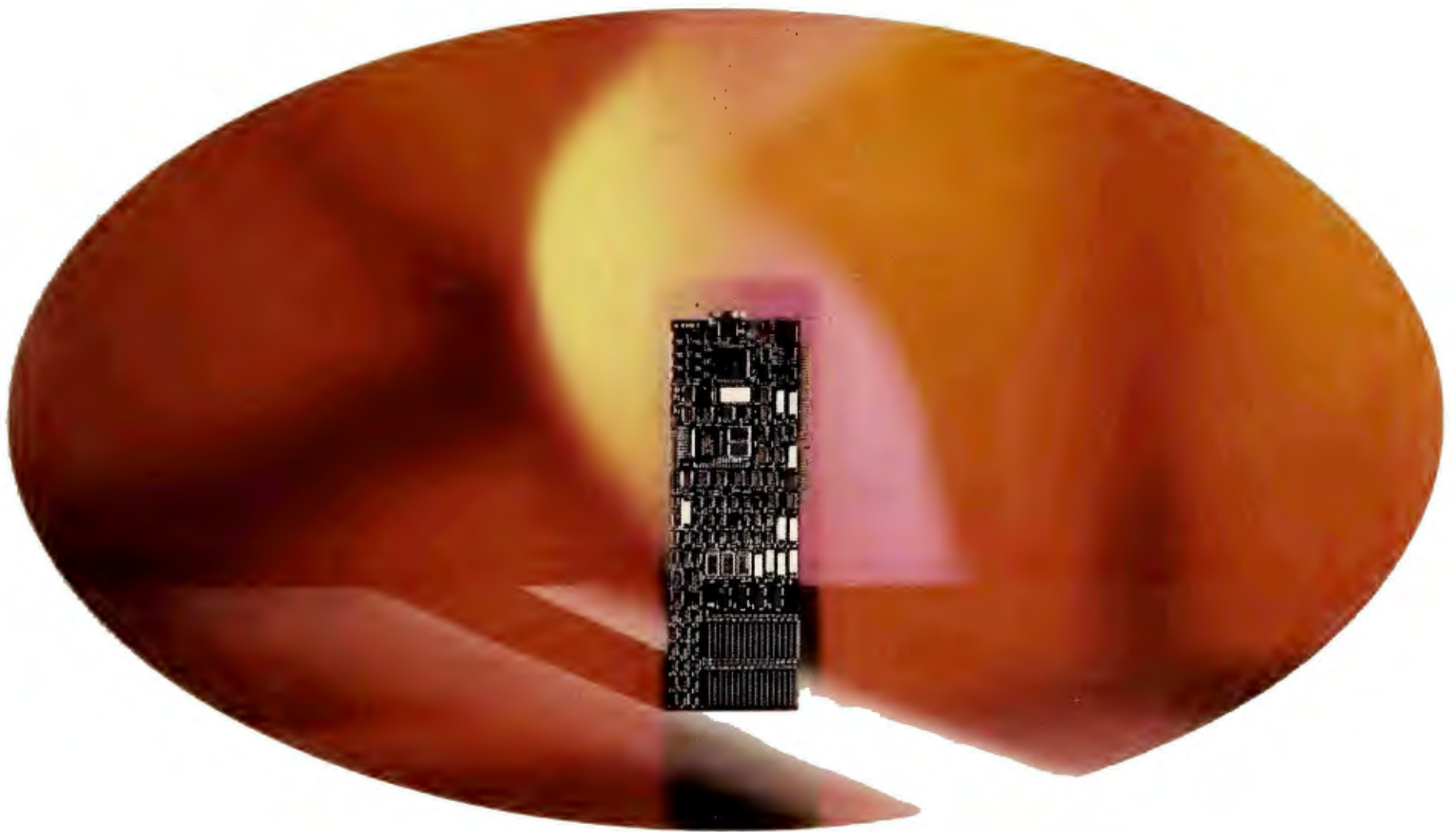
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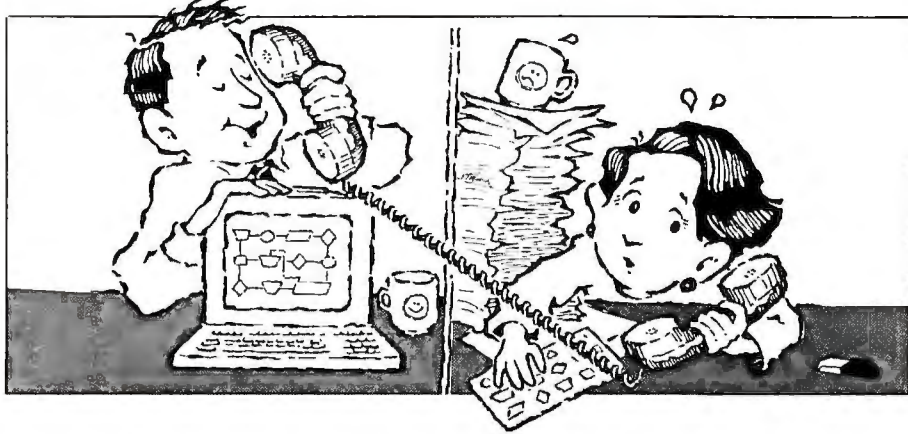
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RICHARD LANDRY

spawned them. Barring any bizarre outcome from Apple's copyright lawsuit against Microsoft, *Windows 3.0* and OS/2's Presentation Manager should provide a protective umbrella under which even the most unimaginative developer will be able to hide from a look-and-feel charge. In fact, when *PC World's* art staff arranged to photograph this month's cover story featuring *Excel* and *1-2-3/G*, they briefly thought they had loaded the same software on both machines! Standardized interfaces will force developers large and small to do more than tweak superficial features if they hope to survive.

In this respect, technology will accomplish what law can only attempt: reward the innovators and expose the imitators. That's good news for every PC user, because it means better products and greater freedom of choice. And nobody will have to spend a dime on a lawyer.

As always, I'm interested in your opinions on this or any other subject. Write to me at *PC World*, 501 Second St., San Francisco, CA 94107; fax 415/442-1891; MCI Mail Richard Landry/301-3685. ☺

POWER TIP NO. 131

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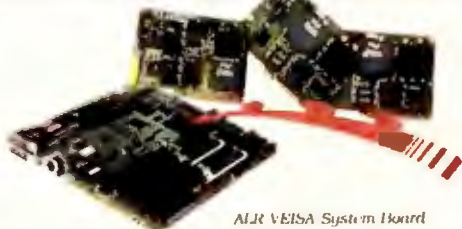
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ALR's BusinessVEISA 386/33 liberates EISA from the research lab. With a starting price of only \$3499, you can now afford to put a high-performance EISA system on every desktop in your office without having to declare war on your bank account.

But don't let the low price fool you. The ALR BusinessVEISA is a value of revolutionary proportions. This radically affordable system includes a 33-MHz 386™ processor, 64-KB of high-speed memory cache, and 1-MB of memory. **The "network-ready" Model 1 comes complete with an SMC-compatible ALRlan networking card;** just add video to create a powerful LAN workstation.

Just Upgrade the CPU!™

EISA compatibility combined with a cost-effective processor upgrade path helps to make the BusinessVEISA "future ready" as well. Need more processing power? ...Just plug in a more powerful CPU module. This simple approach has a distinct economic advantage over competitive designs that force you to replace cache and system memory when upgrading the CPU. Compared to AST's CUPID™ systems, the BusinessVEISA will save you up to 33% when you decide to move from 386 to i486™ processing.

ALR's economical upgrade path doesn't force you to sacrifice performance either. In recent tests, an ALR PowerVEISA (the floor-standing version of the BusinessVEISA) equipped with a 33-MHz i486 CPU module **"...easily bested the AST Premium 486/33"** *Byte Magazine 4/24/90.*

If you want a system that can evolve to meet your future needs at a price that's nothing short of revolutionary, the ALR BusinessVEISA 386/33 was built for you. For more information, please call:

1-800-444-4ALR

The ALR BusinessVEISA				
Type	386/33	386/33	486/25	486/25
Model	1	40	1	110
CPU	386	386	i486	i486
Speed	33-MHz	33-MHz	25-MHz	25-MHz
Memory	1-MB	2-MB	2-MB	2-MB
Cache	64-KB	64-KB	Opt.	Opt.
Video	Opt.	SVGA*	Opt.	SVGA*
Monitor	Opt.	SVGA*	Opt.	SVGA*
Storage	0-MB	40-MB	0-MB	106-MB
Floppies	5.25	3.5", 5.25"	5.25"	3.5", 5.25"
Price	\$3,499	\$4,999	\$4,999	\$7,199

*Graphics adapter supports both standard VGA resolutions and 800x600 SuperVGA (SVGA) modes. Monitor automatically adjusts frequency to support both standard VGA and SVGA modes.

Just Upgrade the CPU!

ALR VEISA 25-MHz i486 CPU Module

ALR VEISA 33-MHz 386 CPU Module

33-MHz i486 CPU Module



ALR VEISA System Board

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(714) 581-6770 FAX: (714) 581-9240

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Shown with optional monitor and optional 3.5" floppy. Prices and configurations subject to change without notice. Prices based on U.S. dollars. BusinessVEISA and Just Upgrade the CPU are trademarks of, and ALR is a registered trademark of, Advanced Logic Research, Inc. All other brand and product names are trademarks or registered trademarks of their respective owners. © 1990 by Advanced Logic Research, Inc.

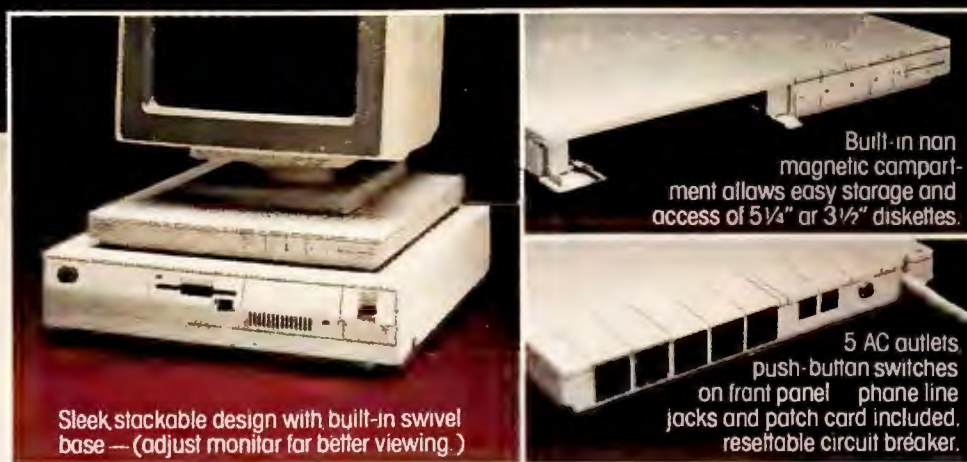
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Manufacturing Company, Inc.

CURTIS



Sleek, stackable design with built-in swivel base — (adjust monitor for better viewing.)

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5 AC outlets, push-button switches on front panel, phone line jacks and patch cord included, resettable circuit breaker.



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The new Curtis Command Center puts guaranteed protection and complete control of your entire system at your fingertips:

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- **Complete Control**—One-touch of the Master Switch powers up entire system while dis-

charging built-up static electricity. Independent push-buttons provide individual control of computer and 4 peripherals.

All in a sleek new space-saving design. What more could you ask for?

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Curtis \$10 Rebate

#40

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LETTERS

Reactions and responses from the PC World community

Who's Defending the User?

I read your defense of software authors and publishers in the May *Help Screen* ["The Straight and Narrow Upgrade Path"], but I wonder, when, where, and how do users get protection? I have no qualms about spending money for reliable software, but more than once I've wasted cash on bad products. Shareware seems to offer a way to test programs before you buy, but even shareware distributors don't want to refund your money once they have it. It appears that the computer industry hasn't gotten to the point of policing itself. Bad products are put on the market and protected by loose laws. When will the industry clean up its own act?

John H. McKinney
Wattsburg, Pennsylvania

Keep Those Cards Coming...

I'd like to commend your brightened format. I'm a longtime reader, and I've always liked your content, but the new look is great! It's easier to figure out what's what (news, preview, review, and so on), and I really appreciate the In-

stant Reference Card. I've already put two of the advanced DOS commands to use.

Barbara Harris
Solana Beach, California

I've been following PC developments since the beginning. But I'm not a corporate buyer, so your increasing emphasis on expensive, high-end products has left me more and more dissatisfied. The May and June issues renewed my interest. The new How To columns give me something to look for every month—especially the *Word* and *Excel Shortcuts*. Let's hope you can find some more ways to keep us small PC users happy.

S. I. Wolford
Clay, New York

Where's Northgate?

I read your June Buyers' Guide, "Keyboards, Mice, and Trackballs With the Personal Touch," with interest and dismay. The Northgate OmniKey 102 is one of the most talked-about keyboards in the industry. The keyboards of other, more obscure companies were listed. I checked your list of advertisers and discovered that Northgate's name does not appear. Then I understood.

Harvey Ardman
Rockport, Maine

This letter is being typed on an OmniKey 102, the best keyboard I have tried. Why does *PC World* ignore Northgate products?

Peter Feldman
New York, New York

As it happens, one of our editors has an OmniKey 102 and won't use anything else. The authors made repeated attempts to obtain information for the

Buyers' Guide from Northgate Computer Systems' public relations staff. Northgate, however, refused to allow us to include any mention of their products in our guide or to cooperate with our essential fact-checking process. Finally, a check of our June Advertiser Index will reveal that only 2 of the 30 vendors whose products were included advertised in the issue. —Ed.



ADAM MCCAULEY

Fonts, Fonts, Fonts...

After reading "Fonts Made Easy" [June 1990], I agree that "news about fonts is everywhere these days." But I doubt that most users care. I don't need to produce a bunch of cute, Mac-style documents. Serious business needs can be met with letter-quality output. Computers are supposed to help simplify our work. The last thing I need is further complication!

Hal Stanton
Dallas, Texas

Good article on fonts. Ross Smith explains the options and cuts through the jargon.

Stephen Barg
Lincoln, Nebraska
(continues)

Does This Make Choosing An Online Service Hard?

	GE SM nie Service	Compu- Serve [®]
Current & Historical Stock Quotes	✓	✓
Stock Brokerage Services	✓	✓
Personal Financial Management	✓	✓
Market Analysis	✓	✓
Mutual Funds Information	✓	✓
Investment Discussions	✓	✓
Company News & Information	✓	✓
U.S. and World News	✓	✓
Worldwide Computer Industry News	✓	✓
Sports	✓	✓
Amiga Support	✓	✓
Ashton-Tate Software Support	✓	✓
Atari Support	✓	✓
Borland Software Support	✓	✓
Commodore Support	✓	✓
CP/M Support	✓	✓
IBM Support	✓	✓
Macintosh Support	✓	✓
Microsoft Software Support	✓	✓
Tandy Support	✓	✓
UNIX Discussions	✓	✓
WordPerfect Software Support	✓	✓
Electronic Mail	✓	✓
Chat Services	✓	✓
Bulletin Boards	✓	✓
American Airlines' EAAsy Sabre	✓	✓
Official Airline Guide Electronic Edition	✓	✓
Hotel and Car Rental Info & Reservations	✓	✓
Multiplayer Games	✓	✓
Fantasy/Role Playing Games	✓	✓
Online Encyclopedia	✓	✓
Peterson's College Selection Services	✓	✓
Leisure & Hobbies	✓	✓
Shopping-Services	✓	✓

Circle 133 on reader service card

LETTERS

"Fonts Made Easy" is a nice guide for the uninitiated, and I hope it stimulates more people to use these tools. Now how about a piece on *appropriate* use of fonts?

Charles Abram
New Orleans, Louisiana

486 Kicks

Thanks for the June review of 486s, with its debunking of industry hype. Buyers expect new technology to deliver the goods, and those of us who listened to IBM were expecting its production 486 to leave all the 386s in the dust. Well, your tests show that it just ain't so! Gone are the days when we shell out dollars for an unproven product. When it comes to dealing with marketing claims, I'm most definitely from Missouri!

William Rayhall
St. Louis, Missouri

I've been dealing with IBM for over ten years, and while no company is perfect, I think their record is pretty solid. (At least they're still around!) Your June review of the first 486s seemed to take a swipe at IBM and the other companies with the courage to implement a new technology. Development of technology has always been incremental, and despite your negative tone, even you had to admit that the 25-MHz 486s outperform 33-MHz 386s.

Andy Massey
Boston, Massachusetts

Write Once...

Erasable-optical drives ["Super Storage," June 1990] may become substitute hard drives, but as far as storage reliability goes, hard drives are more reliable and much cheaper. What you did *not* mention in comparing these drives to WORM [write once, read many] drives is that WORM offers security of data exceeding the average person's lifetime, whereas rewritables' data lasts a fraction of that time. WORMs offer security even from viruses and provide an audit trail of prior files. Magnetic-opticals have some use, but this volatile

technology does not adequately protect the consumer. Surely these drives are no substitute for true optical WORMS.

*Michael K. Erickson
Monte Rio, California*

BBS Numbers

Thanks for the fine "Do-It-Yourself BBS" in May. I need to set up a BBS for my company and am having trouble locating vendors of *RBBS-PC* and *The Major BBS*. Can you help?

*Art Brown
Walnut Creek, California*

RBBS-PC is distributed by the Capitol PC User Group, Software Exchange, P.O. Box 6128, Silver Spring, MD 20906, 301/762-6775. The Major BBS is produced by Galacticom, 4101 S.W. 47th Ave. #101, Fort Lauderdale, FL 33314, 305/583-5990. —Judy Getts (continues)

POWER TIP NO. 121

Where Batteries Hang Out

Battery holders that take four standard AA alkaline batteries and replace the lithium cells commonly used in AT-style computers are a real money saver, but some people worry that alkaline batteries will leak and damage their PCs. The solution is simple: Mount the battery case on the outside of the computer; its thin wires can go through any opening on the back. If the battery leaks, it may stain your desk, but it won't bother your motherboard. Furthermore, this solution makes changing batteries a snap.

*Martin P. Neudel
Chicago, Illinois*

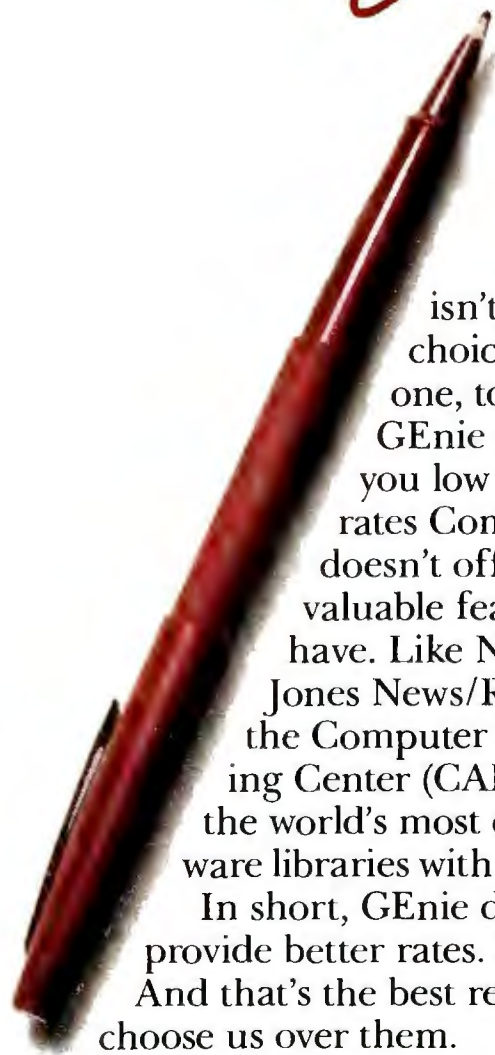
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1. Set your modem for local echo (half duplex), 300, 1200, or 2400 baud.
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3. At the U# = prompt enter XTX99559GENIE then RETURN. Have a major credit card or checking account number ready.

For information in the U.S. or Canada call 1-800-638-9636. Or write GE Information Services, ATTN: GENie, 401 North Washington St., Rockville, MD 20850-1785.



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GUESS WHICH REGIONAL

What's most important about a business presentation is how good you look after everyone else has finished. No matter what you know, it's how well you've communicated that usually determines your success. That's why you need Charisma.

Charisma is a complete graphics program for business, combining text charts, graphs, and drawing tools in one powerful package. Switch to Charisma and you can stop switching back and forth between all the other programs to get what you need. Now it's all at your fingertips. The time and energy you save can

be used to refine your presentation. And think of the time your work group will save by only having to be proficient with a single easy-to-learn graphics program.

Another clear advantage is Charisma's compatibility with Windows 3.0 which conveniently pops hundreds of options on the screen for rapid experimentation. Browse through chart types, clip art, 42 outline typefaces, perspective chart effects, colors, gradients, chart templates, and free form layouts, to name a few. Charisma also includes drawing tools that will help the beginner



MANAGER HAS CHARISMA.

and offer the power user maximum control. So finding the combination that gives your presentation the right snap will be quick and easy.

Charisma also imports many other graphic and spreadsheet formats, but more importantly, imported text, charts, and graphics arrive as data and can be further manipulated and incorporated.

When boundaries disappear creativity flourishes. The usual can be made unusual. Communication becomes forceful and unique. Charisma turns drudgery into innovation.

Make your next presentation a memorable performance. Ask for Charisma at your local software dealer or through your corporate purchasing department. Or call MICROGRAFX directly at 1-800-733-3729, ext. 3250(USA) or 3710 (Canada) for our special free offer of a self-running demo (supplies limited).

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CHARISMA[™]

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Type	Trade	Quant	Purch Price	Comm /Buy	Cost	Sell Date	Sell Price	Comm /Sell	Today's Value	P/L
Put	12/26/84	100	\$3.00	\$209.25	\$30,708.25	01/09/85	\$4.25	\$226.25	\$42,273.75	\$11,565.50
Call	01/29/85	100	\$4.38	\$230.00	\$43,980.00	02/11/85	\$5.63	\$267.50	\$55,982.50	\$12,002.50
Put	03/12/85	100	\$2.88	\$209.25	\$28,959.25	03/19/85	\$4.00	\$218.75	\$39,781.25	\$10,822.00
Call	04/26/85	100	\$3.50	\$209.25	\$35,209.25	05/20/85	\$6.75	\$301.25	\$67,198.75	\$31,989.50
Call	06/26/85	100	\$2.38	\$209.25	\$23,959.25	07/01/85	\$3.13	\$209.25	\$31,040.75	\$7,081.50
Call	07/18/85	100	\$5.00	\$248.75	\$50,248.75	07/23/85	\$3.75	\$211.25	\$27,288.75	(\$23,960.00)
Put	09/16/85	100	\$2.25	\$209.25	\$22,709.25	09/26/85	\$2.50	\$209.25	\$24,790.75	\$2,081.50
Call	11/05/85	100	\$4.88	\$245.00	\$48,995.00	12/18/85	\$19.63	\$668.50	\$155,562.50	\$106,567.50
Call	01/27/86	100	\$3.25	\$209.25	\$32,709.25	03/04/86	\$10.88	\$325.00	\$108,325.00	\$75,615.75
Call	03/12/86	100	\$4.75	\$241.25	\$47,741.25	04/29/86	\$9.63	\$33.50	\$95,862.50	\$48,121.25
Call	05/21/86	100	\$4.50	\$233.75	\$45,233.75	06/09/86	\$9.13	\$33.25	\$97,108.75	\$51,875.00
Call	08/06/86	100	\$4.13	\$222.50	\$41,472.50	09/05/86	\$3.88	\$481.25	\$127,018.75	\$85,546.25
Call	09/17/86	100	\$4.50	\$233.75	\$45,233.75	11/13/86	\$3.88	\$305.00	\$68,445.00	\$23,211.25
Call	11/25/86	100	\$4.13	\$222.50	\$41,472.50	12/15/86	\$4.13	\$245.00	\$48,505.00	\$7,032.50
Put	01/02/87	100	\$2.38	\$209.25	\$23,959.25	01/15/87	\$1.00	\$2.00	\$9,790.75	(\$14,168.50)
Call	01/08/87	100	\$6.75	\$301.25	\$67,801.25	03/03/87	\$29.63	\$33.25	\$295,262.50	\$227,461.25
Call	03/05/87	100	\$3.50	\$209.25	\$35,209.25	03/12/87	\$2.94	\$2.00	\$29,165.75	(\$6,043.50)
Call	03/20/87	100	\$4.75	\$241.25	\$47,741.25	07/07/87	\$8.25	\$33.25	\$92,153.75	\$44,412.50
Call	05/06/87	100	\$3.75	\$211.25	\$37,211.25	05/08/87	\$2.25	\$209.25	\$22,290.75	(\$15,420.50)
Put	05/19/87	100	\$4.88	\$245.00	\$48,995.00	05/21/87	\$3.75	\$33.25	\$74,676.25	\$25,681.25
Call	06/17/87	100	\$4.25	\$222.50	\$42,272.50	07/16/87	\$9.00	\$346.25	\$92,153.75	\$39,427.50
Call	07/31/87	100	\$3.13	\$209.25	\$31,040.75	08/13/87	\$3.13	\$209.25	\$49,751.25	\$18,710.50
Call	08/10/87	100	\$5.88	\$258.00	\$58,800.00	09/13/87	\$13.69	\$346.25	\$136,390.55	\$77,590.55
Put	09/09/87	100	\$4.38	\$233.75	\$43,980.00	09/10/87	\$3.63	\$233.75	\$36,040.75	(\$7,939.25)
Put	10/08/87	100	\$7.75	\$380.00	\$77,500.00	10/08/87	\$97.00	\$233.75	\$967,242.50	\$889,742.50
Put	11/10/87	100	\$5.00	\$248.75	\$50,248.75	11/11/87	\$5.63	\$33.25	\$56,605.63	\$6,356.88
Call	12/15/87	100	\$2.09	\$209.25	\$22,709.25	12/24/87	\$8.88	\$333.75	\$84,646.25	\$61,937.00
Call	02/11/88	100	\$1.13	\$113.75	\$11,375.00	03/03/88	\$6.63	\$33.25	\$75,922.50	\$64,547.50
Put	03/25/88	100	\$3.88	\$233.75	\$38,800.00	04/07/88	\$5.63	\$267.50	\$55,982.50	\$17,182.50
Call	05/16/88	100	\$4.63	\$241.25	\$46,387.50	05/21/88	\$5.25	\$33.25	\$52,243.75	\$5,856.25
Call	05/26/88	100	\$4.25	\$222.50	\$42,272.50	06/27/88	\$15.00	\$38.75	\$149,451.25	\$107,178.75
Call	08/01/88	100	\$4.00	\$200.00	\$40,000.00	08/05/88	\$2.94	\$2.00	\$26,040.75	(\$13,959.25)
Put	08/10/88	100	\$4.00	\$200.00	\$40,000.00	08/24/88	\$7.38	\$33.25	\$73,430.00	\$33,430.00
Put	10/05/88	100	\$3.25	\$209.25	\$32,709.25	10/10/88	\$0.00	\$209.25	\$19,790.75	(\$12,918.50)
Call	10/13/88	100	\$5.50	\$265.00	\$55,500.00	10/13/88	\$1.00	\$33.25	\$94,616.25	\$39,116.25
Call	01/09/89	100	\$7.13	\$312.50	\$71,312.50	02/02/89	\$18.75	\$638.75	\$179,361.25	\$108,048.75
Call	02/17/89	100	\$6.25	\$286.25	\$62,786.25	02/22/89	\$5.25	\$256.25	\$52,243.75	(\$10,542.50)
Put	02/23/89	100	\$3.75	\$211.25	\$37,711.25	02/28/89	\$4.88	\$245.00	\$48,505.00	\$10,793.75
Call	03/06/89	100	\$5.63	\$267.50	\$56,517.50	03/13/89	\$8.38	\$335.00	\$83,400.00	\$26,882.50
Call	05/10/89	100	\$2.63	\$209.25	\$22,709.25	05/12/89	\$1.75	\$209.25	\$17,290.75	(\$5,418.50)
Call	07/06/89	100	\$5.75	\$271.25	\$57,125.00	08/14/89	\$25.00	\$673.25	\$249,326.75	\$192,201.75
Call	08/24/89	100	\$3.63	\$209.25	\$36,412.50	08/25/89	\$8.13	\$342.50	\$30,907.50	\$4,485.00
Call	09/28/89	100	\$4.13	\$222.50	\$41,472.50	10/09/89	\$11.25	\$436.25	\$112,063.75	\$70,591.25
Call	12/29/89	100	\$4.13	\$222.50	\$41,472.50	01/03/90	\$8.25	\$346.25	\$82,153.75	\$40,681.25
Put	01/09/90	100	\$5.50	\$265.00	\$55,500.00	01/15/90	\$13.00	\$488.75	\$129,511.25	\$74,011.25
Put	01/16/90	100	\$8.75	\$361.25	\$87,861.25	01/24/90	\$14.88	\$545.00	\$148,205.00	\$60,343.75
Put	02/21/90	100	\$4.25	\$222.50	\$42,272.50	02/26/90	\$2.94	\$196.88	\$29,188.13	(\$13,084.37)
Call	03/16/90	100	\$6.63	\$297.50	\$66,547.50	03/20/90	\$10.00	\$398.75	\$99,601.25	\$33,053.75
Call	04/12/90	100	\$5.50	\$265.00	\$55,500.00	04/16/90	\$8.25	\$346.25	\$82,153.75	\$26,653.75
Put	05/11/90	100	\$5.00	\$248.75	\$50,248.75	05/15/90	\$10.00	\$33.25	\$33,250.00	(\$16,998.75)
Call	05/08/90	100	\$4.75	\$241.25	\$47,741.25	05/14/90	\$19.25	\$676.25	\$191,823.75	\$144,082.50
										\$2,935,716.92

77.77% Accurate: Above is a chart of OEX trades from December 28, 1984 to May 14, 1990, based on the signals generated by the **Right Time-Index Program™**. By following the signals generated by the program, the rules in the manual and starting with just a small amount of capital (\$30,708.25) your profits would have been over \$2,900,000.00.

The **Right Time™** computerized trading system was developed by an expert portfolio manager for his own personal use. Over the last nine years of in-market use the software has been perfected and made easy to use. Now it's available for any smart trader who wants to make quick profits from quick decisions. Just look at the profits generated in the above chart!

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Amazingly Precise.

The **Right Time™** programs run on IBM (and compatible), Apple II and Macintosh personal computers. The software is easy to use, amazingly precise, and very, very clear in its signals.

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• **Index Program:** "Computer whiz finds

program for success. This program really works." A.G. columnist.

• **Futures Program:** "Very profitable with four out of five winners. Paid for itself the first trade." B.L., advisor.

• **Mutual Funds Program:** "Accurately picked my last seven profitable trades. I couldn't trade without it." L.S., individual investor.

• **Stock Program/Long Term:** "Exactly what I've been waiting for from T.B.S.P.. Perfect for our more conservative clients." G.M., stockbroker.

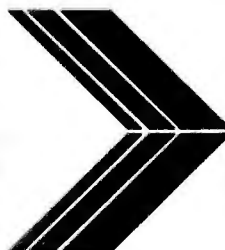
• **Day Trading Program/Index and Futures:** "The Day Trading Programs are sensational." P.S., investor.

For More Information.

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Circle 262 on reader service card

Build a Better Macro...

The **WordPerfect 5.0** macro on page 214 of your May issue could be improved by adding a space after the word *Dear*. This would prevent the search from stopping when it found *Dearborn* or other words containing *Dear*.

Edwina Pace

Searcy, Arkansas

The Proper Path

Your June preview of the IBM LaserPrinter E is in error when it says that the Hewlett-Packard LaserJet IIP's output lands in a tray that swings toward you. This side tray is actually the input tray, and pages emerge on top. An optional bottom-loading tray accepts 250 sheets and adds just a couple of inches to the height and nothing to the footprint. Then the side tray can be either folded up to liberate more desk area or used as a second input tray.

Sol Schoenfeld

Newark, New Jersey

In your comparison of the IBM LaserPrinter E with the LaserJet IIP, you did not consider that the new Hewlett-Packard AppleTalk interface will transform the IIP into an AppleTalk (Macintosh) printer, a compatibility not available on the LaserPrinter E.

Sheldon Teicher

Santa Clara, California

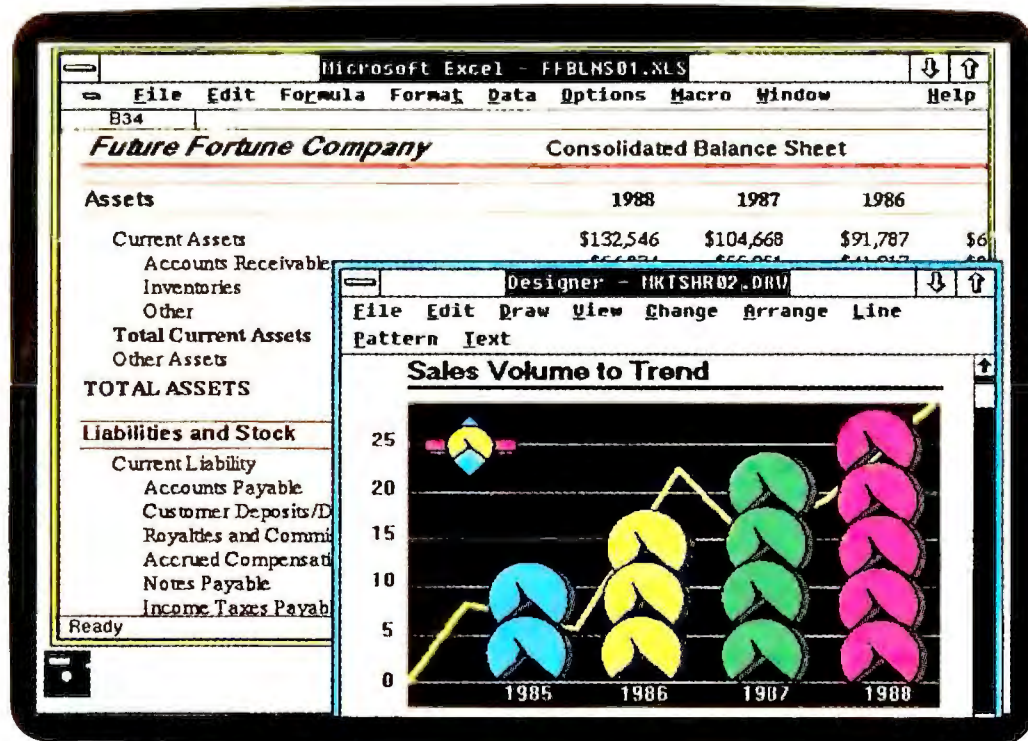
Our preview incorrectly stated the list price of the Hewlett-Packard PostScript cartridge as \$995. The correct price is \$695. Since the article was written, the vendor has reduced the list price of its 2MB memory board from \$795 to \$740 and also changed its minimum memory recommendation for PostScript from 2MB of add-on RAM to 1MB. The 1MB RAM board lists at \$495. —Ed.

Corrections and Clarifications

The June *Product Outlook* item on *Expense It* from On the Go Software incorrectly listed the price as \$199.95. The (continues)

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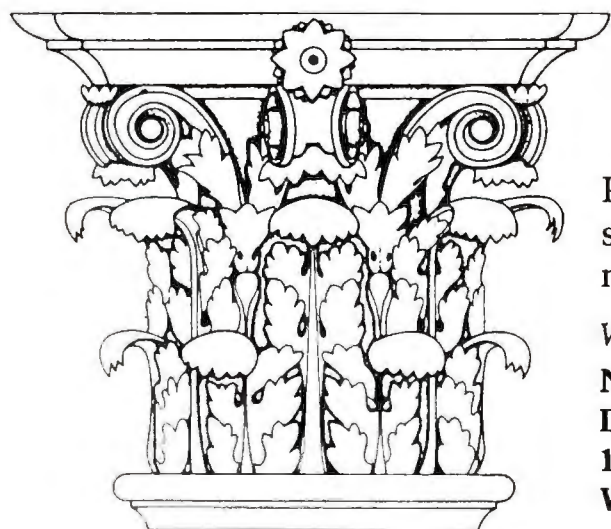
Circle 54 on reader service card

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correct price is \$129.95.

Our June *WordPerfect Shortcut* on page 177 contains a misprint. The correct listing for item 3 is: "To retrieve a DOS text file, press <Ctrl>-<F5>te."

The item about *Doorway 2.05* from Marshall Dudley, which appeared in "Communications Shareware: The People's Choice" (July 1990), incorrectly lists the price. The correct price is \$30, and site licenses are available for corporate, agency, or organizational use.

Paradox Shortcuts for May gives an incorrect number for *Paradox* technical support. The correct number for Borland technical support is 408/438-5300.

To send correspondence, please see *How to Contact PC World*, page 4. ☺

POWER TIP NO. 122

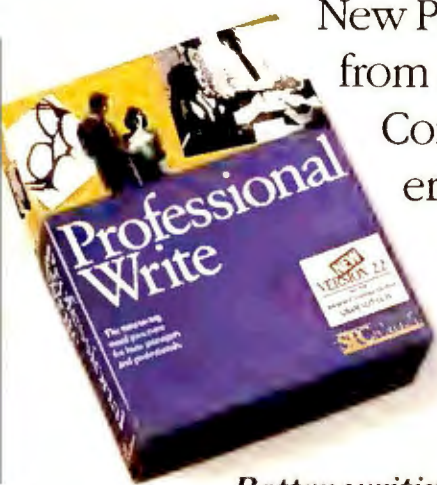
Pasting From WordPerfect's Shell

Users of both *WordPerfect* and *WordPerfect Library* can easily copy text from the word processor into non-*WordPerfect* programs. You must first launch *WordPerfect* from inside *Library's* Shell menu. To block your text in *WordPerfect*, go to the beginning of the desired block, press <Alt>-<F4>, and move to the end of the block. Press <Ctrl>-<F1>s to save the block to the Shell clipboard. Press <Ctrl>-<F1>g to return to the Shell menu, press the letter of the program to which you wish to copy the data (or press 1 to go to DOS, and then run the target program), and press <Alt>-<Shift>-= to paste the text.

Robert Lauriston
Associate Editor

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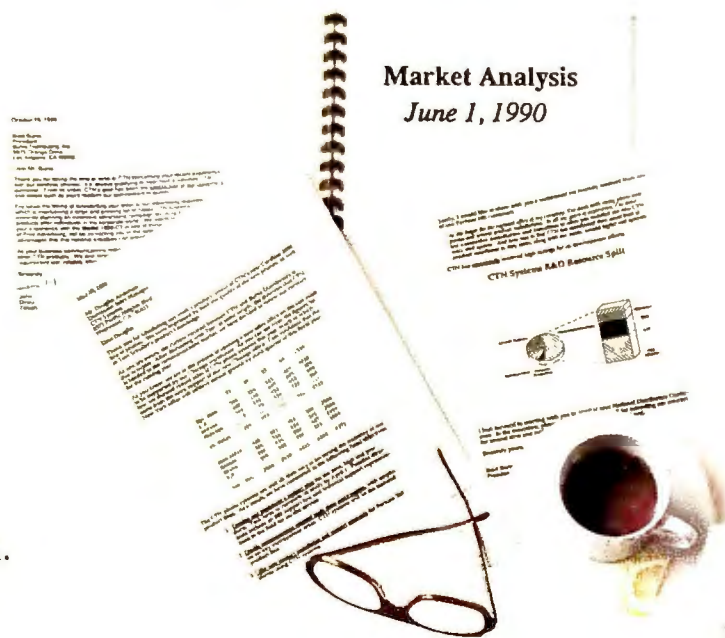
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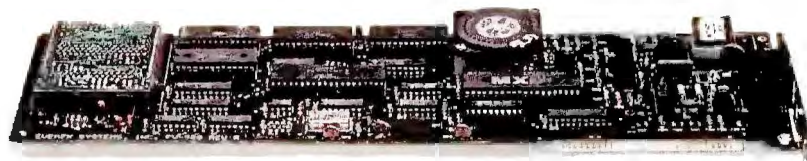
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THE HELP SCREEN

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Keep floppy disks safe and sound, switch system configurations automatically, run Windows/386 under TOPS, discover DOS's command length limit, and ponder the pros and cons of installing a second network adapter in your server.

Karl Koessel

well away from the desktop. Most external modems also have a metal casing, which probably provides sufficient shielding from the magnetic field produced by the modem's speaker. But your disks are still not safe atop a modem; its heat can cause the disk to lose data. So why take chances?

Most flat modems have the footprint of a standard desk phone so that you can place the phone on top of the modem. Doing so will prevent disks from slipping under the phone (phones with magnetically operated bells can destroy data). You should also be aware of other potentially dangerous magnetic fields emanating from common desktop objects like your electric pencil sharpener, magnetic paper clip dispenser, magnetized paper clips, magnetic paper stand, the monitor, magnetic charms on brace-

lets, and power cords. And don't forget other sources of damaging heat, like the top of your monitor or system unit or even the windowsill.

Dual Configuration

Q. Several people in my office use our IBM PS/2. I'm usually working in a structural analysis program (SAP90) that requires 580K. Everyone else uses the PS/2—configured with drivers for a mouse, ANSL.SYS, and a Portuguese keyboard layout—for word processing, spreadsheets, and data bases.

Because of my application's memory requirements, I must delete the PS/2's AUTOEXEC.BAT and CONFIG.SYS files and reboot before run-
(continues)

Modems, Magnetism, and Media

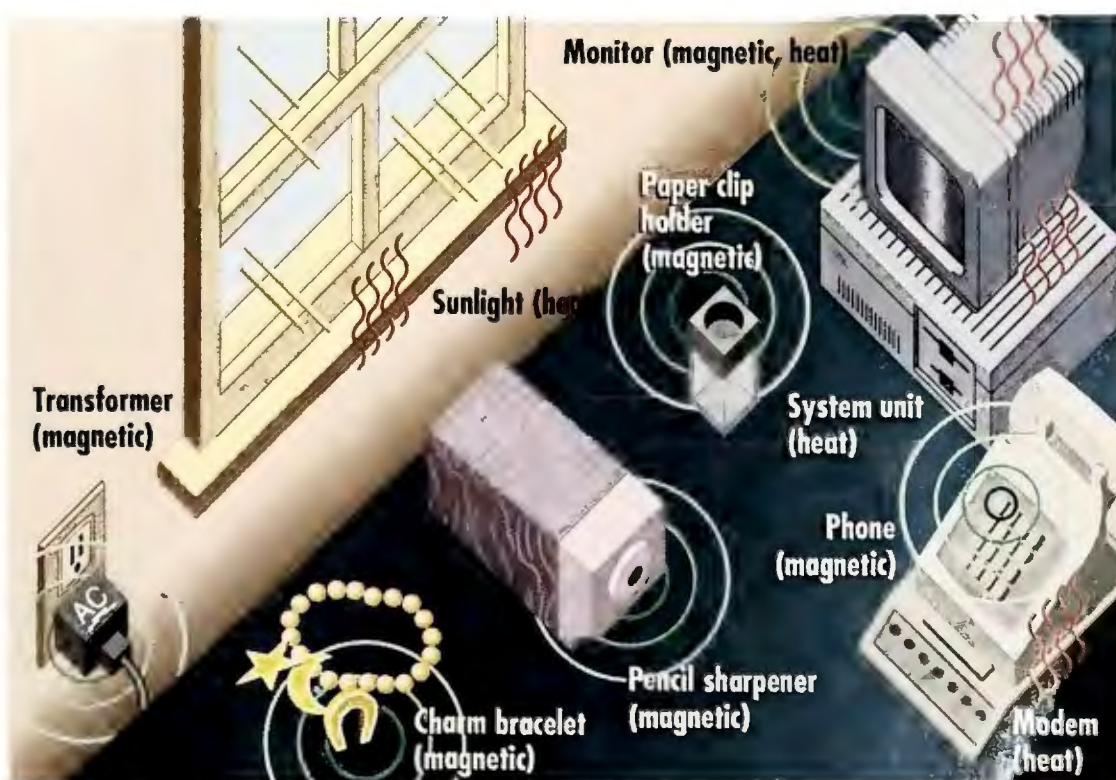
Q. Because my external modem is a conveniently flat surface right near my computer and just about the size of a floppy disk, I often put disks on it. No harm done yet, but does a modem create a magnetic field that might be harmful to the data on a floppy disk?

Mitchell F. Ostrom

Los Angeles, California

A. The AC/DC power converter for an external modem generates a magnetic field; however, the converter is usually plugged directly into the wall socket,

Protect Your Data



Heat and magnetism destroy magnetic data. Keep your floppy disks away from telephones, modems, windowsills, electric pencil sharpeners, magnetic paper clip holders, power transformers, the backs and tops of monitors and system units, and magnetic charm bracelets.

ning SAP90. Then before my co-workers can use the PS/2, I must copy AUTOEXEC.BAT and CONFIG.SYS back to the root of drive C: and reboot.

This repetitive tearing down and rebuilding of the system has grown from tiresome to infuriating. Is there a better way to support two different configurations on the same system?

Nuno Manuel Barosa Botelho
Lisbon, Portugal

A. There is a shareware program, *Boot.sys* version 1.2, that will let you set up a menu of individual configurations for your users. With *Boot.sys* you keep only one version each of AUTOEXEC.BAT and CONFIG.SYS; you don't have to copy, rename, or delete files and then reboot. *Boot.sys* uses only 160 bytes of memory and is available for 70 Swiss francs (about \$42) from the author, Hans Salvisberg, at Froeschmatt-

str. 40, CH-3018 Bern, Switzerland, or via CompuServe (73237,3556) or Internet (salvis@ahorn.iam.unibe.ch). The program is publicly supported on CompuServe as BOOT12.EXE in the DOS Utilities section of the IBMSYS forum and on other BBS's. Those in the United States can purchase *Boot.sys* from the Public software Library for \$34 plus \$4 shipping and handling (call *continues*)

NETWORK Q&A

Will a Second Network Adapter Speed Up Your Server?

David Ferris

Q. Could you please explain how installing an extra token ring board in a Novell file server will speed up the network? Our systems experts here don't seem to think that it will. I would appreciate your going into some detail.

Delbert Yop

Winnipeg, Manitoba, Canada

A. If your network has more than about 25 workstations, and you're doing a lot of concurrent database processing, the extra card should help considerably. If, on the other hand, users are mainly concerned with spreadsheet, word processing, E-mail, and other personal computing applications, there won't be much impact on performance.

A myriad of factors affect system response time, such as wiring quality, adapter card driver software, WAN links, and the type of workstation applications being run. To further confuse matters, the key factors vary from network to network, and what is good for one has little or no impact on another.

Nevertheless, there are several strategies you can try:

Transmission system. The faster the better. Clearly, 4-mbps (megabits per second) token ring and 10-mbps ethernet can transfer packets faster than

Two Cards = A Snappier Server

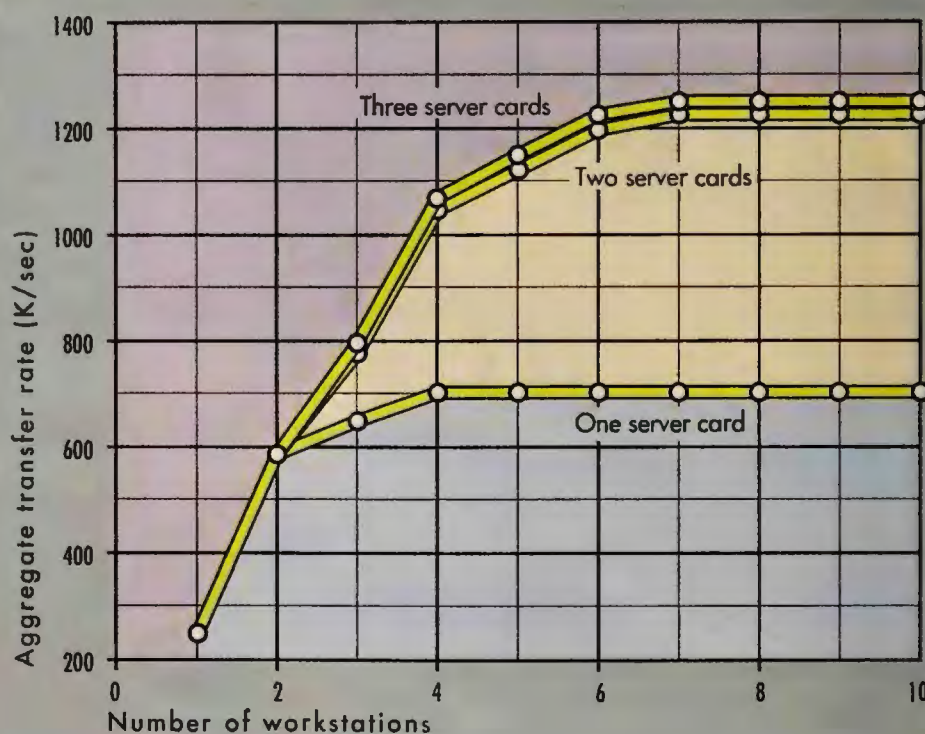


FIGURE 1: A 20-MHz server running NetWare 3.0 was tested with Novell's Perform2 utility and NE2000 ethernet cards. Two cards nearly double the aggregate transfer rate.

1-mbps Storlon and 2.5-mbps Arcnet.

Transmission system topology. If you have more than 30 PCs on a network, consider splitting it up into subnetworks and connecting them with bridges (see "Network Q&A," July 1990).

Adapter card type. Adapter card capabilities vary widely. Some, such as IBM's Token-Ring and 3Com's 3C505, let

you off-load protocol processing from the host CPU, and sometimes this improves performance. Some have larger on-board buffers, letting them absorb longer bursts of inbound packets. Your server will benefit more from a 32-bit adapter loaded with 256K of RAM than from a basic 8-bit, 8K version.

(continues)

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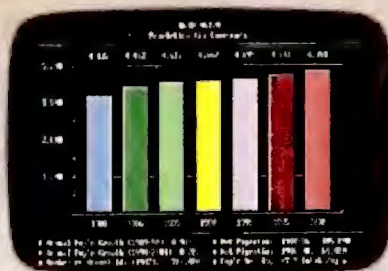
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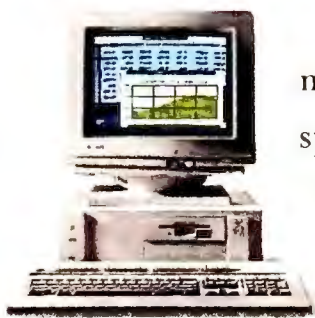


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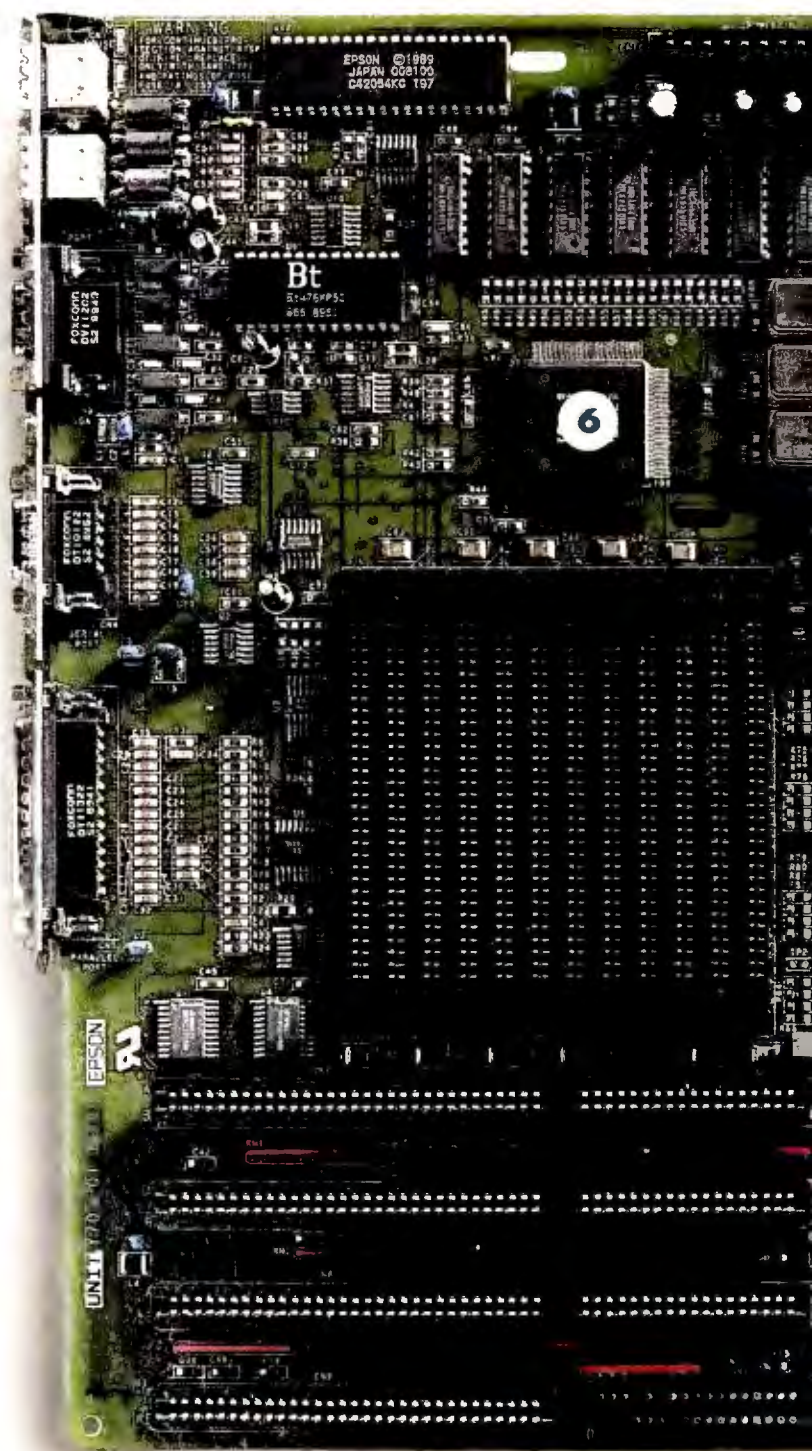
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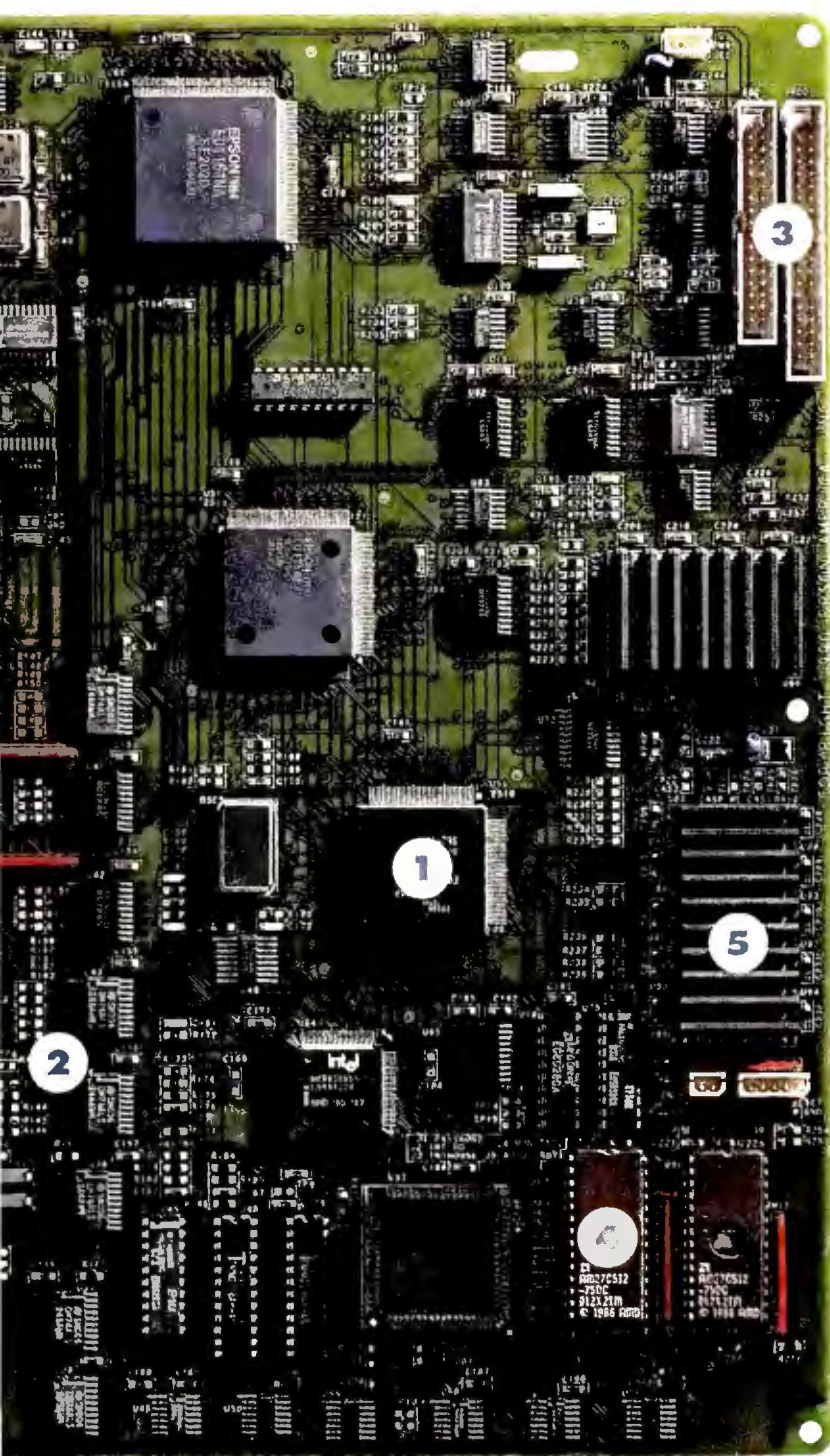
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If you'd rather do it yourself for free, setting up a slightly less elegant dual configuration system is not difficult. The "PC World Step-By-Step Guide" in this column shows you how.

TOPS and Windows

Q. *I manage a TOPS network of 386-based PCs and Macintoshes at a desktop publishing service bureau. I want at least one 4MB 386 PC to run Microsoft Windows/386 and some of that en-*

vironment's most common publishing applications (PageMaker, Illustrator, and so on). However, once the system loads the TOPS network drivers, it doesn't have enough memory left to run Windows/386, much less run a Windows application as well. Is there any way to put the network drivers in extended memory and then run Windows?

Brad Karal

Toronto, Ontario, Canada

A. If you try to run Windows/386 under TOPS 3.0, you get an erroneous out-of-memory error. The actual problem is the incompatibility between the two programs' protected-mode-memory

managers. Either you can run TOPS in real mode (in which case you can probably load only one network service), or you can run Windows/386 in real mode (in which case you limit the number of Windows applications that you can run concurrently, you can't multitask DOS programs, and you lose Windows/386's extended-memory management capability), but not both.

Another alternative is to use a 386 expanded-memory manager, such as Quarterdeck's QEMM, to map some 386 extended memory to addresses between 640K and 1MB (high memory) and to designate the rest as expanded memory. Then load some of TOPS into *(continues)*

NETWORK Q&A

(continued)

Server cache. Servers slow down when they do disk I/O, so it's good to have a large disk cache, whether on-board the controller or in extended memory, to minimize this bottleneck. As a rule of thumb, use at least 1MB of cache for every 100MB of disk storage.

Server disk I/O. Faster disks in your server mean faster storage and retrieval. One of the main reasons that higher-end machines have better performance is that their hard disks are quicker.

Let's turn to your question about multiple LAN cards in a server. This strategy works when many users are concurrently generating a lot of server I/O—for example, 20 heads-down operators entering data, or programmers doing compiles and links. In such cases, you want to use as much of the network bus's capability as you can. Unfortunately, adapter cards can't keep up with the network bus. A lot of ethernet adapters, for example, can transfer packets between the CPU and the network bus at around only 2 mbps,

though the bus is capable of 10 mbps. Inserting another card in the server helps remove the bottleneck.

Navell's Richard King has performed a series of interesting tests that illustrate this point. The study, the results of which apply equally to other LAN operating systems, focused on workstations executing read and write operations to a file cached in a NetWare server.

The results are shown in **FIGURE 1**. Most servers contain an underworked CPU. It's typically in use only about 30 to 50 percent of the time, even when a lot of file I/O is being generated by, for example, many data base users or software developers. Adding another adapter nearly doubles the total data transfer rate and hence halves response time (and, of course, makes the CPU work harder). Adding more cards continues to improve performance, but with diminishing results. Navell's test was done with ethernet cards, but the same conclusions should apply for any other type of network, including token ring.

How can you tell if your server is

likely to benefit from the multicard treatment? Ask yourself: Do I have a lot of concurrent users running applications that constantly generate file I/O, such as data bases or program compilers? Does system response time degrade badly during peak loads? Is the CPU used less than about 70 percent of the time during peak loads?

If the answer to all three questions is yes, your network can probably benefit from the extra-card approach. If you have a protocol analyzer such as Network General's Sniffer or Navell's Lanalyzer, you can confirm your diagnosis by dipping into the wire and assessing its saturation level.

For a copy of Richard King's "Benchmarking NetWare 386 Using Perform2," contact Kathleen Mitchell at Navell, 122 East 1700 South, Mail Stop D24-1, Provo, UT 84606.

David Ferris is president of Ferris Networks, a San Francisco-based consulting firm specializing in PC LANs.

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THE HIRSCH REPORT OF THE SKIES VOL. 8, NO. 4, FALL 1990

STAR SHORTS

Reported by The Star

Every day billions of dust particles enter into Earth's atmosphere. Now scientists are working to make meteor-burst communication a practical and economical alternative to the use of tele-

(continued on page 2)

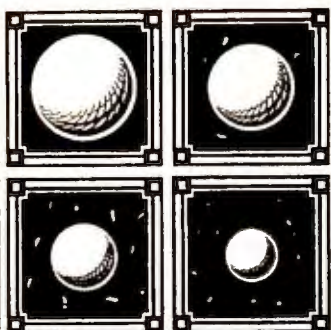
You Can't See the Great Wall from the Moon!

Everyone has heard that you can see the Great Wall of China from the Moon. Or from Earth orbit. Or even from Mars. Certainly you cannot see the Great Wall from the Moon. According to an astronaut, it's difficult even seeing continents. You may be able to see the Great Wall from orbit, but, in general, it's difficult even to see familiar objects; the planet's swift mo-

(continued on page 3)

Voyager's Last Picture Show:

When Voyager 2 was launched 12 years ago, who could have imagined these photos at this point in time.



More on planetary explosions inside.

NO BLACK HOLES?

Scientists are still unable to confirm the existence of even a single black hole, despite widespread belief that such things should exist. Tracking down these invisible objects isn't easy, because they can only be studied indirectly by the effects they have on their surroundings. There are several types of places that

(continued on page 3)

MIRROR, MIRROR

It's a chore, but all reflecting telescopes require cleaning their reflective mirrors. Eventually, the aluminum coating on their mirrors deteriorates and needs replacing. For large instruments, the process requires removing the tele-

(continued on page 5)

CHAIN REACTION

A G O T S CHEMICAL LETTER

JUNE 9, 1990

VOLUME FOUR

ISSUE THREE



New Leaps in Metal-Organic Chemistry

Metal-organic chemistry bridges the gap between organic and inorganic chemistry. It can lead to important new products (for example, poison antidotes). A chelate, such as EDTA above (containing carbon, hydrogen, oxygen and nitrogen atoms) can surround ions of metals and remove them from unwanted places. (continued next page)

What's New in Superconductivity?

It was almost exactly three years ago that a ceramic material that superconducts above liquid nitrogen temperature was discovered. Within days of the discovery, electronics, power transmission, and transportation were being redefined in everyone's imagination. Yet superconductivity was not a new phenomenon. The effect was first observed in mercury in 1911, and, since then, more than 6000 elements, alloys, and compounds have been found to superconduct! (continued next page)

Antimatter Bottled

A device tested may give investigators a glimpse of what an antimatter world might look like. The device cools antimatter to a temperature a few degrees above absolute zero and stores it for several days at a time. (continued next page)

Fifty Years Ago

Rumor has it that before WWII, our chemists were experimenting with a distilling process to lower the calories of ordinary beer. Abandoning the research at the onset of world war, researchers then pursued the development of a shelf-stable C ration. Don't believe all rumors.

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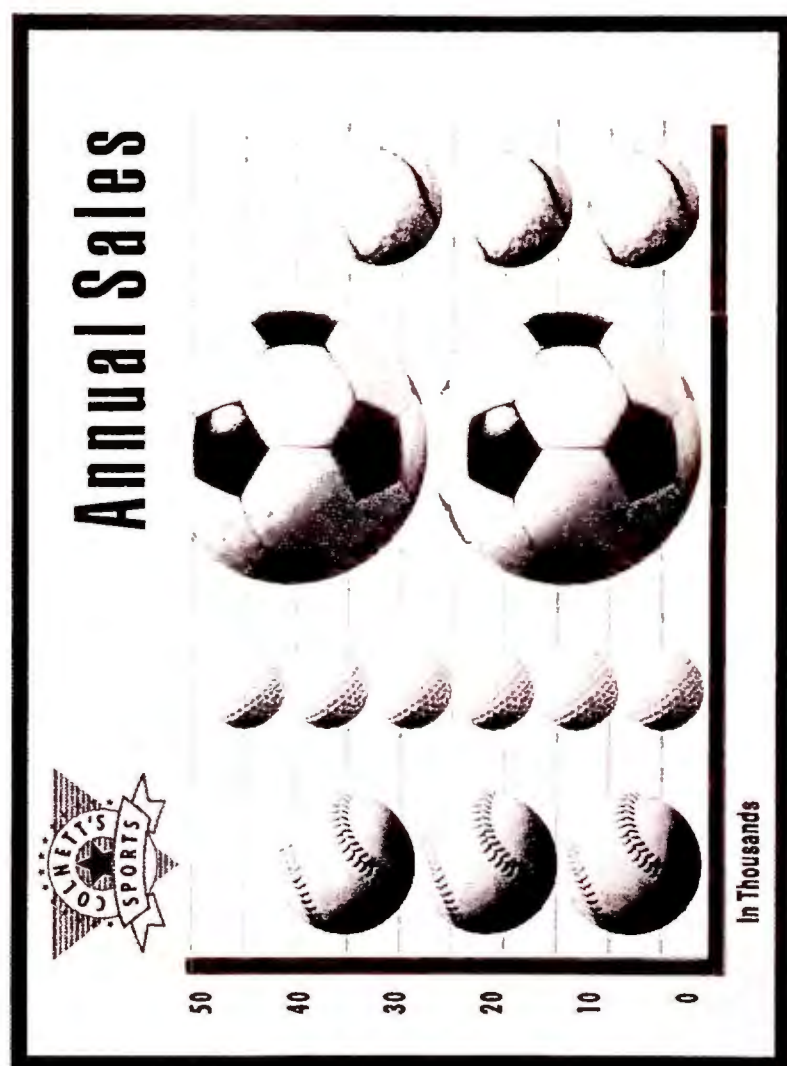
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A collage of various typographic elements. At the top, the word "SCALE" is in a large, bold, black serif font. To its right, "Mirror" is in a large, elegant, black script font, and "Window" is in a smaller, outlined, black serif font. Below "SCALE", the word "Type" is in a large, elegant, black script font. To the right of "Type" is a pie chart divided into four quadrants with labels: "20% Gray", "30% Gray", "40% Gray", and "60% Gray". Below the pie chart is a spiral binding of a book. To the right of the spiral binding is a cluster of the word "Angles" repeated multiple times in various orientations and sizes. At the bottom, the word "PATTERN" is in a large, bold, black sans-serif font. On the left side, the word "Reverse" is written vertically in a large, elegant, black script font. In the top right corner, the words "WEST", "NORTH", "EAST", and "SOUTH" are arranged in a grid-like pattern, with "WEST" and "NORTH" on the left and "EAST" and "SOUTH" on the right, all in a bold, black sans-serif font.

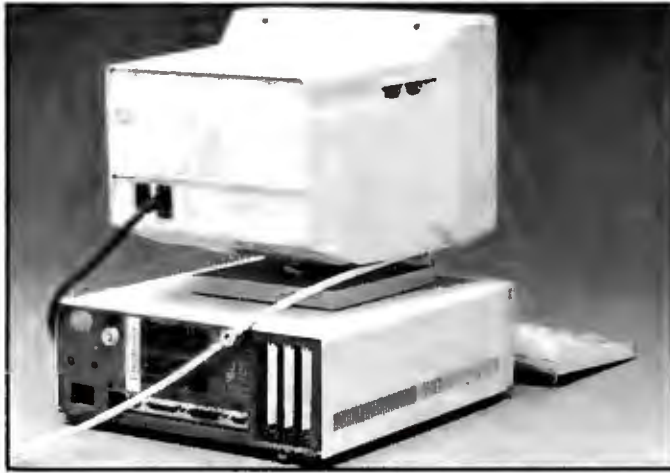


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that high memory to gain room for more services, and use the emulated expanded memory for *PageMaker* under its run-time *Windows*.

None of the solutions is great, but you're trying to mix *TOPS* and *Windows*, programs that both extend DOS. Since *TOPS* was written for DOS, not for *Windows*, compatibility cannot be guaranteed. However, *TOPS* and Microsoft are actively working on a *Windows* 3.0-compatible version of *TOPS* that purportedly will solve all your woes.

DOS Command Length

Q. *The March issue's Star-Dot-Star column contains a batch file, AP.BAT, that enables the user to temporarily add one or more directories to the system's path and to later reset the original path. It works fine except when the original path is too long. In that situation (continues)*

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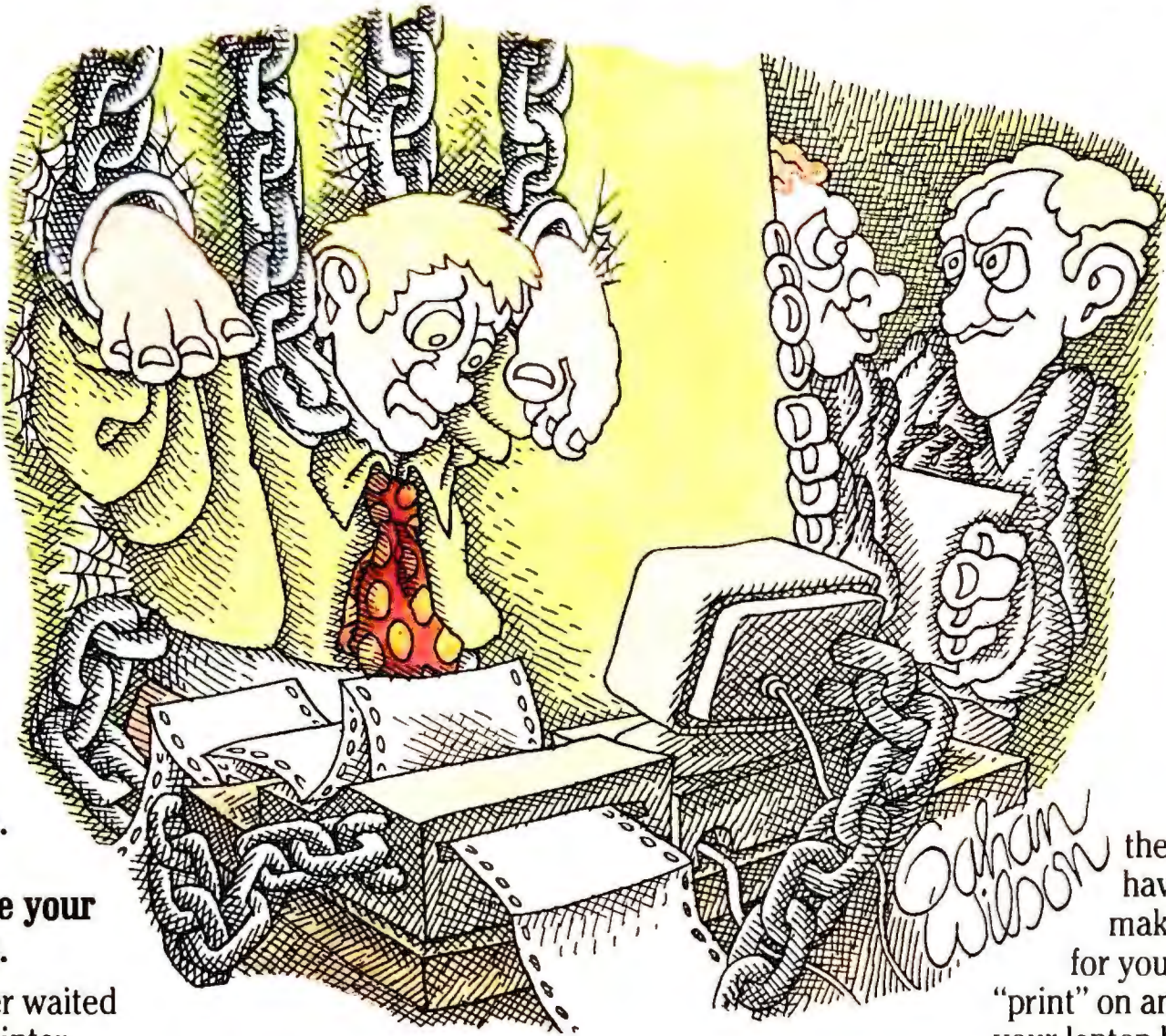
Circle 305 on reader service card

POWER TIP NO. 123**Sending an Item to the End**

If you're sorting a list in *Microsoft Word* and want an item to be at the bottom rather than where it would otherwise go, insert a character with a high ASCII value as the first character of the item. The characters {, }, !, and ~ all sort after the alphabet, but the character obtained by pressing <Alt>-<NumPad 254> comes last of all for alphanumeric, ascending sorts. Once you've sorted your list with Library Autosort, use the Replace command to replace your sort character with nothing.

Kenneth H. Fleischer
Los Angeles, California

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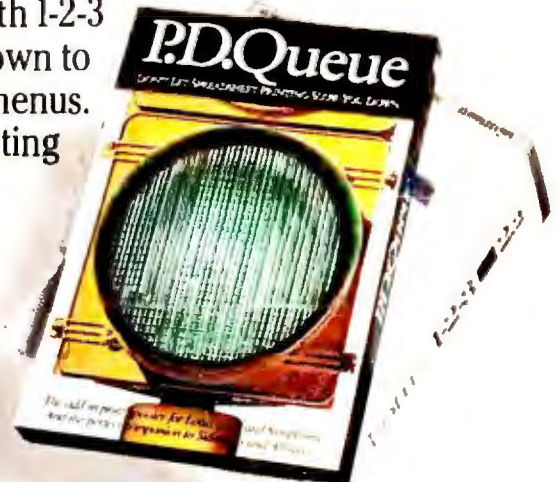
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tion, the command 'if not "%oldpath%"==" " set path=%oldpath%' generates a 'Bad command or file-name' error.

I increased the size of the environment to 512 bytes by placing the command shell c:\dos\command.com /e:512 /p in my CONFIG.SYS file, but that didn't help. Is there some restriction on the length of the strings that SET places into the environment?

Karen A. Mullen
Louisville, Kentucky

A. SET doesn't limit the length of environment strings. However, the DOS command line's 127-character maximum imposes a limit. With at least 6 characters needed to begin a SET command that specifies a single-character variable ('SET A=', for example), environment strings can never be longer than 121 characters. Increasing the environment space raises the number of variables the environment can hold, but it does not alter the DOS command line (continues)

PC WORLD STEP-BY-STEP GUIDE #2

Installing a Multiconfiguration System

Often, a single system is used for more than one purpose. One person may need to load various device drivers that support an application. Another may need to limit the amount of memory taken by device drivers. These users require different versions of CONFIG.SYS and AUTOEXEC.BAT. Users of floppy-based systems simply use different boot disks, but hard disk users can automate switching between various configurations. This guide will show you how.

This method uses multiple sets of CONFIG and AUTOEXEC files. A unique extension differentiates each set. A batch file copies a specified set over any existing CONFIG.SYS and AUTOEXEC.BAT files and then calls a utility to reboot the system. For simplicity, this guide shows you how to set up configurations for "User A" and "User B"; the technique can easily be extrapolated to handle more.

CONFIG.SYS AND AUTOEXEC.BAT

Make copies of User A's CONFIG.SYS and AUTOEXEC.BAT files, calling them CONFIG.A and AUTOEXEC.A, in the root directory of drive C:. You may want to use a more informative extension, such as a user's initials or one that refers to the type of configuration. For example, the extension NIL suggests a configuration that loads no device drivers. Repeat the process to create CONFIG.B and AUTOEXEC.B for User B.

ORGANIZING DIRECTORIES

Related files should be kept in their own subdirectory. For example, you can keep all the files from your original DOS disk(s) in a directory called \DOS, your batch files in \BAT, and your utilities in \UTIL. Then, so that any of the programs in those directories can be run even when a program's directory is not the default, AUTOEXEC.BAT should issue a PATH command that lists those directories. The remainder of this guide assumes you have \DOS, \BAT, and \UTIL directories and that every AUTOEXEC.xxx file has an appropriate PATH command.

THE BATCH FILE

Using an ASCII text editor, create the following batch file:

```
copy c:\autoexec.%1 c:\*.bat
copy c:\config.%1 c:\*.sys
c:\util\reboot
```

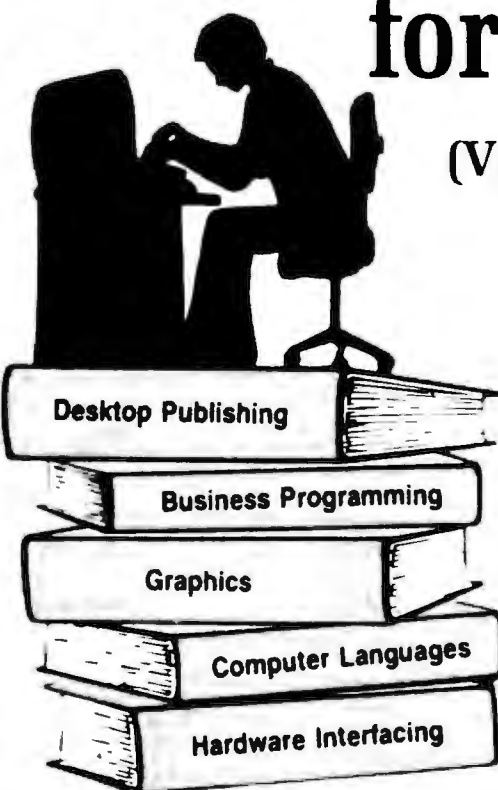
Save the file as BOOT.BAT in the \BAT directory.

THE REBOOT UTILITY

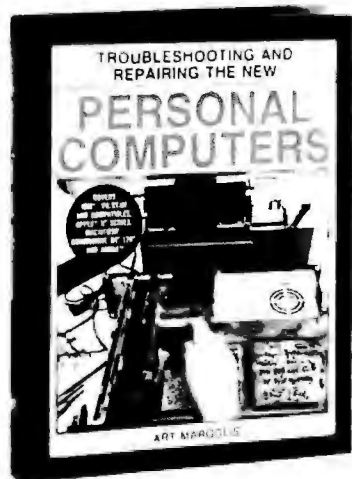
To create REBOOT.COM, run DEBUG (if DEBUG is not in your DOS directory, it should be on one of your original DOS disks). Then type the following keystrokes, pressing the <Enter> key as indicated: a100<Enter> mov dx,40<Enter> mov ds,dx<Enter> mov bx,72<Enter> mov word ptr [bx],1234<Enter> jmp ffff:0<Enter> <Enter> rcx<Enter> 11<Enter> nc:\util\reboot.com<Enter> w<Enter> q<Enter> The installation is now complete. To switch between configurations, simply use the command boot a or boot b at the DOS prompt.

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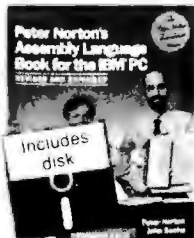
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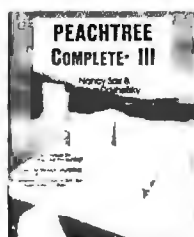
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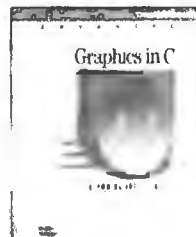
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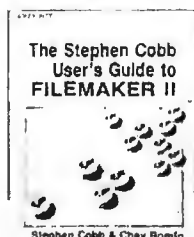
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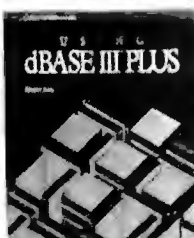
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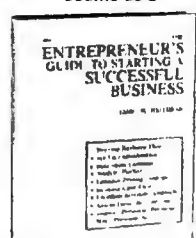
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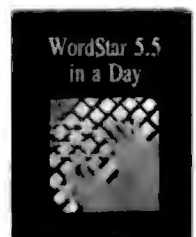
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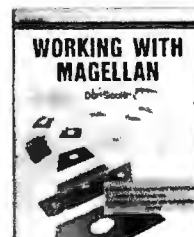
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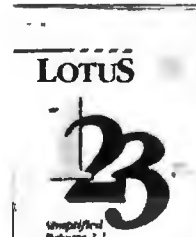
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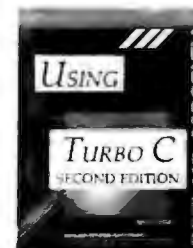
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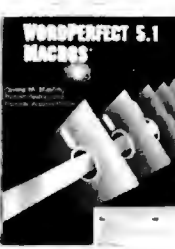
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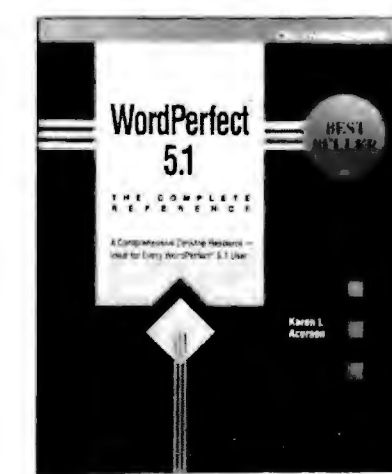
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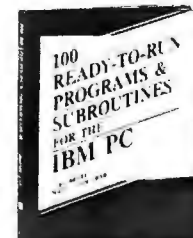
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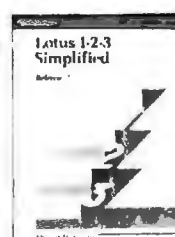
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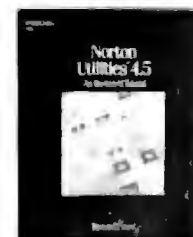
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THE HELP SCREEN

```
echo on
if "%1"==" " goto help
if "%1"=="-" goto reset
if "%oldpath%"==" " goto cont
path=%oldpath%
:cont
set oldpath=%path%
set para=%1
:getpara
shift
if "%1"==" " goto setit
set para=%para%;%1
goto getpara
:setit
path=%para%;%path%
set para=
goto end
:reset
if "%oldpath%"==" " goto end
path=%oldpath%
set oldpath=
goto end
:help
echo To add one or more di-
echo rectories to PATH, use:
echo    AP dir1 [dir2...]
echo To reset default PATH:
echo    AP -
:end
```

LISTING 1: AP.BAT enables you to temporarily add directories to your current path.

character limit.

AP.BAT generates the error because when DOS runs the batch file, it replaces both instances of '%oldpath%' in its fourth command with the value of the environment variable OLDPATH. An OLDPATH string of as few as 53 characters, along with the other characters in that command, produces a DOS command of over 127 characters, generating the error message. What you need is batch file code that doesn't use '%oldpath%' twice in the same command.

The AP.BAT shown in LISTING 1 will work with a much longer path than will the original AP.BAT. However, I advise you to keep your path short by using brief names for subdirectories and by not listing unnecessary directories.

How does...? What can...? Should I...? Send your PC questions to The Help Screen; for details see How to Contact PC World, page 4. ☺

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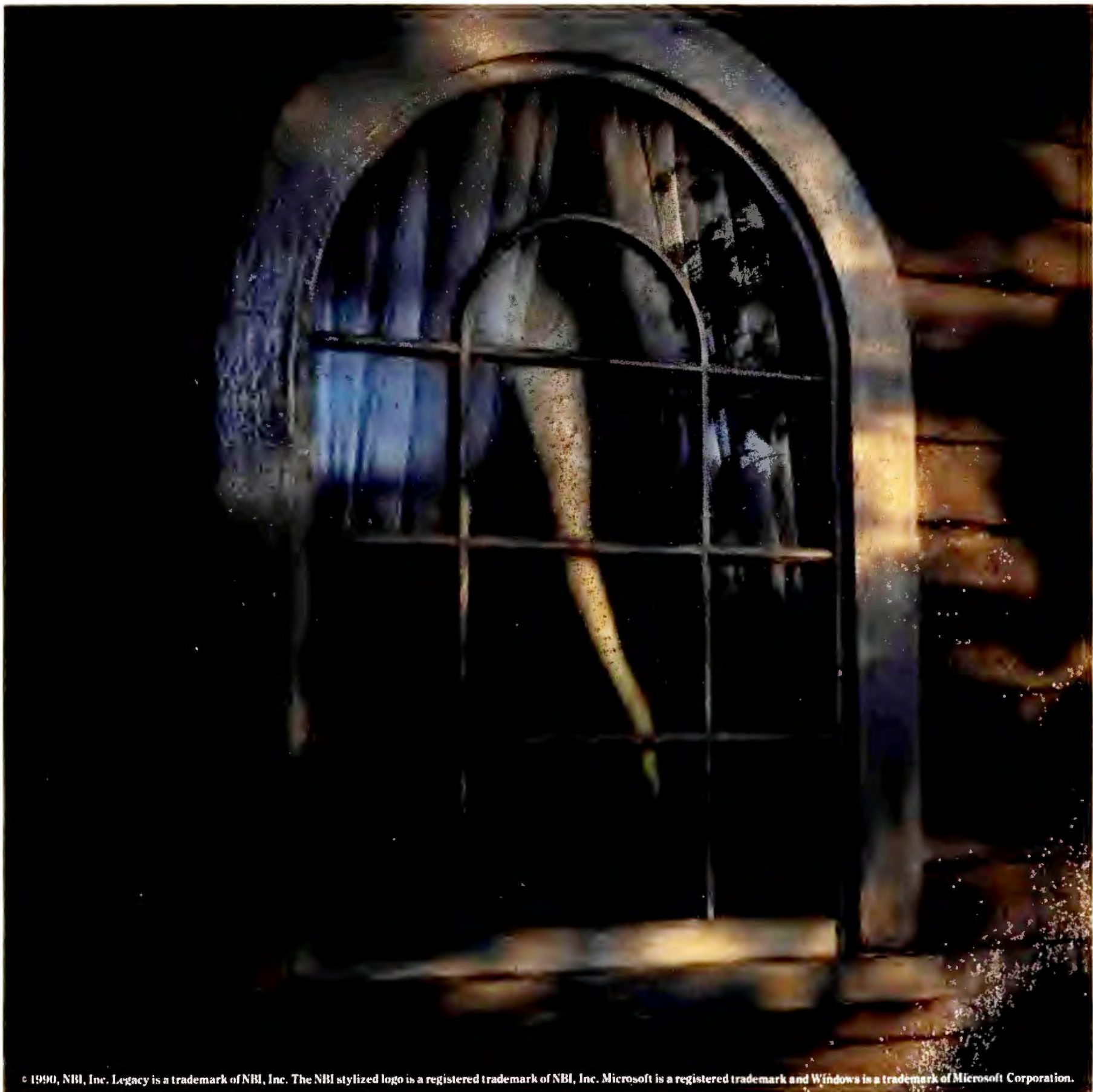
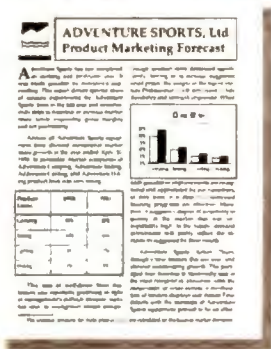
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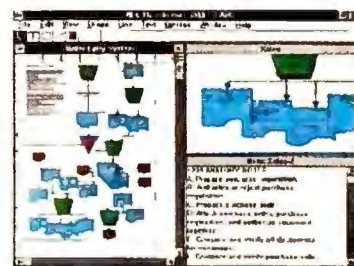
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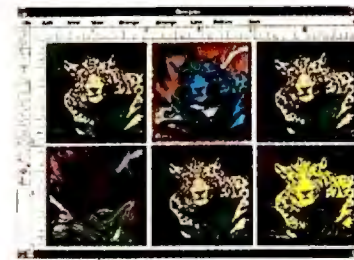
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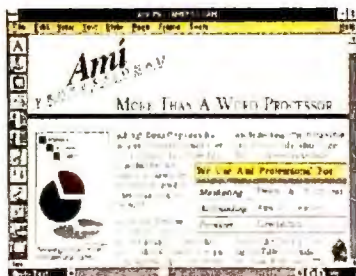


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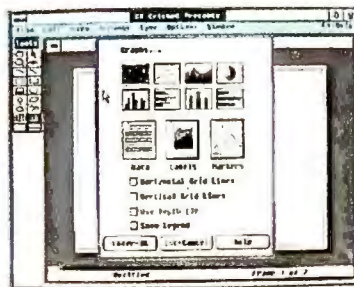
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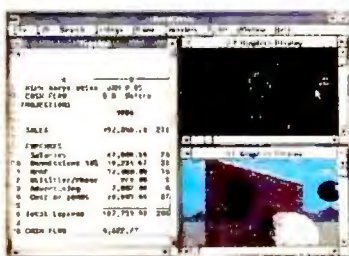
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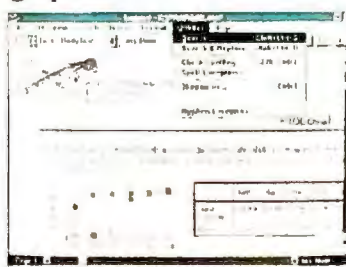
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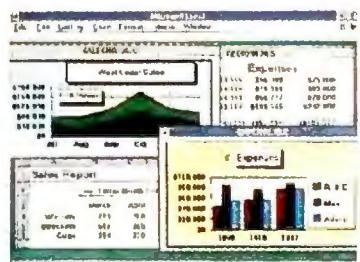
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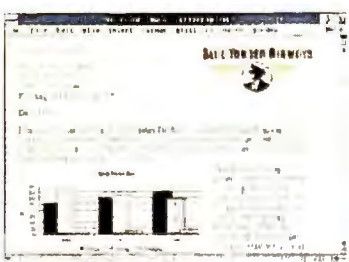
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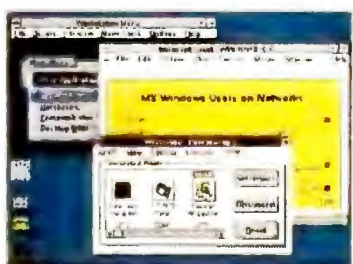
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Garry Ray, writing for PC Week said, "Of these three alternative operating environments (OS/2, Desqview and Software Carousel), Carousel may be the best choice of the day."

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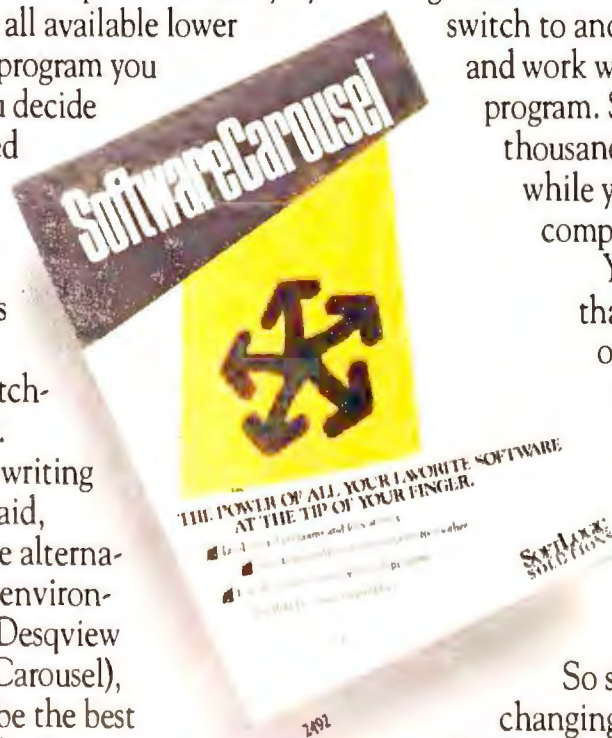
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Roberta Furger

Wheeling and Dealing in the Secondary PC Market

With today's emphasis on the latest technology, the huge installed base of XT's and AT's is often considered little more than junk by those who demand more powerful systems. In fact, the opposite is true—used PCs can often be sold or traded in to offset the cost of new systems. And for new users or users with limited computing needs and tight budgets, an older system can provide sufficient power at an affordable price.

You don't hear too much about it, but the used-computer market is thriving, says Alexander Randall V, cofounder of the Boston Computer Exchange, an international PC broker that matches buyers of used PCs to sellers. Although many corporations and individuals are outgrowing their first- (or second-) generation equipment, he notes, scores of buyers are eager to get a brand name

system—albeit a secondhand model—without paying a brand name price.

Everyone wins when these two groups are matched up successfully: The buyer gets a much-needed system for a reasonable price, and the seller gets a down payment on next-generation hardware. Randall outlines several avenues to a successful match in a book coauthored with Steven J. Bennet, *Alex Randall's Used Computer Handbook* (Microsoft Press, Redmond, Washington, 1990).

Sizing Up the Channels

In general, the more trouble you're willing to go to, the better your return or the more system you'll get for your money. For example, sellers who are willing to track down potential customers, demonstrate their system, and ultimately clean and pack up the unit are likely to get more for their used PC than those who opt for the hassle-free approach of trading in the old system for newer equipment.

Retail stores can be a good source for bargains on used PCs.

The most common source of used equipment is a local dealer that buys and sells used PC hardware. The *Syberx Computer Blue Book*, published twice a year by the National Association of Computer Dealers, lists over 200 dealers throughout the United States that carry secondhand equipment.

One such store, Byte Brokers of Sacramento, California, has been selling

used PCs since 1984, primarily to individuals and small companies on a limited budget, says co-owner Patricia Maxey. A used system typically sells for 20 to 30 percent less than the retail price of a new unit. If the model has been discontinued, the price can be as low as 50 percent of the original selling price. "We don't get many systems on the cutting edge," Maxey notes, adding that used-PC buyers are usually content with "trailing edge" equipment.

But there are plenty of other channels for both buyers and sellers, ranging from want ads in the local paper or PC tabloid to a PC broker, which acts as an intermediary between the two parties.

Weighing the Options

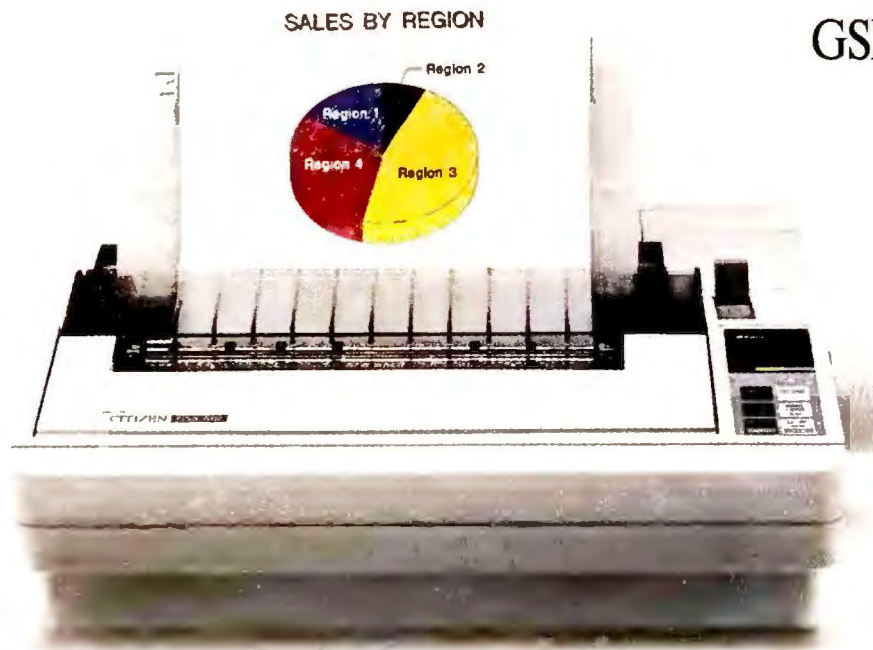
Each channel has its merits, but the route that's best for the buyer isn't always best for the seller. Consider Randall's assessment of some of the most common options.

Want Ads For the most part, want ads aren't worth the time and money for either the buyer or the seller, says Randall. The one exception is a want ad in a local PC circular. The seller reaches a targeted audience, and the buyer can compare a variety of systems.

Retail Computer Stores Your local dealer is a convenient option if you want to trade up, but you probably won't get top dollar for the used system. Buyers, on the other hand, may find retail stores a great source. Dealers make their profit on the new equipment, so they're often willing to bargain on used units. Most test the equipment before selling, and some even offer limited warranties.

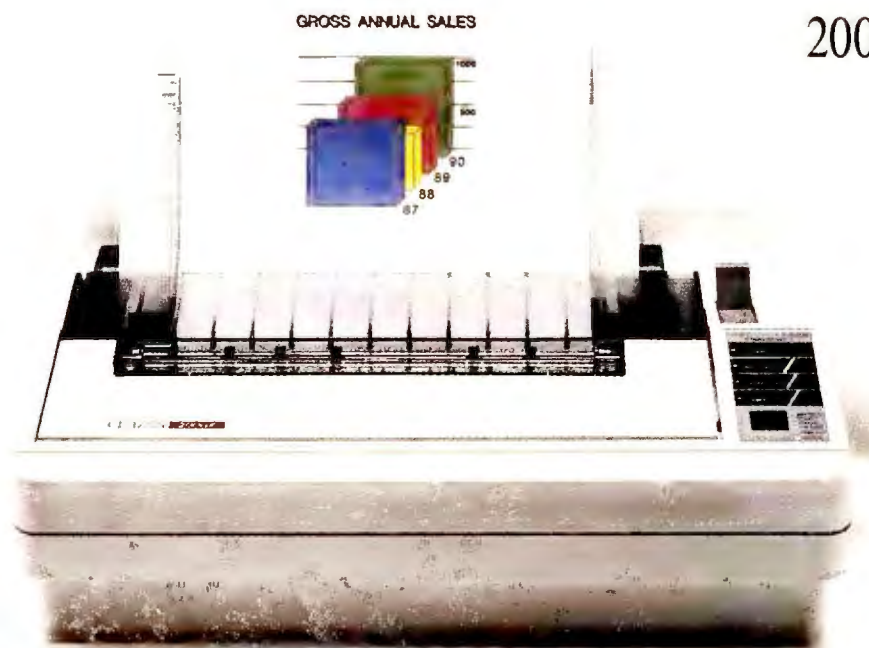
Used-Computer Stores Like retail computer dealers, stores that specialize in used equipment often have a good
(continues)

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selection of brand name systems that have been tested and are backed by a limited warranty. Sellers won't find this channel as attractive, however. According to Randall, you can expect to get only half of what you would have netted if you sold the system yourself.

Consignment Stores Even though there's little work involved for the seller;

the payback will be considerably lower if you choose this route, since consignment stores charge as much as 35 percent commission. A little negotiating on the buyer's part may yield a great price on a system. Selection varies considerably from one store to the next, so call first to find out if the store has the make and model you want. Ask, too, if the

store services what it sells.

Swap Meets Randall describes these modern-day bazaars as a great way to off-load equipment you can't sell anywhere else, but buyers should proceed with caution.

Auctions Once the bidding gets started, buyers may wind up spending far more than the market price for a system, says Randall, so in general this isn't the place to go for great buys. Auctions can also be a hassle for the seller and aren't worth the effort unless you've got a large number of systems to sell. When that's the case, you may be able to fetch top dollar through an auction.

Brokers Local, national, and international brokers represent a low-risk option for both the buyer and the seller. They generally have a wide selection to choose from. They also offer both parties some security, because funds are often deposited into an escrow account (continues)



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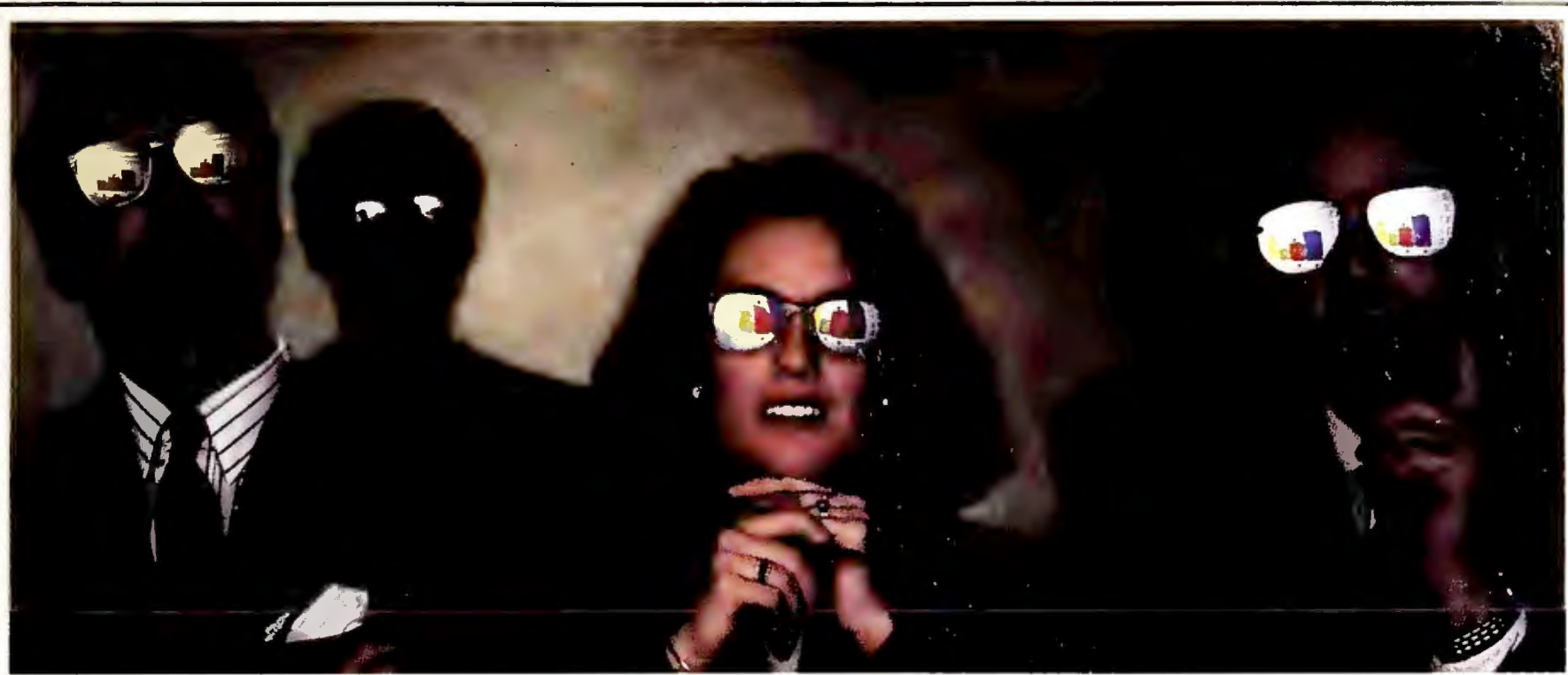
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POWER TIP NO. 124

WordPerfect: Stepping Out of Character

The documented method for turning off print attributes in WordPerfect 5.0 is to press the same keys that you used to turn them on. With bold or underline, this is a simple matter of pressing <F6> or <F8>, but with italics, superscript, and other choices on the Font Appearance menu, as well as with styles, it can get a bit cumbersome. An easier and more reliable way to turn off any attribute is to move the cursor past the closing attribute code by pressing <Cursor Right>.

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until the buyer has tested the system. Brokers generally charge between 10 and 15 percent for their matchmaking services.

Tips for Buyers and Sellers

Whichever channel you're considering, Randall advises sellers to evaluate their options based on several factors.

The first is cost: Calculate the cost of advertising your system as well as the ultimate charge for completing the sale, such as a commission or brokerage fee. Second is exposure: How many potential customers are you likely to reach? Third is effort: Will you have to demonstrate the system to scores of tire kickers, or can you merely walk into the

dealer and negotiate a trade-in? Fourth comes risk: What are the chances you'll be stuck with a bad check?

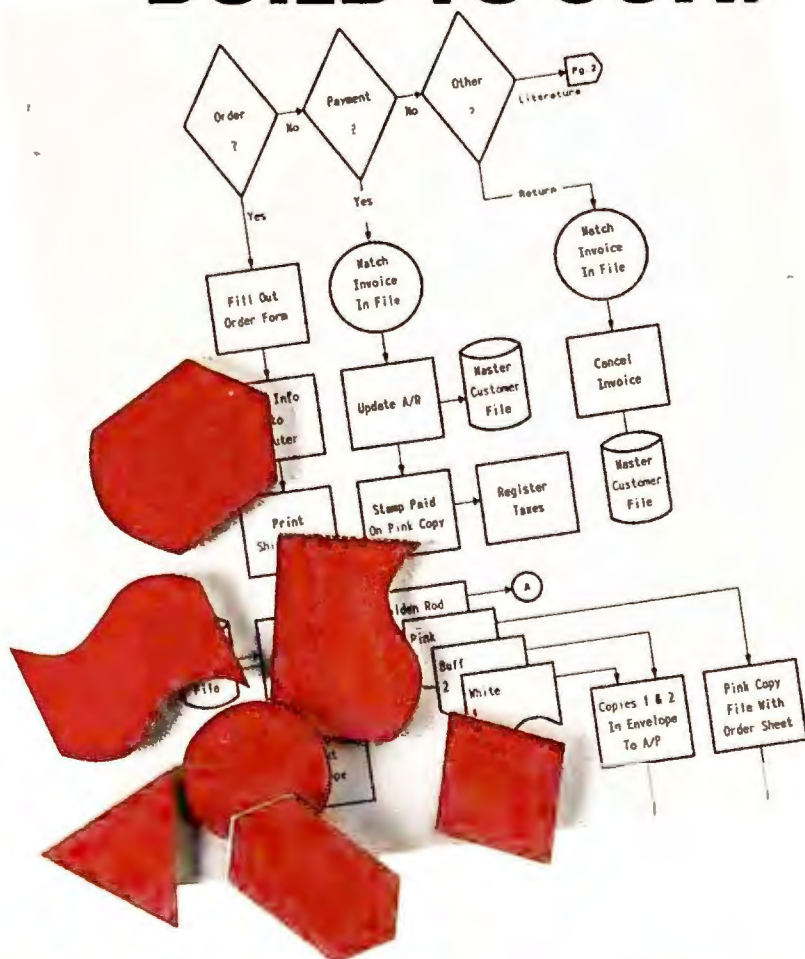
Buyers, too, need to review certain issues before plunking down their money. First, is a used PC the right choice?

For most buyers considering the secondary PC market, the choice comes down to either a no-name clone or a used system. Both are reasonable options, but, as always, there are trade-offs.

If you go with a clone system, you'll generally get a more powerful computer for less money. But its resale value is minimal, says Randall. He advises choosing this option only if you aren't concerned about trading up. Buy a used system, he suggests, if you want the security—and the resale value—that goes along with brand name equipment. Additionally, he points out, you'll often find extras such as a large hard drive, a modem, or a mouse included in the price.

(continues)

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POWER TIP NO. 125

Choose a Font for WordPerfect Line Numbers

In WordPerfect 5.0 and 5.1, line numbers need not be in the same font as your main text. To print them in a different font, go to the top of your document, press **<Ctrl>-<F8>**, pick *Base font*, and select a font for the line numbers. Next, get to the line-numbering option menu with **<Shift>-<F8>** *Line Line numbering Yes*. Select your options and exit the menu with **<F7>**. Finally, select another font for your main text with **<Ctrl>-<F8>** *Base font*.

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Second, if you decide to go the used route, testing should top your list of precautions, says Randall. Some channels will test and guarantee equipment (usually for 30 days after the sale). This provides the seller with an added sense of security, but it may not be worth the added price, Randall cautions. "Either the system will hum along fine, or it

won't work at all," he says.

Third, make sure you get the original invoice for the system. It's your only assurance that you're not buying stolen equipment and the only way you'll be able to obtain service if the unit is still under warranty. (It's up to the dealer, however, whether or not to honor a warranty if you're not the original owner.)

The Perfect Match

Not everyone will want to trade in the secondhand-PC market. Users often pass outgrown equipment along to those with less demanding computing needs, while others choose to donate the equipment (the subject of a future *Consumer Watch*). Similarly, used PCs aren't for everyone. Individuals or corporations with large enough budgets will want the latest technology, as well as the security that goes along with buying new equipment from a familiar source.

Many users, though, will find just what they need in this low-profile but thriving market. As Randall notes, "One person's antique computer is another's technological windfall."

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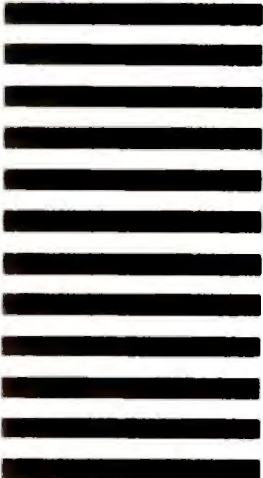
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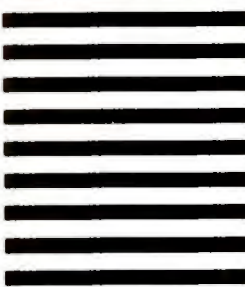


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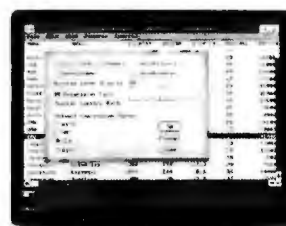
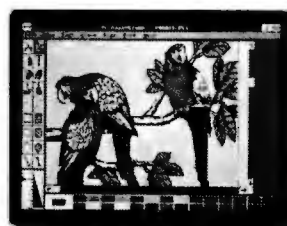
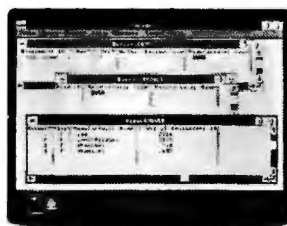


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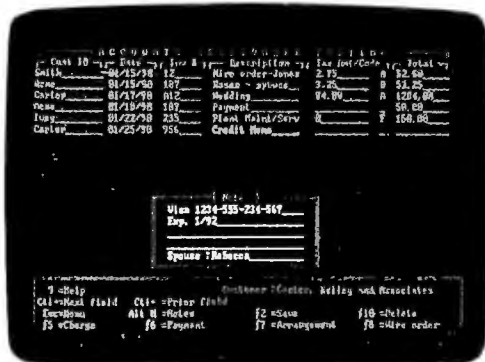
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CheckFree responds: Many *CheckFree* payments are sent by mail. CheckFree guarantees to get payments in the mail so they arrive on time. However, this does not always mean they are posted on time. Some merchants handle *CheckFree* drafts on an exception basis, which causes posting delays.

To help avoid this situation, CheckFree encourages users to schedule payments a few days early. If the merchant posts late, the payment will probably still be posted before its due date. If the merchant posts late and assesses a late fee, CheckFree will do its best to correct the situation.

In Mr. Logan's case, we informed him we would work to resolve any late fees merchants had charged and did not immediately agree to waive.

We experienced some difficulties in customer service during the period in which Mr. Logan encountered problems. At that time, our call volume increased markedly due to the release of the *Managing Your Money/CheckFree* integrated product. Consequently, our reaction time suffered, and we were unable to provide first-rate service consistently. We have addressed this problem through an increase in staff and enhancements to *Managing Your Money*.

Michael M. Sapienza

Vice President, Marketing

Express Micro Policies Questioned

Over the last two months *Consumer Watch* has received more than a dozen letters from customers of Express Micro Mart, a mail-order firm in West Bloomfield, Michigan. Customers complain of being charged for products they haven't received, being unable to obtain (continues)



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service on malfunctioning products, not receiving refunds on returned goods, and more. In virtually every instance, the problems come down to poor customer service on the part of Express Micro Mart.

Although some readers had their problems resolved after *Consumer Watch* intervened, several recent inquiries have gone unanswered by Express Micro Mart. The number of complaints concerns us and should serve as a warning to others considering doing business with Express Micro Mart.

Mail-Order Trade-Offs

I would like to comment on the letter written by Frank J. Sarno, Jr. [April 1990], concerning a warranty issued on a Compaq monitor he purchased from RP Systems.

In Mr. Sarno's case, the Compaq service facility took it upon itself to repair the monitor after the warranty had expired. I agree with Mr. Sarno that Com-

paq went beyond the call of duty in doing so. However, customers must keep in mind that mail-order firms, in order to keep their prices as low as possible, cannot afford the luxury of extending the warranty period beyond the end date. There are of course exceptions to this practice, but such extensions are not the norm in the mail-order industry.

A mail-order firm cannot offer the same breadth of service that a full-service dealership provides. In our experience, most mail-order customers are willing to forgo the services of a fully authorized dealership in order to save money. However, some customers desire a higher level of service. In fact, RP Systems has turned some potential customers away, suggesting they buy from a local dealer instead, if we felt we could not provide the service the customer was seeking.

Celeste Aguilar

*Customer Service Manager
RP Systems*

Read the Fine Print

Everyone seems to be getting into the 900-number act, including some PC mail-order firms that are instituting 900 lines for sales inquiries. Although the ads tell readers they'll be charged for the call (generally to the tune of \$2 per minute), this information usually appears in *very* small type, and it's been overlooked by some mail-order shoppers. One reader told *Consumer Watch* that he was charged \$22 to inquire about a mail-order firm's advertised products. Luckily, after he explained his predicament, the phone company deducted the charge from his bill.

Take action! If you've got a complaint or a compliment, send it to Consumer Watch. We'll follow up and publish letters with the broadest interest. For more information, see How to Contact PC World, page 4. ☺

Which PCs are companies buying? See "Rate Your Satisfaction," p. 78.

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COUNTRY

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At just under a mile long, it's comparable to nearby estates here. The price is reasonable for the property.

I think you should see it.

Alan

Alan

Application for Employment

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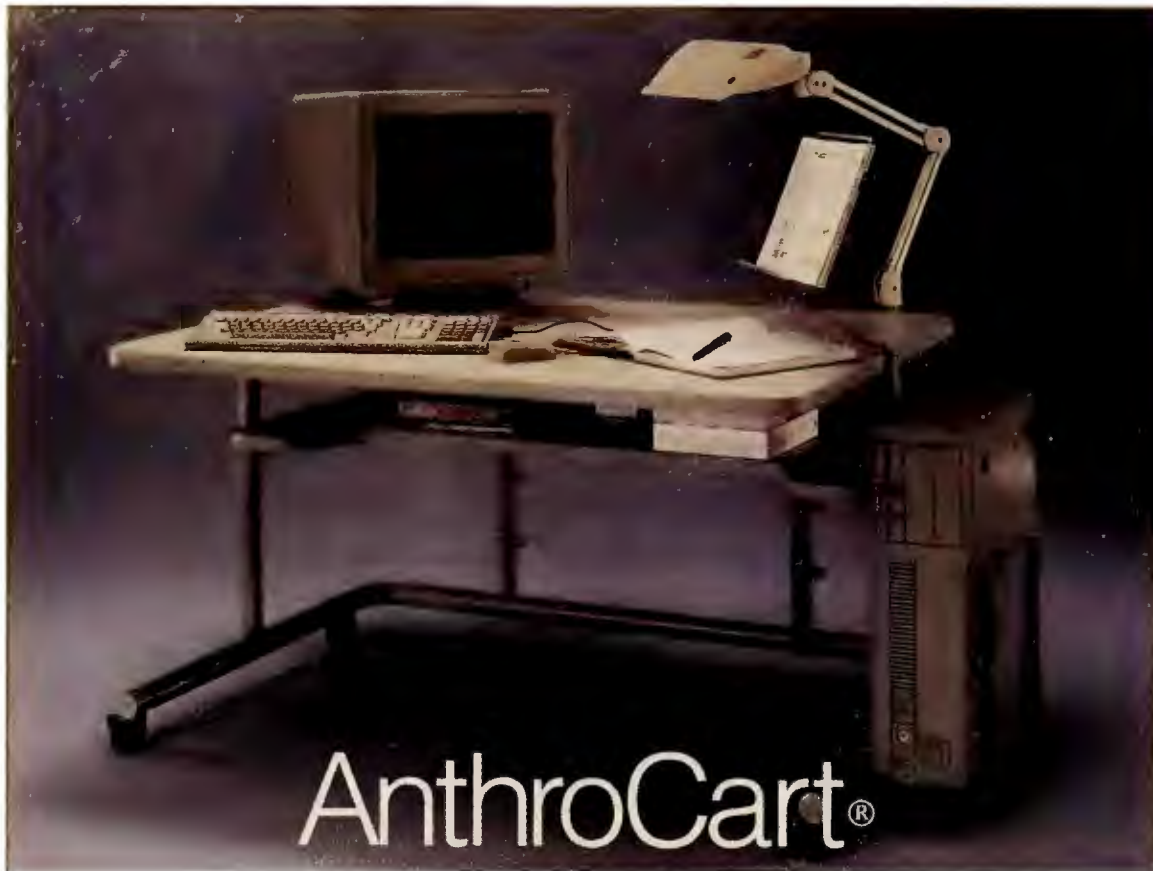
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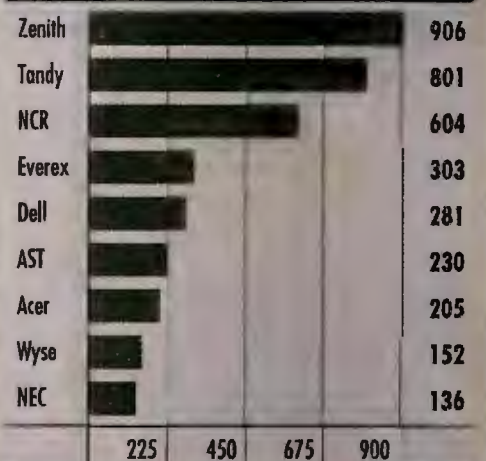
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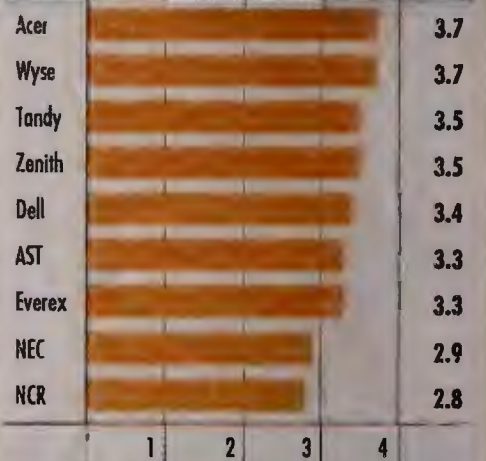
RATE YOUR SATISFACTION: PC Compatibles

IBM and Compaq still rule, but second-tier PC suppliers are carving out a niche among large organizations. Zenith Data Systems and Tandy lead the second-tier market in installed base but not in buying plans. In contrast, Acer and Everex have relatively small customer bases but rate extremely high in buying plans.

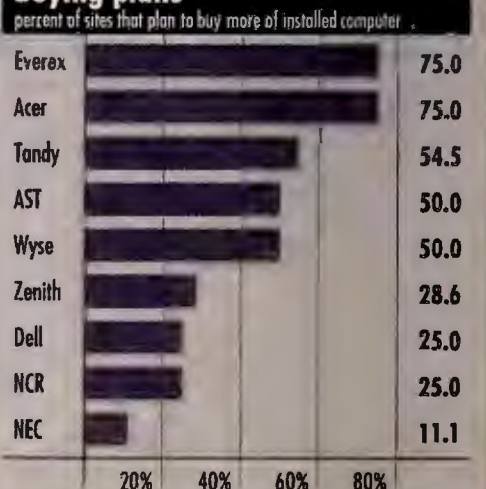
Installed base at survey sites



Users rate their satisfaction 1=low 4=high



Buying plans



Source: International Data Corporation. From a survey conducted in July of 1989 of 200 organizations, each with at least 50 PCs.

NEW! FORMTOOL GOLD! Just Sit Down and Create a Great Form!

*The Best-Selling Forms Software
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It's easy to see why FormTool is the best-selling forms package in the world. It's the fastest, easiest way to create, edit, manage and print custom, professional forms for immediate information gathering.

The ability to quickly gather data and put it to work is critical to corporate information flow. FormTool's "Intelligent Line Drawing" and its hardware compatibility make it an indispensable tool for businesses of any size. That's why FormTool has found a home in well over half of the Fortune 500 companies, along with thousands of educational institutions, government agencies, hospitals and financial organizations around the world. They've discovered FormTool's productivity and information gathering power.

Unlike its competitors, FormTool doesn't require additional memory, a graphics card, color display, mouse or scanner. It runs beautifully on anything from an XT to a 486. FormTool now supports hundreds of dot-matrix, letter-quality, daisywheel, thermal as well as Hewlett-

Packard and new support for PostScript lasers.

Draw Forms with Unmatched Speed.

FormTool streamlines the PC's ability to draw. Lines of any weight, boxes of any size, grids of any complexity and more can be quickly drawn with just a few keystrokes. If a grid isn't quite right, one keystroke re-draws it to meet your exact specifications, then displays it on the screen with our WYSIWYG display. Zoom in to see a close-up of your form, then zoom out for the full page view. If you spot a problem, quickly make the revision, preview it again — then print it.

This preview capability combines the advantages of a graphics-based, on-screen display with text-based, lightning-fast processing times and makes FormTool even easier to use — and enhances creativity and accuracy in the design process.

FormTool's ability to make instant revisions to your forms gives you the flexibility to create exactly the proper form to meet the precise requirements of your work flow. And FormTool is so simple to use, it's ideal for users of any experience level right out of the box.

No other forms package delivers the productive drawing power of FormTool.

Anatomy of a FormTool Form

Horizontal And Vertical Line Drawing.

All you have to do is position the cursor where you want to draw a line. Then hit one key, and FormTool will automatically draw the line.

Any Type Style.

Choose from italic, underlined, bold, bold italic, superscript, subscript and user defined styles.

Large Letters.

You can select large letters, and even oversize letters up to one inch tall.

Line Width.

Just specify single, double, or bold lines, and FormTool will draw them. You can also switch between single, double and bold lines with one keystroke.

Form Fill-In & Merge.

You can easily set this form up as a template for filling in — to be printed, or stored.

Automatic Grid Drawing.

Drawing a grid is easy — just specify: column width, row height, number of columns, number of rows, or leave any out, and FormTool will automatically draw the grid based on your specifications.

Form Size.

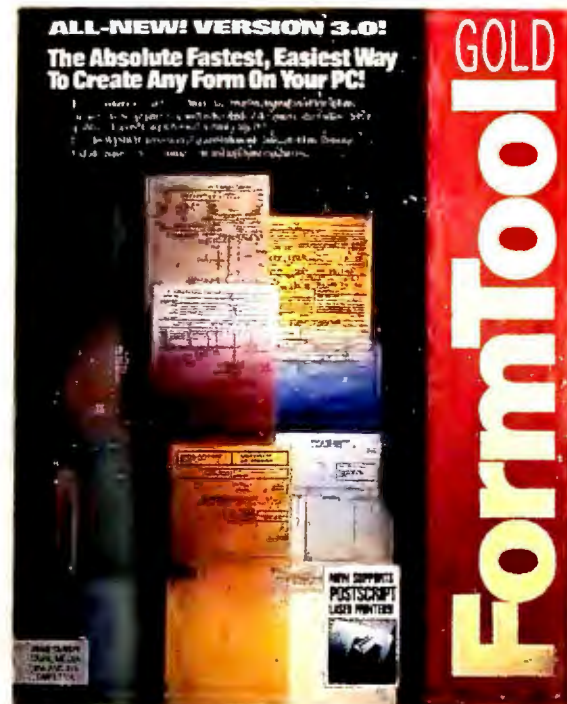
You can select from any standard size such as letter, legal, or computer. Or, you can specify a custom size from postage stamp to 13½ inches.

Perfect Corners.

FormTool will end every line with perfect corners and T's — everytime. It will even "pipe" double lines.

Fully Supports All Attributes of Your Printer.

You can "plug in and print" over 300 dot-matrix, ink jet, thermal, letter quality and laser printers.



Enter Text Into Your Forms In Seconds.

To handle text, FormTool contains a forms-oriented word processor that allows you to move quickly through the form inserting captions, instructions, word-wrapped text and special symbols, logos and characters. FormTool will enter your text into position automatically.

An All New Forms Manager.

And FormTool Gold contains an all new Forms Manager that makes organizing, retrieving and archiving forms faster and more efficient. Includes a built-in backup and restore, the ability to instantly view forms from a list on your screen and a new set of features that allow you to "move," "copy," or "delete" forms from the Forms Manager.

FormTool's Forms Manager also includes hard disk directory support, allowing you to store forms anywhere — or you can assemble form sets in just seconds using the sleek new menu system. There's an all-new automatic "Backup and Restore," a new "View Form" feature — even an innovative directory system for fast, efficient archival.

All New PostScript Support.

FormTool now allows you to quickly print your forms on PostScript and compatible laser printers without conversion or special commands. Simply select your printer type from the configuration screen and print. You can add logos, graphics and other elements to your forms.

Display Multiple Forms In Windows!

FormTool will allow you to load up to four forms into your computer's memory for quick toggling between them, or for viewing multiple forms on the screen at one time.

While editing multiple forms, elements can be transferred from form to form. Blocks can be easily copied, replaced, moved between forms.

Form Fill-In and Merge.

FormTool's merge capability allows users to fill-in form templates, save the data, and print it out into position on the form. This data can be saved by FormTool's database for later retrieval, editing and re-printing.

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Introducing The NEC Intersect CDR-35 portable CD-ROM player. An amazing instrument. Weighing in at just 2.2 pounds the CDR-35 offers all the capabilities of full-size players at about half the price. And, with the purchase of the optional battery pack, the CDR-35 becomes portable, weighing only 3 pounds!

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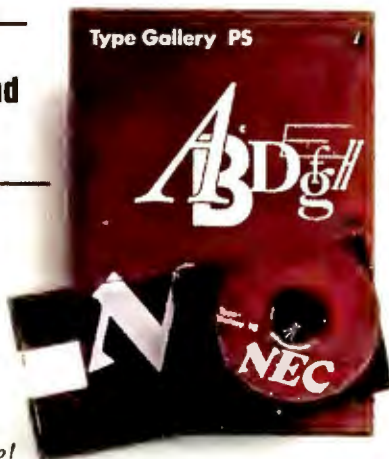
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Turn your PC into a type house with the most extensive collection of typefaces available anywhere! CD-ROM technology allows you to access 600 individual typefaces on a single CD-ROM (rather than gobbling up precious space on your hard disk) and instantly use them for use in letters, reports, newsletters, brochures, ads — anything you publish.

These high-quality typographic libraries are compatible with virtually all desktop publishing systems and are not imitations — they are licensed by Adobe Systems and incorporated from famous type foundries such as ITC, Linotype AG, Bigelow and Holmes, Fundicion Tipografica Neufville S.A., Kingsley/ATF Type Corporation, Letraset and others.

The Type Gallery PS disc contains all 600 Adobe PostScript language fonts. The Type Gallery LJ disc contains 76 AGFA PCL fonts which are compatible with HP (and compatible) LaserJet printers.

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This remarkable volume contains over 4000 high quality digitized photos covering a long list of subjects from business and industry to nature and people. Perfect for layouts, comps and presentations, Image Folio features an ultra fast keyword search system that allows you to find the exact photo you need in just seconds.

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Total for all 2800 Metro Images ... \$719.00

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Personal Lawyer works by asking you a set of questions related to your specific situation. The program will then ask subsequent questions, to follow-up, based on your original responses. Once the complete set of questions has been answered, Personal Lawyer will compile the information, select paragraphs from a pre-determined set within the system, and actually "write" an enforceable document for the circumstances you've described using its unique "text-builder."

This program has been developed under the supervision of attorney Douglas B. Jacobs, and the documents produced are legally binding. You could save thousands of dollars in legal fees by preparing documents yourself on your PC, quickly, easily — and inexpensively — with Personal Lawyer.

► Last Will And Testament.

The importance of a personal will cannot be overstated and there are many reasons for having a will in today's society. You have undoubtedly worked very hard to acquire the property that you have, and it would be unfortunate if it were to go to persons who you would prefer not to benefit from your estate.

Without some careful thought to the distribution of your estate, it is possible that it might escheat (default) to the State or Federal Government, resulting in higher taxes and/or fees than necessary.

Perhaps most important is to remember those persons who you care about and who care about you, and adequately provide for them. Often, it is important to consider who is to take care of your children if you should die before they are old enough to take care of themselves.

This portion of the Personal Lawyer program permits you to bequeath general or special gifts. It also enables you to specify the executor of your estate, choose a guardian or guardians to care for minor children and make many other decisions for competent estate planning.

► Promissory Note.

Promissory notes provide the written ability to agree to accept a loan on certain terms and to define the payback of the loan.

The promissory notes created by Personal Lawyer will be enforceable legally, and can be specifically designed by the user for maximum flexibility. If you have ever borrowed or lent money, you should have a written note outlining in detail the timing and method of payback.

This program will create notes that are paid back with or without interest, with or without installments, with or without balloon payments, or even simple notes payable on demand. You can also write a note that is secured or unsecured and specify the type of security given.

In addition, specific information on all rights and obligations of both borrowers and lenders is provided.

► Power of Attorney.

This program will help you write three very useful legal documents. It will allow you to write a General Power of Attorney, a Special Power of Attorney, and a Revocation of a Power of Attorney. They can give the power to take care of your assets, either generally or for specific matters.

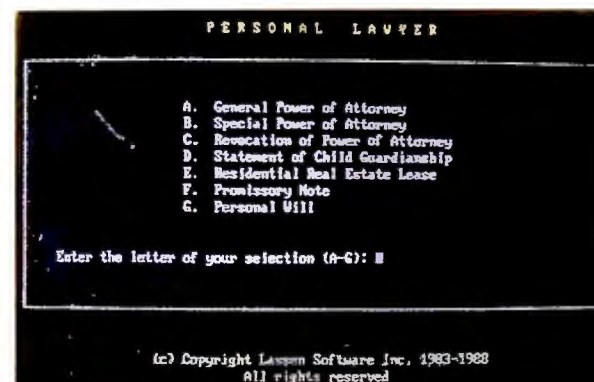
There are many times in one's life when you might want such a document; for example, it could be very helpful if you are leaving on a trip for a period of time and need to legally appoint someone to care for your interests while you are gone.

► Statement of Guardianship.

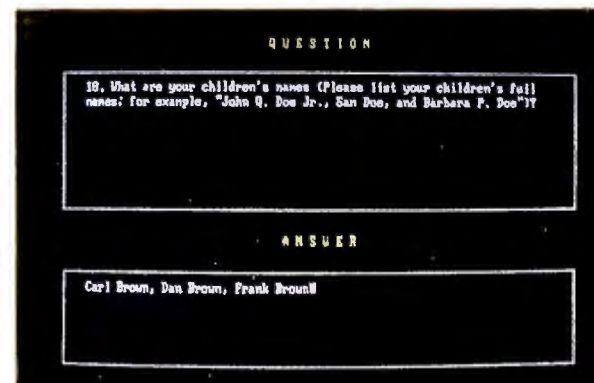
This document authorizes temporary consent for certain situations. It can be used to give a neighbor or friend discretion to care for your children in your absence. Such a document is often useful to give your child's teacher or school the requisite authority to take the child on field trips and class outings. This program can be used to give someone general control or to give them only very limited and specific rights.

► Residential Real Estate Lease.

This portion of the program allows you to easily write a legally binding lease for such residential property as a house, duplex, apartment or rental condominium.



Personal Lawyer is designed for ease of use — from preparing your document to printing it. Each screen contains helpful information and references to the manual for more complete explanations. Shown here is the final screen; you can print to disk, print to screen — or both.

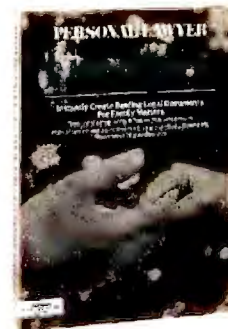


Simply type the answers to questions that appear on-screen. Personal Lawyer then "writes" the document for you.

If you have real property to rent as a residence, or you are a renter of such property, you need the protections of a *written lease*. Using this program carefully will allow you to provide numerous paragraphs to structure an enforceable legal document that describes all of the rights and obligations of both the landlord and the tenant.

You can create a lease that allows or disallows such items as: a security or cleaning deposit, pets, payment of utilities by the landlord or tenant, parking privileges, etc. This will insure that the property is not improperly used or harmed, and that both parties are fully legally protected.

A Personal Lawyer for Family Matters.



Personal Lawyer Lifestyles allows users to easily address issues related to their relationship in a mature, informative manner. It's innovative "question and answer" format asks for specific information about your particular situation, offers help when needed, then automatically prepares the document. Export the document that you've created in Lifestyles to your word processing program for editing.

Personal Lawyer Lifestyles includes modules to create legally binding prenuptial, postnuptial, living-together and marital settlement agreements, as well as statements of guardianship.

(The PERSONAL LAWYER meets the requirements of 49 states and the District of Columbia — the state of Louisiana is excluded because much of its legal system is based on French rather than English law.)

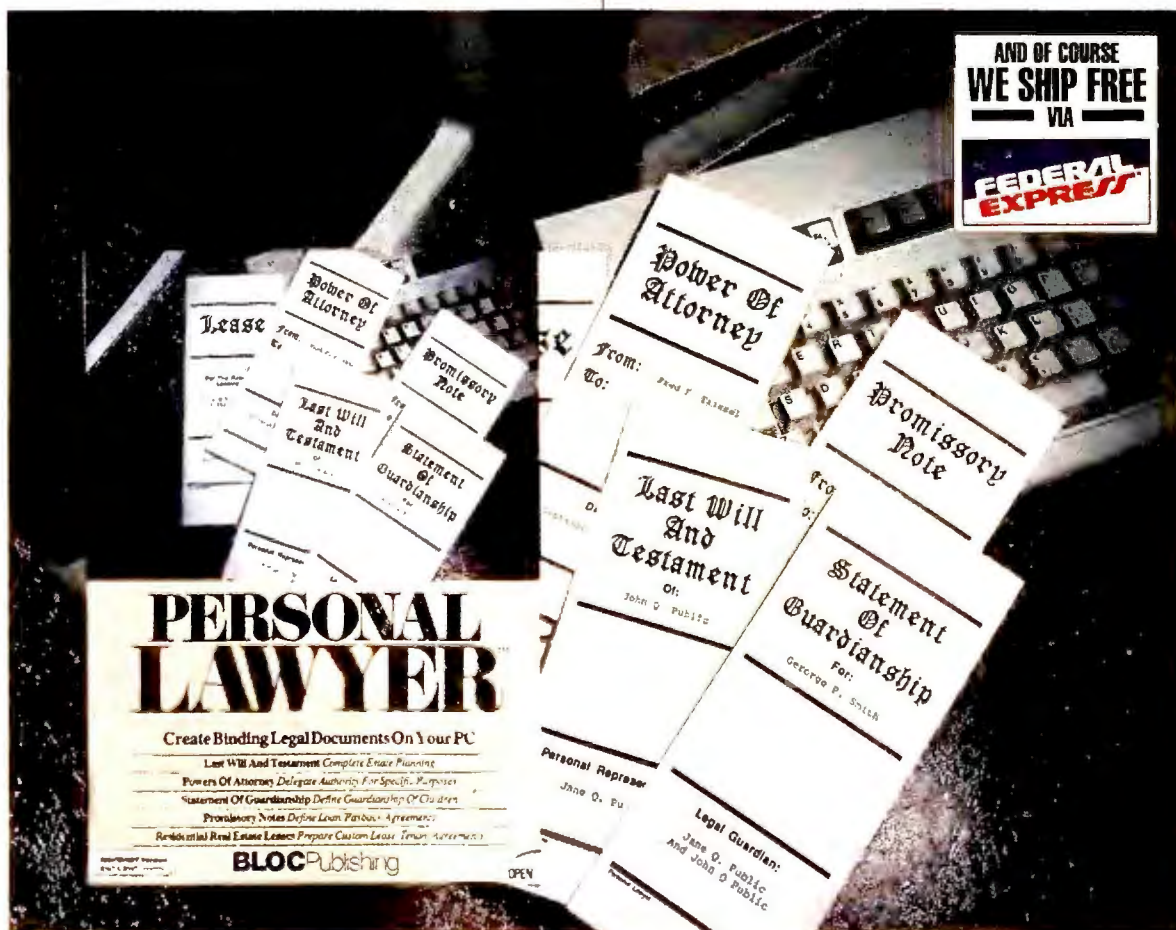
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Diskette labels are printed with a title, your comments, and a complete list of file names found on the diskette. You can use any one of the several pre-designed label formats that are provided with the program or design your own.

Printer Support.

All printers are fully supported. All printer codes, font types and sizes may be used for printing labels. Serial printers supported through DOS MODE command.

Catalog Capacity.

Each catalog may contain up to 500 diskettes and 32,000 files. An unlimited number of catalogs can be created. Catalog size limited only by disk space. Diskette Manager 3 will print any label that your printer will accept. The diskette title will hold up to 20 characters (up-

per and lower case). The date and sequential serial numbers may be automatically added.

File names can occupy up to 66 lines on a 4" x 1 1/2" label, and unlimited file names using additional labels. Comments can occupy up to eight 57-character lines. To find one particular file that's buried somewhere in that stack of fifty — or 500 — diskettes, quickly perform a catalog search to your specifications.

Menu-Drive for Fast, Easy Operation.

Diskette Manager 3's menu-driven system makes it easy to quickly create labels and reports to any specifications. Function-related help screens are available with one keystroke.

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Diskette Manager 3 includes (20) 5 1/4" and (20) 3 1/2" blank labels to get you started right away!.

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Now you can create charts in a matter of minutes — illustrate policy making, responsibility delegation, authority levels, flow charts, procedure diagrams, 'decision trees' — or for use in sales presentations.

Simplicity Equals Speed.

We completed our first chart in 11 minutes after opening the box! Sleek, easy-to-use box drawing capabilities make Corporate Ladder simple — just type your text and one keystroke draws a box around it!

Group boxes with another keystroke and revise charts in seconds. Change paper — and Corporate Ladder adjusts the chart size automatically! It even has an on-screen WYSIWYG display!

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Create popular "Decision Tree" charts that lead employees and associates through "if-then" decision-making choices. This type of chart is designed to reduce

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The "Procedure Diagram" illustrates sequential steps to follow when undertaking a certain task.

Unique "Finishing Touches" Feature.

Once you've completed the layout of the chart, Corporate Ladder will automatically center text, center lines and align boxes. It even consistently spaces the elements of the chart.

If you need to make revisions, simply insert your new boxes or text, hit the "Finishing Touch" command, and the chart is re-aligned and perfectly spaced. That's the beauty of Corporate Ladder — the ability to actually see what your chart will look like as you work.

FREE FONTS!

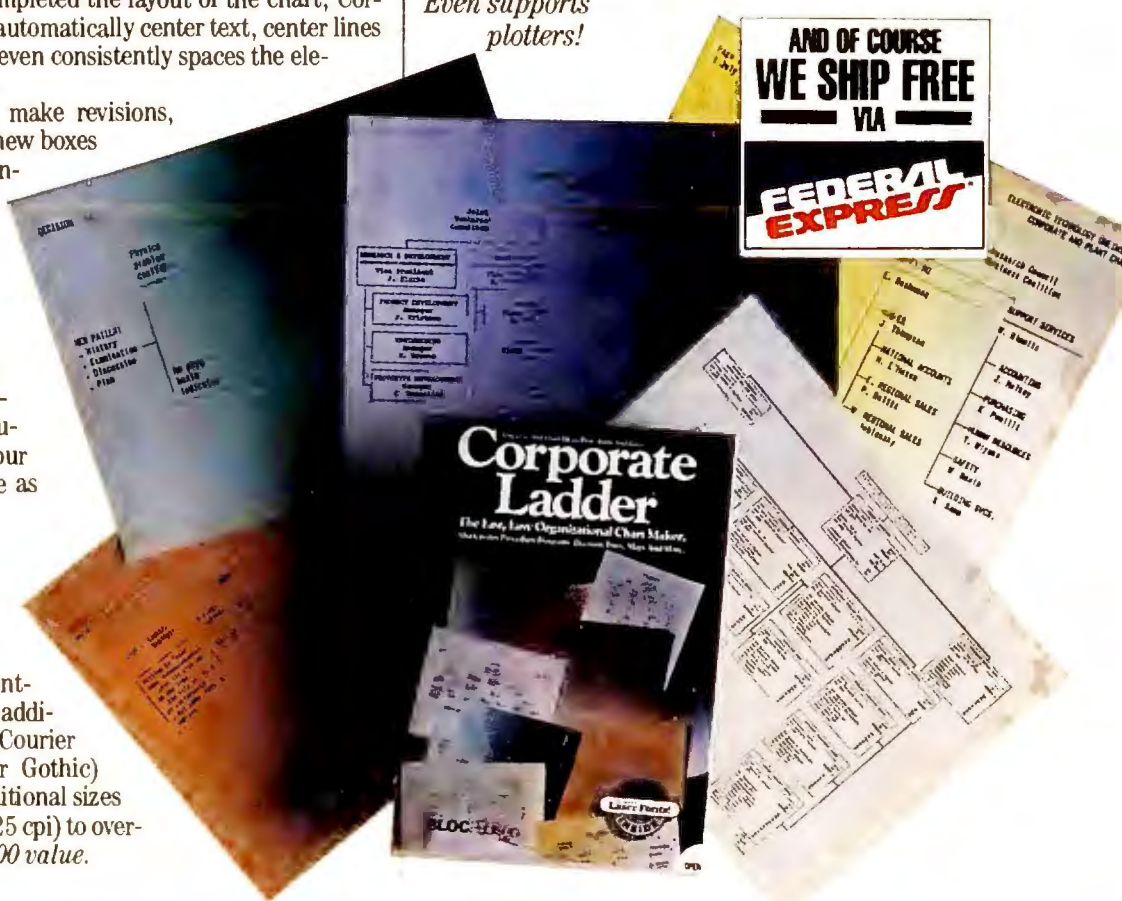
The Laser Font-Pack includes two additional typefaces (Courier and Modern Letter Gothic) and allows four additional sizes ranging from tiny (25 cpi) to over-size (8 cpi). A \$29.00 value.

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DW 4950 Corporate Ladder 5 1/4" & 3 1/2" ... \$79.95
IBM PC, XT, AT, PS/2 and compatibles; 512K RAM. Supports virtually any dot matrix printer — including the HP Laser-Jet Plus or Series II.

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*Supports most dot-matrix and laser printers!
Even supports plotters!*



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Please Read This Page Carefully if You Own a Hard Disk.

Your Hard Disk is A Time Bomb!

Fragmentation Is Inevitable and Fatal!

When your hard disk was new, it ran lean and swift, retrieving files in just a few seconds. But as you added programs and files, your hard disk became fat and sluggish — in fact a *fragmented*, “dirty” hard disk can take up to 100 seconds to retrieve a file that used to take just 10 seconds — THAT’S TEN TIMES SLOWER!

The problem? Fragmentation kills hard disk performance. It causes excessive head movement across the media, creating bad spots throughout the drive. It’s aggravating and dangerous! A fragmented hard disk, left unmaintained, is almost certain to crash. That means major data loss. Disk Optimizer 4.0’s sleek, *easy-to-use menu system* makes hard disk maintenance simple.

So, Who Needs Disk Optimizer, Anyway?

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

But unfortunately, DOS is doing its best to slow hard disks down — by breaking files up into pieces. Storing different chunks in different places. As a result, loading is slower. Sorting is slower. Everything takes longer because your hard disk has to chase around picking up and laying down different pieces of your file.

After un-fragmenting with Disk Optimizer, a file that once occupied twenty different sectors in twenty different locations is now back in one contiguous piece. The next time your drive reads it, there’s just one place it has to look. Performance times may be cut by as much as two thirds!

Absolutely, Positively Disaster Proof.

Lately, we’ve heard some people are reluctant to un-fragment their disks for fear they’ll lose data if something

goes wrong in the process. But have no fear with Disk Optimizer. Nothing will go wrong because nothing *can* go wrong. Even if you yank the plug from the wall in the middle of the program. It’s because only Disk Optimizer is designed to copy each file, piece by piece, then thoroughly check the un-fragmented version for completeness and integrity. Then — and *only* then — does it go back and erase the fragmented version.

Oops! Make a simple slip at the keyboard and you could wipe out your hard disk with a DOS Format command. But don’t worry. The new “Un-format” program will recover your entire disk, and all your data, in just moments.

Dramatically Increases Disk Speed.

Disk Optimizer restores speed to your hard disk by eliminating fragmentation of your files and programs. Can increase speed up to 300% and minimize wear on the hard disk. Installs in seconds.

Here’s How Disk Optimizer Helps You Avoid Disaster!



The New Hard Disk.

This is a brand new hard disk. As you begin to create files, they are stored on the disk randomly. Each occupies a place on the sparsely-populated disk. At this point, disk performance is at its peak. A 256K file or program can be retrieved in just a few seconds. Wear and tear on your equipment is minimal.

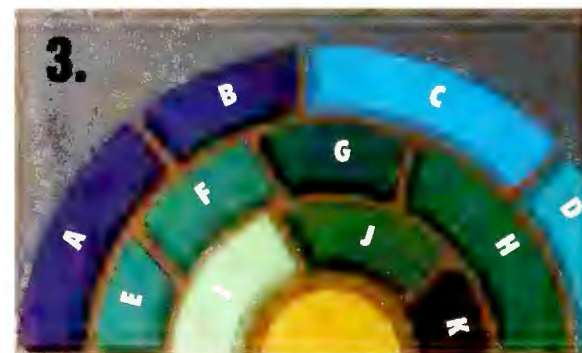
Under normal conditions and use, you can expect top performance from your hard disk for about 10% of its total capacity. After that, you’ll notice the impact that fragmentation will have.



Fragmentation Begins.

As you edit these existing files, DOS will store your additional data in the same random manner. If you delete a file, a “hole” is left where that file had been stored. DOS will fill that hole with parts of other files. Fragmentation has begun. Your hard disk is running considerably slower.

More and more files are added, edited and deleted. There are pieces of your files and programs scattered all over the disk. Your hard disk’s head spends more time “dragging” across the surface of the disk, endangering the media — and the data.



After Using Disk Optimizer.

Disk Optimizer assembles the pieces of your fragmented files and stores them as ONE FILE. Just a couple of keystrokes will help your hard disk run up to 300% faster! And all of your data is 100% safe.

Disk Optimizer contains “Data Guardian,” — recover files and unformat accidentally formatted hard disks — plus a dozen new utility features.

Disk Optimizer actually protects the surface of your hard disk as it works, reducing the damaging effects of excessive wear on the head. In addition, Disk Optimizer helps to eliminate “bad spots” on the hard disk, and even displays the amount of fragmentation at any time.

Maintenance Features:

- ▶ **TrackSaver.** Protects the surface of your disk from excessive wear by preventing the head of the drive from spinning over the same track for too long.
- ▶ **Refresh.** Prevents bad spots that develop on disks due to fading magnetic charges. It’s like a tune-up for your hard disk.
- ▶ **Advanced New ‘Data Guardian.’** Instantly restores an accidentally deleted file, directory or hard disk — up to 255 days after it was erased! Accidentally format your hard disk? Just select Data Guardian’s UNFORMAT feature and it’s instantly restored!
- ▶ **Analyze.** Graphical displays show how much fragmentation has taken place on your hard disk.
- ▶ **FindFile & FilePeek.** Misplace a file? FindFile will perform a “wildcard” search with just a couple of keystrokes. Then get a “quick look” with FilePeek.

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DW 3280 Disk Optimizer 4.0 5¼" \$69.95
DW 3285 Disk Optimizer 4.0 3½" \$69.95

Runs on IBM PC and compatibles. Supports DOS 2.1 and above.

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FREE WHEN YOU BUY DISK OPTIMIZER Cubit THE ULTIMATE FILE COMPRESSOR

Use Cubit, and a word processing file that once took up 20K now takes up as little as 10K. The archival records you use to keep on floppies now stay right on your hard drive, providing instantaneous access in a minimum of precious space.

Storage Media Compatibility.

Cubit’s storage expansion capability is identical whether it’s used with hard disks, floppy disks, streaming tape cassettes or standard data cassettes. Original storage capacity of media is not a factor.

Once a file is compressed with Cubit it automatically decompresses when you use it, then automatically recompresses when you’re finished.

Cubit is ideal for long term archival storage.

A \$69.95 Value!



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The Fast, Easy Database Publisher From Dan Bricklin.

Automate "Bulk-Printing" Tasks On HP and PostScript Lasers.

PageGarden is the latest project from computer visionary Dan Bricklin, creator of the original electronic spreadsheet and the popular prototyping packages Dan Bricklin's Demo Program and Demo II Program.

This time Dan innovates again with the first laser utility that creates custom formats for any repetitive or standardized print task. PageGarden gives you the ability to add dramatic graphic style to reports, lists, labels, name badges, envelopes, tickets and more without having to spend hours working on your desktop publisher.

And PageGarden delivers speed. An HP-LaserJet and PageGarden will blow the doors off the printer drivers included in leading word processors and desktop publishers.

printer control with PDS (PageGarden Description Statement) language.

Create Custom Mailings!

Stop slapping labels on your letters when you mail them! Simply design a format — and print all of your envelopes in the same way. Control the appearance of each and every piece of mail that your company sends out!

"Spreadsheet" Publishing.

Dull spreadsheets are gone forever! With PageGarden, your spreadsheets can have a clear, professional look that adds drama and excitement to the presentation of your numbers.

The ability to add fonts, rules, borders, shaded areas, screens, graphics and logos can greatly enhance the impact of your spreadsheet.

Tickets, Badges, Coupons, Labels — Anything Numbered Sequentially.

PageGarden lets you mix a host of special effects into your smaller published pieces. Then, any number can be printed — each containing different information. Tickets, coupons, trade-show badges, identification labels — plus hundreds more uses! Sample templates enclosed.

Here's What You Get:

- Bitstream® fonts
- PostScript font for printing full IBM PC character sets
- Over three dozen page description scripts
- Transparent ruler for fine tuning output
- Tutorial to help you get started quickly
- Full reference for PDS (PageGarden Description Statement) Language
- Font decoder for descriptive listing of all HP LaserJet soft fonts
- 5 1/4" and 3 1/2" diskettes.



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DW 8060 PageGarden 5 1/4" & 3 1/2" \$99.95
IBM PC, PS/2, compatibles with 256K. Requires an HP LaserJet Plus, HP LaserJet series II, HP LaserJet IIP, HP LaserJet IID, PostScript or 100% compatible laser printer. No special video adapter is required. Does not support DeskJet.

Call (800) 888-4437 To Order.

PageGarden is the latest project from Dan Bricklin, inventor of the world's first electronic spreadsheet, VisiCalc.

Highest rated utility for 1989 by InfoWorld Magazine

**INFO
WORLD**



**EXCELLENT
VALUE**
Nov. 20, 1989



PageGarden creates a format from your design — you simply add ASCII text from your database, spreadsheet, word processor — anywhere! Each time you print a dozen copies of a report, stacks of mailing labels or 300 name badges, they'll all have a custom, professional look. You can easily drop in logos or graphics stored in .PCX format (without going back to their native application), add gray areas, white-on-black type, sequential numbers, boxes with rounded corners, circles and more.

Produce Striking Listings and Reports.

Save time — and save paper — with condensed, easy to read printouts. Personalize reports with smart headers. Use the PageGarden "confidential" stamp. Print multiple files at the same time, each file in its own format.

Get Professional Output with Standard, Off-the-Shelf Laser Labels.

Personalize the return address part of your labels with any "pcx" bit-mapped graphic. Use the fonts built in your HP LaserJet or PostScript printer, or the Bitstream fonts included in this package. Position elements anywhere accurately... to 1/300th of an inch. Use PageGarden scripts for envelope printing too.

Special Features:

Sequential numbering (part numbers, ticket numbers, etc.), white-on-black letters (even on HP LaserJets), rounded corners, grey images and type.

Who's Using It?

All Laser printer users automate repetitive tasks with scripts that come with the package... and personalize scripts as described in the PageGarden tutorial. Companies standardize on the best laser printer formats. Others customize database output for perfect mailings and reports. Power users take advantage of advanced laser

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*Captures Precise Detail,
Offers Unmatched Resolution and
Fits in the Palm of Your Hand!*

The art of the scanned image jumps to a new level of ease and sophistication with the new Mars 800 dpi hand scanner. Photos, line art, graphic designs, logos, illustrations and text can be input in seconds, then easily incorporated into your published pages in a variety of popular formats. Don't re-key text — scan it quickly using the Mars OCR Pro-Reader (included FREE!) and format it the way you like! And unlike other scanners, the Mars 800 has been carefully designed and crafted for sleek, simple operation. It includes 64 gray-scale levels, 12 halftone patterns and delivers ultra high resolution for even the most detailed image. In fact, images the size of a postage stamp can be quickly scanned, capturing even the finest details.

The Mars 800 is state-of-the-art digital imagery, engineered for precision movement and flawless operation.

This remarkable instrument works with you to enhance creativity, and features a unique "inverse image" capability that reverses the image, pixel editing — along with a host of other special effects.

High Resolution Without a High Pricetag.

Resolution quality is the difference between professional looking documents — and those not-so-professional looking. When you use graphic elements, they simply must have a crisp, clean look. Only the Mars 800 offers the high resolution and detail to meet today's business demands — at an affordable price. Most images don't even require the usual obligatory "clean-up" that can take hours of tedious toil.

The Mars 800 comes complete with the Marstek ScanKit software toolkit, allowing vast capabilities for cropping, storing and printing your scanned images. ScanKit can also save your images in TIF, PIX, PCX, CUT, IMG and MSP formats for quick merging into virtually any file. This is a complete scanning system, with all the power, flexibility, compatibility — and extra goodies — that you need for professional image scanning. And it's ready to roll — right out of the box.

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When You Buy the Marstek 800 Hand Scanner.

Mars Pro-Reader OCR Software — This package allows fast, easy optical character reading (OCR) for text pages. Imagine having the ability to simply SCAN text — instead of re-keying it! You'll improve efficiency for a variety of office tasks. Scan text up to 24" with absolutely no problem.

PC Paintbrush Plus — One of the industry's most respected and capable paint programs, and a great companion software system for the Mars 800. PC Paintbrush Plus puts the most extensive electronic palette at your fingertips — colors, shadows, image blending and more. Together with the Mars 800, PC Paintbrush Plus turns your computer into a sophisticated design center.



The Marstek Mice: Designed For Speed and Accuracy, Engineered for Power and Simplicity.

Marstek applies the same commitment of technological excellence to its line of mice. Three models — each able to handle anything from meticulous desktop published pages to lengthy spreadsheets, and completely Microsoft compatible. Each includes Marstek's custom menu software, so you'll be using them to their full potential right out of the box.

FREE Software!

When you purchase either the Mars D32 or the P93 models, you'll receive free a mousepad and desktop publishing software. The D32 includes the popular Dr. Halo and the P93 includes PC Paintbrush Plus.

Marstek

DW 1830 Mars 800 w/CAT Reader OCR and PC Paintbrush Plus	\$279.00
DW 1820 Mars 800 w/CAT Reader OCR and PC Paintbrush Plus and E32 Mouse	\$299.00
DW 1840 Mars Mouse E32	\$49.00
DW 1850 Mars Mouse D32	\$79.00
DW 1860 Mars Mouse P93	\$99.00
DW 1870 Mac 800 Scanner (for Apple Macintosh) with FREE Digital Darkroom (a \$249 value)	\$399.00

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The Professional Mail List Manager. Simple, Fast — And Powerful!

**FastPak Mail Does More
Than Other Packages Costing
TEN TIMES As Much!**

Manage Your Mail Lists — Simply!

FastPak Mail does it all. Prints labels, post cards, reminders, notices, customized letters, envelopes and more. It automatically eliminates duplicates, performs sophisticated zip-sorting, prepares and labels bulk mailings and sorts for lowest possible postage rates right out of the box!

And FastPak Mail has been designed to quickly import names and addresses from most popular database applications, like dBASE, so you can easily customize letters and envelopes without re-keying information.

FastPak Mail is an ideal tool for direct mail campaigns—it's fast, feature-rich, and can easily handle up to 64,000 names and addresses. In fact, this remarkable package actually contains many features found in high-end systems written expressly for direct marketers.

FastPak Mail is so advanced, you can give it a zip code, and it will automatically look up the city, state and area code — then insert it directly into your list, or print a label or envelope.

Now You Can Start Doing That Newsletter!

Experts agree that one of the most cost-effective methods of promoting your business is to prepare and mail a newsletter to your existing customers (or to a list of prospective customers) on a consistent basis. News relating to your particular industry, questions and answers, new product announcements and "how-to" articles can boost customer awareness and help increase sales. Newsletters keep your name in front of your customers without appearing to be junk mail. Using FastPak Mail, you can reduce the time you spend mailing your newsletters, and mail them more often—that's the key, consistent, professional mailings.

Timely Press Releases.

FastPak Mail is also a great tool for use in mailing press releases. Because they usually contain time-sensitive information, press releases must be mailed immediately. FastPak Mail gives you the power to get the job done — now.

Ready To Print Lists And Labels.

FastPak Mail will support virtually any label made — by any manufacturer. Choose from pre-defined formats available from the menu, or quickly create your own format to fit your particular needs.

Print labels 1, 2, 3 and 4 across in dozens of sizes and shapes. FastPak Mail supports all popular continuous feed label brands.

Print all of this and more... labels (any configuration), return address labels, envelopes, rotary index cards, clear adhesive labels, file folder labels, diskette labels, audio and video cassette labels, shipping labels, equipment ID labels, packing labels and dozens more. Just select the type you need from the list of built-in formats and go!

Merge Information — In Minutes.

FastPak Mail will allow you to easily merge names and addresses into the body of any letter. You can quickly produce custom mailings to selected lists — even merge information into the body of your letter.

And if you have existing lists stored in other applications, they can be quickly and accurately converted for use in FastPak Mail.

Automatic Proper Name Capitalization.

FastPak Mail will print the first letter of proper names in capital letters — automatically — regardless of how they appear in the list or database file — eliminates embarrassing errors in your mailings.

Bulk Mail Sorting, Printing And Preparation.

FastPak Mail simplifies bulk mail by streamlining the entire process. All bulk mail regulations and associated labels are available from the menu, and all sorting is done to achieve the least possible cost — like 9, 5, and 3 digit zip code sorting.

FastPak Mail even produces sack labels — all you have to do is drop it off at the post office!

Addresses Express Shipping, Airbills, UPS C.O.D. Labels.

You can use FastPak Mail to finish up mailing chores by addressing Federal Express airbills, U.S. Post Office Express Mail airbills — even UPS C.O.D. labels. The pre-designed templates for these forms are available from the menu and will support virtually any printer.

FastPak Mail will also print shipping labels using a pre-defined format — or create your own.

Laser Printing Capabilities.

FastPak Mail supports all Hewlett-Packard compatible laser printers. Now everything you mail can be crisp and authoritative, taking full advantage of laser technology's broad range of fonts, sizes and formats. FastPak Mail will support all printer fonts as well

as downloaded fonts — even print sideways!

And FastPak Mail includes an innovative print spooling feature that rivals many stand-alone packages.

The Software Of Choice For The Art Of Direct Mail

Communication. An enormous task for businesses of all sizes. In this, the "Information Age," the world is at our fingertips — more information is delivered to every man, woman and child in the United States (by a vast margin), than anywhere else in the world.

As a nation of consumers, we're pistol-whipped with an average of 6,000 random impressions each day — and most are advertising messages.

With this much noise, the small ad budget may seem doomed to failure before a cent is ever spent.

But that is simply not true. The direct marketing industry will top \$300 billion again this year, and you can own a piece of the action without draining your budget.

However, in order to succeed as a direct marketer, you must understand the four individual elements of an effective direct mail campaign.

1. The strategy and offer.

Define your market, establish an average profile of your target customer. Consider how to reach him and what you will offer him.

2. The list.

Probably the most important. Without a good list, forget it. The goal is to deliver your offer to highly qualified buyers.

3. The Creative.

Design a mail piece with a letter that details your offer — compelling the reader to become involved. Typeface, color, photography, layout are absolutely

critical. Avoid "overdesigned" and pieces that compete with your words. Photos should bring the words to life.

4. Track results ruthlessly.

Make adjustments, test, and stay with your customers. Direct mail is a science. It must be measured and evaluated constantly to obtain maximum results.

Finding untapped markets.

Aggressive direct marketing involves servicing existing markets while always finding new markets. How? Keep your eyes open to trends and patterns in society. Here are a few interesting demographic facts:

- ▶ 86 percent of American parents expect their children to go to college — but only 54 percent are saving to pay for it.
- ▶ Americans don't move as much as they used to — only 17 percent each year today — as compared to 20% in 1960.
- ▶ Eating — not transportation or lodging — consumes the largest chunk of a traveller's budget in the U.S.
- ▶ Women control the checkbooks in 3 out of 4 American households.
- ▶ Women buy the majority of X-rated video-cassettes.

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DW 4550 FastPak Mail 5 1/4" \$79.95

DW 4555 FastPak Mail 3 1/2" \$79.95

IBM PC, XT, AT, PS/2 and compatibles with 256K. Supports hundreds of dot matrix or laser printers.

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Print Without Down Time — With The Smart Print Spooling Utility.

*Now You Can Run Your Printer —
While Working (at top speed)
On Your PC.*

PrintRite allows users to run print jobs of any size — while continuing to work, at top speed, on their computer. PrintRite spools your print jobs to disk (and compresses them), allowing applications to generate print jobs at maximum speed — and save hours of printing time — and it occupies less than 50K of memory. Spend time working — not waiting for print jobs!

Designed for Easy, Efficient Operation.

Stop wasting time waiting for your printer to finish a document so you can continue to work on your PC. Harness the power of professional mainframe spooling technology — in an easy to use package.

Introducing PrintRite. Designed for fast, efficient operation, its streamlined pull-down menus allow you to print documents, lists, labels, spreadsheets — anything — *while you continue to work, uninterrupted, on your PC.* PrintRite compresses spooled files to disk for ultra-efficient use of memory.

PrintRite spools each file separately (rather than in one large file) to eliminate costly hard-disk fragmentation. And only PrintRite allows you to control *five printers* at one time, so you can dedicate specific printers for certain tasks. Pop PrintRite up anytime and view the queue and documents on-line. Change the printing order, specify the number of copies, sideways printing, add items — even pause and restart.

Forms Alignment, Multiple Printer Support.

PrintRite will prompt you for alignment of the first page, or every page of your documents. Re-run reports at any page, and stop or start a print job at any time if you need silence.

Groups Similar Print Jobs for Maximum Efficiency.

PrintRite automatically groups types of printing jobs together (like spreadsheets, text, graphics and sideways jobs) for more efficient use of the equipment.

Spooled files are compressed to save disk space and prevent loss of data that can occur with other memory print buffers. PrintRite guarantees 100 percent protection of every bit of your data — even in the event of a power loss with its auto-backup.

Now Laptop Users Can 'Print' — Without a Printer.

To your laptop computer, PrintRite looks like a printer. Your print jobs are spooled to disk and stored (compressed) in a DOS file. When you get to a printer, PrintRite will print the documents.

No Other System Supports up to FIVE Printers!

If you have printers dedicated to certain tasks — your laser printer loaded with letterhead, your daisywheel printing airbills, your dot matrix printing invoices — PrintRite allows you to select the appropriate printer for each item in the queue.

Print up to 65,523 Copies.

Supports Networks.

PrintRite lets you spool your print jobs in the network environment.

PrintRite Features:

- ▶ **Easy-To-Understand User Interface!** PrintRite's sleek interface makes it ready to use — right out of the box. Everything you need to know is contained in its convenient help screens and all functions are accessed by a pull-down menu system.
- ▶ **Queue Management with No Cryptic Commands.** While our competitors throw confusing abbreviations and highly technical terms at you, PrintRite uses plain English to describe its functions.
- ▶ **Fast "Hot Keys" Control.** PrintRite features built-in hot keys that make light work of your printed tasks. From anywhere, you can press a hot key to rearrange your printing order, or add a job to the queue, specify the number of copies you need, switch between printers — or stop printing.
- ▶ **Automatically Compresses Spooled Files.** PrintRite is the only product that compresses your spooled files, drawing on advanced mainframe technology to compress files and store them each in one file on the disk — this eliminates fragmentation and speeds processing time.

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DW 4960 PrintRite 5 1/4" & 3 1/2" \$99.95
Runs on IBM PC, XT, AT, PS/2 and compatibles. Requires 50K memory.
Will support virtually any printer.

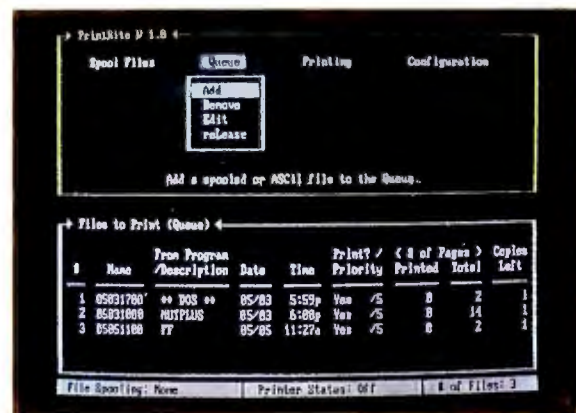
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Supports up to 5 Printers. Supports Networks.



- ▶ **Portrait or Landscape on Any Laser Printer.** Only PrintRite allows you to select sideways printing for specific documents — with just a keystroke — from within any program. And you can instantly convert characters to support different laser printers' symbol sets. It also supports an unlimited number of printer drivers — with over 30 formats built-in!
- ▶ **Up to 225 Entries in Print Queue.** Continue to work while having up to 225 jobs in queue and printing!
- ▶ **Helpful Displays Show All Printing Activities.** PrintRite displays spool file names or source application names in the queue, the time and date for each entry, the status of each item to be printed, the total pages (or pages per file) to be printed, allows you to view any print task on screen — without having to print, and inactivate and reactivate any item in queue any time.

PrintRite features colorful, easy-to-understand screens along with convenient pull-down menus, windows and hot-keys.



Get PrintVision FREE When You Buy PrintRite!

See your documents as they will print! With new PrintVision — a "graphics-like" preview utility that allows users to actually preview word processing documents, database files, spreadsheets, mail merge lists, charts, forms and more with a **What You See Is What You Get** — preview display.



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Circle 259 on reader service card

Seikosha Printers: Value and Performance from the Seiko Group.

The Ultimate In Dot Matrix Printers From A Name You Should Know.

With so many different makes and models out there, shopping for a printer can be as maddening as looking for a new car. That's why at TigerSoftware, we're happy to be able to offer these four great new dot matrix printers from Seikosha.

Since the earliest stages of the PC revolution, Seikosha dot matrix printers have delivered the exceptional performance and value you expect from the Seiko Group, an established world leader in areas ranging from Seiko precision time pieces to microprocessors.

Seikosha's record includes a long list of firsts in the printer market including the introduction of the first dot matrix printer in Japan in 1973 and the first 800 cps 18-pin printer in 1987. For a long time, Seikosha printers have set the standard for reliability and versatility.

The entire line of Seikosha dot matrix printers feature the unique Seikosha "stored energy" printhead technology, which achieves the industry's highest reliability and lowest noise levels. This technology's low power consumption extends the printer's head life up to twice as long as the ballistic printheads used in most leading impact dot matrix printers.

That's why Seikosha printers tout an industry-only 2-year limited warranty across the entire line.

The SP-2000: Byte's "User's Choice" Award-Winning Personal Printer.

The Seikosha SP-2000's compact, space-saving design is packed with all the features that make day-to-day printing a breeze. Maximum speed is 192 cps (48 cps in near letter quality) and has numerous type style, pitch and attribute options available.

Thanks to the SP-2000's push tractor, paper parking tractor-fed paper is simple, saving time when you want to switch to letterhead or other cut sheets.

The SP-2000 is also user-friendly. All controls, including the power switch, are located on the front panel for convenience. The SP-2000 is available with either IBM/Epson or Apple ImageWriter emulations.

Two near letter quality fonts (serif and sans-serif) are standard. The SP-2000 provides a choice of Pica, Elite, condensed, and proportional spacing, with or without justification. Character attributes include italic, bold double-width, and underscore.

The SL-90: The 24-Pin Printer with Big Performance for Small Business.

Good things come in small packages, and Seikosha's SL-90 dot matrix printer proves it. Though it's small and light enough (8.6 lbs.) to be carried under one arm, it's big on features.

The SL-90 prints text as well as graphics in 360x360 dpi resolution. Using its 24-pin printhead, the SL-90 will print a speedy 240 cps. A built-in 12K buffer takes the load off your computer when printing and Epson LQ-850 emulation assures compatibility for your applications.

Still, the beauty of the SL-90 is the clear, crisp quality of its letter quality output. With the SL-90, you'll have all the features that businesses want, in a small package that most businesses need.

The SL-230: Byte's "User's Choice" Award-Winning 24-Pin Wide-Carriage Printer.

The Seikosha SL-230 presents an array of features usually offered in printers costing two and three times its price. The 24-pin printhead assures crisp, letter quality text and finely detailed 360x360 dpi graphics. And, quiet though it is, the SL-230 can fly through heavy-duty print jobs at up to 277 cps.

The SL-230 prints up to 136 columns and features a 5K buffer with 64K optional. Epson LQ-1050 and IBM Proprinter XL24 emulation ensure compatibility with leading software packages and 9 resident fonts enable you to add that professional touch to your documents.

A world first feature in the SL-230 is the unique

Seikosha function card, a slim plug-in card that replaces clumsy DIP switches. In addition, three dials on the front panel make it easy to set paper size, font, and character pitch.

Even letter quality printing is speedy at 92 cps in Elite with the SL-230. And a high-speed skip speeds up printing of charts and tables. The push tractor and paper-parking features allow easy handling of documents and the wide variety of character attributes allows for diverse looks in printing.

The SK-3005/SK-3000: The High-Speed, High-Resolution Graphics Color Printers.

The Seikosha SK-3005 wide-carriage and the SK-3000 narrow-carriage have an unusual combination to offer: high-speed output, high-resolution graphics, and seven color capability. With a blazing 300 cps text output in draft mode and an unbelievable set of features, the Seikosha SK-3005 and SK-3000 are excellent values.

The SK-3005 prints up to 136 columns, is amazingly quiet, and offers a 6K print buffer expandable to 22K. The 9-pin printhead will run up to 50 cps in near letter quality mode. Friction and tractor feed are standard, and the tractor unit is removable. Eight print modes are selectable from the front panel or by software command.

Epson FX/JX and IBM Graphics emulation ensure software compatibility. The SK-3005 and SK-3000 will print an original and 4 copies, and feature 256 downloadable characters.



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DW3090 SP-2000	\$263.20
DW3110 SL-90	\$439.20
DW3120 SL-230	\$799.30
DW3130 SK-3005	\$679.20
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SEPTEMBER 1990 PC WORLD 89

- ▶ **The Sleekest Menu.**
- ▶ **Fast, Simple "Move & Copy."**
- ▶ **Detailed Labeling & Cataloging.**



*You Won't Believe How Fast
And Easy It is to Use!*

Instant One Keystroke Access to Programs.

Most PC users, no matter how advanced, hate the time-consuming gobbledegook-like commands involved in accessing their programs and files. You have to type a backslash here, a cryptic command there, then wade through directories and subdirectories to get to work. And if your hard disk fills up, moving files involves more complex commands and tedious operations. Sound familiar?

That's why busy computer users everywhere are turning to DiskVision. This innovative 3-in-1 system completely eliminates the ridiculous requirements of DOS.

Power Up and Go!

Just turn on your computer, and up pops a clean, simple menu of everything loaded — all of your programs and files. Simply select the program you want — and it's up and ready to run. Looking for a particular file? No problem. Just open a list of files with one keystroke — and select the one you need. DiskVision gives you complete control of all files and programs on your floppies or hard disk.

And when the hard disk is filled to the brim, just tag older or dead files — from the menu — and one keystroke moves them instantly to a floppy, prints a label, then asks you if you want them erased from the hard disk. It's remarkably simple, and you'll always know where the files are. If you need one of the older files at any time, one keystroke instantly loads it back onto the hard disk.

A Sleek, Simple Menu.

A simple, no-nonsense point-and-shoot menu selection can call any program on the system, no matter where it resides. Programs can be on hard disk, on a floppy disk or on the network. The user does not have to learn the complexities of calling and running each and every program.

Menus can contain up to 16 selections. Selections can be programs or subordinate menus.

Move and Copy Files Without DOS Commands.

Moving files has always involved the dreaded DOS commands. One wrong move — and who knows what can happen to valuable (yet seldom used) files. You don't want to throw them away, but you don't want them cluttering up your hard disk.

DiskVision allows you to SIMPLY move files by just tagging them — automatically the files are copied onto a floppy disk and a label is printed. Files are then (optionally) erased from the hard disk. Sort files by date and erase aged files automatically — even search for files and view them!

Create Labels, Reports and Catalogs for Your Diskettes.

Diskette Manager 4 is a state-of-the-art catalog/labeling system. New features include file-by-file comments, and the ability to use disk volume labels as disk names. Create, modify reports and labels with an innovative new report generator. Pre-designed reports and labels are included. Catalogs hold up to 1000 diskettes or 32,000 diskette files.

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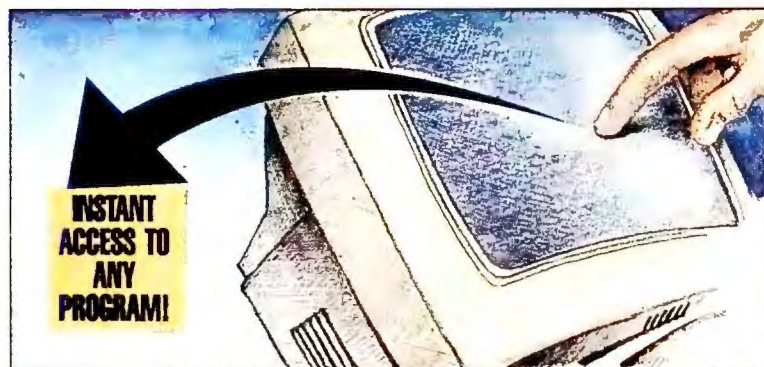
Turn on your computer and start working! Programs and files are accessed instantly — no navigating through DOS commands. Features advanced security and allows an unlimited number of submenus. Supports hard disk as well as floppy menuing.

Streamlined New Archiver. ▶

Clean up cluttered hard disks — just tag files on the menu screen — then instantly "move," "copy," or "erase" them. Move any files — from anywhere to anywhere — in seconds, with no DOS commands! Transfer and archive files without altering them — assuring total recoverability at any time.

INCLUDES NEW DISKETTE MANAGER 4! Diskette Labeler/Cataloging. ▶

Instantly create labels for your diskettes. Now includes "File By File" commenting. Automatically labels archived diskettes. Supports virtually any label size made. Easily locate files by fast, simple searches through the catalog. Catalog 1000 diskettes or 32,000 files!



The Individual Modules: An In-Depth Look.

▶ **Hard Disk Manager**

- Create an unlimited number of easy-to-access submenus.
- Help screens are available for each menu item, or quickly create your own custom help topics for your particular situation.
- Supports hard disk & floppy menuing.
- Provides easy access to files, then fast access back to the menu.
- Complete password and security protection.
- Also supports mouse menu operation.

▶ **File Archive Manager**

- Remarkably simple moving, copying and erasing of files.
- Simple, no-nonsense point-and-shoot file location and selection.
- To move, copy or erase files — just tag them!
- Quickly move files from anywhere to anywhere — hard disk or floppy.
- Transfer files without altering them whatsoever — assures complete recoverability at any time.
- DiskVision maintains a complete log of all file operations for accurate file tracking.

▶ **Diskette Manager 4**

- A special, enhanced version of our popular Diskette Manager 3
- Instant cataloging and labeling of any floppy.
- Print labels and catalog files in one step.
- New! File-by-file commenting for more accurate tracking.
- Allows complete diskette commenting.
- Supports virtually any label size or style.
- Quickly locate files using fast, easy searches through the catalog.
- Catalog 1,000 diskettes or 32,000 files.

Are You Burned Out on dBASE?

*A Faster, Easier, More Capable
dBase Work-Alike!*

"Sure dBASE has its drawbacks and it's tough to use, but I've got a lot invested in it..."

While most businessmen and managers enjoy the enormous benefits of using dBASE III Plus to manage their database, they also tangle with the problem of learning curves. Some tasks are so complex, they're simply never used. For the programmer, the system contains some very serious limitations. But dBASE is a widespread corporate standard...

The answer is dBXL, the amazing dBASE III Plus superclone that's easier to use and more capable than dBASE, while extending its power and scope of functionality. dBXL's advanced new interface makes working with it simpler for novices and faster for experienced users and programmers. And dBXL is completely compatible with dBASE, so you can access the same data files, reports, programs and index files using the same command structure. dBXL puts performance into those areas that dBASE doesn't touch. Like its remarkable new interface that includes true windowing, sophisticated language extensions and built-in charts and other graphic devices. dBXL provides useful tools to store, manipulate, retrieve and perform in-depth analysis of data. Programmers using dBXL will discover enhancements such as multi-dimensional arrays, user-defined functions, automatic memory swapping, "C" language interface, the ability to create complex multi-file relationships, and a unique Fix Option that streamlines debugging.

"What If I Want to Implement a Network, or Even Move to UNIX?..."

dBXL provides pathways to networks and other operating environments. Your applications and files can be

easily moved to the UNIX environment to quickly harness the productive power of this multi-user platform. You can even integrate your databases with a number of SQL database servers.

dBXL Delivers More dBASE than dBASE...

dBXL outruns the program it was patterned after. That's rare in the software business. Windowing, for example, allows dBASE programmers, for the first time, to create, move, size, overlay, remove and restore windows. Pop-up help screens and menu selection bars can be quickly inserted into applications. In addition, dBXL allows simultaneous comparison of two databases on your screen. For good measure, dBXL has full support of EMS — automatically using it to database and index files. This allows much greater programming flexibility and faster program execution.

Friendlier and more powerful, dBXL picks up where dBASE leaves off...

Full File Compatibility with dBASE

Data files, index files, programs, reports, and format files are all fully compatible with dBASE. dBXL and dBASE can use the same databases and run the same dBASE programs.

Users familiar with dBASE syntax will be completely comfortable with dBXL. They need learn only those commands which dBXL adds to the language.

dBXL can swap a program from RAM to disk prior to running a word processor, spreadsheet, or other program from within an application. This capability is currently not available in other dBASE language products.



high level keyboard macro capability as part of INTRO. The use of macros allows you to record a history of your menu choices and save them as dBASE commands in a special program file. Later, "replay" a command sequence with as few as four keystrokes.

Users can use the F1 key to call two levels of context-related Help and a full online manual.

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Requires a min. of 430K TPA (RAM free of the operating system, device drivers, and any other memory resident software). For most systems, this will entail a min. of 512K RAM, dBXL will use 64K of EMS (when avail.). Requires MS-DOS or PC-DOS 2.0 or later.

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"We've been playing the Florida Lottery for three weeks using Lottery Tracker And Wheeler, and as a group have won over \$1100.00!"

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This remarkable system makes playing Pick-6 games fun — and profitable! It can systematically increase your chances of winning by *hundreds* of times. It includes 20 of the most popular wheeling systems.

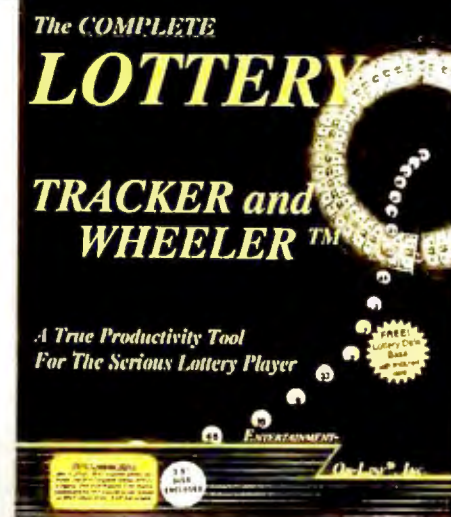
By using the power of your PC, you can actually track as many state and international lottery games as you like — there's no limit! As you collect information, you can produce expert "trend charts" to identify "hot" numbers that frequently win. You'll also pinpoint "due" numbers.

Lottery Tracker And Wheeler Features:

- **Record** hundreds of past winning lottery numbers and dates.
- **Track** as many state and international lottery games as you want — no limit!
- **Chart.** Produce expert trend charts to identify those HOT and DUE numbers!
- **Analyze** "hits" four ways: *bell curves*, to display overall tracks; *recency*, to identify numbers that hit within certain periods of time; *percentages*, offering probability tables for numbers; and *frequencies*, to indicate how often certain numbers hit.
- **Produce Statistics** for all numbers you play — no randomizing here!
- **Select Numbers** to play 5 different ways! You choose what YOU like best!
- **Check Your Bets** for winning combinations! Records *all* systems played including BONUS NUMBER.
 - **Print** charts, statistics, recorded numbers and wheeling systems!

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"The Complete Lottery Tracker and Wheeler" is sold in all 50 U.S. states and 23 foreign countries.



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How Timeslips III Became the Time and Billing Software of Choice.

Timeslips III lets you record, analyze, and bill both time and expenses with ease and complete accuracy. In fact, many customers report up to a 25% increase in billable time. With an equal improvement to the bottom line. Which is the kind of performance that's made Timeslips III the most widely used time and billing software in business today.

You may not have a fancy office like the big guys, but with Timeslips III, you can start making money like them.

Timeslips III is a workhorse for worksheets, reports and graphs. You can manipulate data in dozens of ways to give you up-to-the-minute information — and take corrective action where needed.

Get a broad overview of your business, or focus in on the details.

Timeslips III Reporting Power

- **Client Financial Reports.** The Client Billing Worksheet summarizes unbilled and unposted activity for each client. Review the information that will appear on your client's bills before you send them out.
- **Aging Reports.** Gives you an analysis of client's credit-worthiness. Get a complete 30-60-90 day overdue analysis including the date, amount of last payment and client's phone number.

► **Productivity Reports.** Timeslips III can show you the productivity of each project by creating an activity-by-activity breakdown. What was accomplished by whom, how long it took, and what the actual fee was for the project when it was completed.

By generating custom reports you can design detailed column reports from the data in your time records. For example, create a daily time sheet report that includes date, professional, client, activity, description, accumulated hours and billable amount. Your customized reports can then be printed or exported to a spreadsheet, word processor or database via a simple text file.

► **Detail Reports.** Itemize the contents of some, or all of your time records. For any number of professionals, clients and activities.

► **Summary Reports.** Show total hours and dollars, dollars per hour and percentages by employee, client or activity. Find out who is productive and who isn't. Summarize users, clients or activities for any date range.

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FREE Timeslips® III Speller™

Prevents Spelling Errors in Timeslips III Bills and Reports.

TSSpeller is an electronic spell-checker tailored specifically for use with Timeslips III time/expense-tracking and billing software. Depending on how you choose to work with it, TSSpeller can:

- monitor your keystrokes and report an apparent spelling error or "typo" immediately
- check a field or block of text after you finish entering it
- scan all your slips (or a subset of them) in a batch just prior to printing reports or bills.

Corrects Spelling Errors in TSTimer.

When using the exclusive "stopwatch" timer, or batch entering timesheets, Timeslips III Speller helps keep your spelling error free. If you misspell a word while typing, Timeslips III Speller automatically shows you the alternative words. Choose the correct word and resume typing. Instantly and accurately.

Spell Checks When Reporting.

As you print bills, Timeslips III Speller confirms the accuracy of thousands of Timeslips. And alerts you to all misspellings.



Track and bill activities with Timeslips III in great detail. With a handy pop-up timer that records your time while you work. With custom invoices in formats you determine. And with accounts receivable reports and billing worksheets so you can keep a close watch on every minute you spend, and every dollar you have coming to you.

Track 250 activities, for as many as 250 people, working on 128 projects per client — with a maximum of 3,400 clients.

There's also an optional accessory that links Timeslips III directly to DAC Easy, Peachtree, Bedford, and many other general ledger packages. Yet, you may just find Timeslips III is the only software you need to run your books.

Simple to Use.

Everything you need to keep precise track of billable time is right at your fingertips; Timeslips III features sleek screen design of fields and elements. Entering, updating and editing of data is fast!

More Than Time Reporting and Recording, Timeslips III Provides Tools for Powerful Financial and Productivity Analysis...

► **Transaction Reports.** Lets you search quickly for payments, deposits and even create custom reports such as a daily payment register.

► **Client Fund Report.** Shows you all transactions including withdrawals, deposits and payments to and from each client's account for a complete financial analysis.

► **Thousands of Ways to Create Just the Right Bill.** Each office has its own particular needs. Each client is different. With Timeslips III, you can satisfy everyone. Create the precise billing format you need — move names and addresses to any position on your invoice, add billing phrases like "For Professional Services Rendered," or "Thanks for Your Payment." You can even create custom messages for designated clients.



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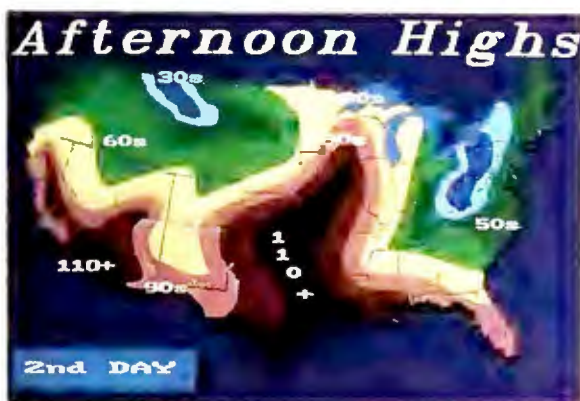
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WHEN YOU BUY WEATHERBRIEF

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version utility that enables you to protect prior investments in document files. It saves the time of re-inputting and extensive re-editing when the need arises to either convert or to communicate with another word processor software program.

Convert In Either Direction Between Any of These Formats:

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- Lotus 1-2-3 1A, 2.0
- Lotus Manuscript 2.0, 2.1
- Microsoft Word 3.0, 3.1, 4.0, 5.0
- Microsoft RTF
- MultiMate 3.3
- Multimate Advantage I & II
- Navy DIF
- OfficeWriter 4.0, 5.0, 6.0, 6.1
- PeachText 5000
- pfs: First Choice 1.0, 2.0
- pfs: Write (version C)
- Professional Write 1.0, 2.0, 2.1
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- Samna Word IV Plus 1.2, 2.0
- Volkswriter Deluxe 2.2
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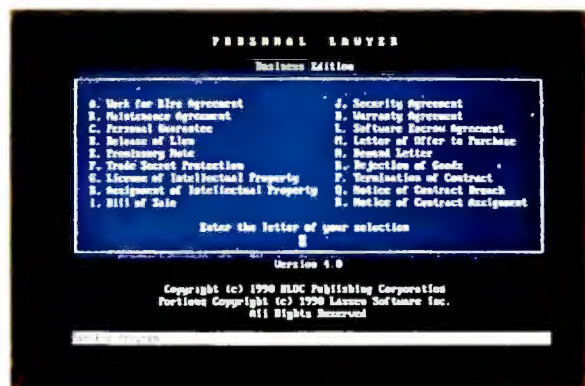
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Personal Lawyer Business Edition gives you the ability to create 18 types of binding legal documents right on your PC — in just minutes. It works quickly and interactively to help you produce documents that cover legal situations that arise often in your business. Just type answers to questions asked on screen.

Lawsuits often result when there are misunderstandings between the parties involved in a project or task. By creating a written document that clearly states the terms to which both parties agree, Personal Lawyer can more than pay for itself the first time you use it. You'll spend less time on legal fees, while providing the protection needed for your company.



From Personal Lawyer Business Edition's main menu, you simply select the type of document you wish to create.

Personal Lawyer Business Edition begins by asking you to select the type of document you wish to create. The system then asks a series of questions relating to your particular situation. As you type your answers to these questions, help and background information is available with just one keystroke. If you need more information, the comprehensive user's manual covers each type of document in great detail. From your original answers, Personal Lawyer will ask a series of follow-up questions, just as an attorney would, to establish the precise details to be included in the document.

Work For Hire Agreement. This type of document can be quickly created when you enter into an agreement with a contractor, or other worker, to perform a specific job or task. It is particularly useful because it is a fast, easy way to lay out the specific terms of the arrangement, what the contractor will do, how much he or she will be paid, the timeframe involved and other important issues.

Maintenance Agreement. Maintaining your company's equipment — from copiers to robotics — usually involves entering into a contract with someone to make repairs in the event of a malfunction, and perhaps to provide periodic preventative maintenance.

Personal Guarantee. A Personal Guarantee allows an individual to guarantee the payback of a loan for another person or corporation that the lender feels is financially insecure. In fact, most banks today will not lend money to a small corporation without a personal guarantee.

Release Of Lien. A useful document to release a lien placed on an individual's personal or real property. Normally, a lien attaches to a real property when someone is hired to work on the property, such as a general contractor who may provide lumber and other materials. If the contractor is not paid, a lien can be placed on the property. Such a lien is usually recorded in the county or parish where the property is located. The title will not be clear until the balance owed has been paid.

Promissory Note. A very valuable document in today's business world. It provides the written ability to

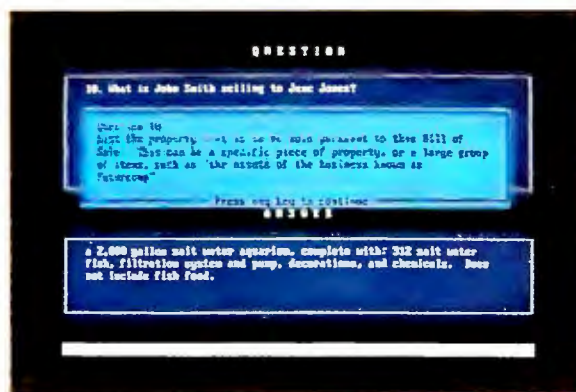
agree to accept a loan on certain terms and to define the payback of the loan. The notes created by Personal Lawyer can be designed to cover virtually any loan/payback situation.

Trade Secret Protection. Many companies have information about their methods of business that could be damaging in the hands of the competition. Often, employees must have access to some, or all of this information in the course of their employment. This document is very useful when you are concerned about employees disclosing "Trade Secrets" during or after their employment with you. Also allows you to create non-disclosure agreements.

License Of Intellectual Property. This part of Personal Lawyer Business Edition allows a licensor to give a licensee the legal right to manufacture or market a product and refers specifically to the patent, trademark or trade-name. Generally this type of agreement is used to license patents or patent rights.

Assignment Of Intellectual Property. An Assignment of Intellectual Property gives the assignee (person receiving the assignment) the right to manufacture or market a specific product or products.

Bill Of Sale. A Bill of Sale is used to document the transfer of personal property from a seller to a purchaser. It acts as a written statement that the property has been sold and now belongs to the purchaser.



A screen from the "Bill of Sale" portion of the program.

Security Agreement. This type of document is used to grant a lender an interest in the personal property of another individual in order to secure debt. The lender/seller has the right to regain possession of the property if payments are not made.

Warranty Agreement. A Warranty Agreement is a document describing an express warranty on a certain item of personal property. Normally, Warranty Agreements are provided by the manufacturer of a product and are used in lieu of an implied warranty.

Software Escrow Agreement. A useful tool for software authors and publishers. This type of document is used to safeguard the source code for a software program so that a distributor or licensor of the software will have access to it if it becomes necessary.



Letter Of Offer To Purchase. When you wish to make a purchase and place your order by letter, you can quickly create a Letter of Offer to Purchase using Personal Lawyer Business Edition.

Demand Letter. If you have a contract or agreement with a company or individual, and they fail to perform or make payment, you can quickly create a Demand Letter.

Rejection Of Goods Letter. In the event you're shipped merchandise that does not conform, for some reason, to what you had ordered, you can quickly create a Rejection of Goods Letter that clearly states the problem. At that time, such a letter is the appropriate action to take to inform the supplier of the inadequacy of the goods.

Termination Of Contract. This document is used to inform a party that you intend to end your obligations under an agreement.

Notice Of Contract Breach. In the event you discover an individual with whom you have a contract has broken it, you can quickly create a Notice of Contract Breach. This document serves to notify the other party that you have discovered the breach. Often, contract breaches may be misunderstandings between the parties and/or their agents. A letter of this nature can help to avoid serious problems in this type of situation.

Notice Of Contract Assignment. A Notice of Contract Assignment is a legal document used to transfer your obligations under a contract to another entity.

If you are party to a contract that allows assignment, this type of document allows you to quickly fulfill your obligation to inform the other party of that assignment.

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Now PopDrop Can Load RAM-Resident Programs into EXPANDED Memory!

Introducing PopDropPLUS...
A Breakthrough Concept!

PopDrop manages all of your RAM-resident programs that use conventional memory. PopDropPLUS (PopDrop plus PopLoad) does everything PopDrop does, *plus* it loads RAM-resident programs into Expanded Memory to save precious conventional memory.

Today, 640K Just Doesn't Cut It.

Word processors, databases, and spreadsheets take up more and more memory today. Yet, DOS still limits you to only 640K. Up until now, you have been forced to leave your handy RAM-resident programs behind, to give these large programs the space they need.

Have Your Cake and Eat It, Too.

PopDropPLUS lets you run your big applications and manage your RAM-resident programs. It frees up your conventional memory, letting you devote the entire 640K to DOS and your memory-hungry applications. With PopDropPLUS, you have complete control: PopDrop removes RAM-resident programs, and PopLoad allows you to shatter the 640K barrier altogether by loading RAM-resident programs into Expanded Memory.

Your RAM-resident programs will be at your fingertips for their usual fast access and execution. Even in Expanded Memory, RAM-resident programs are just a "hot key" away.

It's a Quick Switch.

PopLoad loads up to 50 RAM-resident programs into Expanded Memory at one time. As each program is needed, all you need to do is hit its hot key, and PopLoad automatically swaps one RAM-resident program for the

next! Use PopLoad for RAM-resident programs that normally use only conventional memory — PopLoad runs them from Expanded Memory as quickly and easily.

By loading and running the RAM-resident programs from Expanded Memory, you have more conventional memory free to run larger, memory-intensive programs.

Easy to Use — Completely Menu-Driven.

Setting up PopLoad is as simple as it gets. Pop up its menu, and in just two keystrokes you are ready to identify your RAM-resident programs for PopLoad to handle. Then, use your RAM-resident program's normal hot keys to activate them from Expanded Memory — there's nothing new to learn!

Efficient Use of Expanded Memory.

PopLoad uses only as much Expanded Memory as is necessary. Until you use a RAM-resident program with PopLoad, your Expanded Memory remains free for other programs. PopLoad automatically loads each RAM-resident program into Expanded Memory upon the first time you use its hot key.

Also Manage within Conventional Memory, and Avoid Conflicts.

PopDropPLUS also includes PopDrop, the utility that allows you to remove and deactivate RAM-resident programs in conventional memory without rebooting. If there's not enough room for both your print spooler and your thesaurus, PopDrop can remove one (or both) of them from memory.

PopDrop can help avoid memory and keyboard conflicts, too. With one command, PopDrop can either remove a RAM-resident program entirely, or simply deactivate it to avoid a conflict between hot keys in conventional memory.

PopDrop lets you divide your memory into layers — up to 16. After booting up DOS, you can load one or more RAM-resident program into each layer. Simply load the ones you need the most in the "lower" layers, and load the ones you will more likely need to remove in the "upper" layers.

Create batch files to remove one, several, or all layers at once.

While other products hog up to 40K, PopDrop needs just 1K to do all this!

PopDropPLUS vs. the Competition.

PopDropPLUS truly shatters the 640K barrier, still gives you instant control of your RAM-resident programs, and uses less conventional memory "overhead" to do it. The memory requirements for five popular TSRs (SideKick, SuperKey, Turbo Lightning, SETUP2 and XDIR) versus PopDropPLUS:

Expanded Memory
PopLoad allows you to load megabytes of TSRs into Expanded memory and simply hit a hot-key to use them — from within any application. Your TSRs don't even have to support Expanded memory for PopLoad to load them into Expanded memory.

The 640K Barrier
The limits of DOS are legendary. And with powerful new application software being introduced, (along with higher memory requirements), useful TSRs can't be used. By loading your TSRs into expanded memory, you can keep your larger applications in conventional memory and keep TSRs out of your way.

Utilize "High Memory" For Your TSRs.
PopLoad uses just 27K of your conventional memory to deliver megabytes of "Fat Ram."

Conventional Memory

Task	PopDropPLUS	Competition
Conventional Memory Used	27K	93K
Expanded Memory used with 5 TSRs loaded	344K	508K
Disk space used for swap files for 5 TSRs	0	581K
Keyboard "slowdown"	No	Yes
Use of Features	PopDropPLUS	Competition
DOS commands to configure 10 TSRs	1	50
Number of TSRs per configuration list	50	32
Self removal supported	YES	No

BLOC Publishing

DW 2130 PopDrop 5¼" \$49.95
DW 2140 PopDrop 3½" \$49.95
DW 2150 PopDropPLUS 5¼" & 3½" \$99.95

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A Breakthrough Software Package. Instantly Makes Your PC Run up to 60 Times Faster!

Results of Our FAST! vs. 386

Performance Tests...

You read the headline right — up to 60 times faster! FAST! employs advanced speed enhancement techniques and brings them to a new, sophisticated level that delivers blazing speed to any program you run. And it's simple to use — just load it and go!

A Stock IBM XT vs. a Compaq 386!

In our lab test, we matched a stock IBM PC XT, equipped with FAST!, against a stock Compaq DeskPro 386. The results were astounding — the XT outran the Compaq in a standard data transfer performance benchmark.

How Is It Possible?

FAST! incorporates the proven speed-enhancing performance of 'disk caching' and adds an innovative twist: FAST! includes a form of 'intuitive logic' that actually anticipates what data your CPU will be seeking, and reads that data from your fixed or floppy drive into a special RAM buffer (or "cache") — BEFORE the CPU asks for it!

As a result, your CPU spends virtually no time at all waiting for disk reads — an inherent logjam that slows processing time significantly.

And using FAST!, you'll notice that the more disk-intensive the application (database, for example), the more time FAST! will save — and the faster your applications will run.

And since FAST! reduces drive read time so dramatically, it also reduces wear on the disk drive — extending its life.

On a standard data transfer performance test, FAST! is 18 times faster than a standard AT — and 5 times faster than the leading competitor. In fact, and IBM XT with FAST! is faster than a Compaq DeskPro 386!

Don't Buy More Equipment!

You could spend thousands of dollars trying to achieve the speed required for truly efficient computing. Items like high-speed drives, turbo boards — even complete system upgrades try to overcome your system's inherent slowdown — waiting for disk reads.

FAST! is the only product that eliminates this processing tie-up and gives you top performance using only 8K — for \$99.95. And FAST! will work with conventional, extended, or expanded RAM.

Imagine What FAST! Can Do for a 386!

FAST! will deliver spectacular results on your IBM PC, XT, AT and PS/2, but imagine how much faster the "new generation" of ultra high-speed processing technology like the Compaq 386 or Intel's 386 Above Board will run using FAST! — they instantly leap into a new computing class!

In addition, FAST! supports 'hot key' controls for instant response and installation — saving even more time and allowing you to be more productive, FAST! supports EXPANDED memory — but is not required!

Compute Smarter — Not Harder!

While eager buyers rush to purchase 386-based machines, they ignore the power already available within their current systems. Save yourself thousands — get the best from your system, without more hardware!

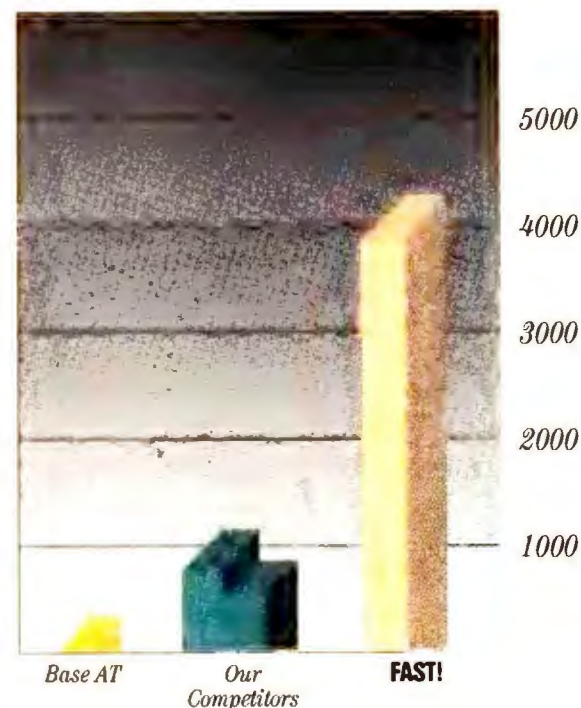
Our Performance Benchmark...

The technicians at TigerSoftware tested FAST! by matching it against the power of the 386.

They took an ordinary XT with a 10mb hard drive and loaded FAST! Alongside it, a Compaq 386, 25Mhz speedster. The task: transferring a few megabytes in a standard performance benchmark.

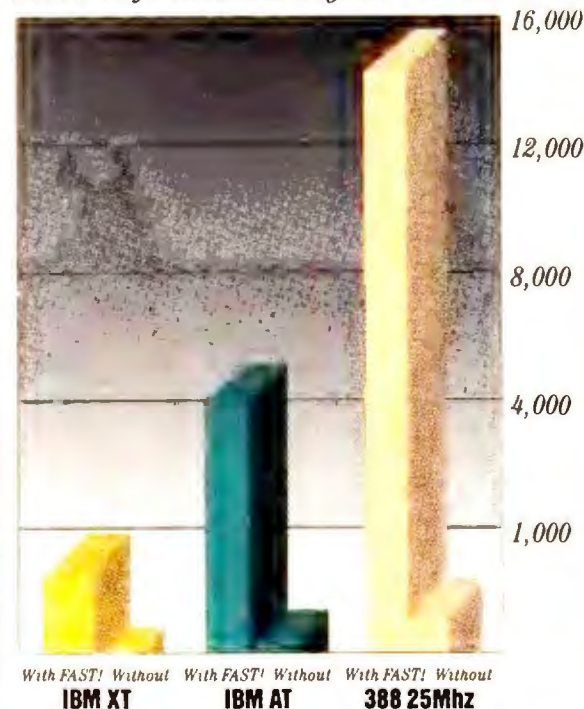
The XT with FAST! outran the Compaq by over 3 seconds! Here are the results:

Data Transfer Rates In Kilobytes Per Second



With FAST! vs. Without FAST!

Data Transfer Rates In Kilobytes Per Second



What Will It Take?

...To convince you that Fast! is the intelligent answer to the problem of sluggish processing? Fast! has topped our best-seller list for 9 straight months! Hardware vendors may not want you to know about Fast!, but smart users everywhere have discovered this incredible software that turns your system into a monster!

CLOSE-UP

"Disk-Caching"

FAST! uses a RAM management technology called "intelligent caching" to eliminate downtime from the central processor's performance.

Improvements in processor technology have brought about CPU's with blazing speed; however, their real performance is limited to that of the slowest component in the system. Floppy and fixed disk drives, which have much lower data transfer rates than the central processor, are notorious for the drain they impose on the overall system performance.

FAST! works by "uploading" data into a RAM cache before the CPU calls for it. While this RAM management technique is not unique to FAST! (in fact, it's been employed by main-frame applications for years), the particular genius of FAST! is its ability to find and load significant file data rather than merely reading in sectors of data randomly. This "intelligence" is the key to why it offers performance vastly superior to other caching software products.

FAST! also represents a superior alternative to hardware upgrades like turbo boards, enhanced processors, and high-speed drives, at a fraction of their cost. Given the virtually infinite combinations of hardware configurations and applications programs, FAST! will provide different performance enhancement specific to each situation.

You'll be astonished by the improvements in your desktop publishing, word processing, and graphics software performance. You'll find that any software runs faster with FAST!, even DOS. It also eliminates wait by saving files instantly to the RAM cache, downloading to disk only at opportune times, rather than holding up processing speed. And FAST! enhances even floppy-based systems, without hard drives. There's simply no better or more cost-effective way to enhance your system's speed.



DW 3850 FAST! 5 1/4" \$99.95

DW 3855 FAST! 3 1/2" \$99.95

FAST! will run on the IBM PC, XT, AT, PS/2 and compatibles with 128K RAM and DOS 2.1 or greater. Supports fixed or floppy disk systems, and supports conventional, expanded or extended memory.

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Back Up Your Files In 0:00 Seconds!

Take The Worry Out Of Having
To Remember To Go Through
The Whole Routine.

Why worry if your hard disk is backed up because you forgot to go through your regular back-up routine? With SitBack, the pressure is off you to remember those precious files are just sitting there, potentially to be lost. Just load SitBack into memory and let it do the job in the background while you work. During your computer's idle time and/or at pre-set times of the day, SitBack will go into action and back-up your newly created or modified files. You can even continue to use your PC while the back-up is in progress.

Relax While SitBack Does the Work

Conventional backup programs force you to put the back-up into action. With SitBack, you know your most recent files will always be backed up, giving you up-to-the-minute protection, without lifting a finger. You can back-up to any DOS device on your PC or LAN, including floppy disks, a fixed or removable hard disk, a file server or optical drive. SitBack only takes an additional 14K of RAM so it won't keep you from running your largest applications.

Written up in all the major PC publications, SitBack has received wide praise for its simple installation, use and operation. PC World said, "SitBack... takes the bite out of hard disk back-up by saving files in the most convenient way — without your involvement."

Loads of Great Features

Installation is easy with SitBack. With an option that will modify your AUTOEXEC.BAT file, loading SitBack becomes as easy as turning your computer on. A context sensitive help screen is available and hot keys including Pause and Cancel perform several back-up functions

without exiting your application program.

SitBack also allows you to back-up only the files which are important to you by setting up one or more back-up configurations.

- Back-up only certain directories.
- Back-up only files with common file name extensions.
- Back-up multiple drives to the same or different back-up destination.
- Back-up certain files to one destination and others to another back-up destination.

You can even exclude specific files, files with common file name extensions or entire directories. This prevents you from wasting valuable disk space by only backing up those that need to be backed up. SitBack does this with the Directory Navigation Utility, which allows you to scroll the directory tree of your hard disk to select the particular files you want to back-up or exclude from back-up. The beauty of this utility is that it eliminates the need to remember or know how to enter lengthy DOS path filenames and syntax.

SitBack's Purge and Restore Utilities make recycling back-up disks and restoring disks like second nature. And in the case of large files, such as databases, the Large File Back-up/Restore Facility protects these files.

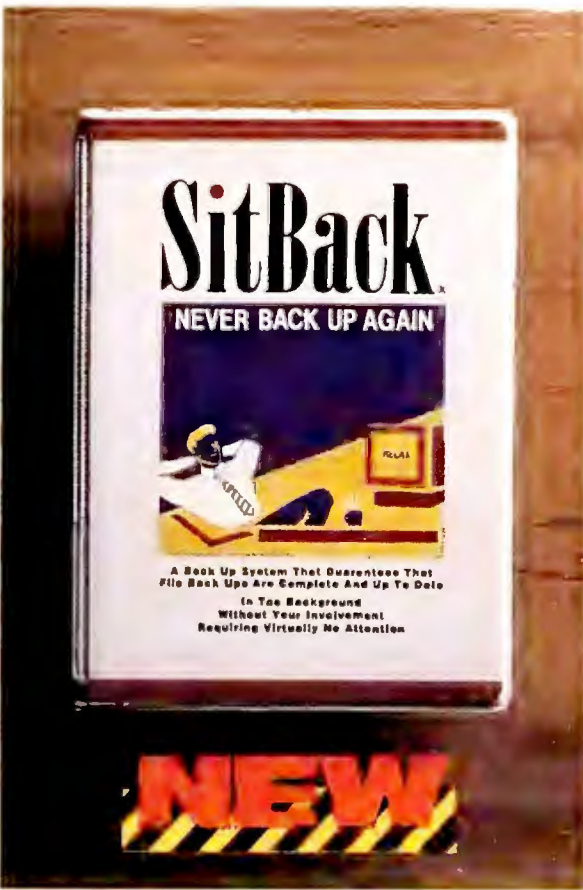
Different Uses for Different Needs

- Back-up stand alone PC's to floppy diskettes, another hard disk, removable hard disk (i.e., Bernoulli Box), hard card or to another partition on the hard disk.
- Back-up hard disk based PC workstations to a network file server or another DOS device on the network.
- Back-up selected directories or files on a file server to a hard disk or other DOS device on a local workstation.
- Back-up a file server to a secondary file server or another DOS mass storage device.
- For LANs which utilize a tape drive to back-up the server each night, SitBack can be used to keep critical files or directories on the server backed up throughout the day in between nightly tape back-ups.

SitBack Technologies, Inc.

DW 3170 SitBack 5 1/4" \$99.00
DW 3175 SitBack 3 1/2" \$99.00
IBM PC compatible, DOS 3.0 or greater and an additional 14K RAM.

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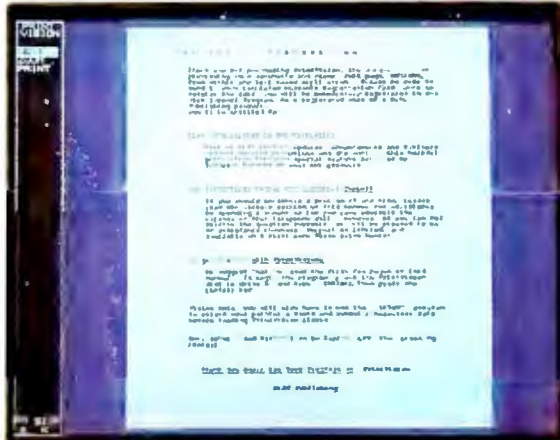
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Catch errors in layout, spacing, font changes and character sizes — before committing them to paper! Save time and money!

Non-graphics applications like word processing, databases, form and chart generators and spreadsheets have exploited the processing speed of the PC. But, text screens don't allow you to see attributes of your documents like various type styles, or bold, underline and italics. So if you have a slight alignment problem, or forget to change typestyle, you may not notice it — and print an error.



Normal Word Processing File Display...

With text-based programs all you see... is plain vanilla text. When you create letters, forms, charts, spreadsheets and lists, you won't know exactly what you've got — until it's too late.

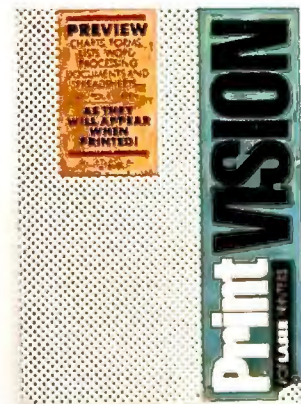
You'll save time, because you can get it letter-perfect the first time — eliminate costly "rejects." You'll also save toner, paper, and wear and tear on your equipment.



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NEW! VERSION 3.0. The Only Way to Accurately Fill-In Pre-Printed Forms Using Your PC.



When Only a Pre-Printed Form Will Do.

The pre-printed form remains the backbone of information flow. Corporations employ hundreds of thousands of pre-printed forms to gather and distribute information internally and externally. Many of these pre-printed forms contain multiple pages, multiple parts, interleaved carbons and other devices that must be addressed when data entry is performed. More importantly, some forms include legal language, disclaimers and other important notices on the reverse side of each sheet, and may require signatures, making them, in effect, contracts.

As corporations seek a balance between paper and electronic forms, they're placing a high priority on making paper forms more efficient, reducing fill-in time, and establishing connections with their database.

While most forms are still completed by hand or using a typewriter, FormFiller allows this task to be automated using virtually any PC and printer configuration, without special hardware, graphics or dedicated printer stations. Waste, inefficiency and error, inherent in the manual fill-in of pre-printed forms, can grind the flow of information to a standstill, and cost thousands of dollars in lost time and unproductive work.

with one menu selection, retrieves them and automatically fills them into proper position in the form.

How FormFiller Works:

Step 1 — Insert The Form Into Your Printer.

The secret to FormFiller's power is its ability to tightly synchronize the computer and printer for precise positioning. You begin by creating a template for each form, matching the exact spacing, position and size for each field or blank on the form and inserting captions, help and fill-in instructions if you like.

Simply insert a sample form into the printer, with the system prompting you for alignment with your printer head. You then invoke FormFiller's "print grid" command. This actually prints vertical and horizontal lines directly on the pre-printed form, with numbers along the top and the left margin. This grid, and the corresponding numbers, are your guide in establishing the coordinates for each print position on the form.

Step 2 — Locate Precise Print Positions for Each Blank.

Using FormFiller's new menu-driven interface, the next step is to create exact print positions for each blank on the form. It's fast and simple — just two keystrokes are required to establish a print position, defining it from starting point to ending point. And FormFiller allows you to adjust your print positions in any direction in incre-

stant call up and fill-in anytime. FormFiller allows data to be entered into templates using any format: columns, prompts, or into the actual form image. The data is then automatically transferred to exact blank positions on the pre-printed form.

FormFiller's Extensive Math Capabilities.

FormFiller contains dozens of math and financial functions that can be used within the form. These functions can be embedded in the form templates and automatically activated when values are entered into certain fields. This allows interactions and relationships between all fields in the form. If you're filling in a mortgage form, for example, changing one number will change all subsequent values related to that number.

Use Existing Data To Fill In Forms.

FormFiller's advanced "merge" features allow users to instantly merge database information into their pre-printed forms from spreadsheets and relational databases simultaneously.

Your existing data can be quickly imported (without conversion) using FormFiller's improved new import capabilities that support dBASE II, dBASE III, Lotus 1-2-3 (WKS and WK1), DIF and ASCII.

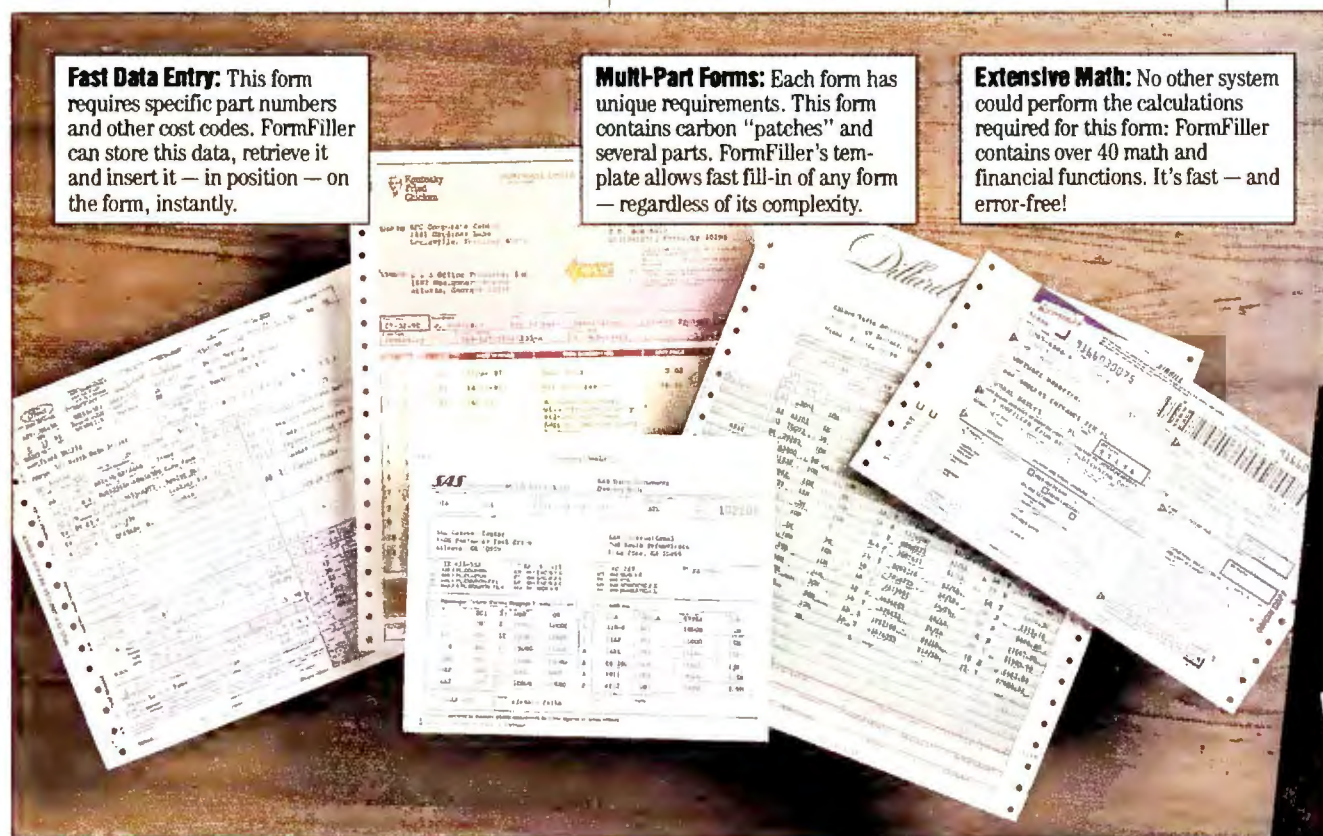
Pinpoint-Precise Accuracy.

Only FormFiller can position data in precise locations on the pre-printed form, using its unique print position "Locator Grid" which actually synchronizes the computer and printer. And FormFiller allows complete control of the printer, including print quality, fonts, attributes, variable page sizes and orientation using dot-matrix, ink jet, daisy wheel or laser printers.

Automatic Look-up And Fill-In.

FormFiller streamlines data entry with its unique "look-up" feature. This powerful function eliminates data entry by providing instant access to details frequently required during fill-in. In preparing an invoice, for example, you can simply enter a part description and FormFiller automatically finds the part number, description, price — even the customer's shipping and billing address.

NEW



Fast Data Entry: This form requires specific part numbers and other cost codes. FormFiller can store this data, retrieve it and insert it — in position — on the form, instantly.

Multi-Part Forms: Each form has unique requirements. This form contains carbon "patches" and several parts. FormFiller's template allows fast fill-in of any form — regardless of its complexity.

Extensive Math: No other system could perform the calculations required for this form: FormFiller contains over 40 math and financial functions. It's fast — and error-free!

FormFiller is the ideal fill-in solution for government, insurance, legal and tax forms, building permits, medical forms, shipping airbills and countless others.

FormFiller is the only system specifically designed to accurately fill-in pre-printed forms with pinpoint-precise accuracy — for up to 640 fields! It eliminates the tedious nature of form fill-in, and allows forms, regardless of their type or complexity, to be filled in with unparalleled speed, and without the margin for human error.

FormFiller's advanced mathematical and financial calculation capabilities allow you to enter values and have the system make the calculations (using dozens of built-in formula functions) automatically. These extensive math functions include percentages, exponents, depreciation, amortization, interest, present and future values — even advanced trigonometry functions.

FormFiller also includes a time-saving "Lookup" feature that stores details such as part numbers, phone numbers, shipping and billing addresses, wholesale/retail prices, claim and case numbers and more — than

ments of up to 1/720th of an inch for pinpoint-precise alignment. You can quickly create custom grids for complex or inconsistently spaced forms.

When the data positions have been located, FormFiller will automatically insert X's to represent characters so you can visually test alignment and inspect the spacing of the fill-in areas.

Step 3 — Preparation of the 'Master Template'

Once the coordinates for each print position on the form have been entered, you then enhance the "master template" for the form. FormFiller allows you tremendous flexibility to custom design master templates to fit the exact needs of your information flow and accommodate your data entry requirements. This master template controls the entire data entry process.

Step 4 — Swift, Simple Data Entry.

The master template for each form is stored for in-



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Account Number — please include all digits.

Month Year

[illegible]

Expiration Date Print exact name appearing on credit card

Signature _____

Check or Money Order Number _____

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flexible board.

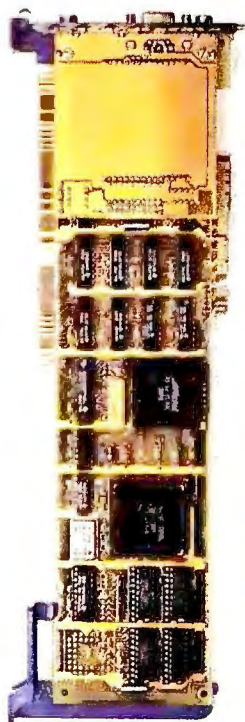


IRMAtrac. The most flexible token-ring board in the world.

Within the myriad of connectivity options, you need to choose the path or paths that will protect your investment both now and in the future. Which is why we developed IRMAtrac,[™] our new, highly flexible token-ring board. IRMAtrac Token-Ring Adapter/Convertible is designed to adapt in three different ways, to cover all of the token-ring growth possibilities that face you.

Whether you're planning to move from twisted pair to fiber optic, 4 MBPS to 16 MBPS, or the standard PC environment to the MCA world of PS/2[®], IRMAtrac's flexible architecture and modular design allow you to handle all of these environments.

That way, you can select the path that's right for your business, all the while enjoying the kind of reliability and IBM[®] compatibility that make DCA's IRMA products so highly successful.



Yet our appeal doesn't stop at flexibility. IRMAtrac offers better performance than IBM's token-ring, with less memory due to bus-master technology. And we're compatible with the industry-leading network operating systems, including Novell[®] Netware[®] 286 and 386, DCA 10Net[®], Microsoft[®] LAN Manager, 3 + Open,[™] IBM LAN Server Program, and IBM PCLAN Program.

Plus, other microcomputer architecture versions, such as Macintosh, will be available in the near future.

In short, IRMAtrac represents the ultimate token-ring connectivity solution.

For more information on IRMAtrac

Token-Ring just call us at
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ext. 64C.*

DCA



DCA

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Circle 62 on reader service card

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Edited by ERIC BENDER

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Can PS/1 Run Future Home Office?



Aimed at novice users, the Personal System/1 is the first home computer that bundles on-line services.

Can you ever get too close to your customers? Yes, if you focus so closely on their needs today that you fail to consider what they'll want tomorrow. That's the trouble with the Personal System/1, say some analysts—although they expect IBM to sell its new home computer by the truckload.

Launched in a few metropolitan markets this summer and nationally this fall, the PS/1 is a compact AT compatible. It has a built-in modem for connecting to on-line services, but its expansion capabilities are limited (see "IBM's Half-Step Toward Home," August 1990). At \$1999 with VGA monitor and 30MB hard disk, "the product is moderately competitive," says IDC analyst Bruce Stephen. But the IBM label will make the PS/1 a comfortable purchase, he says,

and "it's a good time to get into the home market."

New Users, Not New Roles

The PS/1 represents a controlled experiment for IBM. It's the first home computer that not only bundles on-line services but also offers technical support through them. It focuses on ease of use and will sell through department stores as well as computer dealers.

PS/1 marketing manager Skip Gladfelter says the PS/1 is a market expansion project, aimed at millions of families who avoid PCs because they are too hard to buy, install, and run. Analysts agree the PS/1 fulfills novices' need for an easy-to-assemble PC at a reasonable cost but wonder if they will be sophisticated enough to take advantage of bulletin

board support.

While the PS/1 doesn't break new ground in computing, it doesn't have to, because compelling programs already exist, counters Gladfelter. He says people are telling IBM, "I need to work at home for my job. My wife started a small business at home. My daughter in high school can't spell and needs a word processor with a spelling checker."

Taking work home is the most common justification for buying a home computer—every fifth PS/2 already ends up there. With the PS/1, "IBM is actually positioning a home computer against itself," remarks Thomas Miller, vice president and director of home office research at LINK Resources in New York City. But the PS/1 offers much less of an upgrade path than the PS/2 or most PCs, which raises the question of whether it will run most business software satisfactorily down the road.

Relentless customer research produced a grab bag of interfaces, leading some to wonder why IBM didn't just turn to *Windows 3.0*. "This is the best interface we can put together for half a megabyte of memory," replies James Cannavino, head of IBM's Personal Systems group.

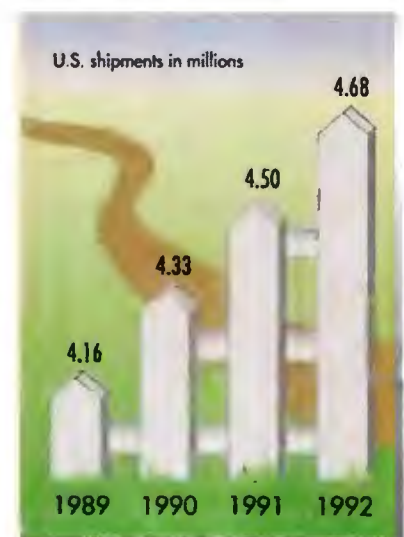
As a family purchase, the PS/1 needs to be an appealing platform for education and entertainment software. Some say that IBM should have moved toward multimedia by building in the optional audio card, adding less than \$100 to the cost and spurring on software developers. "As a consumer, I really don't want to pay now for something I might use in three or four years," answers PS/1 product manager Bob Amezcua.

Such decisions show IBM "listened to customers too much," says Esther Dyson, editor of *Release 1.0* in New York City. "That's what you do when you're marketing a new soap—not a computer. What the PS/1 lacks most of all is imagination."

LINK's Miller predicts that "Japanese and other vendors who understand consumer product design and retail channels better than IBM" will take more imaginative approaches. In one scenario, each family member will get his or her own notebook PC, which will connect to a combined facsimile/printer/copier via an infrared link.

However, IBM promises that this time around, it won't give up on the home front after 18 months as it did with the PCjr in 1985. "The VCR was the consumer product of the last decade," says George Conrades, senior vice president for U.S. marketing and services. "We think the home computer will be the consumer product of the decade ahead." —E. B.

PCs Head for Home



Shipments of personal computers into U.S. households are rising steadily, according to data from LINK Resources.

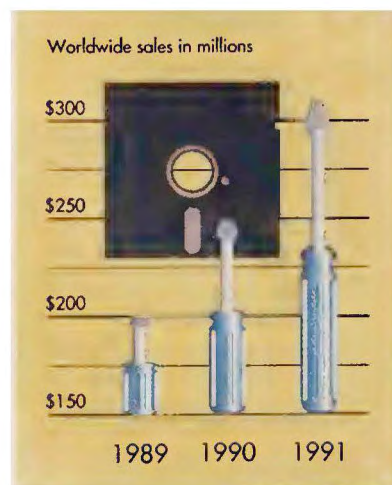
Symantec/Norton Merger Refocuses Utility Wars

PC Tools Faces Stronger Attack

Peter Norton, Mr. Fix-It for the PC, has found a quick fix for his firm's need for financial backing. Instead of the slow and painful route of a public offering, Peter Norton Computing will move under the wing of Symantec Corporation. The move will strengthen PNC in its battle against Central Point Software—a white-hot competition that's paying off in enhancements for the two leading disk-management packages.

Symantec, a \$50 million firm, offers PNC immediate access to the strong sales force it needs to ride the boom in utility software—not just in the United States but overseas. "With the merger, we can make a giant leap," explains Ronald Posner, president of PNC in Santa Monica, California.

Utility Sales Soar



As hard disks grow larger, operating systems grow more complex, and personal computers become even more critical to businesses, utility packages will be one of the hottest niches in software. International Data Corporation predicts that worldwide utility sales will climb to \$310 million next year.

Comeback Trail?

A few years back, *The Norton Utilities* was the overwhelming choice for those seeking mastery over their hard disks. Then in 1988 Central Point began taking sales away with *PC Tools Deluxe*. Besides restoring erased files, the all-in-one package backs up hard disks, manages files, and keeps appointments. In the year ended March 31, the Beaverton, Oregon, firm sold an astounding 839,000 copies of *PC Tools*, while 400,000 copies of *Norton Utilities* and *The Norton Commander* went out the door.

A year ago, Norton brought in Posner to help him take PNC public and raise about \$20 million. But the acquisition proved to be a better deal for Norton, a 90 percent shareholder, and Posner, who has a 10 percent stake. In return for a 60 percent stake in PNC, whose sales reached \$25 million last year, Norton and Posner received 40 percent of Symantec's stock, worth about \$70 million.

Until last year PNC relied on incoming phone calls to sell its products. Now it can exploit Symantec's 50-person sales staff. "I don't want to find a way to coexist with Central Point," says Symantec president Gordon Eubanks. "I'd like to find a way to win."

For Eubanks, the purchase was a natural. "Utilities are becoming much more central to personal computer users," he says, and this trend will strengthen as hard disks grow larger and operating systems become more complex. "To write our own utilities package for the PC didn't make



Combining forces, Gordon Eubanks (left) and Peter Norton hope to retake the lead in utility software sales.

sense," he adds. "*The Norton Utilities* is by far the best-known product in its field."

"This move throws much more weight toward Symantec," comments Jeffrey Tarter, editor of *Soft-letter* in Woburn, Massachusetts. Symantec, which gets 66 percent of sales from the Q&A data base manager and *Time Line* project management package, extends its 15-product line not just with *The Norton Utilities* but with *The Norton Commander*, a DOS shell that makes up 20 percent of PNC's sales. All future Symantec utility products will bear Norton's mug shot and name.

After the deal is done in August, administrative functions will have shifted to Symantec's Cupertino headquarters, and about a third of PNC's staff will have been laid off. Yet about 70 technical and marketing personnel will remain in their offices, which are adorned with modern art and overlook the Pacific. Can Symantec keep the key talent? "This is the fourth major acquisition we've done, and we know how to make them work," Eubanks says. Symantec has "done a good job of making disparate companies mesh," notes Nancy McSharry of International Data Corpo-

ration (IDC) in Framingham, Massachusetts.

Competition Still Climbing

"Sheer size isn't necessarily an advantage," counters Central Point chief executive Michael Brown. Aggressively marketing *PC Tools*, Central Point grew sales to \$25.8 million in the year ended March 31, 1990—with about half as many customers as PNC.

The burgeoning utilities market, which will grow to \$310 million worldwide next year by IDC estimates, is far from divided between the two firms. Fifth Generation Systems in Baton Rouge, Louisiana, still easily dominates the disk backup market and is larger than either PNC or Central Point, with 1989 sales of about \$40 million.

New categories continue to emerge. Eubanks points to antiviral products, saying that "the DOS world has not really woken up to the risks and dangers of viruses." *Soft-letter's* Tarter agrees that antivirus products and other offerings could flourish. Other small manufacturers also will play a role. "The utilities market won't be like word processing, where a few powers emerge and everyone else dies," Tarter predicts. —Patrick Cole

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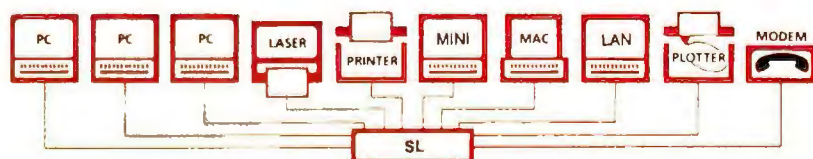
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Super Servers Arrive

But Software Lags Behind



The technical barriers for super servers "are collapsing very quickly," says NetFrame's Enzo Torresi.

Look at the multiple CPUs, huge memories, plentiful 32-bit slots, stacks of large hard disks, and special network facilities: High-end net servers have reinvented the minicomputer, with PC parts. For big nets that can't afford to go down, such "super servers" are ready to offer clear advantages in price/performance and reliability.

Well, they're not *quite* ready. The network and application software that will allow super servers to leap tall nets in a single bound hasn't arrived. And it's still too early to tell if resellers can sell and service these machines.

Hardware Leads Software

While everyone from ALR to Zenith is unsheathing a multi-processor PC, at this writing the only system software that exploits even dual processors efficiently is SCO UNIX—hardly the standard for PC nets. Both Novell and Microsoft plan to run applications on the second processor, but they haven't set a date for doing so.

In the real world, fault-tolerance and net management features are more crucial than dual-processor support. Super servers strive for various levels of fault tolerance at the hardware level. But again, NetWare and *LAN Manager* are missing important pieces.

And on the application side, the client/server packages that make the super server architecture pay off are barely starting to trickle in.

But that's not news to those providing super servers. Compaq's Systempro and peers are engineered for future environments. "We built the hardware to meet the needs three to five years down the road," says Gary Stimac, vice president for systems engineering.

The \$3 billion Compaq has put its weight behind the Systempro, investing heavily in dealer training. Customers seem willing to buy the machine now and expand later. "Compaq is going to be extremely successful with the Systempro," predicts IDC analyst Lee Doyle.

Among other contenders is the PowerFrame from Tricord Systems in Plymouth, Minnesota. It lets you swap out a bad drive without shutting down. NetFrame from NetFrame Systems in Milpitas, California, offers still higher performance, with prices starting at \$22,500.

Then there's IBM, which "has always had problems positioning its PC LAN products so that they don't destroy the mini products," comments Doyle. While it's hard to avoid that conclusion, the upcoming dual-486 Advanced Technology Super Server can ride herd on a respectable 5.5 gigabytes of SCSI storage.

Reseller Challenge

Selling, installing, tuning, and maintaining super servers can get complex—a challenge compounded by the frequent need to hook them into wide-area networks. "These servers seem to fall into a no-man's-land of distribution, being hard to sell for the retail channel and hard to sell direct" because they don't offer the profit margins of minicomputers, one analyst remarks.

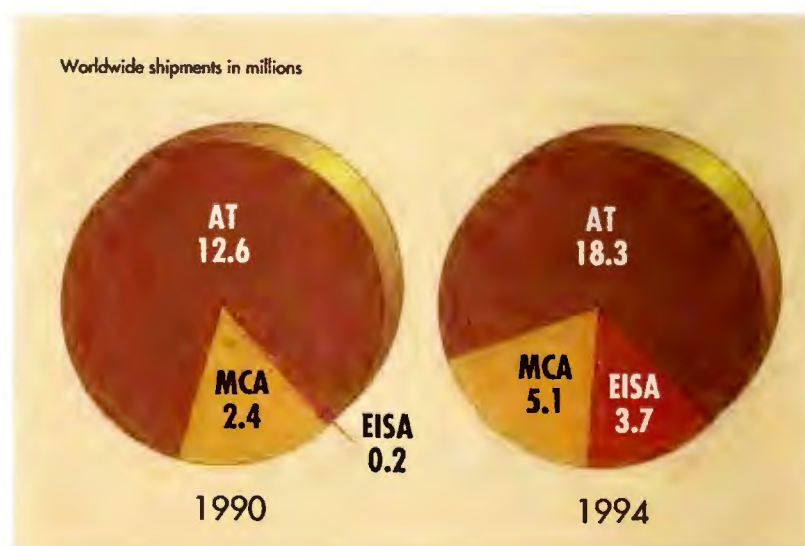
NetFrame president Enzo Torresi acknowledges that

"we're betting a lot on the distribution channel graduating from box pushers to value-added resellers." He argues, however, that some resellers already have shown they can sell nets to Fortune 500 firms—and support all flavors of workstations better than any direct-sales organization.

Torresi maintains that with PC software houses driving application development, PC-based servers offer clear advantages. But customers can't put mission-critical functions on generic PC servers because those lack reliability. While it will take time for super servers to bloom, "the technological obstacles are collapsing very quickly," he says.

"These aren't just souped-up PCs; they have extra levels of reliability and redundancy built into them," says Wylie Crawford, president of Chicago reseller Kenwood Associates. "You can make an economic argument to buy them right now. The other fancy stuff will be gravy when you get it." However, Doyle cautions against betting too heavily on proprietary systems like NetFrame. "Maybe one or two of this crop will make it," he says. —E. B.

AT Still the Bus to Beat



While powerful network servers are starting to demonstrate the benefits of IBM's Micro Channel architecture and the rival Extended Industry Standard Architecture, Dataquest predicts that even in 1994 the overwhelming majority of PCs will contain an AT bus.

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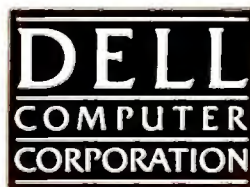
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Circle 318 on reader service card

PostScript Gains Speed

Adobe Promotes Cross-Platform Strengths as Laser Market Splinters

A year ago, if you wanted scalable text fonts and first-class graphics, you would almost certainly buy a printer incorporating Adobe Systems' PostScript page-description language. Today PostScript-compatible printers have arrived, Hewlett-Packard offers scalable fonts and enhanced graphics in the LaserJet III, and Apple and Microsoft are busily drafting a PostScript superset.

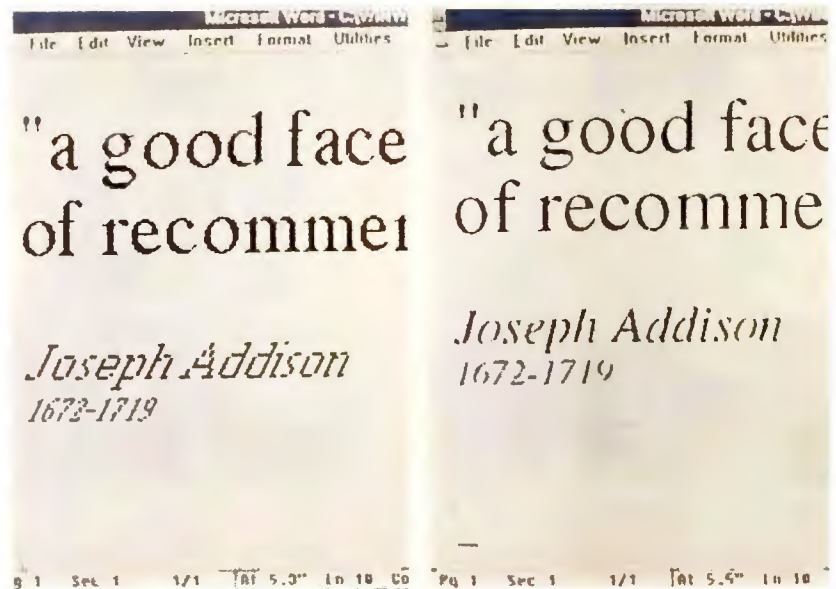
Adobe's markets have been under fire, its profits have dropped, and its stock has been battered on Wall Street. In June the firm launched a counteroffensive by announcing PostScript Level 2 and its first PC retail products—an on-the-fly *Windows 3.0* font generator and a PostScript cartridge for the LaserJet II. Adobe is kicking off another

round of competition that will make fonts and other fancy graphics cheaper, more accessible, and more varied.

Reaching Level 2

PostScript Level 2, Adobe says, will include speedier font-rendering techniques, more efficient memory management, support for Display PostScript (an on-screen environment that matches printed output), various industry-standard flavors of device-independent color support, file compression/decompression tricks, and more.

Adobe won't estimate the speed increase, but others say many operations should take a third the time or less. Just as crucial, you can use all existing PostScript fonts and print out existing PostScript applications on a Level 2 printer,



Adobe Type Manager for Windows replaces today's on-screen fonts (left) with scalable PostScript fonts (right) that not only look much better but give you a closer approximation of printouts.

stresses Patricia Marriott, marketing director for Adobe's systems division.

Adobe expects Level 2 printers to begin cropping up early next year. Many PostScript devices could be upgraded, but each manufacturer will decide what's feasible, says Marriott.

Level 2 "is not just for high-end devices," she emphasizes. Adobe hasn't raised its royalties, and Level 2 printers will work effectively with as little as 1.5MB of memory, she says.

Overall, "the price of PostScript is coming down," Marriott notes. "In the next year to 18 months, you'll see PostScript printers at \$1000" on the street. (Some say these will be complete PostScript devices rather than PostScript-cartridge-LaserJet combinations—which now offer the cheapest entry point because of idiosyncrasies in Adobe's royalties.)

A Compatible Response

While Level 2 raises the bar, clone makers say it's business as usual. "We've anticipated Level 2 for quite a while, and we've continued to add compatible features," says Bob Downs, vice president for peripherals business at Phoenix

Technologies.

Downs says that major pieces of Level 2 remain undefined, delaying its arrival. "Even if Adobe can...get Level 2 deployed by enough [manufacturers] in the next 18 months, there will be a lag before the applications pick it up in a serious way," he adds.

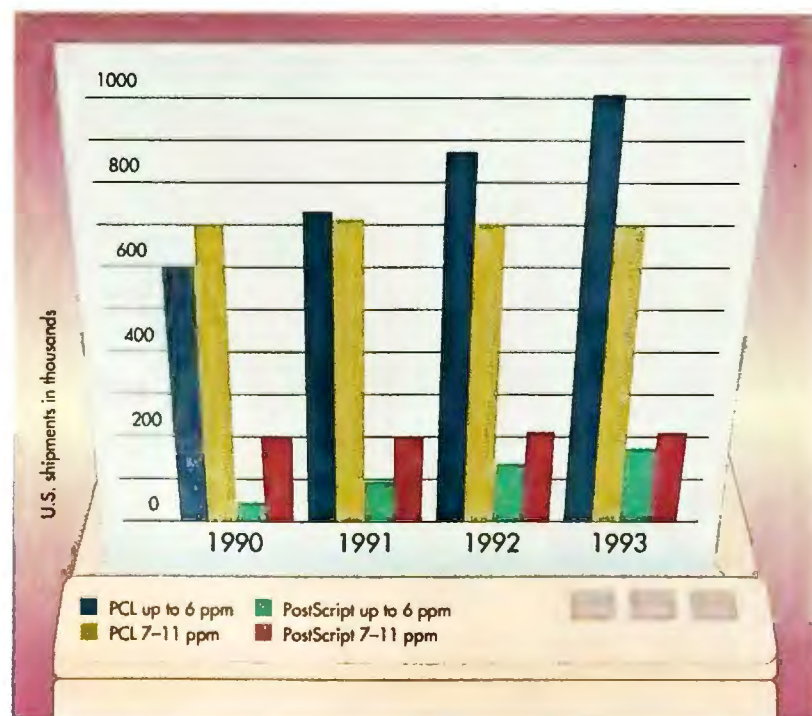
A major Phoenix customer is Pacific Data Products of San Diego, which ships thousands of PostScript-compatible cartridges a month. "We may ship more PostScript products for the PC than all of Adobe's [manufacturers] combined," says Downs.

Duel for Windows and OS/2

Among the products announced in June, Adobe will integrate its font-rendering technology into *Windows 3.0* with *Adobe Type Manager for Windows*, a \$99 package including 13 scalable fonts that's slated for September release.

The potential user benefits for Adobe's approach are compelling: When you want a given font in a given size, you make a simple menu choice to generate it—for both printer and screen, so you *really* see what you get. You don't have to buy print cartridges or hassle (see *PostScript*, p. 108)

"Personal" Laser Printers Take Lead



In the laser printer market, desktop models that churn out up to 6 pages per minute will show solid growth, according to BIS CAP International. In contrast, BIS CAP expects sales of 7- to 11-ppm PostScript and PCL (LaserJet-compatible) devices to peak early in the decade.

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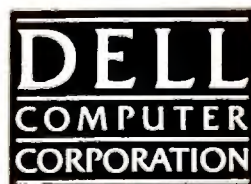
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Circle 318 on reader service card

PostScript

(continued from p. 106)

with soft fonts. You get an easy entrance into the PostScript world—plus the ability to print out on LaserJets and dot matrix printers.

However, Microsoft and Apple not only take the same



PostScript Level 2 is much faster and "not just for high-end devices," says Adobe's Patricia Marriott.

approach but will include the TrueType font technology in their base-level software. Microsoft promises TrueType in *Windows* later this year. When that arrives, "not many people will want to go out and buy a capability that's already built into the operating system," contends Dan Steele, director of Microsoft's Printer Business Unit. It's not clear, though, what owners of PostScript or LaserJet printers should expect from TrueType.

A similar scenario is likely for OS/2, although Adobe gained the backing of IBM, which hopes to ship *Adobe Type Manager* in OS/2 2.0 this year. But Microsoft instead is pushing TrueType and its associated page-description language and doesn't plan to offer OS/2 2.0 until next year. (No, this OS/2 doesn't sound like quite the same product, does it?) True-

Image printers, which Microsoft says will handle both TrueType and Adobe fonts, may appear by year-end.

Meanwhile, this fall HP plans to offer similar *Windows* and OS/2 software based on the LaserJet III's PCL5 page description language. Most observers agree that if you simply want scalable fonts, PCL5's Intellifont technology is fine. HP is expected to launch other PCL5 products this fall, while its rivals struggle to offer PCL5 clones.

And third-party font specialists ranging from Atech and Bitstream to Zenographics and Z-Soft are offering their own scalable font packages for *Windows*. Most of these seem headed for healthy, but short, product lives.

Adobe Versus All Comers

As Marriott points out, the Microsoft/Apple alternatives don't exist yet, and PostScript Level 1 is far more robust than competitors: "What we have today is a language that allows you to image any page you can imagine." Because PostScript supports multiple computing platforms via Encapsulated PostScript files, graphic-oriented documents can be

swapped without manual re-formatting. "Everything we hear from corporate customers says that they want a standard," she says.

"Although I would expect Adobe's technical strength and hardware independence to give it control at the high end, Apple and Microsoft could do well at the low end," comments W. Christopher Mortenson of Alex. Brown & Sons in New York City. "If I have a worry about Adobe, it's that these behemoths could muddy the waters a year from now."

"Momentum is built by installations, and it gets bigger and bigger for PostScript every day," remarks Mick O'Rourke, Pacific Data's marketing vice president. "TrueType just gets talked about."

But Microsoft's Steele maintains that TrueType and TrueImage are better technology and better matched to OS/2 than PostScript. He also says that because TrueImage supports both TrueType and Adobe fonts, TrueImage printers will offer greater document portability than PostScript devices—although this claim meets universal doubt outside Microsoft. When these products appear,

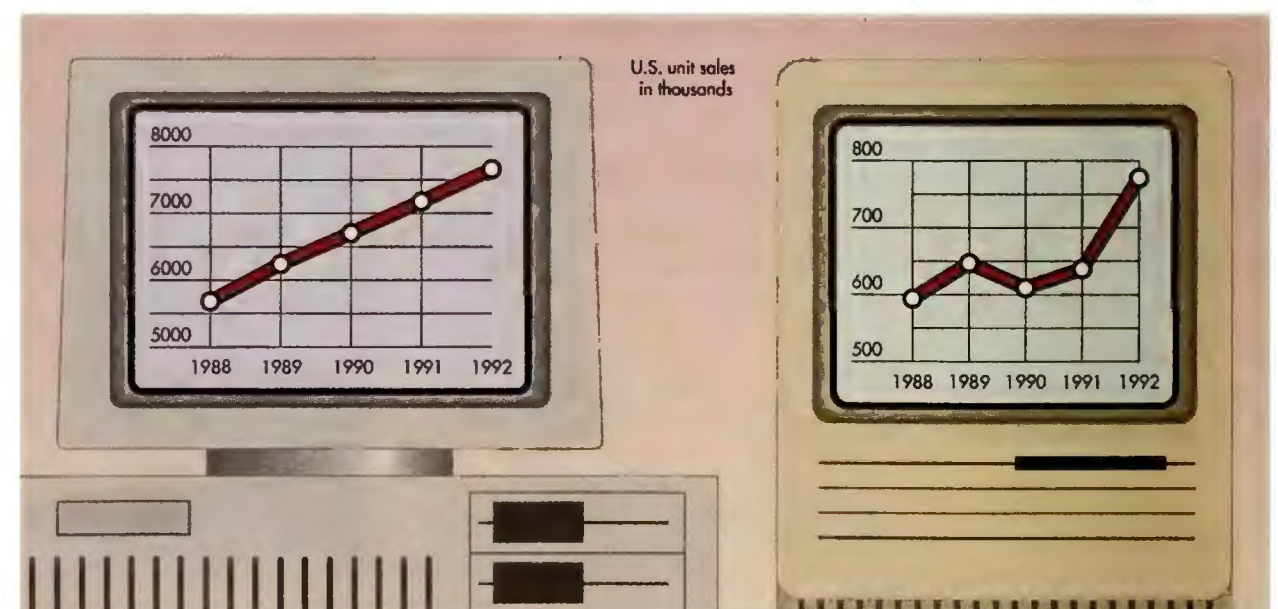
"customers may say 'No, I'm not even going to try them and take the risk of getting hurt,'" says Cathy Lyons, product marketing manager for office printers at HP in Boise, Idaho.

Downs suggests that PostScript has grown into a standard beyond Adobe's control or the Apple/Microsoft secession. Apple has remained conspicuously quiet about Level 2, he points out, partly because it must offer a compatible printing path to all Mac users. "It's not a foregone conclusion that Apple and Microsoft will stick together," he adds.

In the long run, "vendors like us will have to offer multiple font renderers, multiple font outlines, and multiple page-description languages in a single package," says O'Rourke. Moreover, he says, all that technology must fit smoothly under the covers where it won't bother customers. "Most people are just not that sophisticated about fonts and don't want to be," he says. "But they do understand the value of big and little fonts." —E. B.

Patrick Cole writes on business and is based in Los Angeles. ☺

PC Sales Climb as Mac Sales Dip Slightly



Market growth has cooled off, but U.S. shipments of IBM-compatible personal computers are still climbing, according to International Data Corporation. However, IDC projects that Macintosh sales will drop this year (largely due to a lack of successful low-end systems) and not rebound strongly until 1992.

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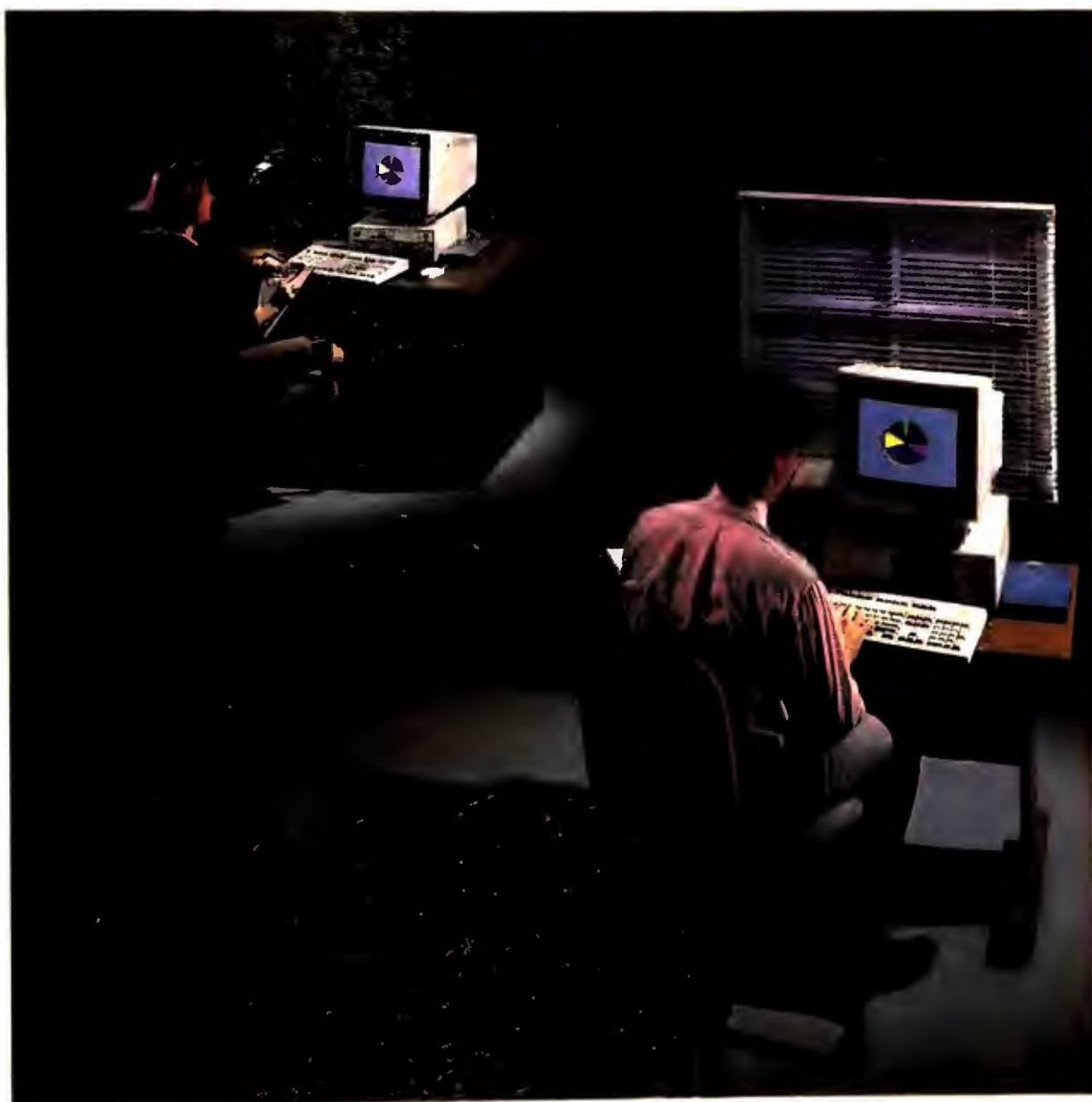
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June 12, 1990
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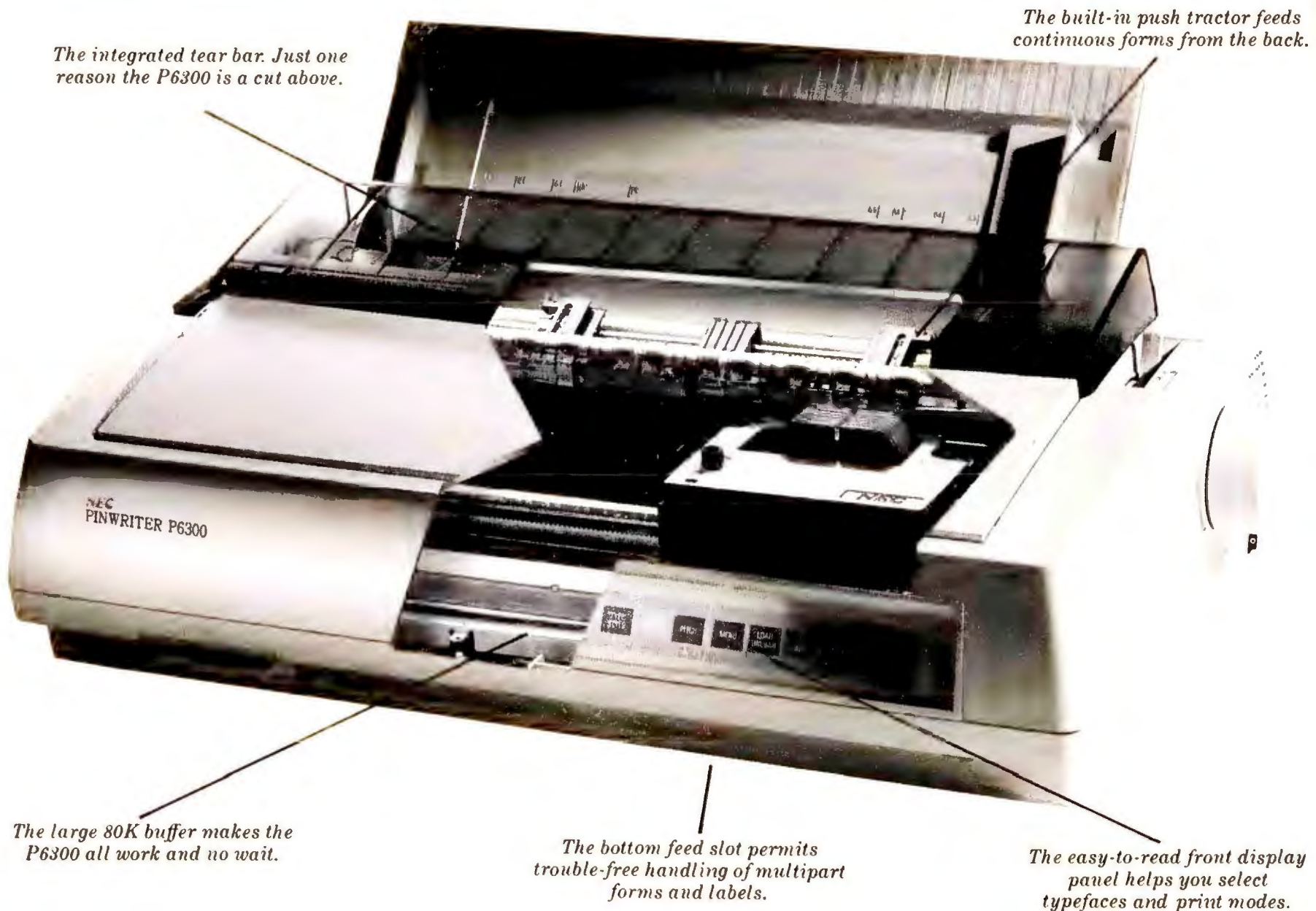
Phone: (904) 878-8564
FAX: (904) 877-9763
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Full Spectrum Communications

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Circle 236 on reader service card

Only the new NEC P6300 has the guts to outperform any dot-matrix printer in its class.



The integrated tear bar. Just one reason the P6300 is a cut above.

The built-in push tractor feeds continuous forms from the back.

The large 80K buffer makes the P6300 all work and no wait.

The bottom feed slot permits trouble-free handling of multipart forms and labels.

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Only the Pinwriter® P6300 printer from NEC has the guts to deliver this much glory:

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the beauty of the P6300 (and its narrow-carriage brother, the P6200) extends beyond the printed page. Because they give you the ability to print on everything from 24-pound letter-head and envelopes, to continuous forms, labels, and card stock. Plus the ease to go from one to another, from one minute to the next.

It takes guts to say the Pinwriter P6300 is the best dot-matrix printer you can buy today.

It takes a lot less than you think to bask in its glory.

NEC

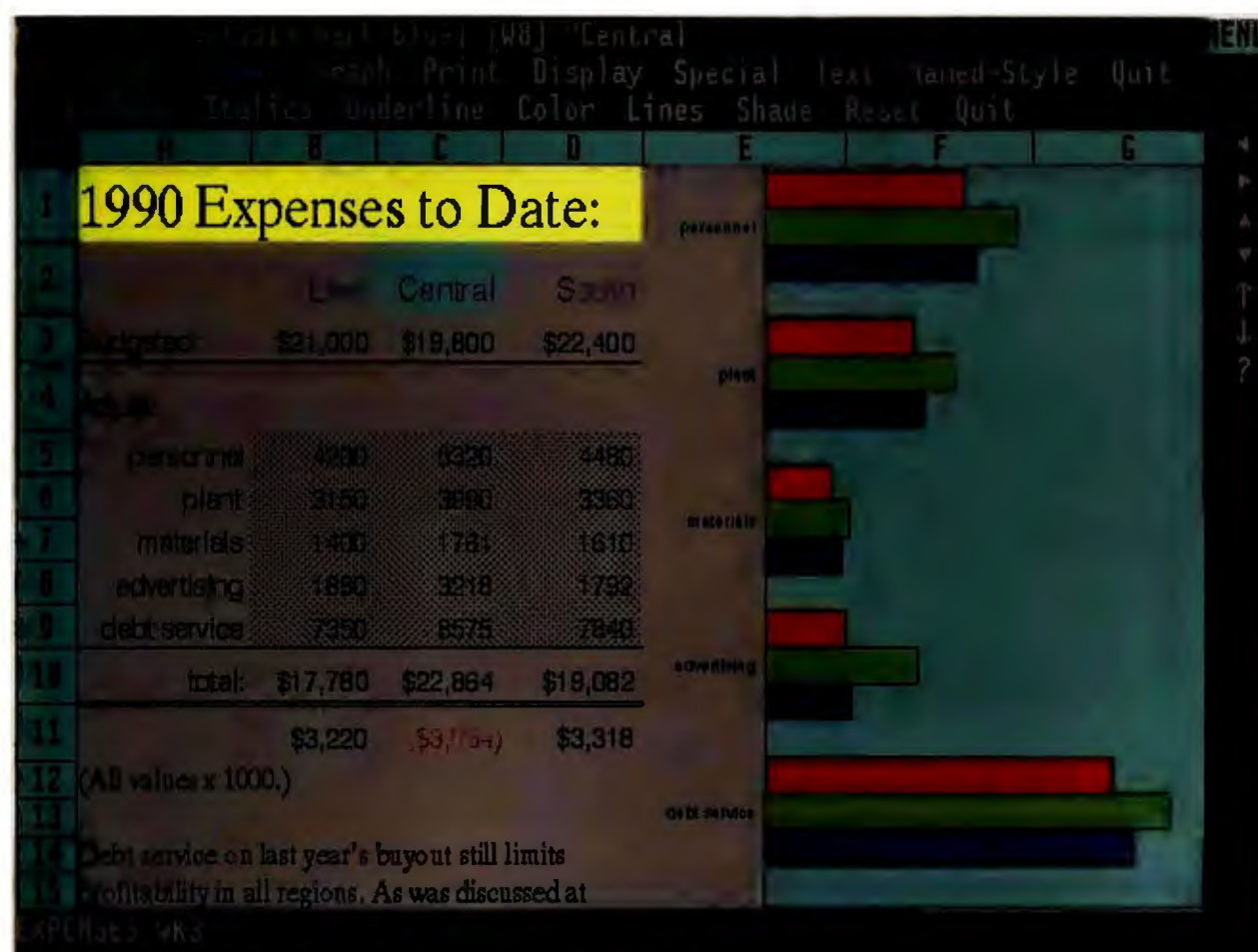
*Color kit sold separately.

PREVIEW

PC WORLD OFFERS FIRST IMPRESSIONS OF PRERELEASE HARDWARE AND SOFTWARE

1-2-3 Meets Windows Halfway

1-2-3 release 3.1 gives you a graphical interface and runs under Windows 3.0—but not both at the same time.



With 1-2-3 3.1, when you change your data, your graphs update automatically.

Robert Lauriston

It's not *1-2-3 for Windows*, but Lotus's latest upgrade takes steps in that direction. *1-2-3 3.1* gains a graphical interface, a *Quattro Pro*-style chart editor, soft fonts, style sheets, and a print spooler. And unlike *1-2-3 3*, *3.1* can run under *Windows 3.0*.

Basic number-crunching,

PC World previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.

programming, and data management features are unchanged from release 3. An improved memory manager eliminates conflicts with *Windows 3.0* and with some AT clones' "shadow RAM." It also lets you tap 32MB of disk space as virtual memory so you can now load spreadsheets too big to fit in RAM.

Release *3.1* can run in all three *Windows 3.0* modes, either full screen or in a character-mode window. While you can copy text and graphics to (but not from) *Windows*' Clipboard, there's no Dynamic Data Exchange (DDE) support, and you can't use *Windows* print queues or drivers.

Adding WYSIWYG

Most other improvements relate to display or output and depend on the WYSIWYG add-in that's included with *3.1*. (This is actually an enhancement of the *Impress* add-in. Lotus purchased the technology from PC Publishing, which continues to sell a *1-2-3 2.x* version, *Impress 2.0*, that provides many of *3.1*'s slick graphical features for \$149.)

WYSIWYG's alternate interface, which you can switch to or from at any time, accurately displays on screen the way your spreadsheet and graphs will print. It lets you use a mouse to select ranges, navigate around the work-

sheet, and enter commands, and you can change row height and column width with a simple click and drag. But it doesn't have everything you expect from a graphical interface: It lacks pulldown menus, scroll bars, and resizable menus, and you can't select a row or column with a single mouse click.

You get more formatting options from WYSIWYG than from *Allways* or *Impress*, and you can read files from both earlier add-ins. Each worksheet can employ up to eight basic typefaces, which can be boldfaced, underlined, or italicized freely. You can add lines, borders, shading, background

SNAPSHOT

1-2-3 3.1

Lotus's top-end DOS spreadsheet offers greatly improved display and printing capabilities, plus better memory management.

KEY FEATURES

- Semigraphical interface
- Runs under *Windows 3.0*
- Zoomable worksheet view
- Users can paste "live" graphs in worksheet
- Enhanced output

AVAILABILITY

Third quarter 1990

PRICING

\$595; upgrade from release 3 \$35, from 2.2 \$75, from earlier versions \$150

Lotus Development Corp.

55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500

Reader service no. 703

and text colors, and drop shadows to ranges. Additionally, you can define up to eight named styles that include text, color, and shading attributes, and then use the styles to format new areas or copy the styles to another worksheet. All WYSIWYG formatting is stored in a separate FM3 file. While this approach is inconvenient, it does maintain file compatibility for 1-2-3 release 3 and other programs that read WK3 format.

Live Graphs in Worksheets

WYSIWYG lets you paste as many as 64 graphs in a work-

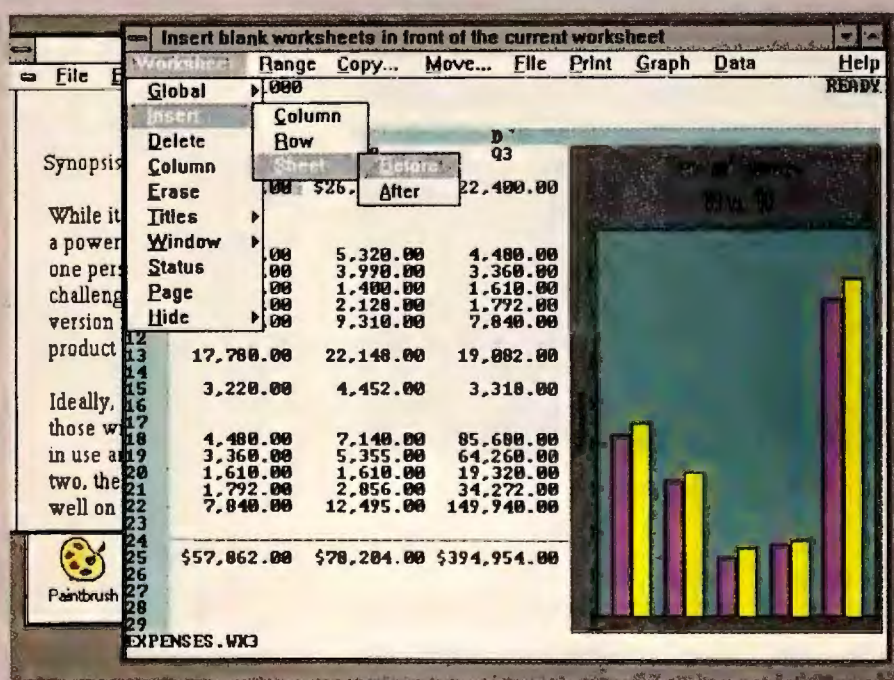
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	A	B	C	D	E
3	Budgeted:	\$21,000	\$19,800	\$22,400	
4	Actual:				
5	personnel	4200	5320	4480	
6	plant	3150	3990	3360	
7	materials	1400	1761	1610	
8	advertising	1680	3218	1792	
9	debt service	7350	8575	7840	
10	total:	\$17,780	\$22,864	\$19,082	
11		\$3,220	(\$3,064)	\$3,318	
12	(All values x 1000.)				

EXPENSES.WK3

With 3.1, you can zoom in for precise placement of lines or graphics. You can also zoom out to fit more spreadsheet on your screen.

3-FOR-3 MAKES PEACE BETWEEN 1-2-3 AND WINDOWS



3-for-3 runs 1-2-3 release 3 in a regular Windows 3.0 application window, with pulldown menus and all. A large window can display more than 1-2-3's standard 20 rows.

If you're heavily committed to Windows 3.0, look at Iris Associates' 3-for-3, which gives 1-2-3 release 3 a better Windows interface than 1-2-3 3.1's. 3-for-3 runs release 3 in a resizable window with standard Windows pull-down menus and full mouse, printer, clipboard,

and DDE support.

However, there's no WYSIWYG font or graphics display or Impress-style output improvements, and you can't select ranges with the mouse. Additionally, 3-for-3 can't run in Windows' "real" mode and doesn't work with other add-ins. —R. L.

WHERE TO BUY

3-for-3

Iris Assoc., Inc.
P.O. Box 735
Westford, MA 01886
508/692-8419
LIST PRICE: \$99.
REQUIREMENTS: 286 or better CPU, 2MB RAM, 1-2-3 3, and Windows 3.0

Reader service no. 704

sheet. The graphs are "live," meaning they change as you alter their data. You can also paste in graphics from PIC or CGM files. Double-clicking on a graph or graphic switches the program into graphics-editing mode. This capability is useful, but it's not as powerful as what *Quattro Pro* provides—for instance, a graph and its legend can't be manipulated separately.

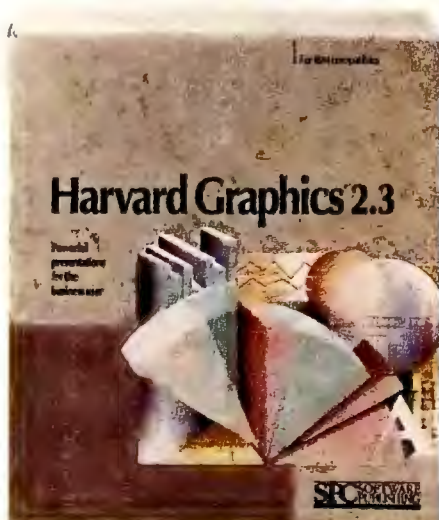
Four families of Bitstream *Fontware* soft fonts are included. Unlike *Quattro Pro*, 1-2-3 3.1 doesn't generate fonts automatically as they're needed: You must run the Install utility to generate the point sizes you want. Lotus claims 3.1 will support all currently available LaserJet font cartridges, plus selected PostScript fonts. Additional printer features include automatic compression of a selected range to fit on a single page, landscape printing, and print preview.

1-2-3 3.1 offers many of the advantages of a fully graphical spreadsheet like *Excel*, incorporates some of *Quattro Pro*'s innovative features, and remains fully compatible with earlier releases of 1-2-3. ☺

Robert Lauriston is an associate editor for PC World.



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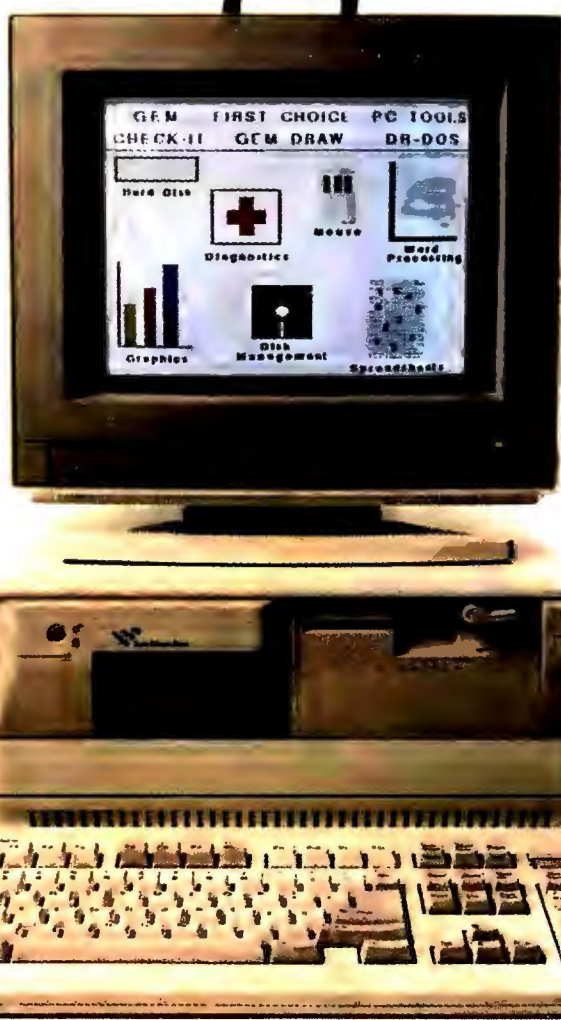


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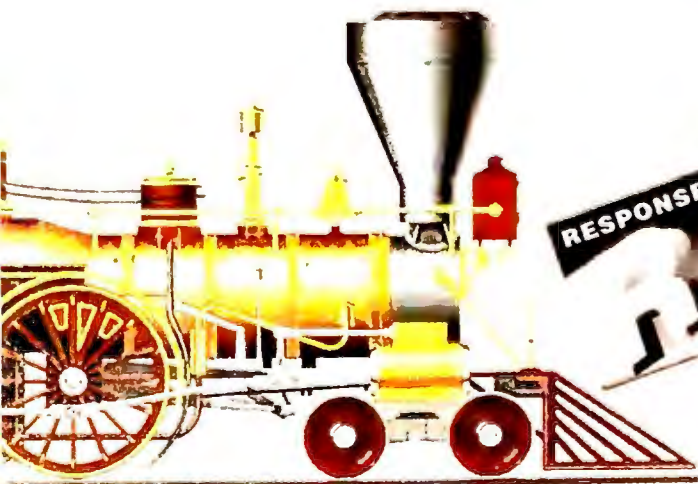
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Circle 48 on reader service card

NEC Pushes Laptop Power

The aptly named UltraLite gains a big brother, while a 20-MHz SX rounds out NEC's ProSpeed laptop line.



With a VGA display, a 20MB hard disk, and a 12-MHz 286 CPU, NEC's UltraLite 286V is more usable than the original, driveless UltraLite.

Eric Knorr

Pick up an NEC UltraLite, and you immediately feel that this 4½-pound, slim-line notebook is the perfect size and weight for a go-anywhere computer. But the machine forces you to make serious trade-offs. Without a hard or floppy drive, you're stuck with a small RAM disk for data and a scant selection of pricey ROM "credit cards" for programs.

Fortunately, the original UltraLite has a new sibling: the UltraLite 286V. In exchange for 2 more pounds and about a half-inch in every dimension,

you get a 12-MHz 286 CPU instead of a 9.5-MHz V30, a VGA LCD instead of a CGA, and—best of all—a 20MB hard disk. With an external 3½-inch floppy drive, 1MB of RAM, batteries, and an external recharger/power supply, the unit goes for a competitive \$3999 (double the original's current price).

NEC also is introducing the ProSpeed SX/20, a 12½-pound unit that's nearly twice the size and weight of the UltraLite 286V and offers considerably more power. With a 20-MHz 386 SX CPU, 1MB of RAM, a 40MB hard disk, and a superior VGA display, the

ProSpeed SX/20 should sell for approximately \$6000. Both the UltraLite 286V and the ProSpeed SX/20 are scheduled to ship by the time you read this.

Battling Notebooks

The original UltraLite established the notebook PC category. But the popular Compaq LTE/286 redefined the playing field, offering built-in hard and floppy drives and 12-MHz 286 power in a heavier but only slightly larger unit.

The UltraLite 286V is bigger than Compaq's baby but matches the 6½-pound weight. It compares well against the

LTE/286 in two areas: screen and keyboard. The 286V's big, backlit, blue-on-white LCD not only offers VGA instead of CGA resolution, but its aspect ratio matches a CRT's—so pie charts don't look like egg charts. The keyboard provides a better feel and layout, with fewer reduced-size keys and an inverted-T formation for the cursor keys instead of the awkward L formation of the LTE/286.

You can expand RAM to 5MB—approximately double the LTE/286 capacity—and the battery life matches its rival's 3-hour limit. The unit is designed to use two rechargeable batteries but will run on one, easing on-the-fly battery changes. To conserve power, a standby mode shuts down all components except RAM and CPU; at power-up, a resume mode brings you back to where you left off.

The UltraLite 286V's one obvious weakness is that it

SNAPSHOT

UltraLite 286V

Heavier and larger than the original UltraLite, the UltraLite 286V offers a 20MB hard disk, 286 power, and a reasonable price.

KEY FEATURES

- Backlit, 10-inch-diagonal VGA LCD
- 12-MHz 286 CPU
- 1MB RAM standard, expandable to 5MB
- External 3½-inch floppy drive included in base price

AVAILABILITY

Immediate

PRICING

\$3999

NEC Technologies, Inc.

1255 Michael Dr.

Wood Dale, IL 60191

708/860-9500

Reader service no. 700

lacks a built-in floppy drive. The external floppy is compact and hooks up easily, but it still entails an extra step when you're exchanging data between laptop and desktop. Oddly, NEC has opted to include a slot for its proprietary UltraLite ROM cards; it's a mystery why anyone would buy software this way.

Along with an interface for the floppy drive, the UltraLite 286V has the usual serial, parallel, and VGA monitor ports. There's also an interface for an expansion station, which will be available in the fourth quarter and will provide two 8/16-bit slots and space for a 3½-inch drive. Other accessories include a 2400-bps modem for \$499 and a 9600-bps fax modem for \$799. Pricing wasn't set at press time, but a 40MB hard disk option will soon be offered as well.

The ProSpeed SX/20: A Desktop Replacement?

Although NEC hopes many users will adopt the UltraLite 286V as their primary machine, the ProSpeed SX/20 is far more plausible as a desktop replacement. A 20-MHz



NEC's ProSpeed SX/20 offers desktop performance in a 12½-pound package, with a VGA screen, a 20-MHz SX CPU, and an 80MB hard disk option.

SX/20 runs even *Windows* at a decent clip, and the optional 80MB hard disk has ample room for applications.

The ProSpeed SX/20 has a full-sized, removable, AT-style keyboard with a desktoplike feel. The high-contrast, black-on-white LCD is more suitable for today's graphical applications than the UltraLite 286V's display. The battery offers an acceptable 3 hours of life when fully charged; a single bay holds either the battery or the power supply, so recharging requires an external unit.

With battery, the ProSpeed SX/20 weighs 2½ pounds less than its predecessor, the 15-pound 16-MHz ProSpeed 386SX. It's also 30 percent smaller, the trade-offs being that RAM tops out at 5MB rather than 9MB, and you can't get a 100MB hard disk. There's a slot for a modem, and modem options are identical to the UltraLite 286V's. But you lose the ProSpeed 386SX's proprietary commu-

nications slot.

Purchase the ProSpeed SX/20's docking station, however, and you get plenty of room for expansion—there's space for two full-length 8/16-bit boards and one half-height 5¼-inch drive. Slide the ProSpeed SX/20 into the docking station, and the station automatically begins supplying power. If you've installed a deskbound hard disk, its AUTOEXEC.BAT and CONFIG.SYS files will supersede the ProSpeed's, immediately hooking you up to the office LAN, for example. The ProSpeed SX/20's ports—VGA, serial, parallel, and RJ11 (for modem communications)—pass through to the docking station for easy desktop connections.

The ProSpeed SX/20's docking station improves on earlier units, offering a smaller footprint, foolproof docking, and the option of standing the ProSpeed on its side. If you've hooked a monitor to the station, you can bring your Pro-

Speed SX/20 back from the road, slide it into the station next to your desk, and plug a keyboard into the laptop's external keyboard port, giving up a minimum of desk space.

The Desktop PC: Tomorrow's Dinosaur

Like most laptop manufacturers, NEC envisions a day when *personal computer* means something you carry with you. High-powered machines like the ProSpeed SX/20, complete with desktop connectivity options, are already encouraging that transition.

Before you know it, that power will migrate down to UltraLite-sized units. Most laptop suppliers will offer notebook SXs next year; CRT-quality color LCDs should also hit the streets in the same time frame (with penthouse price tags). Soon you may run out of reasons to buy a PC you can't sling over your shoulder. ☺

Eric Knorr is executive editor for PC World.

SNAPSHOT

ProSpeed SX/20

One of the first 20-MHz SX laptops, the ProSpeed SX/20 includes a crisp, black-and-white VGA LCD; a docking station is optional.

KEY FEATURES

- 40MB hard disk
- 20-MHz SX CPU
- 1MB RAM standard, expandable to 5MB

AVAILABILITY

Immediate

PRICING

\$6000

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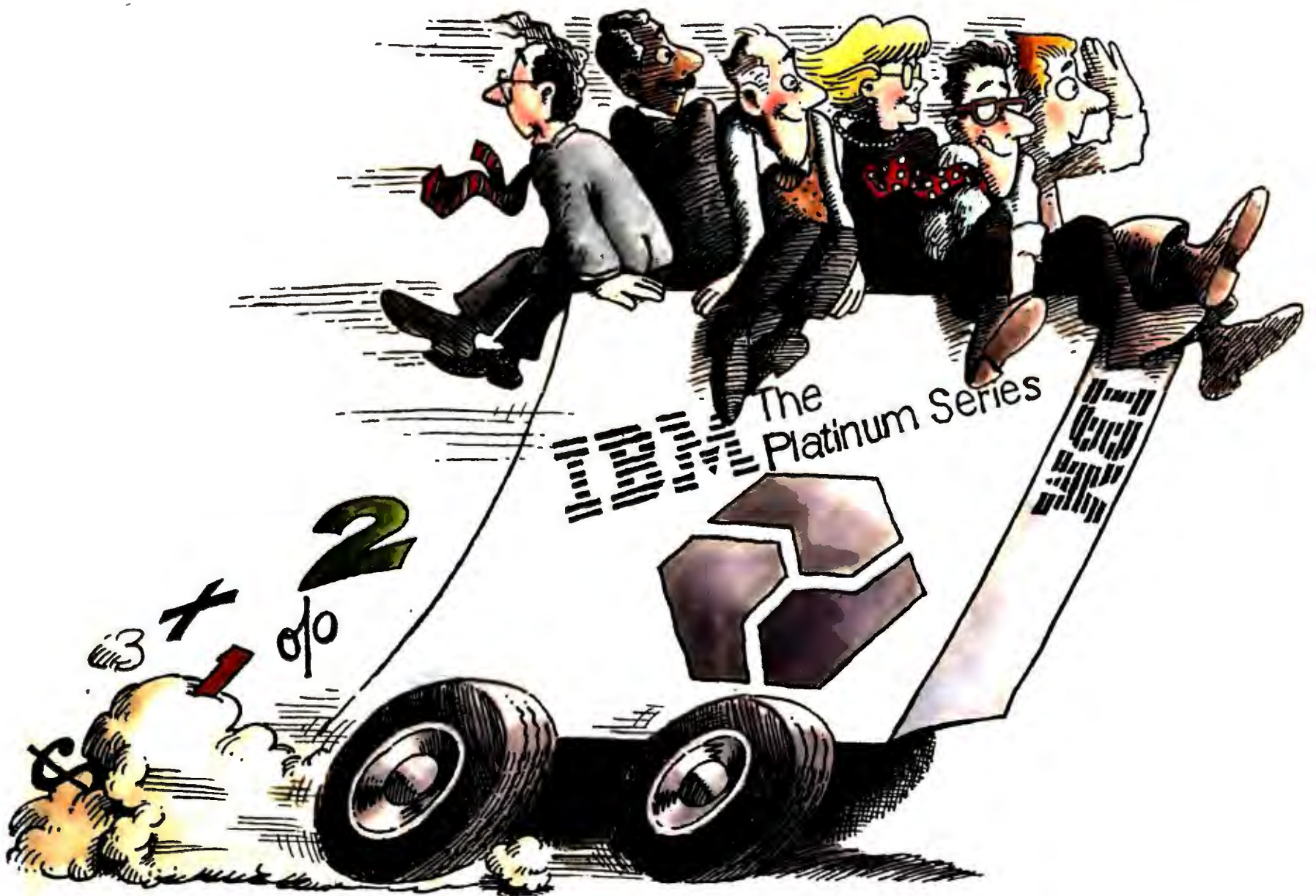
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1 Genuine Adobe® PostScript.® You need a true Adobe PostScript printer. The Silentwriter2 290 printer from NEC. Some companies emulate PostScript with clone interpreters or add-on cartridges. Others have limited font capabilities. But that's not the way to produce eye-popping newsletters, or 3D charts. We've known this since we introduced our first Silentwriter LC 890 printer back in 1987.

2 MS-DOS® and Macintosh® Connectivity. That's right, the 290 works with both Macintosh and PC-compatibles. And with its standard Centronics parallel, RS-232C, RS-422 and AppleTalk™ interfaces, the 290 is ideal for stand-alone or network environments.

3 WYSIWYG Screen Fonts. As in What-You-See-Is-What-You-Get. Our printer support kit included with every 290 we sell includes software that lets you see all of the printer's 35 scalable typefaces before you print them out. Also included are diskettes that allow you to install the fonts on any Macintosh or under Microsoft® Windows™ in the MS-DOS environment.



4 Memory. With a full 2 MB of standard memory, there's simply no more worry. Since now you have more than enough memory to print a full page of text and graphics (letter or legal size) without losing valuable data. Plus the optional user-installable 2 MB of additional memory satisfies your need to store downloadable fonts and overlays.

5 Software. The Silentwriter2 290 is the printer of choice for MS-DOS or Macintosh users working with hundreds of the most popular software packages. With an installed base of over 100,000 Silentwriters, our experience with printer software is hard to beat. Meaning you get more than just a printer, you get answers.

Since NEC began making PostScript® printers, we've learned how to stay ahead of the competition. Sure, other PostScript printers can do some of these things, but only NEC puts them all together in the Silentwriter® 2 290, the printer that goes to the head of the class. To find out more about the Silentwriter2 290, call us at 1-800-NEC-INFO. In Canada, 1-800-343-4418.

PRODUCT OUTLOOK

Edited by MIKE HOGAN

INSIDE PRODUCT OUTLOOK

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139 Lotus Agenda 2.0 Lotus guarantees you'll be on friendly terms with its personal information manager within 30 minutes.

141 Folio Views 2.0 Hypertext made quicker, easier, and cheaper.

MinisPort HD

Zenith Tries Again—With a Hard Disk

The 2-inch floppy drive Zenith put in its first MinisPort notebooks in June 1989 was intended as a stopgap. Now that notebook technology has overcome previous size and power limitations, Zenith hopes to make up some ground on the Compaq LTE and Toshiba T1000 families—products that leapfrogged the MinisPort and the NEC UltraLite because of their standard storage options.

The biggest change in the MinisPort HD is the replacement of that nonstandard floppy with a 2½-inch Conner 20MB hard drive whose 1:1 interleave and 23ms access speed would spell high performance even on a desktop. Nor is Zenith unaware of your desire for a 3½-inch floppy. The company takes the middle road, between Toshiba (which asks you to choose either a floppy or a hard drive model) and Compaq (which insists that you carry both disks around). The MinisPort HD comes with an external 720K floppy that you can take or

leave as it suits you.

The MinisPort HD slips into the slimmest attaché case at 12.4 inches wide, 9.8 inches deep, and a trim 1.3 inches tall. At 6 pounds with battery and CGA video display, this 10-MHz 80C88-based portable is even lighter than either the 6.2-pound Toshiba T1000XE or the 6.7-pound Compaq LTE/286. The duration of the nickel-cadmium battery remains the standard 3 hours, but Zenith has reduced the recharge time from 6 to 2.5 hours. An AC adapter is standard issue, as is an internal modem slot for the optional 1200-bps (\$199) or 2400-bps (\$399) modem.

Finally, you get a generous 1MB of memory standard (most of the memory above 640K can be used as a RAM disk or as expanded memory), Rupp Corporation's *FastLynx LX* serial transfer bundle, and an abridged version of DOS 3.3 stored in ROM, and a complete copy factory-installed on the hard drive. You also get a port for each serial, parallel, floppy drive, and color monitor add-on.

The \$2799 list price compares favorably to the Toshiba T1000XE's \$2699 and the Compaq LTE/286's \$3999. Zenith is reducing the prices of the 2-inch-floppy-equipped Models 1 and 2 (with 1MB and 2MB of memory, respectively) to \$1799 and \$2399, but their street prices are expected to plummet to \$900 and \$1200. Zenith Data Systems, 1501 Feehanville Rd., Mount Prospect, IL 60056; 800/553-0331. —Mike Hogan

Reader service no. 670



Zenith's 15-month-old MinisPort notebook makes a good move with a 23ms 20MB hard drive and an external 3½-inch floppy drive.

For a limited time, the B and A in BASF stand for Bon Appetit.



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Deskpro 386N, Deskpro 286N

Compaq Unveils Diskless Deskpros

Deskpros 386N and 286N, the first diskless workstations from Compaq, come with an abundance of features that make the systems easy to integrate into your network. The 386N is powered by a 16-MHz 386SX chip, while the 286N has a 12-MHz 286. Except for memory expandability, the machines are identical.

A ROM-based setup utility lets network managers configure either system without using a floppy disk. A similar ROM-based test program checks memory, video, and other components. Further diagnostics are sometimes a problem without a disk, but you can use an optional serial cable to hook up the 386N or 286N to a laptop and boot from the laptop.

The lack of disks boosts

your control over network data. The ROM setup program on these workstations has additional security features, such as a user-invoked power-on password and a way to lock the keyboard without exiting the current application. Managers can lock in system configuration and software security features via a hardware keyboard switch. The slim 15-by-15-by-5-inch case features mechanical locks to keep the lid in place and add-on cards and other internal components where they belong.

The Compaq Deskpro 386N Model O, without disk drives, retails for \$2299 while the Deskpro 286N Model O sells for \$1699. For another \$100, you can turn either into the Model 1s with a 3½-inch



Compaq's Deskpro 386N (left) and 286N (right) diskless workstations offer data security and ROM-based configuration and diagnostics.

1.44MB floppy. You can get the Model 40s with floppies and 29ms, 40MB hard drives for \$3199 (the 386N) or \$2599 (the 286N).

All models come with 1MB of memory, expandable via dedicated memory slots to 13MB on the 286N and 16MB on the 386N. There are two drive bays and two standard 8/16-bit expansion slots. A 16-

bit VGA graphics controller, a floppy controller, a hard drive connector, and ports for parallel, serial, and mouse I/O are on the motherboard. A 90-watt power supply comes standard. Compaq Computer Corp., 20555 State Highway 249, Houston, TX 77070; 800/231-0900. —Mark Henricks
Reader service no. 672

EPI 4000

Epson Ink Jet Handles Big Jobs Fast

If your department's daily tasks range from quick CAD plots to publication-quality text and graphics, Epson has a printer for you that can do the duties of both a \$5000 plotter and \$20,000 B-size laser printer—for under \$2000.

It prints up to 11-by-17-inch paper a page at a time.

The EPI 4000 uses 64-nozzle Epson ink jet technology to print up to 11-by-17-inch paper a whole page at a time at 300-dpi resolution. At a speed of 2 ppm, it can produce plots fast-

er than a plotter. Its size lets you fit two desktop-published pages of normal size on a single sheet of paper. It's also great for printing jumbo charts or spreadsheets, although this is no word processing workhorse.

The printer handles tractor-fed as well as cut-sheet paper in its 150-sheet input bin, which also accepts up to 30 envelopes. The EPI 4000 measures 2 feet wide, a little more than 2 feet deep, and 1 foot high. At 40 pounds, it's light enough to move easily.

Maintenance is easy: You replace only the quick-drying ink cartridge, which loads in the side of the machine—not the entire printhead, as in a Hewlett-Packard printer. Each cartridge is good for



The EPI 4000 ink jet printer lets you fit two 8½-by-11-inch desktop published pages on a single 11-by-17-inch sheet.

1000 letter-quality pages at 5 percent coverage or 2000 drafts at 2.5 percent coverage. Cost is about 2 cents per page in either case. The EPI 4000

sells for \$1995. Epson America, Inc., 23530 Hawthorne Blvd., Torrance, CA 90505; 800/922-8911. —Mike Hogan
Reader service no. 678



Our Printer Sharing Unit Does Networking!

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Take our **Master Switch™**, a sophisticated sharing device, combine it with **MasterNet™** networking software for PCs, and you've got an integrated solution for printer and plotter sharing, file transfer, electronic mail, and a lot more. Of course you can also share modems, minis, and mainframes or access the network remotely. Installation and operation is very simple.

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Or you can use the Master Switch to link any computer or peripheral with a serial or parallel interface. The switch accepts over 20 commands for controlling the flow of data. It may be operated automatically, by command, or with interactive menus. Its buffer is expandable to one megabyte and holds up to 64 simultaneous jobs. The

MasterLink™ utility diskette for PCs comes with every unit and unleashes the power of the switch with its memory-resident access to the commands and menus.

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Epson Equity LT-386SX, DrivePort

Snap-Out Drives Set SX Laptop Apart

If you're pretty sure of what you want in a laptop but you'd like to leave your options open, Epson's Equity LT-386SX offers a snap-apart design combined with 16-MHz processing power.

Flexibility is key: You can pop the 20MB or 40MB hard drive options out of their resting spots and swap them among LTs, or you can carry them with you for convenience or security. The Epson modular drives even work with non-Epson PCs, provided you have Manzana Microsystems's DrivePort adapter.

You can double the standard 2MB of memory on the motherboard by adding Epson's proprietary 2MB memory card. There's another proprietary slot for a \$299 2400-bps modem as well as a single

two-thirds-length 8/16-bit slot. You'll also find room for a single third-height, 3½-inch hard drive and a 3½-inch 1.44MB floppy in the 13-by-14-by-4-inch frame. The LT-386SX weighs 17 pounds with its removable nickel-cadmium battery pack, which is rated at 3 hours.

Parallel and serial ports are built-in. So is the VGA-compatible controller, which supports an external monochrome or color monitor along with the laptop's own removable 640 by 480 paper-white LCD screen. An AC adapter is standard.

You'll pay \$5298 for the Equity LT-386SX with a 3½-inch floppy and a 27ms, 20MB hard drive. The cost climbs to \$5598 if you opt for the 25ms, 40MB drive. A 2MB memory expansion card is \$799. An external



The Equity LT-386SX delivers 16-MHz processing power, and you can pop its 20MB or 40MB hard drive in and out for convenience or security.

1.2MB 5¼-inch floppy drive is \$499.

Manzana Microsystems sells its DrivePort adapter for \$339. It requires an 8/16-bit AT slot in the host PC and includes a housing to hold the hard drive. —Mark Henricks
Epson America, Inc., 23530

Hawthorne Blvd., Torrance, CA 90505; 800/922-8911.

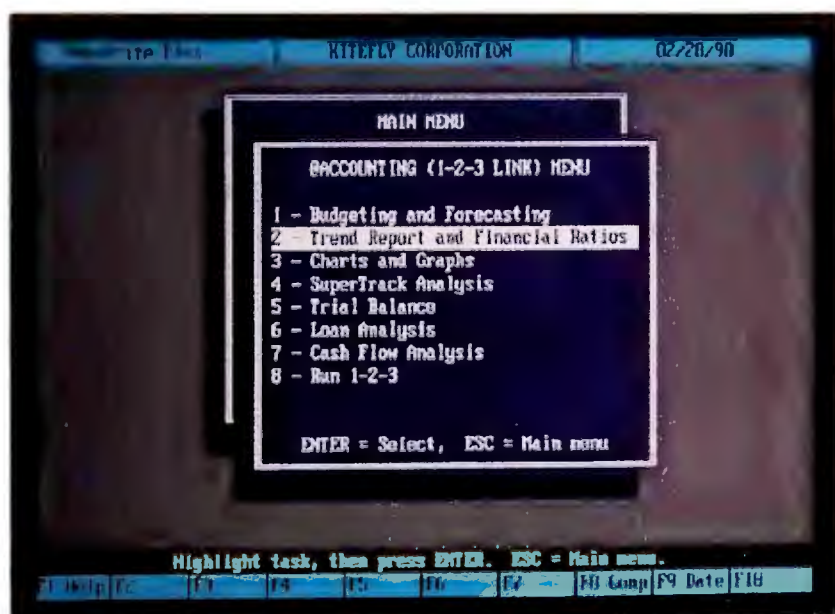
Reader service no. 673

Manzana Microsystems, Inc., 7334 Hollister Ave., Ste. B, P.O. Box 2117, Goleta, CA 93118; 805/968-1387, 805/968-5449.

Reader service no. 674

Financial Manager

1-2-3 for Accountants: An Inside Job



Financial Manager combines the One Write Plus accounting program, 1-2-3 2.2, several predefined worksheets for financial analysis, and a file translation utility in a single package.

Great American Software, developer of One Write Plus, has teamed up with Lotus Development to give you quick

and easy access to 1-2-3's analytic tools from within the small-business accounting program.

A bundle called *Financial Manager* assembles *One Write Plus* 2.06, 1-2-3 2.2, and the *@Accounting* link into a single box. *@Accounting* automatically translates *One Write Plus* files into 1-2-3 format and lets you access the spreadsheet from within *One Write Plus*.

To get you up and running quickly, *Financial Manager* includes several templates for analyzing and tracking financial information accumulated in *One Write Plus*. These predefined worksheets cover such functions as cash flow analysis, budgeting and forecasting, charting and graphing, calculation of trends and financing ratios, loan analysis, and trial balances.

@Accounting currently works only with 1-2-3 2.2, but an extension for release 3 is planned. Great American Software will be the sole pro-

vider of technical support for *@Accounting* and *One Write Plus*.

Financial Manager sells for \$795 (the combined suggested retail prices of the accounting package and spread-

Gain easy access

to 1-2-3 from within

One Write Plus.

sheet). Those already outfitted with 1-2-3 and *One Write Plus* can buy *@Accounting* for \$99. *Financial Manager* requires 640K, DOS 2.1 or later, and a hard disk. Great American Software, Inc., 615 Amherst St., Nashua, NH 03063; 800/388-8000, 603/889-5400.

—Roberta Furger

Reader service no. 680



M.V.P.

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PacificFive Page P-E, Pacific Outlines, PacificPrint

Scalable Fonts for Your Old LaserJet

Want the same fonts and desktop publishing capabilities on your personal HP LaserJet IIP that work groups share on a LaserJet III? PacificFive Page P-E is a pop-in cartridge that emulates the expanded font and vector graphics capabilities in PCL5, the printer command language that sets the LaserJet III apart. Versions that run on the Series II and IID are available as well.

You don't get the resolution enhancement that the LaserJet III accomplishes with dots of five sizes. But you do get the same Intellifonts font-scaling technology, which provides eight CG Times and CG Univers fonts scalable from .25 to 999.75 points in .25-point increments and 14 (non-scalable) bit-mapped fonts. Pacific Data also includes a Phoenix Tech-

nologies emulation of HPGL/2, the HP plotter language with enhanced print features such as mirroring and the ability to rotate and scale text and graphics. You can do spirals, curves, or outline type and print different text and graphic orientations on the same page.

The IIP and IID versions of PacificFive Page sell for \$499. You'll need at least 1.5MB of printer memory to use it. Pacific Data sells a populated 1MB memory board for \$395 and an unpopulated one for \$295. Still another version for the Series II, PacificFive Page, sells for \$599.

You can bring more fonts to your work group's LaserJet III with Pacific Outlines I and II, which are add-in printer cartridges that contain a total of 51 typefaces (25 and 26

typefaces, respectively) scalable in the same .25-point increments as those in PacificFive Page P-E and using the same Intellifont scaling technology. Each cartridge costs \$299 and simply plugs into your printer. They give you fonts faster than computer-loaded soft fonts and don't tie up your PC during font creation.

If you're sharing a Hewlett-Packard LaserJet on a NetWare network, you may sometimes find that the previous user has set the printer to the wrong mode for your print job.

PacificPrint lets you switch your printer easily between normal LaserJet mode and either PostScript or plotter emulation. *PacificPrint*, which can be loaded as a memory-resident package, also lets you share printers attached to workstations.

PacificPrint, which requires DOS 3.1 or a later version and NetWare 2.1 or a later version, sells for \$399. Pacific Data Products, 9125 Rehco Rd., San Diego, CA 92121; 619/552-0880, 619/552-0889 (fax). —Mike Hogan

Reader service no. 676

PowerSave 500

UPS on a Card: Personal Protection

Unexpected power interruptions corrupt files and lose data, so uninterruptible power supplies are necessary protection for network servers. But the cost and size of UPS systems has left operators of individual workstations and standalone PCs dependent on regular backups and frequent saves. PowerSave 500 addresses both issues.

Unlike PC Power and Cooling's Inner Source 2210 (*Product Outlook*, July 1990), PowerSave 500 doesn't replace your power supply. Rather, this full-length card sits alongside it and monitors the power flow. PowerSave 500 delivers a full 200 watts of power for up to 20 seconds, long enough for even a 486 with a large hard disk to power up and down safely several times during intermittent power failures. An optional mode can keep a diskless workstation alive for up to 15 minutes without shutting down.

A pack of nickel-cadmium batteries rated at 1000 rechargeable cycles provides the necessary DC power to ride out momentary power inter-

ruptions of up to 2 seconds. The batteries are triggered by any dip in voltage from 5 volts to 4.75 volts. If the condition persists for 2 seconds, the

It sits alongside

your power supply.

UPS saves everything in RAM to a discrete subdirectory on the hard disk. After 20 seconds, PowerSave 500 parks the heads on the hard disk and shuts the system down. When power revives, you can return to where you were when interrupted or reboot.

The \$339.95 PowerSave 500 uses one expansion slot if it's next to a half card; otherwise, it requires two. PowerSave has its own microprocessor with the RAM needed to run the UPS, so it needs only 100 bytes of system RAM to operate. Dakota Microsystems, Inc., 301 E. Evelyn Ave., Bldg. A, Mountain View, CA 94041; 800/999-6288, 415/967-2302. —Rex Farrance

Reader service no. 679

ME 386-SX/SL

Sleek SX Has Plenty of Room

In the quest for desk space, you usually sacrifice expansion capacity. But the ME 386-SX/SL is a 386SX-based desktop sporting five slots, a svelte silhouette, and a reasonable price tag.

Fitting three 16-bit and two 8/16-bit slots into the unit's 15-by-16½-by-4-inch frame called for a lot of system board integration. The 16-MHz 386SX CPU shares the motherboard with 1MB of memory (expandable to 4MB on the board and 16MB overall using slots), floppy controller, hard drive connector, a VGA adapter, serial and parallel ports, and an 80387SX coprocessor slot.

For a mere \$1499, you get a 28ms, 40MB hard disk, a 1.2MB 5¼-inch floppy, and a


monochrome VGA monitor, plus a 15-month warranty and a 30-day money-back guarantee. A 1.44MB 3½-inch floppy is optional.

Micro Express still found room at that price for a couple of nice touches. For no additional cost, you can swap the standard 101-key keyboard for a model with an attached trackball. And the price includes a lithium clock battery whose ten-year life span means that it probably won't need to be replaced until after you've retired the PC. Micro Express, 1801 Carnegie Ave., Santa Ana, CA 92705; 800/642-7621, 714/852-1400, 714/852-1225 (fax). —Mark Henricks

Reader service no. 681

New Version
Performs defect analysis on
"anything that spins."

Hard Disks Die.



Hard disk manufacturers want us to believe that hard disk technology is absolutely reliable ... but experience teaches otherwise. We depend upon data storage to be flawless, but hard disk technology isn't. Surface defects, head alignment drift, and low-level format aging cause hard disks to fail.

A hard disk drive's low-level format fades with use. The drive's read/write heads lose their delicate alignment and move away from the original low-level format information. These new data track locations intersect unseen surface defects that were once harmlessly located between tracks. DOS's chilling "Abort, Retry, or Fail?" message inevitably results. Precious data is soon lost.

If left unchecked, data storage becomes more an act of hope and faith than one of science.

A return to science. The problem is known and understood, and the solution is clear. While a drive's data can still be read, the drive must be given a new, realigned and strong low-level format. Then all current surface defects must be located and managed.

This process prevents hard disk data loss.



An act of prevention. Gibson Research Corporation's SpinRite™ software program reads hard-to-read and impossible-to-read data from a DOS hard disk, nondestructively low-level reformats the drive's surface while optimizing the sector interleave factor, analyzes and scrubs each track of the drive for surface defects, and relocates any endangered data to safety. SpinRite easily restores hard disk drives to better-than-new condition with their data intact. Before any data is lost, SpinRite detects that a drive is "softening" then determines and eliminates the cause. SpinRite readily recovers data that the system cannot read.

SpinRite won Byte Magazine's prestigious Award of Distinction and

continues to win computer industry praise and acclaim. It has proven itself to be effective in preventing hard disk failure. SpinRite will work for you.

SpinRite II features a detailed technical log, as well as support for DOS 4 and large device driver partitions. It is available immediately from local software retailers or directly from Gibson Research with a 30-day satisfaction guarantee.

Suggested retail price: \$89.

To receive additional literature or to purchase SpinRite II, call toll-free:



SpinRite II.

A return to science.
An act of prevention.

(800) 736-0637.

Expanz

Board Conserves Precious Disk Space

Expanz lets you pack up to three times as much data on your hard or floppy disk and then snatch it back again in real time—all without those ungainly compression/decompression commands. A hardware-based alternative to software compression utilities like *PKARC*, the \$199 Expanz board fits in an 8-bit slot and automatically squashes or expands data in transit.

That feature elevates Ex-

panz's role from that of a file archiver to a space saver for nearly every file on your drives. While inappropriate for tape drives, Expanz not only fetches your files without a speed loss from hard drives, RAM disks, and magnetic-optical drives but even enhances the performance of floppies, InfoChip claims.

Expanz employs a string-matching compression technique, rather than the Huff-

man-based coding used by other compression schemes. That lets the product achieve compression ratios of 3:1 without data loss or distortion, InfoChip says. Expanz also recognizes data inappropriate for compression and passes such files through unchanged.

Expanz requires DOS 3.0 or later. An included utility decompresses disks in case the card fails. Info-Chip Systems, 2840 San Tomas Expwy., Santa Clara, CA 95051; 800/447-0200, 408/727-4590 (fax). —Mark Henricks

Reader service no. 671

3000/GS

Slick Scanning at a Skinflint Price

A picture may be worth a thousand words, but getting photo-quality images into your documents can cost several thousand dollars. Now desktop publishers with limited budgets can get the picture for a lot less: Advanced Vision Research's 3000/GS scanner offers 256-gray-scale performance for only \$1790.

That price includes the interface card and *Picture Publisher*, Astral Development's sophisticated image-editing package. The 300-dot-per-inch flatbed unit emulates Hewlett-Packard's popular ScanJet Plus scanner, eliminating the need for special software drivers. The scanner can handle documents up to 8½ by 14 inches.

The 3000/GS's proprietary scan engine features Intelligent Image Correction: The machine tests and recalibrates itself before each scan in order to minimize the effects that voltage fluctuation and light distortion have on image quality. You can choose from three scanning modes—line art, dithered patterns, or 256 levels of grey—and then manipulate the image using *Picture Publisher's* darkroom tools.

Users who are interested in using the 3000/GS scanner for optical character recognition can buy AVR's \$495 *TigerOCR* package and a 100-page sheet feeder for \$695. *Picture Publisher* requires 640K, a hard disk, *Microsoft Windows*, DOS 2.1 or a later version, and VGA or MCGA graphics. Advanced Vision Research, 2201 Qume Dr., San Jose, CA 95131; 800/544-6243, 408/434-1115, 408/434-0968 (fax). —Daniel Tynan

Reader service no. 677

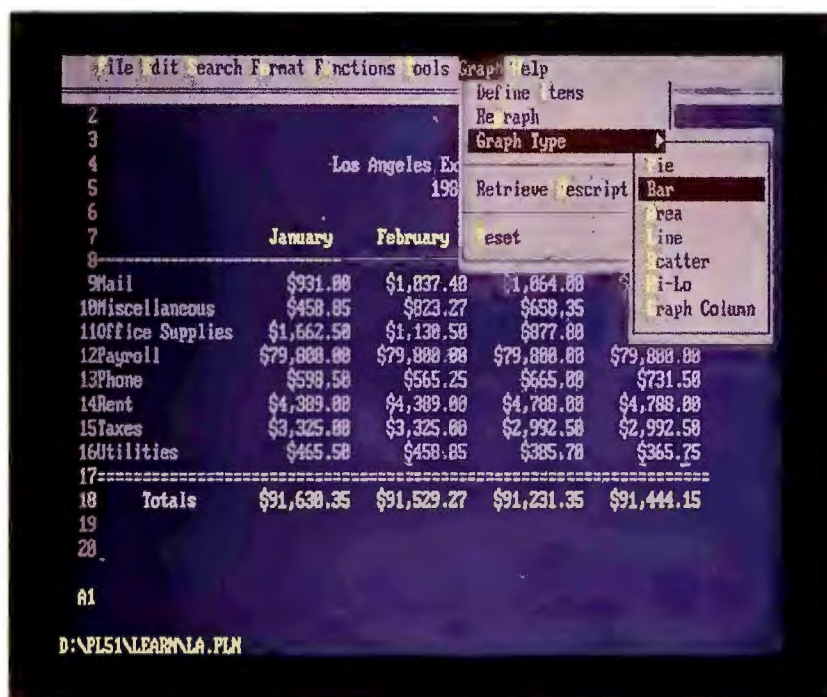
UPDATE

WordPerfect 5.1 6/29/90,
PlanPerfect 5.1

"Secret" Updates

One of the most attractive of WordPerfect Corporation's eccentricities is its policy of releasing regular "maintenance updates." Several such updates have been combined to make the year-old *WordPerfect 5.1* worthy of a new version number, even though WordPerfect identifies it only as *WordPerfect 5.1 6/29/90*. The latest version claims significantly improved scrolling, formatting, and printing.

Drivers for more than 200 additional printers have been added, including those for the LaserJet III (and its scalable fonts), the IBM LaserPrinter E, the LaserMaster 1000, the Okidata 840, and color PostScript printers. You can choose to print only odd or even pages and to send spooled files to the directory of your choice (a crucial feature for some network users). The printer definition utility



The pulldown menus in PlanPerfect 5.1 (and WordPerfect 5.1, too) make life easier for beginners and occasional users.

(PTR) can copy soft font information between printer drivers.

WordPerfect's pulldown menus display command-key equivalents of menu choices and offer context-sensitive help and expanded mouse support. A single setup choice redefines the <Esc> key as Cancel Current Operation and <F1> as Help. An updated template that displays this assignment is available.

WordPerfect now imports/exports and creates file links to a wider variety of spread-

sheets, including 1-2-3, *Excel*, *PlanPerfect*, *Quattro*, and *Quattro Pro* (although linked data is not automatically updated). Multipage (3-D) 1-2-3 release 3 spreadsheets can be imported one at a time.

While it doesn't offer as many new features, *PlanPerfect 5.1* brings the company's spreadsheet the same interface innovations, including context-sensitive help and pulldown menus with mouse support. *PlanPerfect 5.1* supports the same 700-plus print- (see *WordPerfect*, p. 135)

Ventura Publisher introduces the Gold Series. It simply does more, any way you look at it.

And now there are several new ways to look at it. Because the desktop publisher that does more for you now does it all in the three leading PC environments.

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steps other programs make you repeat over and over. Ventura Publisher is the one DTP program that can handle all your publishing and design projects.

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**Ventura Publisher
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It simply does more.



WordPerfect

(continued from p. 133)

ers. The two programs can even share a single set of printer drivers. You can retrieve *WordPerfect* tables into *PlanPerfect 5.1*, along with 1-2-3 files up to and including release 3 (but not *Excel* or *Quattro* spreadsheets). A graph preview has been added, though you still can't preview a page that mixes text and graphics.

WordPerfect 5.1 mainte-

nance updates cost \$10 for up to five disks, and \$1 for each additional one. Pricing for *PlanPerfect 5.1* has not been announced yet. Both of the programs require 384K of RAM, DOS 2.0 or a later version, and one 1.44MB floppy drive, two 720K floppies, or a hard disk. WordPerfect Corp., 1555 N. Technology Way, Orem, UT 84057; 800/451-5151, 801/225-5000, 801/222-5077 (fax). —Robert Lauriston

Reader service no. 683

Corel Draw 1.2

Quicker on the Draw With Windows 3.0

The latest version of *Corel Draw* lets you do more drawing in less memory by exploiting the memory management features of *Windows 3.0*. You can work with larger files, and thanks to the lifting of the 64K limit on the *Windows* clipboard, you'll have an easier

time sending your drawings to files from compatible applications like *Ami Professional* from Samna.

PCX files and creates EPS files that can easily be imported into *Corel Draw*. It works in real mode for compatibility with *Windows 2.x* as well as *Windows 3.0*. The draw package's typeface conversion utility has been updated to let you import fonts created with version 3.0 of Altsys *Fontographer* and both import and export fonts to Z-Soft's *Type Foundry* for modification. *Corel Draw* also has added 11 import/export filters to extend its reach into the most popular word processor, desktop publishing, and graphics packages.

Corel Draw 1.2's \$595 price tag also covers 6MB of clip art and a videotape tutorial. The software requires 384K of memory and a hard disk with 1MB of memory for a 286 and 2MB for a 386. It will work with *Windows 2.x* as well. Upgrades are \$149 from *Corel Draw 1.0*, \$99 from versions 1.1 and 1.2, and free if you purchased the package after March 1. Corel Systems, Corel Bldg., 1600 Carling Ave., Ottawa, Ontario, Canada K1Z 8R7; 613/728-8200. —Mike Hogan

Reader service no. 688

Trace an entire
bit map of a logo
in a single pass.

time sending your drawings to files from compatible applications like *Ami Professional* from Samna.

Corel Draw 1.2 includes the new auto-tracing utility Corel Trace, which lets you trace an entire bit map of a logo or technical illustration in a single pass. Included in its eight user-definable functions is a batch mode for tracing multiple files with a single command. You can either outline-trace or use the centerline method for tracing figures that aren't filled with patterns. Corel Trace accepts TIFF and

Hercules, the Power For Windows 4.X!

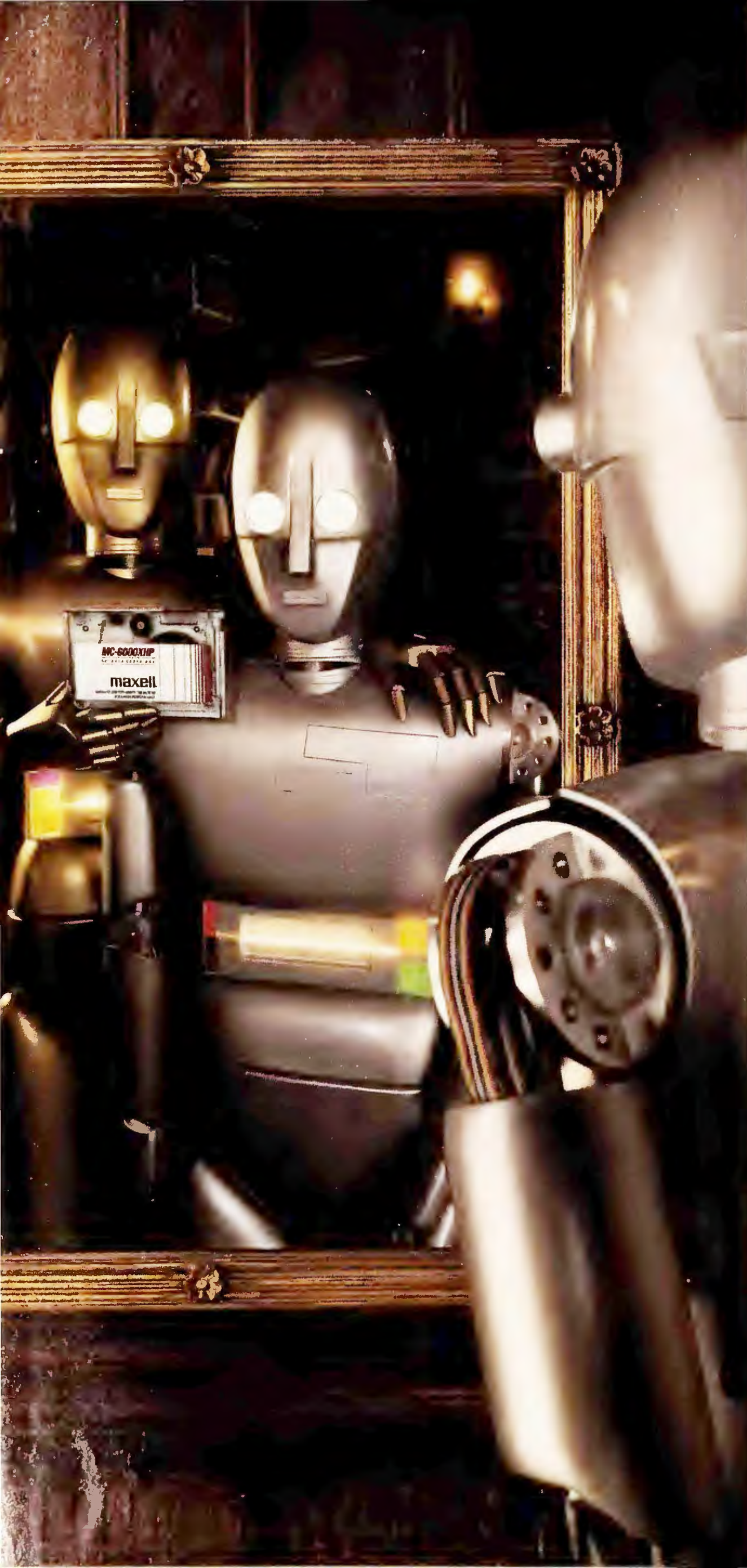
Not only can the Hercules Graphics Station Card handle Windows 3.0, it has the power to run Windows that have yet to be opened.

With its TI 34010 processor, the Hercules Graphics Station Card frees your CPU from time-consuming graphics functions. So you can run programs like PageMaker, Excel and Corel Draw up to five times faster than the fastest super VGA card, even at 1024 x 768 resolution. And with 1024K of VRAM for 16- and 24-bit color, your display can have 16.7 million colors—pictures have never been more true to life.

For current and future business and design applications, the Hercules Graphics Station Card is flexible, compatible and very affordable. Call 800 532-0600, ext. 708 for more information.

Because when it comes to Windows, Hercules has the power you need.





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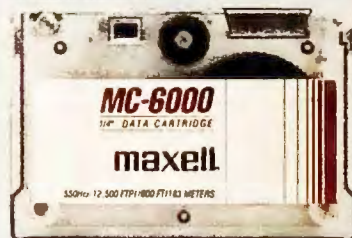
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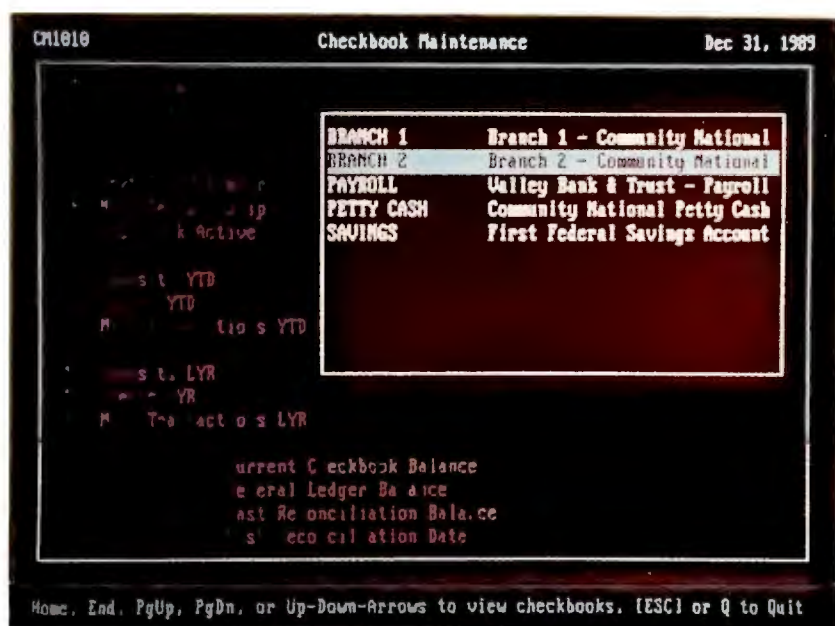


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Great Plains Accounting Series 5.3

Accounting Upgrade Targets Developers



The new cash-management module of Great Plains Accounting Series 5.3 helps you analyze transactions and reconcile bank statements.

Great Plains Software has upgraded its modular accounting system and added a set of development tools for greater customization of reports and records. *Great Plains Accounting Series 5.3's* \$695 cash-management module

These new development tools allow for greater customization of reports.

supports functions such as analysis of cash receipts and payments, automatic creation of deposit slips for checking accounts, reconciliation of bank statements, and support for an unlimited number of checking accounts.

Other new twists include integration of the purchase order and job-cost modules, support for union and workers' compensation insurance information in the payroll module, and tracking of employer contributions such as payments to

retirement funds. Great Plains also claims a 25 percent speed improvement for screen-intensive applications.

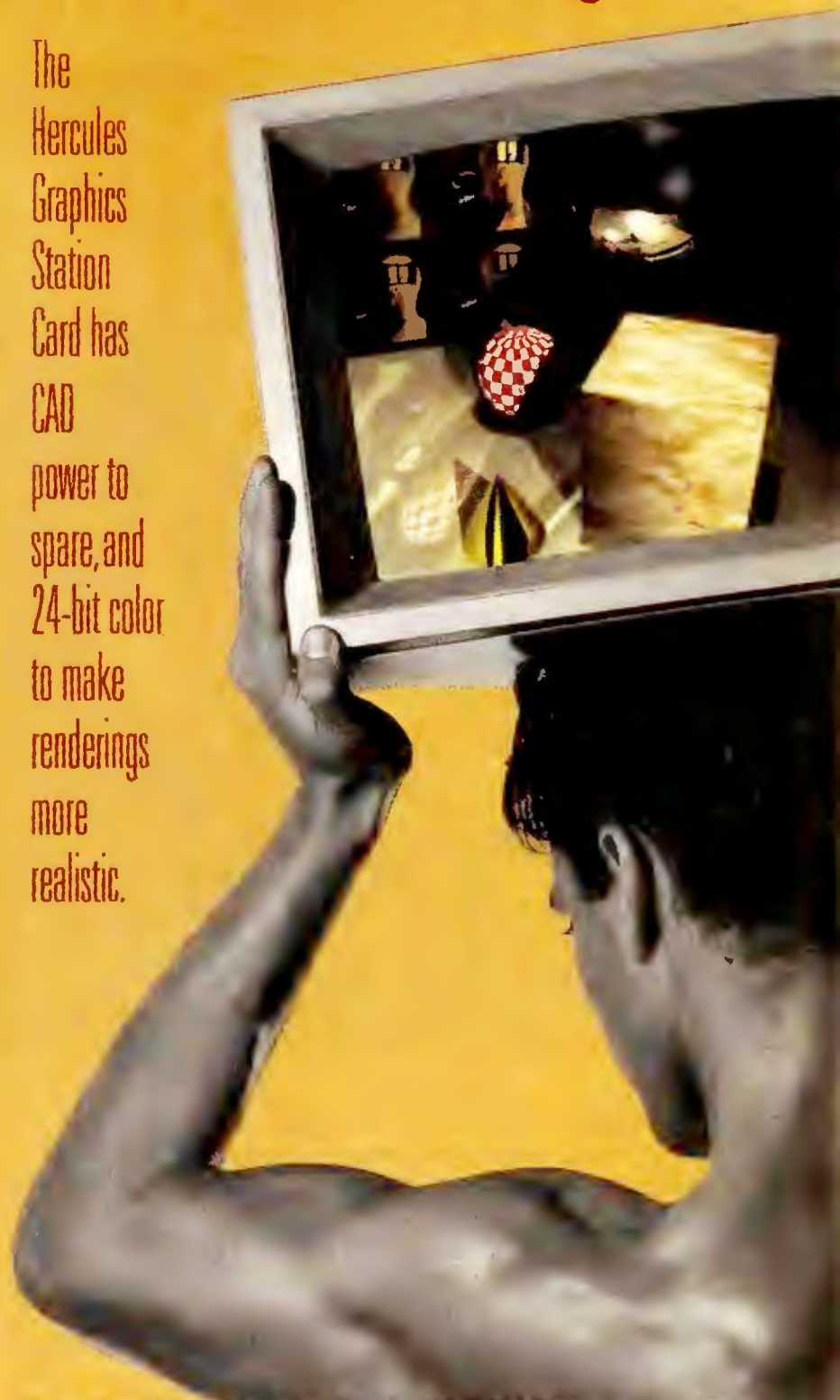
Also new is the *Great Plains Edition of Magic PC*, a relational data base management system and application generator from Aker Corporation. Developers can tap *Magic PC* to create custom applications or reports for use with the *Great Plains Accounting Series*. The *Great Plains Edition of Magic PC* is available in two versions. A \$1695 developer version can create LAN and single-user applications. A run-time version costs \$95 for single-user systems and \$495 for networks. *Great Plains Accounting Series* modules are available for single users and networked systems and cost \$395 to \$795. The *Accounting Series* requires 512K for single users (640K for multiple users), DOS 3.1 or later, and a hard disk. Upgrades to version 5.3 are \$75 or free to customers on a paid-support plan. Great Plains Software, P.O. Box 9739, Fargo, ND 58109; 800/456-4417, 800/456-0025.

—Roberta Furger

Reader service no. 687

Hercules, the Power of Realism For Your Drawings!

The Hercules Graphics Station Card has CAD power to spare, and 24-bit color to make renderings more realistic.



The Graphics Station processor frees your CPU from time-consuming graphics functions. It includes a TIGA ADI driver that pans, zooms and redraws dramatically faster than VGA cards. With 1024K of VRAM for 16- and 24-bit color, you have up to 16.7 million colors to make renderings more realistic than ever. And you can run programs like PageMaker, Excel and Corel Draw up to five times faster than the fastest super VGA card.



And best of all you can have all these features for less than you'd think. Call 800-532-0600, ext. 709 for more information.



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Spreadsheet Sizes	3.6 points	3.6, 4.8 points
Headline Sizes (24-48 points)	Requires a \$399 additional cartridge	Unlimited with modules
Accepts Additional Fonts	No	Unlimited with modules
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Cartridge Price	\$399.00	\$399.00
Module Price	NA	\$99.00
Expansion Potential	None	Unlimited

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DataFlex 3.0, DataFlex Database Engine, FlexQL

Friendlier Face for Complex Data Base

Long a stalwart in transaction-heavy environments, *DataFlex* is known and admired for the company it keeps—a sophisticated fourth-generation data base development language. Version 3.0 has acquired some of the features voted most likely to succeed in the nineties, including pull-down menus and object-oriented programming. It's also acquired a client-server version called the *DataFlex Database Engine* and a report writer called *FlexQL*.

DataFlex 3.0's interface, patterned after IBM's SAA-style interface, sports pull-down menus, mouse support, and context-sensitive help. Indexing has been improved and variable-length text and image field types added. More important is the addition of object-oriented programming tools. These let you both create and reuse modularized *packages* that include not only the properties of the object but also the object's intended behavior. Data Access has bundled libraries of buttons, checklists, forms, menus, and other ready-made objects with the program.

In addition to the traditional DOS-based LAN version of

DataFlex, you can choose the *DataFlex Database Engine*, an OS/2-based server within the client/server architecture model.

Perhaps most appealing is Data Access's SQL-based report writer, *FlexQL*, which can combine data from *DataFlex*, *dBASE*, *Paradox*, *1-2-3*, and *DIF* files into single reports. *FlexQL* shields you from its SQL querying engine with a menu-driven query-by-example facility. You query the various data bases just once, performing relational joins between different files. *FlexQL* reads each file directly, so no conversions are needed.

DataFlex 3.0, which requires DOS 3.1 and 640K, costs \$695 or \$1250 per server for the DOS-based LAN version. Upgrades cost 20 percent of your previous license, or \$139 for a typical single-user upgrade. The new *DataFlex Database Engine* costs \$1250 for each four-user group. *FlexQL* costs \$295 for the single-user version and \$595 for the LAN version. Data Access, 14000 S.W. 119th Ave., Miami, FL 33186; 305/238-0012, 305/238-0017 (fax). —Eric Brown

Reader service no. 686

Lotus Agenda 2.0

Agenda's Easier—Lotus Guarantees It

Two years after unleashing the personal information manager on an unsuspecting world, Lotus has set a new *Agenda*. Responding to criticism of *Agenda 1.0's* complex interface, Lotus has equipped version 2.0 with dialog boxes, a batch of quick-start applications, and a Domino's Pizza-like guarantee: If you're not

productive 30 minutes after start-up, you can return the product within 30 days for a full refund.

To ensure easy start-up, *Agenda 2.0* offers four canned applications—an activity planner, people and account managers, and an information sifter. It augments its *1-2-3*—(see *Lotus*, p. 141)

24-bit Color is Just One of Our Strengths.



The Hercules Graphics Station Card gives you the real picture and power to spare. Power to run Windows 3.0 and beyond.

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for more information. After all, 24-bit color is just one of our strengths.

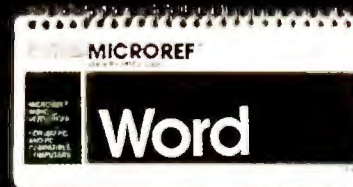
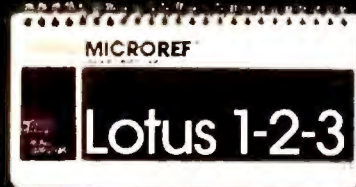


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NEW TITLES!

Formatting Text	Using Format Codes	Searching and Replacing Text or Codes
Default settings for future documents Shift F1	1. To reveal codes, press	Search forward F2
Create and use style sheets Alt F8	2. If desired, type new text or delete codes	Search backward Shift F2
Change line format Shift F8 1	3. When finished, press Alt F3	Replace forward Alt F2
(Tabs, margins, spacing, hyphenation, alignment)		Specify text text
Change page format Shift F8 2		Specify code formatting key
(Page length/numbers, top margin, header/footer)		Begin search F2
Change document summary/defaults Shift F8 3		Extended search forward Home F2
Change other format settings Shift F8 4		
Display tab ruler Ctrl F3 1		
Respond to hyphenation prompt:		
Word wrap entire word F1		
Insert a hyphen arrow keys Esc		
Reveal or hide codes Alt F3		

Special Effects
Align on tab
Bold
Center
Change font
Hard hyphen
Hard space
Hyphen (all)
Right align Alt F6
Superscript character Ctrl F8 1 1
Subscript character Ctrl F8 1 2
Underline F8
Delete an effect—See Using Format Codes

End header/footer F7
Create a footnote/endnote Ctrl F7
End footnote/endnote F7
Script or news columns Alt F7
Draw with cursor Ctrl F3 2
Insert graphics figure Alt F9

CTRL = C	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
ALT = A	Go to DOS/Shell	Spell Check	Screen Options	Move Copy	Text In/Out	Align Tab	Footnote	Font	Merge/Sort	Outline Macro
SHIFT = S	Thesaurus	Replace	Reveal Codes	Block Options	Marking Options	Flush Right	Math/Columns	Style	Graphics	Start Macro
UNSHIFT = U	Setup	Search Backward	Switch Occ.	Indent L/R	Date/Outline	Center Text	Print Options	Format	Merge Codes	Retrieve
	Cancel/Undelete	Search Forward	Help	Indent Left	List Files	Bold	Exit	Underline	Merge Field	Save



FORMATTING PAGES

SETTING PAGE FORMAT

GUIDELINES

- Use page format settings to indicate the size and type of paper and to change the size of the top and bottom margins.
- When you change a page format setting, you insert a code in a document at the cursor position. You change the page format of a document from the cursor position to the end of the document or to the next page format setting.
- To add or delete page format codes on the screen (see USING WORDPERFECT CODES section).
- When you specify the paper size and width of margins, WordPerfect automatically determines the amount of text on each

page. If you specify page numbering, headers, or footers for a document, WordPerfect will print them within the top or bottom margins and adjust the amount of text on each page.

SPECIFY PAPER SIZE

(DEFAULT = 8.5 in. by 11 in.)

- Position cursor at top of page where new paper size will begin
- Hold down **SHIFT** and press **F8** (Format)
- Press **2** (Page Format)
- Press **8** (Paper Size)
- When size options appear:
 - To select a listed paper size, press the appropriate number, or
 - Enter a different paper size. WordPerfect uses this size to reformat your document and find the appropriate form in the selected printer's definition to match the paper size.

a. Press **O** (letter o (Other))

- Type paper width and
- Type paper length and
- To return to document, press

NOTES:
New paper size must have margins indicated on the [All] form. To change maximum width [ALL OTHERS] form, follow the **PRINTER** procedure.

Modify paper size as many times in a document.

If you change paper size, WordPerfect automatically adjusts the text width within the current margin.

SPECIFY PAPER TYPE

(DEFAULT = Standard)

Use this procedure to select a paper type that indicates a change in any of the following: orientation, initial presence (must type G (Go) from Printer Control screen to begin printing), sheet feeder bin/manual feed/continuous feed, and page offsets.

- At Paper Type menu, select a paper type. WordPerfect uses this type to find an appropriate form (in the selected printer definition) that contains necessary bin, paper feeding method, page offset, and font orientation instructions.

NOTES:
Select a different paper type as many as you need in a document. For example, you may want to use different

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Circle 68 on reader service card

Lotus

(continued from p. 139)

like menu bar with pop-up dialog boxes. Experienced users can still create their own to-do lists, calendars, client data bases, or other custom applications with *Agenda's* flexible development tools.

As with *Agenda 1.0*, you enter text items into an outline, assign categories, and attach notes of up to 10K for each item. Version 2.0 lets you view and search external notes (such as word processing files) of any size. *Agenda* can sort views by categories such as time, priority, person, and project. However, it still dis-

plays only one view at a time.

Other pluses include 200-character views, column math functions, an improved macro facility, and support for EMS 4.0 memory and PostScript printers. Version 2.0 uses the Lotus-standard file reservation system, which means network users can share *Agenda* files.

Agenda 2.0 is \$395 and requires 640K, a hard disk, and DOS 2.1 or later. Upgrades from version 1.0 cost \$99. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 800/343-5414, 617/577-8500. —Daniel Tynan

Reader service no. 684

Folio Views 2.0

Fast Relief for Hypertext Headaches

Despite the greater flexibility of hypertext documents, the bulk of electronically distributed information still travels as plain old ASCII text. Why? Until now, turning data into hypertext has been complicated and tedious. Worse, the lack of a standard hypertext file format has meant that anyone who wants to read your hypertext document needs a full copy of the program that created it.

Folio Views 2.0 solves the first problem by automatically converting and indexing files from 30 popular word processors, then inserting hypertext links according to user-defined rules. For instance, footnotes can be converted to pop-up fields, or selected words can be automatically linked to a specified page. Of course, you can opt to add links manually.

The problem of sharing hypertext documents has also been overcome: If you purchase an unlimited run-time license for an additional \$200, you can distribute run-time

versions of your documents.

Other enhancements to the program include pulldown menus, mouse support, a 2:1 data compression ratio, and the ability to have a hypertext link launch a program and load a file.

The single-user (but LAN-ready) *Folio Views* costs \$495, while *Folio Publisher Views* (the same program, plus an unlimited run-time license) is priced at \$695. The \$995 *Folio Legal Views* has tools for indexing deposition transcript files. All three require 512K, DOS 3.0 or later, and a hard disk or other high-capacity media. Folio Corp., 2155 N. Freedom Blvd. #150, Provo, UT 84604; 801/375-3700, 801/374-5753 (fax). —Robert Lauriston

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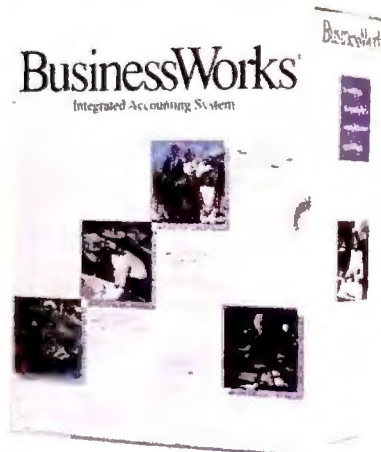
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 - 7392 ☐ Adobe PostScript Cartridge 249.
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- Aldus ... NCP**
- 1332 ☐ PageMaker 3.01 499.
- Alpha Software ... NCP**
- 5104 ☐ Alpha Four 1.1 319.
- Application Techniques ... NCP**
- 1214 ☐ Pizazz Plus 2.0. 69.
- Ashton-Tate ... NCP**
- 4450 ☐ dBASE IV 1.0 499.
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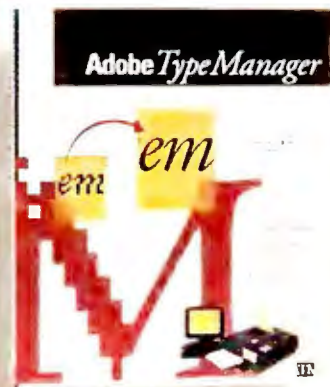




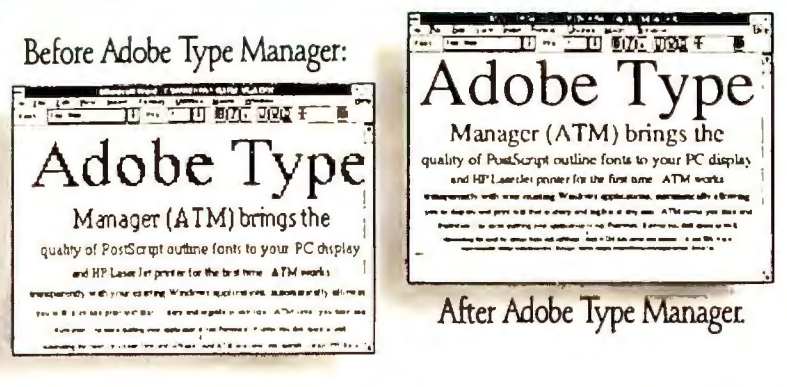

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- 5039 ☐ PC Tools Deluxe 6.0. 89.
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- Chronos Software ... NCP**
- 4387 ☐ Who•What•When 2.0 179.
- Concentric Data Systems ... NCP**
- 6575 ☐ R & R Relational Report Writer 3B 109.
- Corel Systems ... NCP**
- 5506 ☐ CorelDRAW! 1.2 329.
- Crosstalk Communications ... NCP**
- 2908 ☐ Crosstalk XVI 3.71 119.
 - 5611 ☐ Crosstalk for Windows 1.0 129.
- Custom Applications ... NCP**
- 7474 ☐ Freedom of Press 2.2. 255.
- Data Storm ... NCP**
- 4798 ☐ PROCOMM PLUS 1.1 65.
- Delrina Technology ... NCP**
- 4325 ☐ PerFORM 2.1 (\$30 rebate!) 159.
 - 7351 ☐ PerFORMPRO 1.0 for Windows. 299.
- Delta Technology ... NCP**
- 5829 ☐ Direct Access 5.0. 55.
- Digital Composition Systems ... NCP**
- 6799 ☐ db Publisher 1.0 for Ventura. 149.

- Dow Jones ... NCP**
- 5494 ☐ News/Retrieval Membership Pkg. 24.
- 5th Generation ... NCP**
- 5504 ☐ Brooklyn Bridge 3.0. 79.
 - 2762 ☐ Mace Utilities 1990. 99.
 - 3950 ☐ Fastback Plus 2.1 119.
- FNN Data Broadcasting**
- 7005 ☐ NewsReal 1.0 99.
- FormWorx ... NCP**
- 5810 ☐ FormWorx with Fill & File 2.5 85.
 - 7311 ☐ Form Publisher for Windows 1.2 . 145.
- Fox Software ... NCP**
- 6188 ☐ FoxPro 1.02. 489.
- Franklin Software ... NCP**
- 7071 ☐ Language Master 2.0 59.
 - 7416 ☐ Language Master 3.0 for Windows 59.
- Funk Software ... NCP**
- 2228 ☐ Sideways 3.21 42.
 - 7380 ☐ P.D. Queue 1.0 (print spooler) ... 55.
- Generic Software ... NCP**
- 2265 ☐ Generic CADD Level 3 1.1.3 ... 225.



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6572 ☐ WealthBuilder by Money Magazine 1.1—Save & invest wisely. Set financial goals & achieve them. Plan for retirement, a child's education, a home. Optimize your portfolio & track all of your investments \$145.

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- 4880 ☐ One Write Plus Acct. Sys. 2.06 . \$179.
5825 ☒ Money Matters 1.0 55.

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- 2324 ☒ PC Logo 3.0 59.

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- 7389 ☒ Windows Express 3.0 55.
7383 ☒ First Apps 1.0 55.

Hiigraeve ... NCP

- 2323 ☒ HyperACCESS/5 1.1 (DOS & OS/2) 115.

IBM ... NCP

- 6599 ☐ Current 1.1 239.

Individual Software ... NCP

- 6222 ☒ Resume Maker 1.1 29.

Inset Systems ... NCP

- 7298 ☒ Hijaak 1.1 85.
7300 ☒ Inset Plus Hijaak 99.

Intult ... NCP

- 2426 ☒ Quicken 3.0 39.

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- 7478 ☐ FontSpace 1.16 59.

LaserTools ... NCP

- 6882 ☒ PrintCache 2.3 99.

Lord Publishing ... NCP

- 5191 ☒ Ronstadt's Financials 1.02 75.

Lotus ... NCP

- 5417 ☐ 1-2-3 3.0 call
5653 ☐ 1-2-3 2.2 349.
5134 ☒ Magellan 2.0 119.

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- 2798 ☐ Managing Your Money 6.0 119.
7002 ☒ Home Lawyer 1.0 69.

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- 6234 ☐ CarbonCopy Plus 5.2 119.
7024 ☐ CarbonCopy Plus+ Host 5.2 199.

Micrografx ... NCP

- 6597 ☐ Designer 3.01 489.

Micro Logic ... NCP

- 6787 ☒ Info Select 1.1 55.

Microlytics ... NCP

- 2731 ☐ GOfar 2.0 45.

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- 7010 ☐ Windows 3.0 99.
7388 ☒ Project for Windows 1.0 469.

- 7387 ☒ PowerPoint for Windows 1.0 . . . \$329.

- 2904 ☐ Works 2.0 99.

- 2901 ☐ Word 5.0 209.

- 6195 ☒ Word for Windows 1.0 329.

- 2856 ☒ Excel 2.1 call

- 2894 ☐ QuickBASIC 4.5 69.

- 2895 ☐ QuickC 2.0 69.

- 2853 ☒ C Compiler 6.0 339.

Multisoft ... NCP

- 4925 ☐ PC-Kwik Power Pak 1.5 79.

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- 2982 ☐ WillMaker 3.0 35.

Norton-Lambert ... NCP

- 4928 ☐ Close-Up Customer 3.0 135.

- 4929 ☐ Close-Up Support 3.0 165.

PC Globe ... NCP

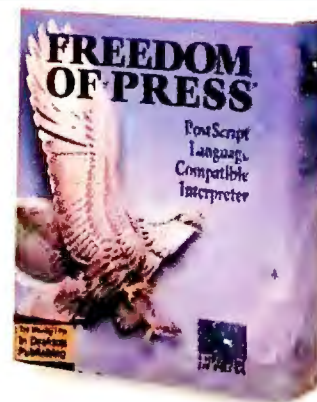
- 5902 ☐ PC Globe 3.0 39.

- 5900 ☐ PC USA 1.0 39.

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- 4384 ☒ Ultravision 2.0 79.

- 7048 ☒ Monarch 1.0 (Data Mgmt. Tool) . 319.



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- 7483 ☒ Grammatik Windows 1.0 52.

Revolution Software ... NCP

- 4480 ☒ VGA Dimmer 2.01 (screen saver) . 19.

RightSoft ... NCP

- 4155 ☒ RightWriter 3.1 54.

Samna ... NCP

- 5799 ☒ Ami Professional 1.2 309.

Softlogic Solutions ... NCP

- 3542 ☐ Software Carousel 4.0 55.

Software Publishing ... NCP

- 3499 ☐ PFS:First Publisher 3.0 99.

- 3478 ☐ PFS:First Choice 3.02 105.

- 3496 ☐ Professional Write 2.2 165.

- 3482 ☐ Harvard Graphics 2.3 339.

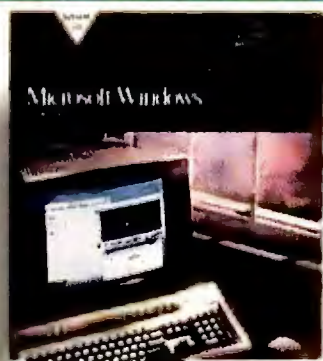
Symantec ... NCP

- 3425 ☐ Q&A 3.0 229.

- 3431 ☐ Timeline 4.0 469.

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- 6397 ☒ The Norton Backup 1.1 99.

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- 6600 ☒ Superbase 4 for Windows 1.2 . . 429.

Qualitas ... NCP

- 7539 ☐ 386MAX 5.0 75.

Quarterdeck ... NCP

- 6422 ☐ QRAM 1.0 49.

- 3221 ☐ Expanded Memory Mgr. 386 5.1 . 59.

- 3220 ☐ DESQView 2.26 79.

- 4586 ☐ DESQView 386 1.1 129.

Reality Technologies ... NCP

- 6572 ☒ WealthBuilder 1.1 145.

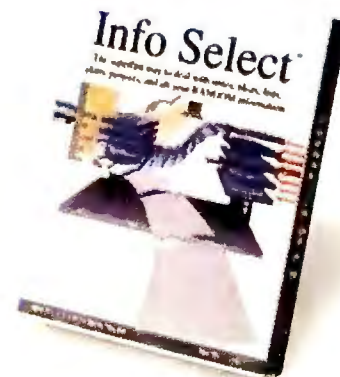
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4155 ☒ RightWriter 3.1—Make your business writing clear, concise and powerful. Award winning RightWriter checks your grammar, style, word usage and punctuation. Works with most popular word processors. . . \$54.

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6994 ☐ PercentEdge 1.0 69.

Timeworks ... NCP

- 6253 ☒ Publish-It! 1.1 115.

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3720 Flashcard 2.1 (AppleTalk network card; 1 year warranty) 155.

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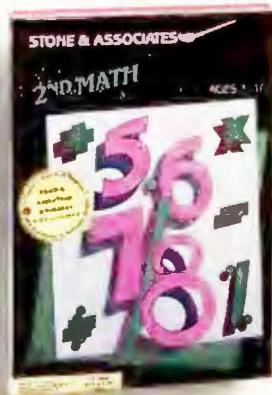
- 3561 ☒ True BASIC 2.1 52.

Verlcomp ... NCP

- 6771 ☒ Memory Master 1.0 45.

WordPerfect Corp. ... NCP

- 3804 ☐ WordPerfect 5.1 265.
6685 ☒ DrawPerfect 1.1 279.



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- 7016 ☒ PC Paintbrush IV Plus 1.0 119.

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- 5701 ☐ Where/Time Carmen Sandiego? . . . 32.
6295 ☒ The Playroom 32.
5851 ☒ SimCity 33.

Electronic Arts ... NCP

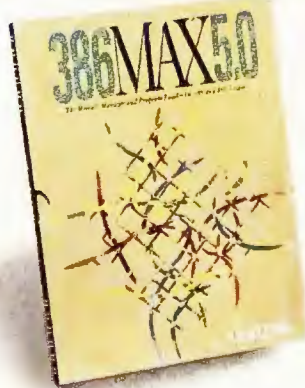
- 5804 ☒ Deluxe Paint II (Enhanced) 89.

Microsoft ... NCP

- 2858 ☐ Flight Simulator 4.0 39.

Penton Overseas ... NCP

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7539 ☐ 386MAX 5.0—Powerful new MAXIMIZE feature finds and uses all the memory you paid for. Automatic install makes this industry standard memory manager indispensable for all level of 386 users. \$75.

Sierra On-Line ... CP

- 6023 ☒ Leisure Suit Larry III 39.
6796 ☒ Codename: Iceman 39.
6972 ☒ Conquests of Camelot 39.

Software Toolworks ... NCP

- 6436 ☒ Hunt for Red October 20.
4659 ☒ Chessmaster 2100 (CP) 35.

Stone & Assoc. ... NCP

- 3438 ☒ Young Math (ages 5 to 8) 22.
3439 ☒ 2nd Math (ages 7 to 16) 27.

True BASIC, Inc. ... NCP

- ☒ Kemeny/Kurtz Math Series:
10 titles each 45.

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Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.



Corel Systems ... NCP

5506 ☐ CorelDRAW! 1.2—The world's leading PC illustration software now comes with even more value: CorelTRACE, over 100 typefaces, over 300 clip-art images, a Pantone license—all bundled in for free. \$329.

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- 7108 APC Smart-UPS 400. 339.
6812 200DL (stand-by power source) . . 155.
6811 360SX (stand-by power source) . . 255.
7107 450AT (stand-by power source) . . 339.
7106 520ES (stand-by power source) . . 399.
7105 600LS (stand-by power source) . . 469.

AST Research ... 2 years

- 1299 SixPakPlus 384k C/S/P 179.
6795 SixPak 286 512k 209.
4107 RAMpage Plus 286 512k 419.
6980 VGA Plus (w/512K) (800 x 600 res) 229.

Boca Research ... 5 years

- 7001 BOCARAM/AT PLUS (0-8 Meg) (LIM 4.0 extended) 125.
7061 BOCARAM/XT 0K (0-2 Meg, LIM 4.0) 99.
7135 TophAT (16-bit backfill 512K to 640K) 99.
6998 I/O Board for AT 59.
6999 I/O Board for Microchannel S/S/P . 109.
6995 SuperVGA (800 x 600, 16/8 bit) . . 135.
7026 1024 VGA (16 bit non-interlaced, 512K) 219.

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- 7400 2 Pos. Laser Compatible Switch Box 109.

Brother International ... 1 year

- 5787 HL-8e Laser Printer 1699.
5788 HL-8Ps PostScript Laser Printer . 2949.

CH Products ... 1 year

- 7341 Gamecard III Plus (for Microchannel PS/2s) 49.
7340 Flight Stick 49.
7345 RollerMouse (Trackball) serial 85. bus 99.

Compucable ... 2 years

- 1604 2-Position switch box 25.

Cuesta ... 1 year

- 1608 Datasaver 400 Watt (power backup) 429.

Curtis ... lifetime

- 1694 Emerald SP-2 36.
1707 Ruby SPF-2 (6 outlets) 55.
1708 Ruby-Plus SPF-2 Plus 65.
7358 Command Center. 93.
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1052 Printer-to-IBM cable (6 feet). 15.

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7157 Logical Connection Plus 512k ... 599.

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2307 Smartmodem 2400 349.

7391 Ultra 9600 Modem 899.

Hercules ... 2 years

2318 Graphics Card Plus. 189.

Hewlett-Packard ... 1 year

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6582 LaserJet IIP (w/toner) 1069.

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2352 2400B Internal Modem 2 (for PS/2) 249.

5119 2400 Baud External Modem 179.

6420 2400EX MNP Modem. 229.

2346 Inboard 386/PC w/1 Meg (w/free Ami) 519.

4266 Above Board Plus 512k. 419.

4267 Above Board Plus I/O 512k 449.

5336 Above Board Plus 8 2 Meg. 599.

5342 Above Board Plus 8 I/O 2 Meg ... 629.

4272 Above Board 2 Plus 512k 469.

5396 Above Board MC 32 0k 359.

4275 Connection CoProcessor 529.

MATH COPROCESSORS

7385 80287XL (for 80286 CPU's) 229.

4750 80387SX (for 80386SX CPU's) ... 309.

2371 80387 (for 16 MHz 80386 CPU's) .. 349.

2372 80387-20 (for 20 MHz 80386 CPU's) 399.

Key tronic ... 3 years

4518 101 Plus Keyboard 99.

Kraft ... 5 years

5800 3 button Thunder Joystick. \$29.

5802 Trackball 69.

Logitech ... limited lifetime

5464 C9 Mouse for PS/2's 69.

5151 HiREZ Mouse (C9) 85.

6029 Trackman (Trackball) serial 85. bus 89.

4297 ScanMan Plus (hand scanner) ... 185.

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6669 Intensify 2 Meg Expansion for HP

LaserJet II (upgradeable to 4 Meg) . 219.

7012 Beyond Memory Board for PS/2

Model 70 (2 Meg) 265.

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2897 Mouse with Paintbrush 109.

2898 Mouse with Windows 3.0 149.

MicroSpeed ... 1 year

6007 PC-TRAC Trackball serial 75. bus 85.

Mouse Systems ... lifetime

5997 Trackball (1 yr. wrnty.) serial 75. bus 85.

4306 PC Mouse II w/PC Paint+ 89.

NEC ... 2 years

4799 Multisync 2A (VGA Monitor) 499.

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Above Boards—FREE Quarterdeck QRAM and Manifest with any Above Board or piggyback, now through December 31, 1990! see Intel listing for prices.

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7512 ProDesigner VGA II (1024 x 768) . 299.

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3202 Turbo Cool 150 (25° - 40° cooler) 129.

3200 Silencer 150 (84% noise reduction) 115.

7053 InnerSource 2210 (internal backup) 399.

Pacific Data Products ... 1 year

6779 25 Cartridges in One! (for LJ II, IIP, IID) .275.

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7158 Pacific Page (PostScript Cartridge for LaserJet IIP/III) 379.

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3100 1200 Baud External Modem (mini) . 77.

3103 2400 Baud Internal Modem 135.

3102 2400 Baud External Modem 179.

5286 2400 Baud Int. MNP Modem (Lev. 5) 175.

5285 2400 Baud Ext. MNP Modem (Lev. 5) 209.

4542 2400 Baud Internal Modem for PS/2 . 229.

7008 P/NET (peripheral sharing) 1189.

Reflection Technology .. 1 year

7127 Private Eye (virtual display) 499.

SAFE Power Systems ... 2 years

4562 Safe 425W (standby power bkup) 329.

6747 Safe 400S (new) 399.

SOTA Technology ... 2 years

5111 SOTA 286i-12 (12 MHz accelerator) 269.

5402 SOTA 386i-16 (16 MHz accelerator) 389.



Intel ... 5 years

MNP Modems—Features data compression, error correction, & a built-in buffer providing compatibility with OS/2.

6421 2400B MNP Internal Modem. \$199.

6420 2400EX MNP Modem 229.

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6037	Premier leather carrying case	199.
TheComplete PC ... 2 years		
5140	TheComplete Page Scanner	549.
5828	TheComplete Communicator	559.
Tripp Lite ... 2 years		
6199	Isobar 4-6 (4 outlets, 6 ft. cord)	49.
6200	Isobar 6-6 (6 outlets, 6 ft. cord)	59.
Video 7 ... 7 years		
5883	1024i VGA (includes 512k)	269.
4931	VRAM VGA 512k	379.

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5116	Bernoulli II Single 44 Meg Internal	995.
5117	Bernoulli II Dual 44 Meg External	1969.
5113	44 Meg Cartridge Tripak (5 1/4") . . .	249.
2499	PC2 Controller	169.
7551	Bernoulli II Transportable 44 Meg .	1299.
Mountain Computer ... 1 year		
2917	40-60 Meg Internal Tape Drive. . . .	379.
5502	83-152M Ext. Tape Drive.	799.
5500	83-152M Int. Tape Drive	629.
5190	DC2000 Pre-formatted Cartridges ea.	35.



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7311 **Form Publisher for Windows 1.2**—Desktop publishing designed especially for creating professional-quality forms. Use unique object-oriented design techniques & import graphics. Over 600 forms included! . . \$145.

Pacific Rlm ... 1 year

5010	1.2 Meg External (for PS/2's)	215.
6602	1.44 External (for PC/XT/AT)	239.

Plus Development ... 2 years

6425	Hardcard II 40 Meg (19 ms)	599.
6424	Hardcard II 80 Meg (19 ms)	699.

Seagate ... 1 year

2285	20 Meg Int. Hard Drive ST225 (w/controller and cables, 65 ms) . .	275.
2286	30 Meg Int. Hard Drive ST238 (w/controller and cables, 65 ms) . .	289.
4554	40 Meg Int. HD ST251-1 (28 ms) . .	359.

TEAC ... 1 year

4951	720k Drive (specify XT or AT, 3 1/2") .	75.
4670	1.44 Meg Drive for PC/XT (3 1/2") . . .	89.
4326	1.44 Meg Drive for AT (includes Bastech software utilities, 3 1/2" copy prot.) .	109.

MISCELLANEOUS

Checkfree

6360	CheckFree (electronic checking srv.)	\$25.
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CompuServe

7546	DOS Membership Kit	23.
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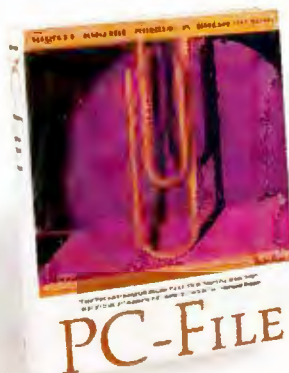
Maxell ... lifetime

2789	5 1/4" MD2-D 360k Disks (Qty. 10) . . .	12.
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Reflection Technology ... 1 year

7127 **Private Eye**—A large screen in a small box. A tiny virtual display which offers a full-size, 12" IBM CGA auxiliary screen to PCs & laptops. View privately in planes or meetings. Brighter than LCDs. \$499.



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2790	5 1/4" MD2-HD 1.2Mb Disks (Qty. 10) . .	19.
2792	3 1/2" DS/DD 720k Diskettes (Qty. 10) . .	14.
2793	3 1/2" DS/HD 1.44Mb Diskettes (Qty. 10)	27.

Sony ... lifetime

3291	5 1/4" DS/DD 360k Disks (Qty. 10) . . .	10.
3292	5 1/4" DS/HD 1.2Mb Disks (Qty. 10) . . .	19.
3297	3 1/2" DS/DD 720k Diskettes (Qty. 10) . .	13.
3298	3 1/2" DS/HD 1.44Mb Diskettes (Qty. 10)	22.
6659	QD 2000 Tape Cartridge	19.

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6556	256k DRAMs (100 nanosecond) . . .	call
3248	256k DRAMs (120 nanosecond) . . .	call
4366	1 Meg x 9 SIMMs (100 nanosecond) call	
5510	1 Meg x 9 SIMMs (80 nanosecond) call	
5746	1 Meg Chips (80 nanosecond)	call

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7551 **Bernoulli II Transportable**—The compact version of the Bernoulli Universal family removable media drive, offering users the freedom to easily move his/her Bernoulli drive from one AC outlet to another \$1299.

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- For all other items, add \$3 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.

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PC CONNECTION®

Do Presentation Manager Spreadsheets Have The Right Stuff?

If 1-2-3/G or Excel for OS/2 is at the top of your buying list, read on.

PC World's spreadsheet shoot-out reveals some surprising conclusions.

John Walkenbach

For years we've been hearing about how OS/2 would be the ultimate computing environment. The graphics punch of Presentation Manager (PM) would increase ease of use by an order of magnitude, and common interface conventions would make it far easier to learn new applications. Programs would exchange data easily and dynamically. Performance would benefit from superior memory management, multitasking, and multithreading (where multiple lines of code execute simultaneously in parallel, within a single application).

The arrival of Lotus's 1-2-3/G and Microsoft Excel for OS/2—PM versions of the two most popular spreadsheets—provides an opportunity to judge those claims. Are these programs more powerful, easier to use, and faster than their DOS or Windows versions?

Only three things distinguish Excel for OS/2 from its Windows counterpart: A nifty new utility eases data consolidation; you can mix more fonts in a worksheet; and you can't query dBASE data bases. The PM 1.2 environment is so similar to Windows 3.0 that the two Excels are virtually identical in look and feel. What's more, Excel for Windows proved significantly faster in PC World tests.

1-2-3 gets a well-deserved face-lift from PM's graphical display, windows, and flexible fonts. The new version

also greatly expands the program's graph options and adds a breakthrough result-optimizing utility, the Solver. 1-2-3/G has the most powerful features of any spreadsheet available—and at \$695, the highest price. But, while 1-2-3/G beat 1-2-3 2.2 in PC World tests, it was

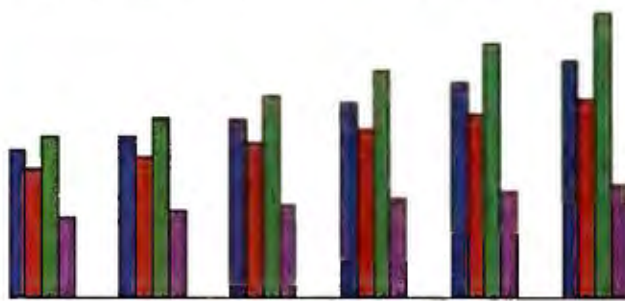
significantly slower than release 3. The real rub, though, is that Lotus is working on a Windows 3.0 version of 1-2-3/G without the pain of OS/2.

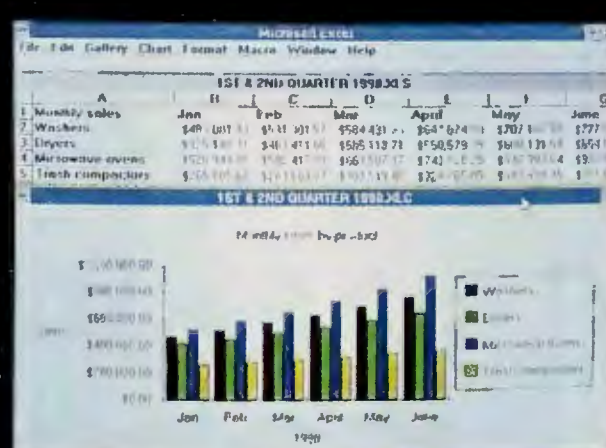
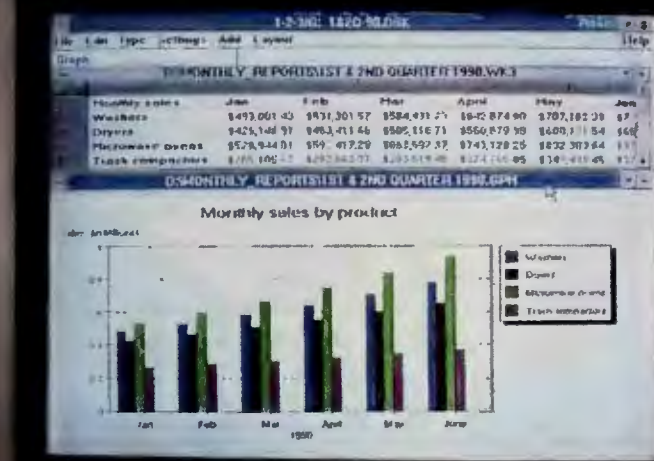
Given OS/2's appetite for expensive hardware, and a still-

limited complement of applications, it's hard to justify moving to either of these OS/2 spreadsheets. OS/2 users will find that they need a fast 386 with a big, fast hard disk and at least 8MB of RAM before they can load multiple applications and run them at an acceptable speed; Windows users should be able to do fine with half as much RAM. If your company is already committed to OS/2, 1-2-3/G is the better buy. Otherwise, Windows 3.0 is a better platform for your graphical spreadsheet, and Best Buy-winning Excel is currently the right program to run under it.

The Graphical Edge

Despite the OS/2 PM issues, 1-2-3/G and Excel for OS/2 are still spreadsheets and will be judged by the usual standards. That means they must be easy to use and

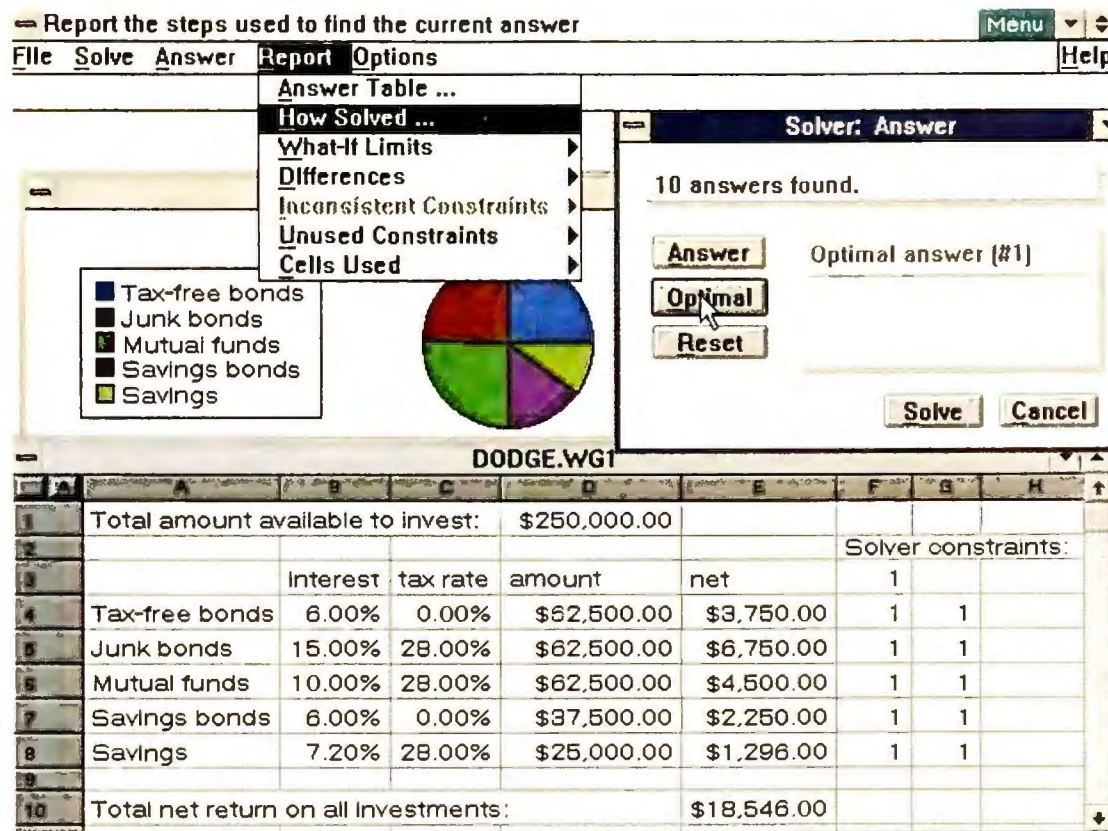




include the powerful spreadsheet, macro programming, and data base management tools experienced users demand. For top-quality reports and presentations, they must offer a wide variety of fonts, colors, and customizable charts.

Naturally, both *1-2-3/G* and *Excel for OS/2* have the basic advantages shared by all Presentation Manager—or *Windows 3.0*—programs. Universal pulldown menus and context-sensitive help ease learning for beginners.

Shared conventions for file and editing commands, function keys, and mouse procedures make skills learned in one of the programs applicable to the others. You can run several programs, each in its own window, and jump between tasks with a mouse click. For instance, while one program is busy sorting a data base or downloading a file, you can switch to another program—or even start a new session of the same program—and keep working while the first program chugs away in the background.



Here, 1-2-3/G's Solver utility suggests the right mix of investments to achieve the highest return. Formulas in cells F3..G8 require that each type of investment make up between 10 and 25 percent of the total. The 1's in the constraint cells show that the Solver's optimal answer meets all the specified conditions (one or more 0's would show it doesn't).

Both 1-2-3/G and *Excel for OS/2* can turn a range of numbers into a handsome graph with little effort, and both let you dress up your text with fonts, lines, boxes, and colors to make your presentations pop. The PM *Windows* graphical interface really pays off here, since the fonts, colors, and shadings you select for output are closely approximated by the screen image. And if that's not enough, zoomable page preview adds headers, footers, and other accoutrements not visible while editing. Both programs let you print text and graphs on the same page—though not side by side. Worse, since there are only a few OS/2 printer drivers that work with these programs, your selection of printers and fonts is much more limited than under DOS or *Windows*.

When it comes to the nuts and bolts of spreadsheet functionality, *Excel* and 1-2-3/G also share a wealth of features: Both of the spreadsheets have minimal and background recalculation, macro recorders, powerful macro programming languages, analytical tools, data base managers, sophisticated graphics,

and extensive context-sensitive help.

The only true innovation in either program, 1-2-3/G's Solver, is one of the most impressive new spreadsheet tools to come along in a while. What-if tables that show how variables in one or two cells change the results of selected formulas are old news, but the Solver takes this concept to new heights. For instance, you can calculate the best balance of growth, return, and tax benefits for a mix of investments or where to allocate fixed capital and personnel resources for the highest profits. The Solver can then generate a report explaining exactly how each optimized result was calculated.

The most obvious difference between the two programs is the structure of the worksheets they can produce. While *Excel* is limited to the traditional two-dimensional model, 1-2-3/G—like character-based release 3—literally adds a new dimension. Simply envision a stack of normal two-dimensional spreadsheets and you'll get the picture. 3-D files are great if you tend to work with groups of similar spreadsheets (such as

individual monthly sales reports).

Data base management abilities are another important difference between the two programs. Since 1-2-3/G can query and update shared *dBASE*-compatible or *SQL Server* files over a network, it can easily serve as a front end for data base applications. *Excel for OS/2* offers only single-user, flat-file data management.

Prior experience, however, is the key consideration in deciding between the two products. If you've used other versions of 1-2-3, moving up to 1-2-3/G is easy: You can continue to use familiar keystrokes, switching to the mouse only when you find it more efficient. And if you're familiar with the *Windows* or Macintosh version of *Excel*, you'll feel right at home with *Excel for OS/2*.

1-2-3/G 1.0

With 1-2-3/G, Lotus has caught up with—and in most areas surpassed—*Excel*. Combining the 3-D and data base power of 1-2-3 release 3 with the innovative Solver, improved graphs, and a carefully designed interface, the first graphical 1-2-3 is a major improvement over earlier versions. Longtime 1-2-3 users will feel right at home, though: Despite the radically different interface, most keyboard commands work just as before. At \$695, it's also the most expensive spreadsheet on the market.

Most of 1-2-3/G's commands match release 3's, and its functions, formulas, macro language, and data base management and file linking capabilities are identical, but 1-2-3/G sports several improvements. The graphical interface eases learning, makes it much easier to manage fonts and multiple files, and lets you switch back and forth between 1-2-3/G and other applications running simultaneously. You get 20 levels of undo, so you can still back out of mistakes even if you don't catch them immediately. An improved Group mode lets you manipulate or format selected pages rather than whole worksheets, as in release 3.

FEATURES EVALUATION

When Is an Upgrade Not an Upgrade?

1-2-3/G is a significant advance over earlier releases, but Excel for OS/2 doesn't add much to Excel for Windows' repertoire. Both OS/2 programs lack several of their predecessors' capabilities.

- Yes
- No
- ◐ Deficient
- △ Limited only by available RAM

Standard features

	1-2-3 release 2.2	1-2-3 release 3	1-2-3/G 1.0	Excel for OS/2	Excel for Windows
Price	\$495	\$595	\$695	\$495	\$495
Interactive tutorial	○	○	○	○	●
Mouse support	○	○	●	●	●
Reads/writes WK1 files	●	●	●	●	●
Reads/writes 1-2-3 macros	●	●	◐ ¹	◐ ²	◐ ²

Spreadsheet

Pages per worksheet	1	256	256	1	1
Number of open files	1	△	16	△	△
Multiple views of single file	2	3	80	4	4
Number of characters per cell	255	512	512	255	255
Dynamic file links	◐ ³	●	●	◐ ³	◐ ³
Saves multifile work space	n/a	○	●	●	●
3-D ranges	○	●	●	○	○
Discontinuous ranges	○	○	●	●	●
Number of levels of undo	1	1	20	1	1

Analysis/advanced functions

Goal seeking	○	○	●	●	●
What-if table creation	●	●	●	●	●
Optimization	○	○	●	○	○
Array formulas	○	○	○	●	●
Matrix calculation	●	●	●	●	●
Regression analysis	●	●	●	●	●
Consolidate by label matching	○	○	○	●	○

Auditing

Traces formula references	○	○	○	●	●
Identifies circular references	●	●	●	●	●
Cell noting	○	●	●	●	●
Map view	○	●	●	●	●

Data base

Concurrent sort keys	2	255	255	3	3
Column sort	○	○	○	●	●
Relational table join	○	●	●	○	◐ ^{4,5}
Provides data input form	○	○	○	●	●
Reads/writes DBF files	◐ ²	●	●	●	●
Queries/updates dBASE data bases	○	●	●	○	● ⁵
Queries/updates SQL Server data bases	● ⁵	● ⁵	● ⁵	○	○

Programmability

Macros					
Learn mode	●	●	◐ ⁶	●	●
Step mode/trace cells option	●	●	●	●	●
Macro can include external OS commands	○	●	●	●	●
User-defined functions	○	○	○	●	●
Dialog box editor	○	○	○	●	●
Creates application-specific menus	●	●	◐ ⁷	●	●

Graphs

Overlapping bars	○	○	●	●	●
Scatterplots	●	●	●	●	●
High-low-close-open	○	●	●	●	●
Dual y-axes	○	●	●	●	●
Three-axis bar graphs	○	○	●	○	○
Diagonal data-series labels	○	○	●	○	○
3-D effects	○	○	●	○	○
Chart editing					
Sets minimum/maximum y-axis values	◐ ⁸	●	●	●	●
Free-form legend location	○	○	●	○	○

Output

Print preview	○	○	●	●	●
Multiline headers and footers	○	○	○	○	○
Prints in color	●	●	●	●	●
Mixes text and graphs on page	●	◐ ⁹	◐ ⁹	◐ ⁹	◐ ⁹
Prints multiple ranges per page	●	●	●	○	○
Saves named report format	○	●	●	○	○
Formatting					
Maximum fonts per report	8	8	255	255	4
Adds arrows	○	○	◐ ¹⁰	◐ ¹⁰	◐ ¹⁰
Adds text items	○	○	◐ ¹⁰	◐ ¹⁰	◐ ¹⁰
Drop shadows	○	○	◐ ¹⁰	◐ ¹⁰	◐ ¹⁰

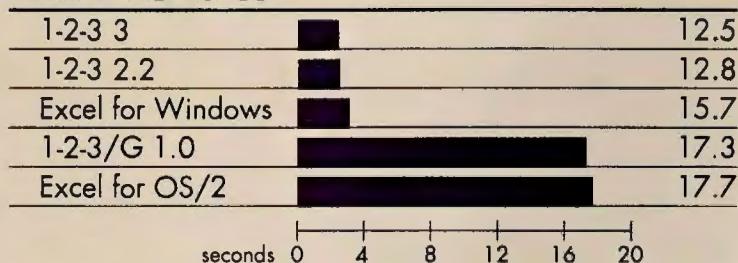
- ¹ Same macros will require translation by included utility.
² Included translation utility reads but cannot write.
³ Cell-to-cell links only; formulas cannot reference disk files.
⁴ Joins external tables only.
⁵ Requires extra-cost add-in.
⁶ Keystrokes only, not commands entered by mouse.
⁷ Cannot suppress standard menus.
⁸ Line graphs only.
⁹ Cannot print text and graphs side by side.
¹⁰ Graphs only.

PC WORLD TEST REPORT

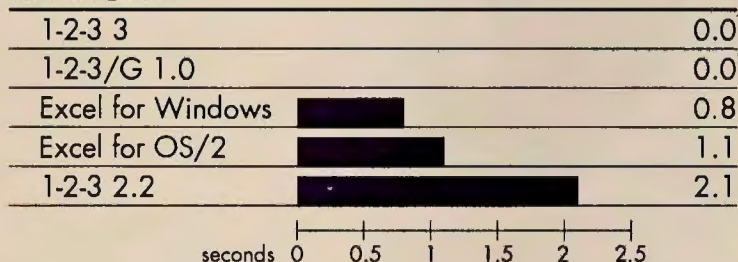
Sluggish Performance Is OS/2's Price Tag

Overall 1-2-3/G is faster than Excel for OS/2, but 1-2-3 release 3 is fastest of them all—and it handles the largest worksheets. Excel for OS/2 pays a similar performance penalty compared with its DOS counterpart.

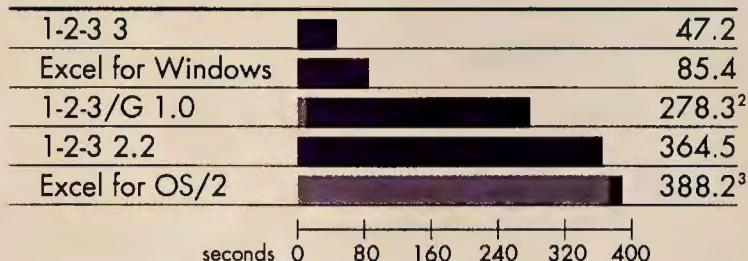
Load a worksheet



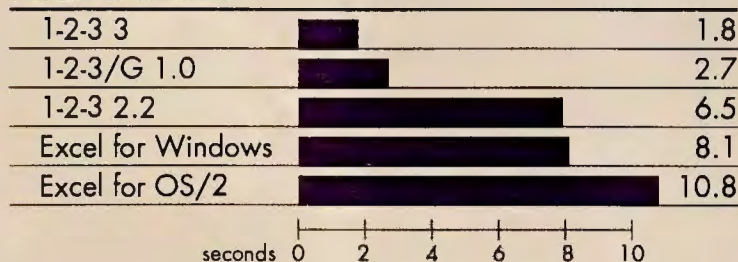
Recalculate



Print



Insert a column



¹ Time was too fast to record.

² Shaded bar on left represents 4 seconds spool time.

³ Shaded bar on left represents 372.1 seconds spool time.

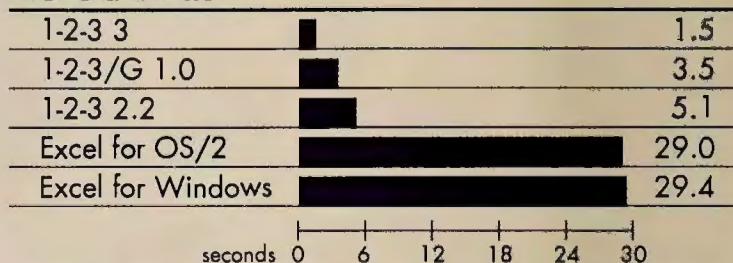
Methodology

A 16-MHz Compaq Deskpro 386s with a 40MB hard disk and 10MB of RAM was used for OS/2 benchmarks; the same system with only 5MB of RAM (4MB configured as expanded) was used for DOS benchmarks. Tests were performed using a worksheet containing a three-year cash-flow model, a balance statement, an inventory, amortization schedules for the present year, a data table, and a personnel file consisting of sales, commissions, and projections. Modules were interrelated with interdependent formulas, the majority being arithmetic functions and combinations of functions. The calculation mode was set to automatic to take advantage of background and minimal recalculation schemes.

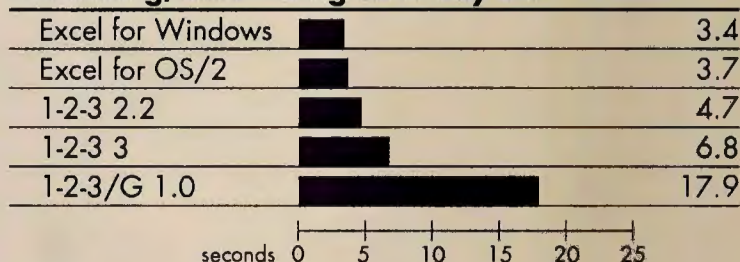
Load a worksheet

This test measures how long it takes to load the test worksheet.

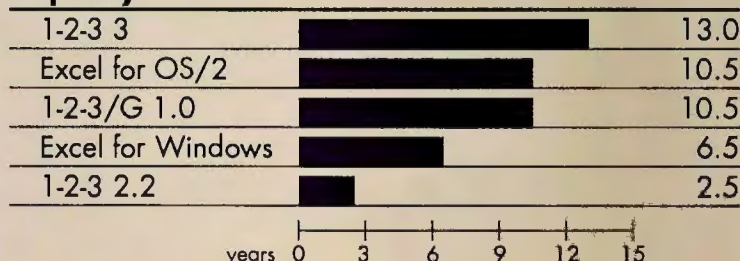
Move a block



Ascending/descending dual-key sort



Capacity



Recalculate

This test measures the elapsed time between entering a value in the worksheet and the return of cursor control to the user. Products with capabilities for background and minimal recalculation score best on this test.

Print

This test measures the time required to print a complex, four-page report in landscape mode on a Hewlett-Packard LaserJet Series II. For the OS/2 products, the shaded portion of the bar shows the time required to spool the print job—that is, how long it takes after the print command is entered for each program to return control to the user.

Insert a column

This test measures the time it takes to complete insertion of a column at the second column position of the test worksheet.

Move a block

This test measures the time it takes to move the block C1 to AR93 one column to the left on the test worksheet.

Ascending/descending dual-key sort

A block of 19 rows and 86 columns containing a list of names, commissions, and associated data is sorted according to commission rates in descending order and by name in ascending order.

Capacity

This test measures worksheet capacity by counting how many additional years' worth of data can be added to the worksheet. If an entire year cannot be added, an attempt is made to add six months. (As noted above, the two OS/2 products were tested on a system with 10MB RAM, while the DOS test system had only 5MB.)



Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Conshohocken, PA 19428. All rights reserved.

1-2-3/G's optimization feature, the Solver, uses advanced mathematical techniques to solve complex problems that previously required long manual computation or special, expensive software. As a simple example, you could specify maximum and minimum values for raw materials, finished products, overtime hours, and profits for several departments, and have the Solver list several alternative ways to optimize overall profits. Instead of just presenting you with a set of numbers, the Solver will tell you exactly how it arrived at its conclusions and generate a detailed report of how each was calculated. Since the Solver uses both linear and non-linear programming, it's suitable for a wider range of problems than optimizer add-ins like *What's Best*, though it can't handle as many variables.

Most of 1-2-3/G's other new features are already familiar to *Excel* users. You can save a work space containing a group of files and their window settings and later retrieve them as a group. You can also save template files containing specific worksheet or graph configurations, so you don't have to start from scratch with every new file. Ranges can be any flat or 3-D shape and include disconnected areas: Outdoing *Excel*, 1-2-3/G lets you define irregular or discontinuous ranges using only the mouse, and ranges can span files. Unlike other versions, 1-2-3/G also lets you select a range of cells *before* issuing a command.

1-2-3/G's data base abilities are unmatched by those of any spreadsheet except 1-2-3 release 3. The worksheet data bases are similar to earlier releases but can also read and write DBF files directly. Using the same commands, you can query and update shared *dBASE*-compatible or (for an extra \$75) *Microsoft SQL Server* data bases over a network. Lotus promises that this feature will allow MIS to download corporate mainframe data to LAN servers, giving managers faster, easier access from within the familiar confines of 1-2-3. Relational capabilities

EXECUTIVE SUMMARY

PM Spreadsheets Won't Win New Converts to OS/2

Slower than DOS competitors, few new features

The original graphical spreadsheet, **Excel for Windows**, set a high standard: It's powerful, flexible, and easy to use. To justify the added expense of OS/2, PM spreadsheets should match that, then add superior performance, new features, and improved output.

The first OS/2 spreadsheets, **1-2-3/G** and **Excel for OS/2**, are slower than their DOS counterparts and don't have enough new features to justify switching to OS/2. Nonetheless, **1-2-3/G** is the better spreadsheet of the two. Its breakthrough optimizer utility, the Solver, will appeal to users with analytical needs too complex for conventional goal-seeking or what-if table features.

	1-2-3/G 1.0	Excel for OS/2
Spreadsheet	Good	Good
Data base	Excellent	Fair
Programmability	Good	Excellent
Graphs	Excellent	Good
Output	Good	Good
Performance	Good	Good
Ease of use	Excellent	Good
Overall value	Good	Good

Reader service no.	605	606
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How we rate spreadsheets

We rate spreadsheets based on information in the Features Evaluation and the PC World Test Report, combined with our opinion of quality, reliability, ease of use, and user benefit.

Spreadsheet is the key category; it covers the basic tools—commands, functions, and file structure and links—plus analytical and auditing tools. An Excellent score requires an outstanding selection of commands and functions, multipage files, formula references to spreadsheet files on disk, and formula reference tracing.

Data base refers to work with record- or table-oriented data and to sorting capability. To earn an Excellent score, the spreadsheet must have relational capability and be able to query and update shared data bases.

Programmability refers to macro recording, the macro programming language, creation of custom applications, and user-defined functions. To be rated Excellent the program must have a top-notch language and recorder and allow full customization of menus, help screens, and dialog boxes.

Graphs reflects the variety and utility of graphs the program can generate. To earn an Excellent rating, the program must have an outstanding selection of charts and allow flexible editing, customization, and annotation of its graphs.

Output ratings reflect cell formatting, font and color selection, printing, and page preview. To earn a score of Excellent, a program must have comprehensive formatting options and let you print charts and graphs side by side.

Performance ratings compare the product's scores in the test report with those of all previously tested spreadsheets. An Excellent rating reflects very high scores on all tests.

Ease of use measures how intuitive and accessible a program is and applies to all the criteria. For an Excellent rating, the program must have logically named menu choices for all basic functions and provide easy-to-find, clear explanations of other important tasks in the program's on-line help.

Overall value averages all the above criteria plus price. Basic spreadsheet features, graphing, and output are given extra weight.

let 1-2-3/G extract data from several tables at once, and you can specify up to 255 sort keys.

The macro programming language

used by 1-2-3/G is identical to that found in 2.x and 3. Macros that don't generate graphs or perform any fancy printing chores will usually run without a hitch.

SEPTEMBER 1990 PC WORLD 153

WINDOWS USERS FIND NO SHORTAGE OF SPREADSHEET OPTIONS

Robert Lauriston

Windows is undeniably a less expensive platform for graphical spreadsheets than OS/2. Judging from Excel's performance, Windows is faster, too. There's a wide selection of programs in every product category, and you can run as many of your old DOS programs as you have RAM for.

The first, and still most popular, Windows spreadsheet is Best Buy Excel for Windows, which is nearly identical to Excel for OS/2. The most recent update, 2.1c, adds support for Windows 3.0 but is functionally unchanged from the initial release 2.1. However, Windows 3.0's improved memory management could mean better performance.

The only other Windows spreadsheet currently available, Masai Software's *Twindows*, is meant to appeal to 1-2-3 users. However, it's not 100 percent compatible with 1-2-3, its macro record-

er is unreliable, and it's slow. In our May 1990 review, these defects led us not to recommend the product.

Wingz, which was released too late for review, has been out on the Macintosh for some time. Informix initially announced plans for a PM version (see "Wingz Steps Into the OS/2 Picture," May 1990); later they decided to include a Windows version in the same package (see "Windows 3.0 Accelerates Applications," August 1990). The program's basic powers are on a par with Excel's, but it lacks 3-D files and offers limited linking. *Wingz* is the only spreadsheet with 3-D surface, contour, and wireframe charts, and you can change the perspective view of 3-D graphs. Unlike Excel and 1-2-3/G, *Wingz* lets you insert graphs anywhere in your spreadsheet. With the simple built-in word processor, you can write custom help windows,

and draw and paint tools let you create basic graphics and paste them anywhere in your worksheet.

Latus has announced that it's developing a Windows version of 1-2-3 but has not yet offered any details. As an interim step, Latus will release 1-2-3 3.1, a Windows-compatible upgrade to release 3. For immediate relief from release 3's incompatibility with Windows 3.0, there's Iris Associates' 3-for-3. For a look at both, see the preview of 1-2-3 3.1 in this issue. Finally, Barland is working on a Windows 3.0 version of Best Buy Quattro Pro. The company hasn't revealed any specifics, but it promises to add new features and capabilities that will make the program more powerful than its predecessor.

Robert Lauriston is an associate editor for PC World.

For other macros, or if you want to run 1-2-3/G macros with earlier releases, you'll need to use the macro translation program included. One irritating flaw: While you're recording a macro, mouse commands are ignored.

1-2-3/G gives you far more control over the appearance of your graph than does Excel. You can freely manipulate and resize titles, labels, and legends simply by grabbing them with the mouse and moving them to a new location. Creating a graph is a snap: Just highlight the data and select Graph View. If you include row and column headings in your range, 1-2-3/G automatically creates a legend and x-axis labels. You can then add text and arrows to emphasize important details, and choose to view the graph for maximum on-screen readability or exactly as it will print.

Attractive printouts are easy with 1-2-3/G. You can mix fonts, adjust row height, add colors, lines, and boxes, and print graphs below text or vice versa. You can't print text and graphs side by side, however, nor can you paste a graph into your spreadsheet—both simple tasks for *Quattro Pro* or 1-2-3 release 2.2 with *Allways*.

In *PC World* benchmark tests 1-2-3/G was significantly slower than releases 2.2 and 3 in sorting and slower than release 3 in most other tasks. However, it was significantly faster than Excel for OS/2 overall, particularly in printing: 1-2-3/G spooled the test job in a few seconds and finished printing in 4.5 minutes; Excel took 6.5 minutes to print the same job, and finished spooling only 16 seconds before the end of printing. Despite the text results, sluggish scrolling and cursor movement mean 1-2-3/G

generally feels slower than Excel for OS/2, and the included keyboard speed-up utility doesn't seem to help.

1-2-3/G is better than Excel, and it earns the faint praise of being the best spreadsheet for OS/2. If it ran under Windows, its power and advanced features might win it a Best Buy despite its mediocre performance and record-breaking price. As it stands, 1-2-3/G is worthwhile only for those who need the Solver's optimization talents badly enough to justify the costly and difficult switch to OS/2—and for the few who've already made that transition.

Excel for OS/2 2.2

Excel originally surfaced in the Macintosh environment, and it was among the first major applications available for both Windows and OS/2 PM. By design,



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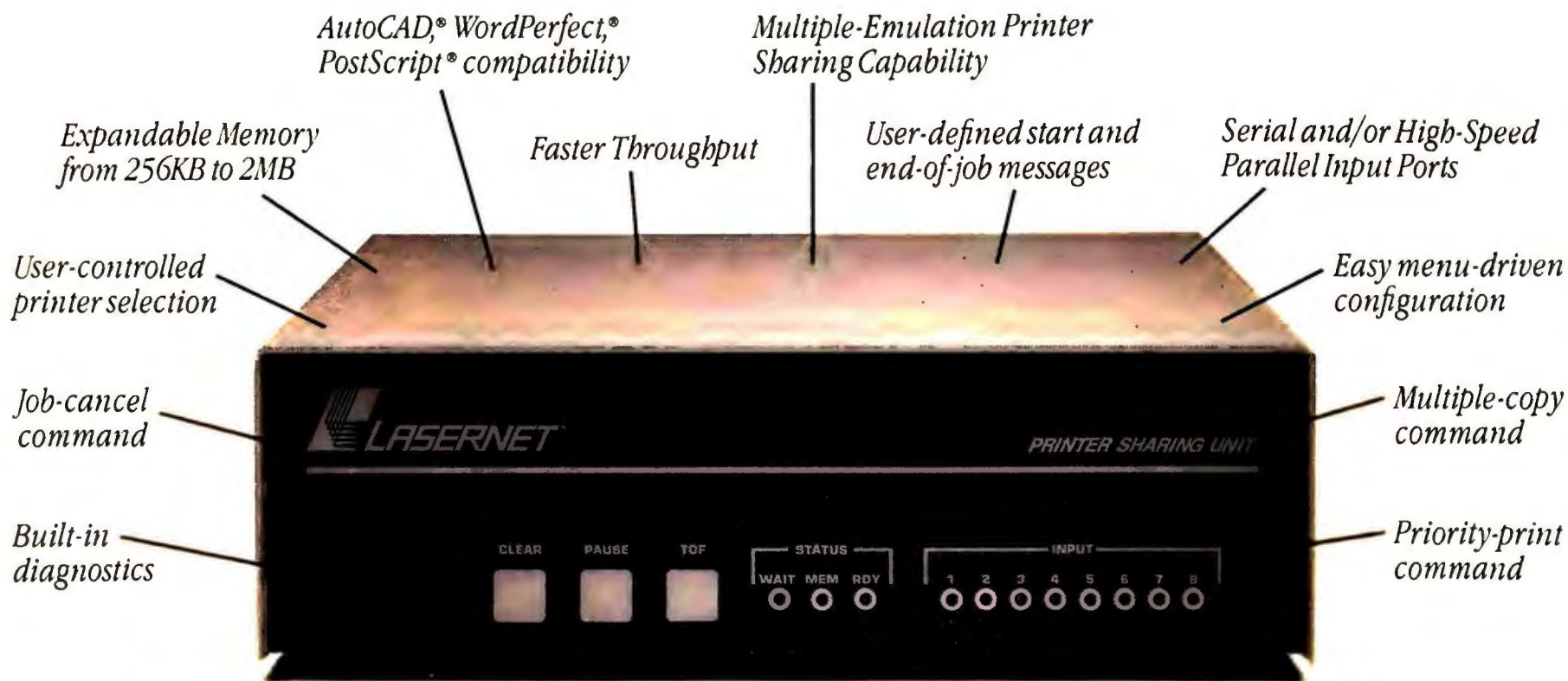
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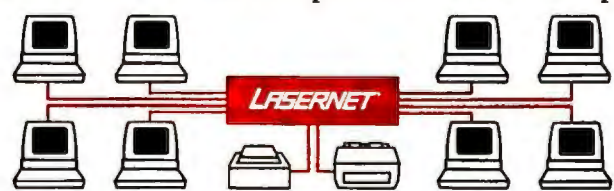
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When shopping for a high-performance printer/plotter sharing unit, take a look at the LASERNET "C" series. See if you agree there's no better performing PSU for the money.

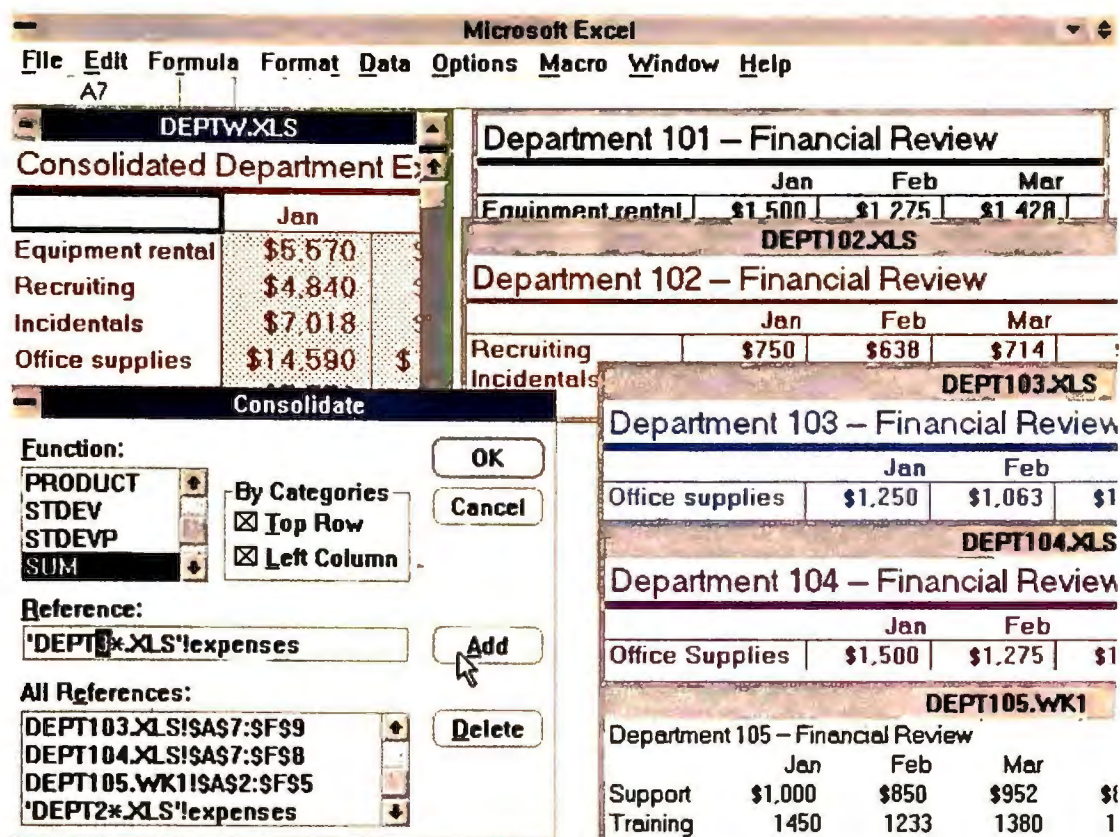
For more information on the "C" Series or other members of the LASERNET family, call us toll free at **1-800-854-7226**, (in California call 1-714-586-9950) FAX 1-714-583-9514, or write Western Telematic Inc., 5 Sterling, Irvine, CA 92718.

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all three versions are nearly identical and even share a common file format, making *Excel* uniquely suited to offices with mixed systems. That also means that *Excel for OS/2* gives you no incentive to move to OS/2—except for improved consolidation and weaker data base management, it's almost indistinguishable from previous Best Buy *Excel for Windows 2.1* (see "Power Spreadsheets: A New Standard?" October 1989) and carries the same \$495 price tag. What's more, in *PC World* tests, *Excel for OS/2* proved to be slower than its predecessor.

The OS/2 version boasts only one major advance over *Excel for Windows*: It can consolidate multiple spreadsheets with drastically different layouts without loading them into memory. The process is flexible: *Excel* matches cells by top row or left column labels, which need not be exactly the same. For example, entering *Expen** would consolidate all data under columns labeled 'Expenses' or 'Expenditures'. This is significant beyond the File Consolidate command found in *1-2-3/G* and most other spreadsheets.

On the other hand, *Excel for OS/2* can't match *Excel for Windows*' data base capabilities—let alone *1-2-3/G*'s.



The new Data Consolidate command in *Excel for OS/2* makes it easy to consolidate information from a variety of worksheets even if each is formatted differently.

All data must reside in a single active worksheet, and you're allowed only three sort keys. However, Microsoft promises that an OS/2 release of the *Q+E* add-in from Pioneer Software (sold by Microsoft) will give the program relational access to external *dBASE*, *SQL Server*, and *OS/2 Extended Edition* data bases.

The only other functional difference between the two *Excels* is relatively minor. Like *1-2-3/G*, *Excel for OS/2* lets you use as many fonts as you like in your worksheets and graphs. *Excel for Windows* limits you to four fonts per worksheet—though there's no such limitation on graphs.

Thoughtful features make *Excel* easy to learn. A "short menu" option helps beginners by stripping advanced commands from menus, while old Lotus hands can find the *Excel* counterpart of any *1-2-3* command by navigating a *1-2-3* menu tree in *Excel*'s on-line help. However, the OS/2 version lacks *Excel for Windows*' interactive tutorial.

Though *1-2-3/G* leads in basic spreadsheet features, *Excel* has some significant advantages. When you calculate regression, data distributions, or

what-if tables with *1-2-3/G*, you have to reissue a series of commands every time data changes. With *Excel*'s array formulas, the results change as you change the data. *Excel*'s formula tracing, which *1-2-3* lacks, helps in debugging complex spreadsheets or custom applications. On the other hand, *Excel*'s file links have a serious defect: Formulas can refer only to cells in open files, so you can't break a too-large spreadsheet up into memory-sized chunks the way you can with *1-2-3/G* or *Quattro Pro*.

Excel also leads *1-2-3/G* in programmability. Its macros record mouse commands, allow greater control over dialog boxes and menus, and let you develop your own custom functions. Microsoft includes a library of macros for goal seeking, auditing, cross-tabulating data, and even debugging other macros. *Excel*'s custom dialog boxes can include buttons and list boxes, and you can completely customize the menus and help screens. Moreover, the program's formula tracing gives it a big advantage in developing complex applications.

When *Excel* debuted, its graphs were quite impressive, but recent products like *Quattro Pro* have since surpassed

POWER TIP NO. 127

Maximum Margins With WordStar

Here's a quick way to set up a maximum right margin in *WordStar 5.0* and later versions. Place *.rm* as your last dot command at the top left margin of your document. You'll be able to set up a table hundreds of characters wide without disabling word wrap.

Rex Farrance
Assistant Editor

it. Generating a graph with *Excel* is simple, if not intuitive: You highlight the data and select File New Chart. *Excel* assigns row headings to *x*-axis labels, but you must create the legend manually. Some graph types are tough to find—for example, you can't choose a scatter *x-y* graph from the menu but instead must use the Paste Special command. Chart editing is limited: You can vary fonts, colors, line widths, and spacing between bars and add free-floating arrows and text, but you have only a few choices for placement of the legend box, and you can't relocate titles, labels, or other chart elements.

Excel's output abilities pretty much match *1-2-3/G*'s. You can't paste a graph into a spreadsheet or print text and graphs side by side in either program. *Excel* helpfully displays page breaks on the editing screen—though *1-2-3/G*'s multipage files make sprawling tables less necessary.

PC World tests found *Excel for OS/2* to be slower than *Excel for Windows*—especially in printing. *Excel for OS/2* was much faster than *1-2-3/G* on the multikey sort test, but it was significantly slower on most of the other tests.

In sum, *Excel for OS/2* simply offers no motive to switch to OS/2. Compatibility with the *Windows* and *Mac* versions of *Excel* is its strongest point. However, since *Excel for Windows* runs faster, it's a much better choice for anyone not already running OS/2.

Choose Your Weapon if You Must

The ultimate irony of these products is that they're supposed to appeal to advanced users seeking powerful new tools—yet the only features not equaled or surpassed by DOS or *Windows* spreadsheets are *1-2-3/G*'s Solver and *Excel for OS/2*'s Data Consolidate command. Worse, both programs are actually slower than their DOS and *Windows 3.0* counterparts. Both also need work: *1-2-3/G*'s auditing and application-building tools are weak, and *Excel for OS/2*'s graphing and data base features are out-of-date. Unless you must

have Lotus's Solver, neither program merits switching operating systems.

All things considered, *1-2-3/G* is the superior product for those already wedded to OS/2. Time spent learning prior versions of *1-2-3* will not go to waste, and exchanging files and macros with users of earlier releases should be relatively painless. On the other hand, if your office has a mix of DOS, OS/2, and *Mac* systems, *Excel for OS/2*'s uniform interface and conversion-free file exchange

will be a big advantage. While there's no Best Buy for OS/2 users, there are still two great choices for the rest of the world. Best Buy—winner *Excel for Windows* does almost everything the OS/2 version does, only faster, and *Windows* has lighter hardware requirements, better printer support, and a much wider selection of applications than OS/2. Borland's *Quattro Pro* (a Best Buy in "Seven Sensible Spreadsheets," April 1990) is faster and arguably more powerful than either version of *Excel*, doesn't need *Windows*, and will run comfortably even on a 640K PC or XT. Either program is an excellent buy for spreadsheet shoppers. ☸

Contributing Editor John Walkenbach is vice president and market research manager for a leading savings and loan association based in Southern California.

POWER TIP NO. 128

dBASE Procedure Files

You can save disk space and processing time by storing your dBASE III Plus programs' commonly used procedures in procedure files. Up to 32 procedures can be stored in each file and used by any dBASE program. Just have the program issue **SET PROCEDURE TO** procedure_file.ext and use **DO** commands to execute the procedures. To illustrate, save the following lines in a file called **Example.prg**:

PROCEDURE First

? "This is the first procedure."

RETURN

PROCEDURE Second

? "And this, the second."

RETURN

Then issue:

SET PROCEDURE TO

Example.prg

DO First

DO Second

Roy Moore

Director of Technical
Support

Ashton-Tate

WHERE TO BUY

1-2-3/G 1.0

Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500

LIST PRICE: \$695 (upgrade for users of releases 2.2 and 3 \$75 through 9/30/90, \$150 thereafter)

REQUIREMENTS: OS/2 1.1 or later version, EGA or better graphics display, 4MB RAM (5MB recommended with DOS compatibility box or network software), 12.5MB free disk space; 386 system and mouse recommended

TECHNICAL SUPPORT: free for six months; toll-free 24-hour number, seven days

OTHER SUPPORT: Lotus magazine (six-month subscription included)

Reader service no. 605

Microsoft Excel for OS/2 2.2

Microsoft Corp.
One Microsoft Way
Redmond, WA 98052-6399
206/882-8080

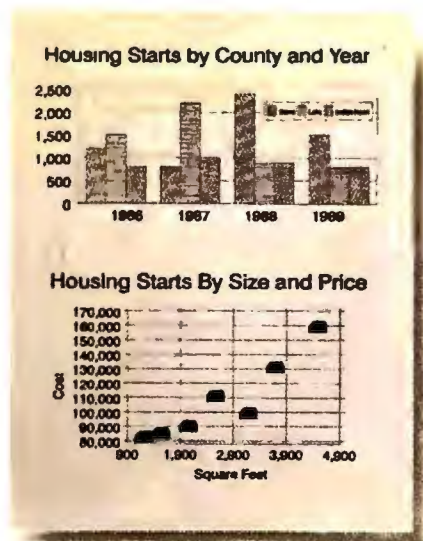
LIST PRICE: \$495 (Microsoft Excel for Windows users can upgrade for \$50)

REQUIREMENTS: OS/2 1.1 or later version, EGA or better graphics display, 2.5MB RAM (4MB recommended); mouse recommended
TECHNICAL SUPPORT: toll number, M-F 8-5

OTHER SUPPORT: none

Reader service no. 606

Wow.



Print multiple charts on the same page.
(PostScript device)



Let your imagination run wild
using the advanced drawing tools.



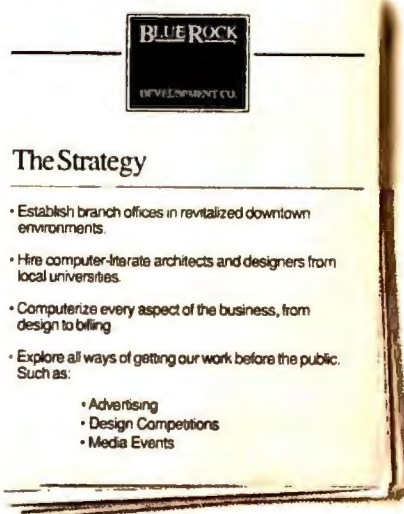
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professional transitions. (VideoShow)



Automatic organizational charting
makes it easy to put everything in its place.



Get slides or transparencies overnight
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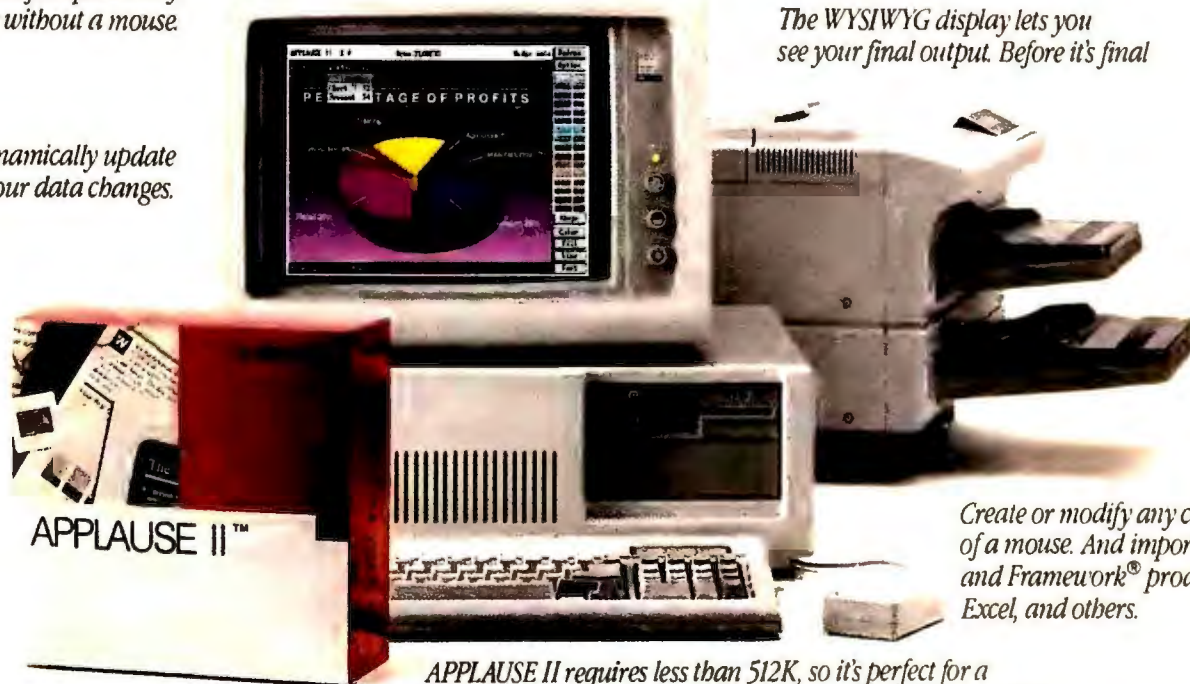
You'll have letter by letter control
of fonts, color, and rotation. (HP LaserJet)

How.

The "Windows"-like interface puts every
option near at hand. With or without a mouse.

"Warm links" dynamically update
your charts as your data changes.

The WYSIWYG display lets you
see your final output. Before it's final



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of a mouse. And import data from dBASE®
and Framework® products, Lotus 1-2-3,
Excel, and others.

APPLAUSE II requires less than 512K, so it's perfect for a
network. And it supports graphics boards from CGA* to VGA.

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knock out—on anything.

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512K PC XT's and AT's to the newest 386 screamers. With the
laser printers, plotters, and scanners you're already using.

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"Windows"-like environment with pull-down menus, all

this power is within easy reach of virtually anyone.

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dealer or call 1-800-437-4329,
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demo disk that'll show you
how you can wow them at
your next presentation.

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MASTER GRAPHICS USERS**

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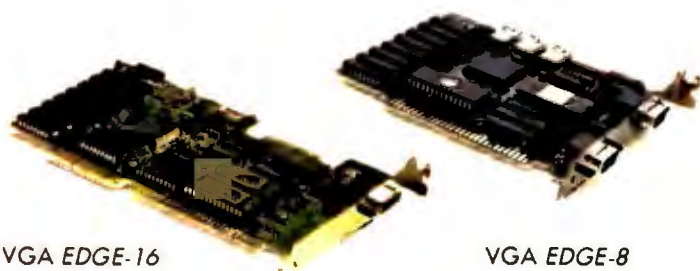
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Circle 302 on reader service card

Fonts Unlimited: Seven Smart Lasers for Under \$3000

Why settle for a handful of cartridge-based typefaces when built-in scalable fonts are this affordable? Our laser printer face-off turns up a nearly irresistible Best Buy.

Daniel Miles Kehoe



TI's PS17, the Best Buy of this roundup, is the least expensive PostScript printer you can buy.

Compelling business documents require an assortment of good-looking typefaces in a variety of sizes—and who has time to download fonts for every print job? When you're creating a newsletter or brochure that may be read by thousands, flexible typography is an absolute necessity. Fortunately, one solution can fill both needs: A laser printer with plenty of built-in scalable fonts—typefaces that can shrink or expand to the size you want, quickly and easily.

Until recently, that solution meant PostScript—Adobe's widely supported page description language that delivers font scaling as well as a broad variety of graphics capabilities. However, even a year ago PostScript printers were not cheap. When *PC World* surveyed the field (see "PostScript Printers—Right for the Office," August 1989), the lowest list price we could find was \$4199.

Happily, big changes are going on in the scalable font arena, with major benefits for business users. For one thing, the price elevator is still descending: Today you can buy the Canon LBP-4, with scalable fonts, for less than \$1600 list—and about \$1100 on the street. No

less than seven scalable font printers in a total of eight configurations are available for less than \$2700.

The purchase decision involves more than price. Thanks to the introduction of new font-scaling schemes, PostScript is no longer the only game in town—although it still enjoys the broadest software support (see the sidebar "Five Reasons Why PostScript Is Still Your Top Choice"). Hewlett-Packard's LaserJet III uses PCL5 to deliver font scaling, while Canon and Okidata have their own proprietary schemes.

To help you sort through this exciting profusion of affordable scalable font printers, *PC World* takes a close look at seven low-cost machines in eight different configurations: Canon's LBP-4 (with native CaPSL font scaling), Hewlett-Packard's LaserJet IIP (with HP's PostScript cartridge), HP's LaserJet III (with native PCL5 font scaling, and also with HP's PostScript cartridge), IBM's LaserPrinter and LaserPrinter E (both units with IBM's PostScript board), Okidata's OkiLaser 820 (with a proprietary font-scaling scheme), and Texas Instruments' Post-

Script-based MicroLaser PS17.

Only one of these printers qualifies as a Best Buy: Texas Instruments' MicroLaser PS17. It offers a broad selection of typefaces, good paper handling, standard Adobe PostScript compatibility, and a small footprint—all for around \$1600 on the street.

Buying Issues for Smart Shoppers

It should come as no surprise that these low-end font-scaling printers are relatively slow; if printing speed is crucial to your business, you'll do better spending more for a faster machine. However, if you decide you can live without top performance, there's no need to settle for an underpowered feature set. For most bargain shoppers in the font-scaling supermarket, essential features are broad software compatibility, a good selection of scalable typefaces, and low price. You'll also want to look for large paper capacity, reasonable performance, and good print quality.

Compatibility If your favorite application (or that of someone else on the network) doesn't include a driver for your new printer, you've thrown your money away. Fortunately, most applications these days come with a PostScript driver, which means you can use them with any of the reviewed PostScript printers. Support for printers using non-PostScript font scaling can be more of a problem.

Full access to the LaserJet III's font-scaling features requires a PCL5 driver—and while most software vendors are rushing to include one in their latest releases, you may need to upgrade in order to get it. Buying a printer from Canon or Okidata can be even more problematic; while some applications include drivers for these machines (and more come with the printers), your favorite application may not be on the list. Check before buying. With the exception of the Canon, all the printers reviewed can emulate the LaserJet Series II—but you won't get scalable fonts, and emulation may be imperfect.



HP's LaserJet III delivers outstanding print quality thanks to hardware-based Resolution Enhancement, and its \$1719 street price is equally impressive.

FEATURES EVALUATION

Font-Scaling Power for a Song

The PS17 delivers Adobe-licensed PostScript plus first-rate paper handling—at an outstanding street price. Both IBM LaserPrinters and all three HP LaserJet configurations offer good value as well.

- Yes
- No
- ◐ Deficient

	Canon LBP-4	HP LaserJet IIp (PostScript)	HP LaserJet III	HP LaserJet III (PostScript)	IBM LaserPrinter (PostScript)	IBM LaserPrinter E (PostScript)	Okidata Okilaser 820	Texas Instruments MicroLaser PS17
Pricing								
Street price ¹	\$1112	\$1966	\$1719	\$2643	\$2527	\$1888	\$1842	\$1617
List price ¹	\$1545	\$2685	\$2395	\$3585	\$3343	\$2443	\$2295	\$2499

Standard features

Engine model	L8P-LX	L8P-LX	L8P-SX	L8P-SX	IBM 4019	IBM 4019	OL-800	Sharp JX-9500
Rated engine speed	4 ppm	4 ppm	8 ppm	8 ppm	10 ppm	5 ppm	8 ppm	6 ppm
Processor	NS 32CG16	M68000	M68000	M68000	M68000	M68000	M68000	M68000
Processor speed	16 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	12 MHz
Interfaces								
Parallel	●	●	●	●	●	●	●	●
Serial	●	●	●	●	●	●	●	◐ ²
AppleTalk	○	◐ ²	◐ ²	◐ ²	○	○	○	◐ ²

Compatibility

Font-scaling modes								
PostScript	○	●	◐ ²	●	●	●	◐ ²	●
Proprietary	●	○	●	●	○	○	●	●
Emulation								
LaserJet II	○	●	●	●	●	●	●	●
HPGL	◐ ²	○	●	●	●	●	○	●
Dot matrix	◐ ²	○	○	○	●	●	●	◐ ²
Software-selectable modes	●	○	○	○	●	●	●	●

Paper handling

Paper capacity	50	50	200	200	200	200	200	250
Supports optional second tray	●	●	○	○	●	●	●	●

Typographic features

Number of scalable typeface families	3	11	2	11	5	5	4	5
Type source	Bitstream	Adobe	Compugraphic	Adobe	Adobe	Adobe	Bitstream	Adobe
								BEST BUY

¹ Includes all options and extra memory (if needed) for font scaling.

² Extra-cost option.

Typographic Features You should expect at least five built-in scalable typeface families, and one should be mono-spaced (otherwise you can't align spreadsheet columns). Typically, a typeface family includes regular, italic, bold, and bold italic typefaces. All the printers reviewed here accept downloadable typefaces from Adobe, Compugraphic,

and Bitstream. Which is best? It's strictly a matter of opinion as to which has the best-looking typefaces, but at the moment, the Compugraphic library is the smallest of the three.

Street Price Most people buy printers from dealers and pay less than list. To help you make your best buy, we've researched current street prices by

calling five dealers per city in seven major cities across the country for every printer and averaging their quotes. (The street price for the Texas Instruments PS17 is an estimate, because this printer—though a production model—was not in the stores at press time. The estimate is based on the street price for TI's popular MicroLaser PS, which lists

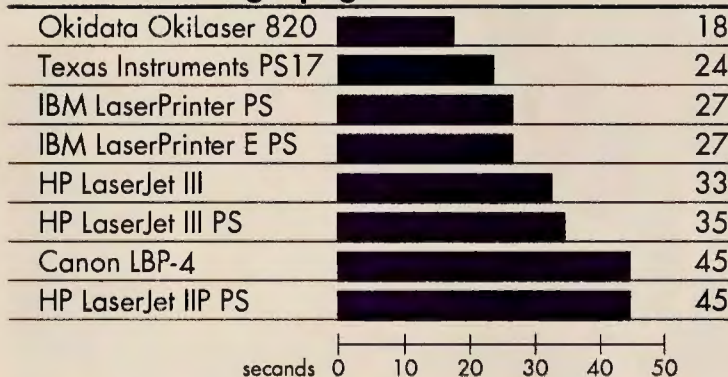
PC WORLD TEST REPORT

Who Does Fonts Fastest? That Depends...

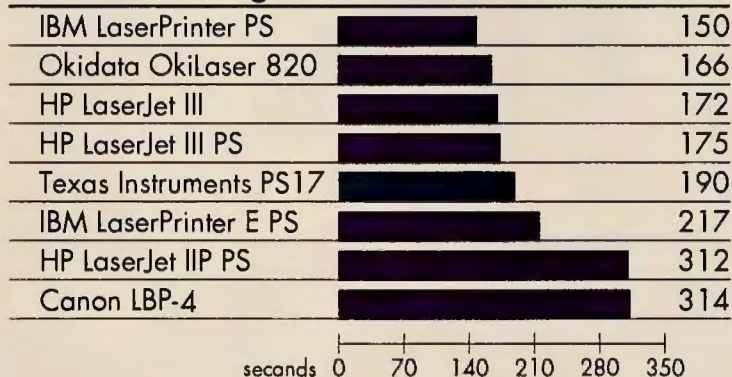
The proprietary engine in Okidata's Okilaser 820 lets it roll out single pages—even complex ones—faster than any of its rivals. For long documents, though, IBM's LaserPrinter with PostScript is the top performer. Texas Instruments' PS17 is nearly as quick as the high-priced leaders, helping it nail down Best Buy honors.

■ Best Buy

WordPerfect single page



WordPerfect long document



Methodology

Benchmarks were conducted using a 12-MHz Compaq Deskpro 286 Model 40 equipped with 640K of conventional RAM and 2MB of extended RAM. All the test files were printed to disk and then copied to the printer from a 2MB extended memory RAM disk. Timing began when the command to print was issued and ended when the last page came to rest in the output tray.

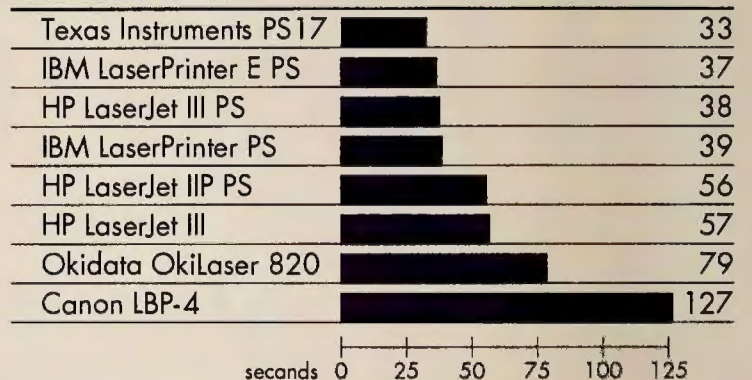
WordPerfect single page

A single WordPerfect 5.1 page containing multiple types and sizes of fonts is printed.

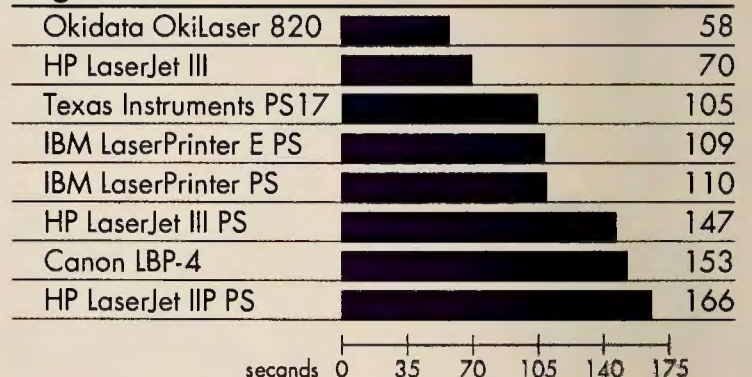
WordPerfect long document

An entire 20-page WordPerfect 5.1 document that contains multiple types and sizes of fonts, two tables, single- and double-line draw characters, and shading is printed.

Excel bar chart



PageMaker



Excel bar chart

A Microsoft Excel 2.2 bar chart containing multiples types and sizes of fonts, an arrow, and shaded text is printed.

PageMaker

A one-page PageMaker 3.0 newsletter containing multiple types and sizes of fonts, charts, tables, and a TIFF file is printed.



Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Conshohocken, PA 19428. All rights reserved.

for \$500 more than the PS17; the projected street price for the PS17 is merely that of the PS, minus \$500.) Printers were priced with all accessories and expansion memory required to support font scaling.

Paper Handling This criterion is critical for work groups. An input tray with at least a 200-sheet capacity is essential; support for a second legal-or-letterhead tray is highly desirable. Envelope printing is a must; fortunately, all

the printers in this roundup support it.

Performance PostScript printers have long suffered a reputation for painfully slow performance, but our tests show that this is no longer the case. Simple text pages that take 21 seconds

or so on the LaserJet Series II print in 24 seconds on the MicroLaser PS17—with scalable fonts! The OkiLaser 820, which uses a proprietary scheme, is even faster.

Engine speed is still important; an 8-page-per-minute PostScript printer will blast out a memo faster than a 4-ppm PostScript printer. With complex documents, however, where many fonts must be scaled or graphics must be composed, controller performance makes a much bigger difference than engine speed.

Our performance benchmarks included both single-page and 20-page multiple-font text documents in *WordPerfect* format, an *Excel* bar chart, and complex combinations of text and graphics generated by *PageMaker*. Overall, Okidata's OkiLaser 820 was the speed champ, with our Best Buy printer, TI's PS17, not far behind.

Print Quality Good quality means crisp type that's free from jaggies; sharp fine lines; a wide range of gray tones; and consistent density in large black areas. HP's LaserJet III produced the best print quality, thanks to its Resolution Enhancement technology. HP's LaserJet IIP and Canon's LBP-4 (both of which use the Canon LBP-LX engine) also delivered good quality.

Canon LBP-4

At \$1112 on the street, Canon's LBP-4 boasts the lowest price in the roundup, but it sacrifices speed and paper capacity to achieve its low price and small footprint. You get only 512K of RAM (enough for about one-third of a page of graphics) and a mere three scalable typeface families—and you may run into trouble if its font-scaling scheme is not supported by your software. However, the bottom line is, this is still a functional font-scaling printer for an amazing price.

The Canon does not support PostScript; nor does it offer LaserJet emulation. That means your software *must* include a driver specially written for



IBM's LaserPrinter E with PostScript boasts a tempting \$1888 street price and excellent paper capacity. However, its print quality could be better.

Canon's proprietary CaPSL font-scaling protocol. Happily, that may not be a problem; while Canon's scalable fonts are currently supported by only 15 applications, those include most major word processors, plus *Windows* and *GEM* and therefore all applications that run under them.

One place where this printer's low price shows is in the typeface department. You get only three scalable typeface families (Dutch, Swiss, and Symbol), and no monospaced scalable font is included, making it difficult to align columns. The printer accepts Bitstream's large library of downloadable fonts; however, only *WordPerfect 5.0* and *5.1* support them.

The LBP-4's performance is quite slow, as you'd expect from a 4-ppm engine with a poky processor. It placed last or close to last on every text and graphics benchmark.

On the sunny side, the LBP-4 uses a new Canon engine (the LBP-LX) that delivers good print quality. Type (from Bitstream) was crisp, and pages were clean. The printer provided well-graded grays and dense blacks, with no

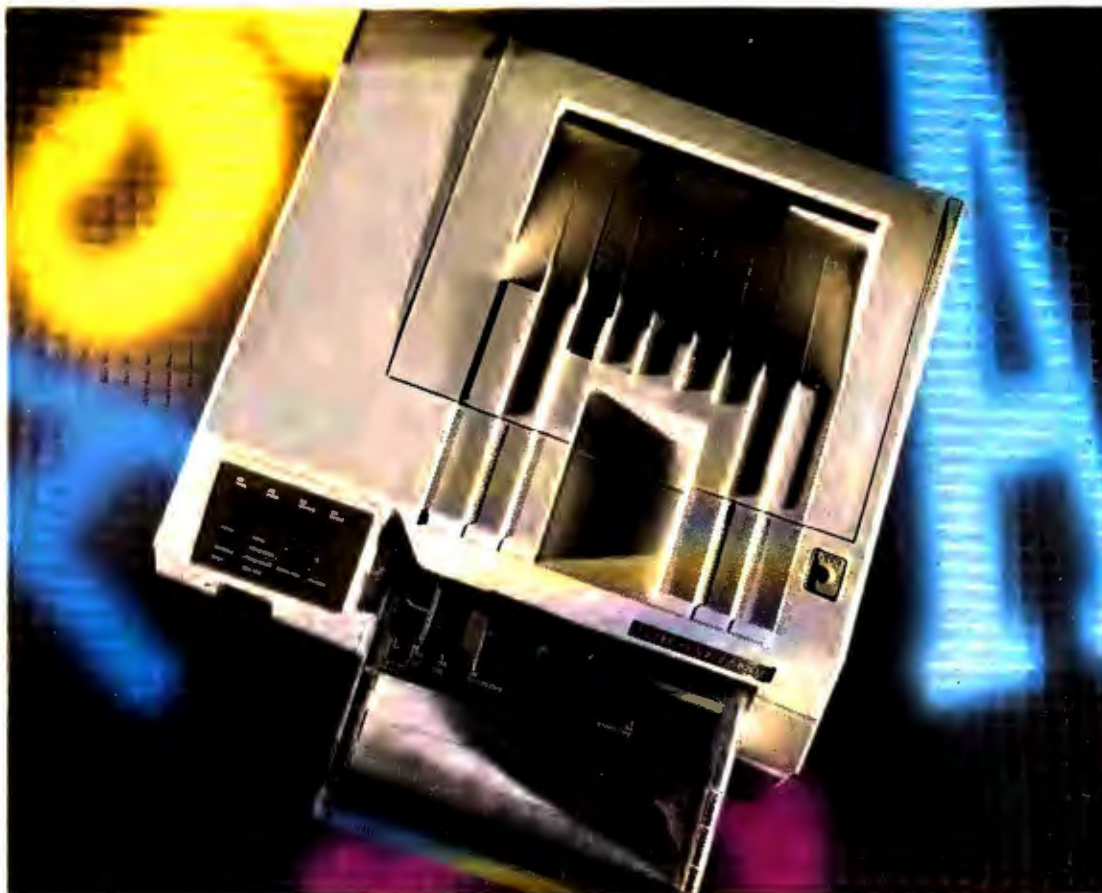
ghosting.

The printer accommodates only 50 sheets of paper. However, Canon offers an optional 250-sheet second tray for \$195. Consumables can be replaced easily with a small, single-unit cartridge. Controls are nice raised buttons.

The Canon LBP-4 is small, quiet, and well made and delivers good print quality at an astounding price. Its slow speed, low typeface count, and limited compatibility are serious problems. Still, for those who need font scaling at an entry-level price, this is a breakthrough printer.

HP LaserJet IIP With PostScript

Out of the box, HP's 4-ppm LaserJet IIP has no scalable fonts and only 512K of RAM, but for \$1190 HP will sell you an Adobe-licensed LaserJet Printer PostScript Cartridge and 1MB of additional memory. That brings the package price to \$1966 on the street, which is still not bad—plus you get a generous count of 11 Adobe typeface families and true Adobe PostScript compatibility. Performance, however, is a problem.



Okidata's low-priced OkiLaser 820 is an outstanding performer—but you get only 512K of RAM, and software support for its proprietary font-scaling scheme is limited.

The PostScript-enabled LaserJet IIP tied the Canon LBP-4 at the very bottom of the pack on text documents, and it was even slower at printing the complex *PageMaker* page. Its only good showing was on the *Excel* bar chart. On the bright side, since the LaserJet IIP uses the same LBP-LX engine as the Canon LBP-4, it delivers the same good print quality.

The LaserJet IIP's 50-sheet paper capacity is quite small, but you can buy an optional 250-page tray for \$195. The single-unit consumables cartridge slides into place easily, as does the PostScript cartridge. A small LCD panel displays messages in plain language.

Equipped with HP's PostScript cartridge, the small-footprint IIP offers an impressive array of scalable typefaces, access to the huge library of Adobe typefaces (on cartridges and as downloaded soft fonts), and good print quality, but its performance is a real stumbling block. TI's MicroLaser PS17 delivers roughly comparable print quality, better paper handling, and far greater speed for about the same price.

HP LaserJet III

The LaserJet III is an outstanding replacement for America's favorite printer, the LaserJet Series II. For one thing, it sets a new standard for print quality via its hardware-based Resolution Enhancement scheme. Better yet, the LaserJet III now delivers font scaling via HP's PCL5. Its typeface count is the lowest in the roundup, but considering its good \$1719 street price (with 1MB of RAM), this is still an impressive package.

PCL5 allows typefaces to be scaled from .25 to 999.75 points in .25-point increments. Unfortunately, the LaserJet III is stingy with scalable type families; you get only two, and neither of them is monospaced. However, if you've got some extra bucks, HP offers two cartridges (\$399 each) that together add 15 families of scalable typefaces. (Pacific Data also sells scalable typeface cartridges for the III.)

Older software packages don't support PCL5, but by the time you read this, most major PC applications will

probably provide a driver. Nonetheless, you'll do well to make sure your favorite application comes with one for this printer before you buy it.

The LaserJet III's performance under PCL5 is respectable. When printing long text documents and the complex *PageMaker* document, it ran very near the head of the pack; it placed midrange on the *Excel* bar chart.

Print quality is significantly better than that of any other printer reviewed here, thanks to HP's Resolution Enhancement. It's a hardware-based technique (independent of PCL5) that varies the size and position of the dots to improve the appearance of 300-dpi output by smoothing jaggies into gentle ripples. Even casual users will notice an improvement.

For those who need PostScript, HP offers the same Adobe-licensed PostScript upgrade (with 11 typeface families) as for the LaserJet IIP. With the cartridge and an extra 1MB of RAM, you'll spend about \$2643 on the street, making the PostScript-enabled LaserJet III the highest-priced package in the roundup.

Furthermore, the reality of PostScript-on-a-cartridge may not match your daydream. For one thing, the printer must be powered off and then on to activate the cartridge, which precludes software mode switching. For another, it's a lot slower than PostScript printers that cost far less (such as TI's MicroLaser PS17).

Most features of the III are identical to the Series II's, including the 200-sheet paper tray, the single-unit consumables cartridge, the size (now somewhat bigger than most), and the familiar control functions.

Good price, outstanding print quality, ease of use, and HP's reputation for well-built machinery make the LaserJet III a smart buy—if your software supports it. However, if your business requires turning text and graphics into high-quality, professionally printed output, you'll probably want PostScript—and the TI PS17 makes more sense than

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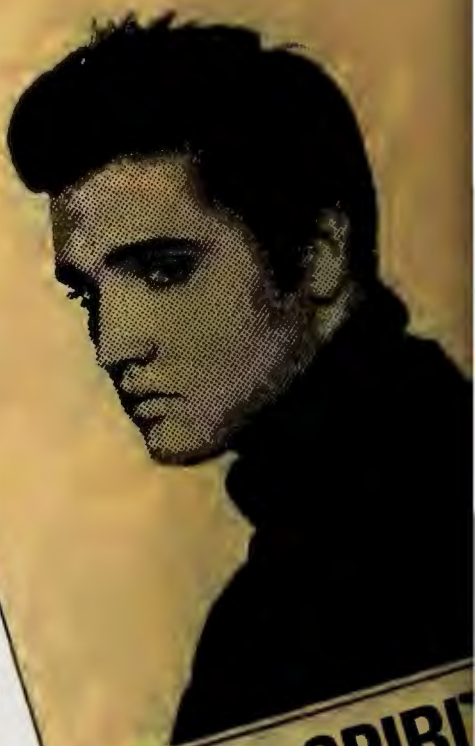
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EXECUTIVE SUMMARY

Price/Performance Champ: Texas Instruments' PS17

Don't let a tight budget scale down your laser-printing appetite. The best of these font-scaling printers offer good selections of built-in typefaces, fine print quality, and genuinely affordable prices.

All these low-end laser printers provide scalable fonts: built-in typefaces you can print in any size you like. The differentiating features are price, the font-scaling scheme each uses (since some schemes are more widely supported than others), the of emulations included (in case your application of choice doesn't support the printer directly), the number of blank sheets the printer will hold, the number of built-in scalable fonts, performance, and print quality.



Texas Instruments walks away with a Best Buy citation for its outstanding **PS17**, a full-fledged Adobe PostScript printer that boasts broad software support, good performance and print quality, plus outstanding paper capacity in a small-footprint chassis—all for a mere \$1600 on the street. The **Hewlett-Packard LaserJet III** delivers excellent print quality thanks to its hardware-based Resolution Enhancement technology, and its street price is only about \$100 more than the TI entry. If you need font scaling at a rock-bottom price, the **Canon LBP-4** provides an attractive alternative.

	Canon LBP-4	HP LaserJet IIP (PostScript)	HP LaserJet III	HP LaserJet III (PostScript)	IBM LaserPrinter (PostScript)	IBM LaserPrinter E (PostScript)	Okidata 820	Texas Instruments MicroLaser PS17
Compatibility	Poor	Excellent	Good	Excellent	Excellent	Excellent	Good	Excellent
Typographic features	Fair	Excellent	Poor	Excellent	Good	Good	Fair	Good
Pricing	Excellent	Good	Good	Good	Fair	Good	Good	Excellent
Paper handling	Fair	Fair	Good	Good	Excellent	Excellent	Excellent	Excellent
Performance	Poor	Poor	Good	Fair	Good	Good	Excellent	Good
Print quality	Good	Good	Excellent	Excellent	Fair	Fair	Poor	Good
Overall value	Fair	Good	Good	Good	Good	Good	Fair	Excellent
								BEST BUY
Reader service no.	650	651	652	652	653	653	654	655

How we rate scalable font printers
We rate these printers based on information in the Features Evaluation and the PC World Test Report, combined with our opinions of quality, reliability, and user benefit.

Compatibility combines two related issues: which font-scaling scheme a printer uses and which emulations it offers (in case your application doesn't support its font-scaling mode). For an Excellent rating, we require PostScript (the most widely supported font-scaling scheme) plus LaserJet Series II emulation.

Typographic features indicates the number of scalable typeface families a printer includes. To award an Excellent, we require at least 11 families; between 5 and 10 families rates Good.

Pricing is based on our phone survey of dealers in seven major computer markets across the country.

Paper handling refers primarily to paper capacity plus expansion options. An Excellent rating requires at least 200-sheet paper capacity plus support for a second tray.

Performance of these printers, which use 4-ppm to 10-ppm engines, varies widely. To determine performance ratings, test results were weighted according to our assumption of how often the average user performs the test tasks.

Print quality is a subjective analysis of how good output looks. For an Excellent rating, a printer must deliver crisp type that's free from jaggies and produce sharp fine lines, a wide range of gray tones, and consistent density in large black areas.

Overall value combines the above criteria, with extra weight given to compatibility and typographic features.

the LaserJet III's slow, expensive PostScript upgrade.

IBM LaserPrinter and IBM LaserPrinter E With PostScript

Despite a \$900 difference in list price, IBM's 10-ppm LaserPrinter and 5-ppm LaserPrinter E, both with PostScript,

are virtually the same printer. They have the same engine (although running at different speeds) and very similar processor boards, and they print graphics at about the same speed. On multi-page print jobs, however, the LaserPrinter is the fastest in the roundup. Unfortunately, the machines also share unimpressive output quality.

For font scaling, both LaserPrinters require IBM's PostScript Option (an Adobe-licensed add-on circuit board that provides five Adobe typeface families) and a 1MB memory board—bringing total street prices to a good \$1888 for the E and a fair \$2527 for the LaserPrinter.

How can 5-ppm and 10-ppm printers

use the same engine? Easy: IBM slows down the engine on the E. As a result, the LaserPrinter easily outpaces the E (as well as every other printer in the roundup) when printing long text documents. On graphics-intensive pages, both of these machines chug along at approximately the same speed: They did well on the *Excel* bar chart, and both of them ran midpack on complex graphics pages from *PageMaker*.

Differences in print quality between these printers are indistinguishable. Large black areas and bold headlines tend to be washed-out, but type and fine lines are crisp, with no light or broken edges.

Both LaserPrinters come with a 200-sheet paper tray; an optional 500-sheet paper drawer and a 75-envelope feeder are available. Consumables can be replaced with a single cartridge. However,

control operations, executed with combinations of five raised buttons, are overly complicated.

The IBM LaserPrinters offer the best compatibility in the roundup: They give you true Adobe PostScript plus a full deck of emulation modes (LaserJet II, HPGL, and dot matrix). If your office tends to create a lot of long documents, the 10-ppm IBM LaserPrinter with the PostScript board is a strong contender—especially as a network printer. But be forewarned: It's not cheap. On the other hand, the IBM LaserPrinter E (with the PostScript Option) is one of the least expensive PostScript printers you can buy, and it boasts excellent paper capacity and adequate performance.

However, if top-notch print quality is of critical importance, neither printer is the best choice.

Okidata OkiLaser 820

Okidata's OkiLaser 820, with an \$1842 street price, is an LED printer that boasts a low price and outstanding performance. But you get only 512K of standard RAM, and software support for Okidata's proprietary font-scaling scheme is limited. Worse yet, print quality was marred by blurred lines, and we ran into problems with our evaluation units.

The OkiLaser comes with four scalable Bitstream type families, including a monospaced Courier that's suitable for easy column alignment in spreadsheets. For \$395 Okidata will sell you a card that offers 22 additional scalable type families.

Bitstream's large library of downloadable scalable fonts is available too, but at the moment only *WordPerfect 5.0*

FIVE REASONS WHY POSTSCRIPT IS STILL YOUR TOP CHOICE

With the emergence of new font-scaling and page description protocols like the LaserJet III's PCL5, some people wonder, Is Adobe's PostScript page description language on the way out?

Indeed, the vast majority of PC users, who need only a handful of typefaces to produce good-looking letters and reports, will be perfectly happy without PostScript. Alternative schemes from Hewlett-Packard, Canon, and Okidata deliver excellent results—and some run faster than PostScript.

However, for users who need to prepare text and graphics for professional printing, and for those who need a number of powerful text and graphics tools and effects, PostScript still delivers definite advantages.

Compatibility With Imagesetters Unlike PCL5 or CaPSL, PostScript permits the same file to be printed on a 300-dpi printer and a Linotronic im-

agesetter at 1270 dots per inch. That means complex documents like a newsletter, a flier, or an ad layout can be printed and proofed inexpensively and accurately on a PostScript printer.

Draw Program Support Some drawing programs such as Adobe Illustrator, Corel Draw, and Micrografx Designer cannot deliver all their features on a LaserJet—even the III. For example, PostScript allows you to draw shapes using Bézier curves, while PCL5 is limited to graphics based on straight lines. Depending on the application, Bézier curves may not be represented accurately on a non-PostScript printer.

EPS Support Unlike the TIFF or PCX file formats, EPS allows graphics to be moved easily from Mac to PC to Mac. Moreover, EPS images can be enlarged or shrunk with no loss of image quality. None of the competing protocols provides comparable capability.

More Typefaces Eventually, a large library of scalable typefaces will be available for the LaserJet III, but Adobe has a big head start with over 550 typefaces available right now. For desktop publishers, or businesses whose bread and butter depends on top-quality layouts, lots of typefaces next month won't do this week's work.

Standardization PostScript also has a big lead on multipatform compatibility, with support spanning Mac, UNIX, DEC, PC, and other environments. While UNIX applications may eventually support PCL5, even HP admits that Mac support for PCL5 is unlikely. Hence, if your company includes PCs, Macs, and UNIX machines, PostScript lets you standardize on a printer without limiting a user's choice of computing platform.

—D. M. K.

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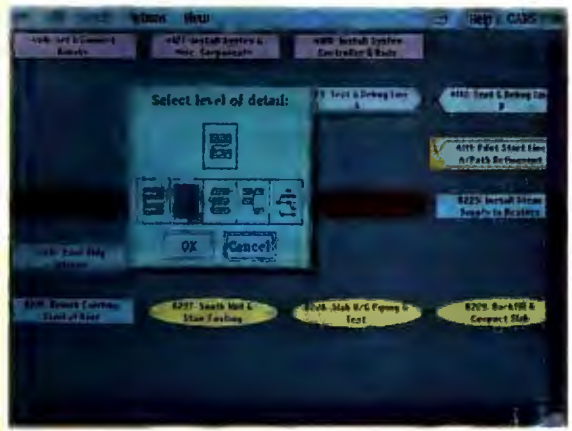
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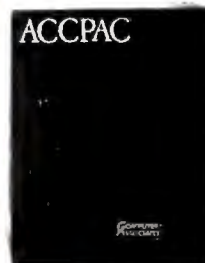
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and 5.1 support them. Buyers should make sure their software supports the printer. At present only four application drivers are available; fortunately, one of them is for *WordPerfect 5.1* and another is for *Windows*. The OkiLaser 820 does emulate the LaserJet Series II, IBM Proprinter, and Diablo 630, but these modes do not support scalable fonts.

Okidata aims to boost performance with a chip dedicated to font scaling, and the strategy works: This 8-ppm machine took top place on overall performance, won the complex-page *PageMaker* contest, and performed admirably on every test but the *Excel* bar chart (where it ran midfield).

Unfortunately, the promise of this printer is betrayed by inattention to quality. The first test unit *PC World* received had a defective control panel; a replacement unit fixed that problem, but both printers distorted a line of text at the same point on every page. Okidata is investigating the problem. Except for the blurred lines, print quality was acceptable.

In other respects, the OkiLaser 820 shows thoughtful design. The printer holds 200 sheets of paper, and an optional \$318 second paper tray holds 200 more. Controls are similar to the LaserJet II's, but replacing consumables is a two-part process, making the task somewhat more tedious than necessary.

On the basis of price, performance, and paper handling, the OkiLaser 820 is not without its merits. But software support concerns and hardware problems cost it our recommendation.

Texas Instruments MicroLaser PS17

At \$1617 on the street, TI's MicroLaser PS17 is the least expensive PostScript printer you can buy—and yet it comes loaded for bear: You get a generous package of five built-in Adobe type families, broad PostScript-language support, LaserJet II emulation, the smallest footprint, and the largest paper capacity in the roundup.

The 6-ppm PS17 performs most office printing tasks well—and some a lot better than that. It took top place on the *Excel* bar chart, and on long text documents and the complex *PageMaker* page, it ran in the middle of the pack.

Print quality is satisfactory but not outstanding. Type is not quite as crisp as it might be, and tonal range tends to be somewhat dark; setting the density control a bit lighter should correct the problem.

Despite its extremely snug size, the PS17 incorporates a 250-sheet paper tray. An optional 250-sheet second paper feeder and a 40-envelope feeder can be installed as well. Controls are unremarkable, except for a handy Help button that prints a map of control panel menu choices and a guide to the keys. Changing consumables is a relatively inconvenient three-part process.

A unique feature permits you to set up four special configurations (each specifying an emulation mode, I/O port, paper tray, orientation, and so on) and recall them by pushing a few control keys. You can also step through the preset configurations via software commands—but this is not documented in the user manual.

While the Best Buy Texas Instruments MicroLaser PS17 is not the fastest font-scaling printer you can buy, it's still a fine machine at a fine price. It delivers full PostScript capability, a generous collection of typeface families, excellent paper capacity, good performance, and a number of handy extras—in a very small box. We're impressed, and we think you will be, too.

Scalable Font Heavyweights

While there's nothing to stop you from spending thousands more for a scalable font printer (and mainly getting higher speed), this review proves beyond a doubt that the smart business buyer can acquire a respectable font-scaling printer for little more than a good dot matrix machine would have cost two years ago.

Our Best Buy? Texas Instruments'

Bold
HP LaserJet III

Bold
HP LaserJet III (with PostScript)

Bold
Canon LBP-4

Bold
HP LaserJet IIP

Bold
IBM LaserPrinter

Bold
IBM LaserPrinter E

Bold
Okidata OkiLaser 820

Bold
Texas Instruments MicroLaser PS17

Hewlett-Packard's Resolution Enhancement gives the LaserJet III (top two examples) outstanding print quality.

full-fledged PostScript printer, the PS17. This reasonably fast machine boasts five Adobe typeface families, the best paper capacity in the roundup, excellent compatibility, adequate performance, and software-driven mode switching—all for just \$1617 on the street.

The HP LaserJet III wins honorable mention for its excellent print quality and good price, but unless you pop for an extra font cartridge (which knocks down the price from good to fair), its paltry selection of scalable typefaces is

a serious drawback—as is its 200-sheet paper limit.

The Canon LBP-4 has its problems—it's slow, it's stingy with scalable typefaces and paper capacity, and software drivers may be hard to find. But its print quality is quite good, and consid-

ering its amazing \$1100 street price, it may be too tempting to resist as an entry-level font-scaling printer.

With smart buys like these on the market, there's no longer any reason to let high price tip the scale against a font-scaling printer. ●

Daniel Miles Kehoe is an industry analyst and writer in Forest Knolls, California.

For more information about all products in this article, circle reader service no. 902.

WHERE TO BUY

Canon LBP-4

Canon USA
1 Canon Plaza
Lake Success, NY
11042
800/848-4123
LIST PRICE: \$1545
ACCESSORIES: letter-sized tray \$195; 1MB memory expansion kit \$495, 2MB memory expansion kit \$345; EP-L toner cartridge \$95 (3500 pages)
WARRANTY: one year parts and labor
EXTENDED WARRANTY: via dealer
TECHNICAL SUPPORT: toll-free number, M-F 9-7
OTHER SUPPORT: in-house BBS, newsletter
Reader service no. 650

HP LaserJet IIP

Hewlett-Packard
Customer Information Center
19310 Pruneridge Ave.
Cupertino, CA 95014
800/752-0900
LIST PRICE: \$1495
ACCESSORIES: 250-sheet letter-sized second paper tray \$69, 250-sheet legal-sized second paper tray \$79, 250-sheet second paper feeder \$195; 1MB memory upgrade \$495, 2MB memory upgrade \$740; PostScript cartridge \$695; EP-L toner cartridge \$95 (3500 pages)
WARRANTY: one year parts and labor
EXTENDED WARRANTY: on-site or carry-in
TECHNICAL SUPPORT: toll number, M-F 8-5
OTHER SUPPORT: fax

number for updates on software support
Reader service no. 651

HP LaserJet III

Hewlett-Packard
LIST PRICE: \$2395
ACCESSORIES: 200-sheet letter-sized tray \$69, 200-sheet legal-sized tray \$79, 15-envelope tray \$89; 1MB memory upgrade \$495, 2MB memory upgrade \$740; PostScript cartridge \$695, two scalable font (PCL5) cartridges \$399 each, EP-S toner cartridge \$125 (4000 pages)
WARRANTY: one year parts and labor
EXTENDED WARRANTY: on-site or carry-in
TECHNICAL SUPPORT: toll number, M-F 8-5
OTHER SUPPORT: fax number for updates on software support
Reader service no. 652

IBM LaserPrinter, IBM LaserPrinter E

IBM
101 Paragon Dr.
Montvale, NJ 07645
800/426-2468
LIST PRICE:
LaserPrinter \$2395, LaserPrinter E \$1495
ACCESSORIES: 500-sheet paper feeder \$399, 500-sheet letter-sized paper tray \$89, 500-sheet legal-sized paper tray \$99, 200-sheet legal-sized paper tray \$69, 75-envelope feeder \$329; 1MB memory upgrade \$449, 2MB memory upgrade \$899, 3.5MB

memory upgrade \$1599; PostScript Option \$499, Premium PostScript Option \$899; Model E (10 ppm) upgrade \$1099; High Yield cartridge \$199 (10,000 pages)
WARRANTY: one year parts and labor
EXTENDED WARRANTY: available via dealer
TECHNICAL SUPPORT: toll-free number, first 90 days only, M-F 8-5
OTHER SUPPORT: none
Reader service no. 653

Okidata Okilaser 820

Okidata Customer Information Center
532 Fellowship Rd.
Mount Laurel, NJ
08054
800/654-3282
LIST PRICE: \$2295
ACCESSORIES: 200-sheet letter-sized tray \$89, 200-sheet legal-

sized tray \$89, 200-sheet second paper tray \$318, 15-envelope tray \$89; 1MB memory upgrade \$495, 2MB memory upgrade \$940; macro card for logos/signatures/forms \$195; 22-scalable-typeface card \$395; toner cartridge \$33 (2500 pages); image drum cartridge \$289 (15,000 pages)
WARRANTY: one year parts and labor
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: toll-free number, M-F 9-5
OTHER SUPPORT: none
Reader service no. 654

Texas Instruments MicroLaser PS17

Texas Instruments Inc.
Information Technology Group
P.O. Box 202230

Austin, TX 78720
800/527-3500
LIST PRICE: \$2499
ACCESSORIES: 250-sheet letter-sized paper tray \$79, 250-sheet legal-sized paper tray \$79, 250-sheet second paper feeder \$395, 40-envelope feeder \$395; 1MB memory upgrade \$495; serial interface \$49, AppleTalk/serial interface \$145; toner kit \$69 (3000 pages); developer kit \$149 (20,000 pages); OPC cartridge \$189 (40,000 pages)
WARRANTY: one year parts and labor carry-in; 90 days parts and labor on-site, or 36,000 pages, whichever comes first
EXTENDED WARRANTY: on-site or carry-in
TECHNICAL SUPPORT: toll number, M-F 8-5
OTHER SUPPORT: none
Reader service no. 655

POWER TIP NO. 129

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DOS reads each line of a batch file, so any remarks (lines of text preceded by REM and a space) that you include to document a complex batch file will slow the execution. Once you've determined that a batch file functions as you wish, make an archive copy for future reference and delete the REM lines from your working BAT file.

*Lee Foster
Spring, Texas*

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- Complex extrusions
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- Block scaling
- On screen shading
- Shaded output to printers and plotters

All of these competitors left out one or more of these desirable features in their standard package. They didn't forget the most horrible feature - the comma.

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If DesignCAD 3D has the power to create the 3D objects shown below, imagine how it could help with your design project!

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\$399

AutoCAD rel. 10	\$3,000.00	AutoCAD AEC \$1,000.00 AutoShade \$500.00
CADKEY 3.12	\$3,195.00	Solids \$995.00 IGES translator \$1,995.00
DataCAD with DC Modeler	\$3,990.00	DataCAD Velocity \$2,000.00
DesignCAD 3D ver. 2.0	\$399.00	NO expensive options! IGES Free, Shading Free
MaxxiCAD 1.02	\$1,895.00	N/A
Mega Model	\$995.00	MegaDraw \$195, List \$295, MegaShade \$395
MicroStation PC 3.0	\$3,300.00	Customer Support Libraries \$1,000.00
ModelMate Plus 2.8	\$1,495.00	N/A
VersaCAD Design 5.4	\$2,995.00	N/A

Source: Byte Magazine

BYTE MAGAZINE SAYS...

"At \$399, DesignCAD 3D was the least expensive package we saw, yet it was one of the more powerful. ..Don't be fooled by the remarkably low price, this program can really perform!"

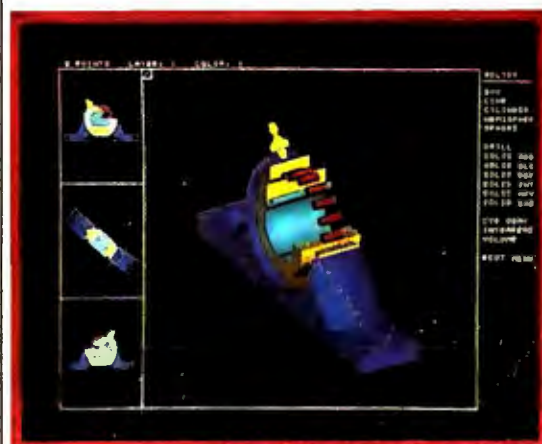
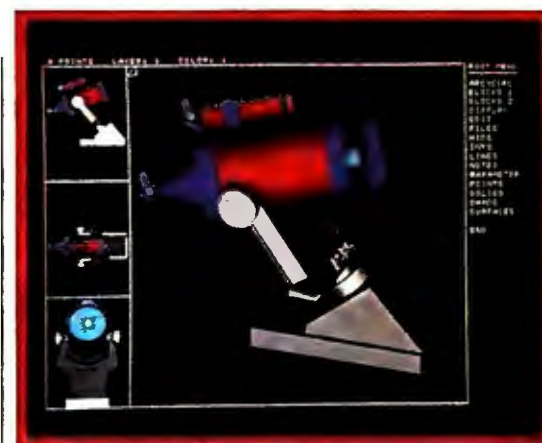
Complete 3-Dimensional design features make it easy for you to construct realistic 3-D models. With full solid-object modeling capabilities you can analyze your drawing to determine the volume, surface area or even center of gravity! DesignCAD 3-D even permits you to check for interference between objects! Aeronautical Engineers can now find the center of gravity for a new airplane design with a couple of keystrokes. The Architect can determine the surface area of a roof for decking in a matter of minutes. The Civil Engineer can calculate the volume of a lake or dam in seconds. The Mechanical Engineer will know for sure if certain parts fit together without interference. The uses for DesignCAD 3-D are only limited by YOUR imagination!

HOW DO I GET ONE?

DesignCAD 3-D and DesignCAD 2D are available from most retail computer stores, or you may order directly from us. If you have questions about which program to purchase please give us a call. All you need to run DesignCAD 3-D is an IBM PC or compatible computer with 640 K RAM memory and a hard disk. Both products support most graphics cards, printers, plotters and digitizers. Free Information and a demo disk are available by faxing (918) 825-6359 or telephoning:

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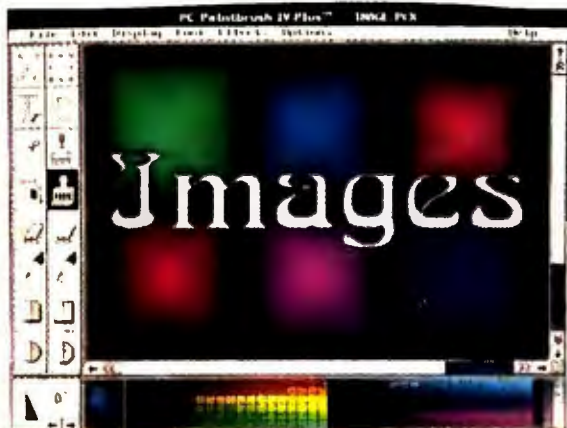
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PC Paintbrush IV Plus



Now you can scan, create, edit and dramatically enhance images. All with one program: the new PC Paintbrush IV Plus.™ It brings you all the power of ZSoft's PC Paintbrush IV™ – and builds in complete scanner control, large image support and other powerful pluses.



Dress up your documents and presentations with gradient color backgrounds, impressive text effects, and automatic patterns.

Scanning power.

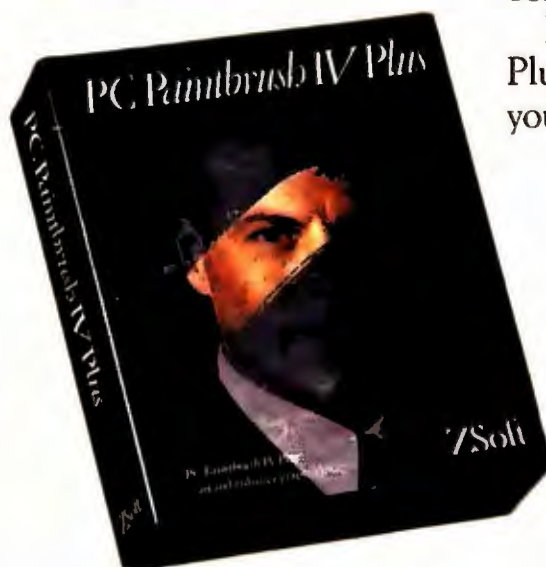
Control your scanner from *within* PC Paintbrush IV Plus. Scan and edit full-page, black-and-white, gray-scale and color images with a 640K system. Rescale images (25 to 400 percent). And with the unique pre-scan feature, simply frame the precise area you want, then scan *only* that area at high resolution.

Image enhancement.

The new PC Paintbrush IV Plus is packed with innovations. New retouching features let you blend, lighten, darken, adjust contrast, change tints and blur portions of any image. New image processing functions let you automatically correct poor originals. It's like having a photo lab in your computer!

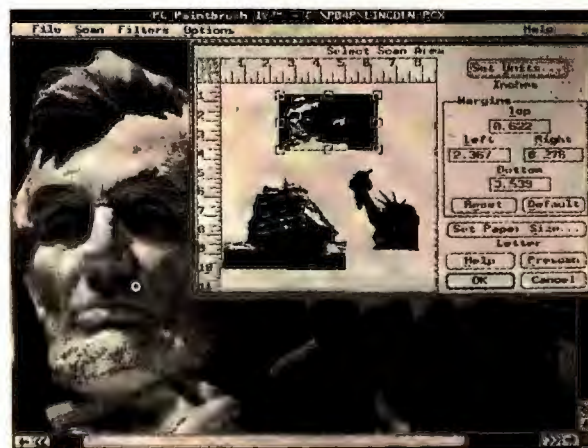
Persuasive presentations.

For compelling overheads, slides and documents, choose from a huge arsenal of features. For example, use the "tiling" feature to create 3-D effects and intricate textures. Automatically shadow, outline and graduate text for dynamic effects. Load and save PCX and TIFF images. Capture screens. You can even overlay two images.



Intuitive interface.

PC Paintbrush IV Plus is packed with convenience: Pull-down menus, customizable screen layouts, graphically labeled options,



Complete control of your scanner... select resolution, halftone pattern, brightness, contrast and rescale from 25 to 400 percent.

multiple levels of context-sensitive help, and a combination of mouse control and keyboard accelerators.

Move up to PC Paintbrush IV Plus. It's the perfect finish to what your scanner started.

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Project Management Reaches the Real World

Every manager dreams of a hassle-free way to keep projects on time and under budget. Any of these six contenders can do the job, but our Best Buy stands out, with its smooth interface and stunning graphics.

Mark S. Burgess



Are you a project manager? You may envision a dusty construction site where hard-hatted construction workers hover over smudged diagrams. That's not me, you think.

But not so fast—once confined to aerospace and construction, project management software now turns up in corporate information systems, marketing departments, and other areas where cost overruns and delays can be critical. Once geared to professional project managers,

the software now aids nonexperts who merge departments or divisions, open branch offices, or launch new products.

This review examines six packages that cost \$500 to \$700: *Harvard Project Manager* from Software Publishing, *InstaPlan 5000* from InstaPlan, *Microsoft Project for Windows* from Microsoft, *Project Scheduler 4* from Scitor, *SuperProject Expert* from Computer Associates, and *Time Line* from Symantec.

For most business users, the mid-range packages reviewed here can do the job just fine. If your projects are very large and you're willing to spend thousands of dollars, you should probably move up to a high-end package (see the sidebar "For Big Jobs Only: High-Priced, High-End Choices"). But fair warning: Even at this level, project management demands mastering new concepts and jargon. To help you learn the ropes, we've included a glossary of terms, a primer on project basics, and, in "Ten Tips for Project Sanity," advice from project managers.

Project, Not Process

A project management program is a task-based scheduling tool for planning and tracking the interrelated expenditures of time, resources, and money. It lets you test assumptions within a model and measure the impact of events before they become a reality. It also lets you track progress and quickly respond to changes. In essence, project management software is like a spreadsheet designed for what-if scheduling. If you add an employee or shift a date, it recalculates the final deadline, cost, and resource requirements.

The end result should be a project that has a better chance of meeting its schedule and budget. And if the program includes graphics, you may have a better chance of selling the project in the first place. Even if your project fails, you'll have a detailed record that will help you defend against damage claims or study what went wrong.

Before you buy, make sure you're managing a project, not a process. A project has a definite start and finish and a measurable result. In contrast, a process is an ongoing series of tasks that repeat with little change. For example, scheduling factory shifts is a process, but changing to a new phone system is a project. If you manage a process, look into staff scheduling systems such as *Working Hours* from Power Up Software or *Who Works When* from Newport Systems.

FEATURES EVALUATION

Project Management: More Than Mere Scheduling

Microsoft Project for Windows wins a Best Buy with a well-balanced selection of features for business users and a flexible, graphical approach.

- Yes ○ No
- Deficient
- △ Limited only by available RAM
- ▼ Limited only by available disk space

Standard features

	Harvard Project Manager 3.01	Instaplan 5000 2.0	Microsoft Project for Windows 1.0	Project Scheduler 4.2.0	SuperProject Expert 1.1	Time Line 4.0
List price	\$695	\$495	\$695	\$685	\$695	\$695
RAM required	512K	500K	1MB	512K	360K ¹	640K
Minimum disk space required	2MB	1.2MB	1.4MB	1.4MB	1.5MB	3.6MB
Mouse support	○	○	●	●	○	●
LAN support	○	○	●	●	●	●
File locking	○	○	●	○	●	●

Data entry

Custom views	●	○	●	●	○	●
Gantt view	●	●	●	●	●	●
Network logic diagram view	●	○ ²	●	●	●	●
Time-scaled network view	○ ³	○	●	○	○	○ ³
Outline view	●	●	●	●	●	●
Spreadsheet view	●	●	●	●	○	●
Work breakdown structure view	●	○	●	○	●	○ ⁴
Histogram view	●	●	●	●	●	●
Individual resource calendar views	●	●	●	●	●	○
Pap-up form entry	●	○	●	●	○	●
Automatic subproject update	●	○	●	○	○	○
Global task copying	○	●	●	○	○	●
Macro language	○	○	●	○	●	●
Attach notes to tasks	○ ⁵	●	●	●	●	●
Enter status to activity groups	○	●	●	●	○	●
Enter status by percent	●	●	●	●	●	●
Enter status by quantity	○	○	●	○	●	●
Import project (DBF, WK1, ASCII)	○ ⁶	●	●	●	●	●
Data exchange with Primavera	○	○	●	○	○	●
Data exchange with Artemis	○	○	●	○	○	●

Scheduling

Constrain start and finish dates	○ ⁷	○ ⁷	●	●	○ ⁷	○ ⁷
Multiple independent starts and finishes	○	○	●	●	●	●
Link to separate subproject	●	○	●	●	●	●
PERT analysis	○	○	●	●	●	○
Lead and lag relationships	○ ⁸	○ ⁸	●	●	●	●
Show negative float	●	○	●	●	○	○
Logic: start to finish	●	●	●	●	○	●
Logic: finish to start	●	●	●	●	●	●
Logic: finish to finish	●	○	●	●	●	●

**BEST
BUY**

	Harvard Project Manager 3.0 ¹	InstaPlan 5000 2.0	Microsoft Project for Windows 1.0	Project Scheduler 4.2.0	Expert 1.1	SuperProject	Time Line 4.0
Scheduling (continued)							
Logic: start to start	●	●	●	●	●	●	●
Priority coding of tasks	○	○	●	○	●	●	●
Voriable critical path threshold	○	○	●	○	●	○	○
Fractional durations	●	○	●	○	○	○	●
Resource management							
Prioritize resources	○	○	●	○	●	●	●
Colculote overtime	●	○	●	○	●	○	○
Level fram camman resourse pool	●	○	●	●	●	○	○
Level over multiple projects	●	○ ⁹	●	○	●	○ ⁹	○ ⁹
Resaurce applicotian profiles	○	●	○	○	●	○	○
Lead and log relationships	●	○	●	○	●	○	○
Torget cost by resource	●	●	●	○	○	○	●
Shift scheduling	○	○	○	○	○	○	○
Responsibility ossignment motrix (RAM) function	○	○	○	○	○	○	○
Reporting							
Zoom an-screen/reports	●	○	○	○	○	○	○
Report formotter	●	○	○	○ ¹⁰	○ ¹⁰	○	○
Cash flow diagram	●	○	○	○	○	○	○
Arronge tasks on network chort	●	○	○	○	○	○	○
Customize legends	○	○	○	○	○	○	○
Generote CGM graphics file	○	○	○	○	○	○	○
Font support	○	○	○	○	○	○	○
Cost analysis							
Assign casts directly to tasks	●	○	○	○	○	○	○
Cast schedule prafiles	○	○	○	○	○	○	○
Foctor inflotion	○	○	○	○	○	○	○
Eorned value onolysis	●	○	○	○	○	○	○
Capacity							
Support expanded memary	○ ¹¹	○	○	○	○	○	○
Moximum tasks	△	△	2000	2000	△	△	△
Moximum resources per task	△	△	20	△	△	250	△
Moximum resaurce definitions per project	△	△	2000	500	△	△	△
Moximum linked projects	△	△	9	△	△	△	△

**BEST
BUY**

¹ LAN version uses an additional 100K RAM.

² Internal version limited to seven tasks; printing requires seporate Classic PERT madule, which won't display diagram.

³ Task boxes don't graphically represent duration.

⁴ Built from outline levels instead of WBS structure.

⁵ Nates are limited to 30 characters.

⁶ Can't impart structure, just data.

⁷ Can constrain start or finish but not both.

⁸ Can assign lead or lag but not bath.

⁹ Must copy or merge subproject into the master far cross-project leveling.

¹⁰ Cannot set column widths.

¹¹ Expanded memory can speed calculations but can't hald mare tasks.

Also, a small project such as an office party may not warrant the time you'll invest with the software. For small projects, you can use a spreadsheet, an outliner, a Gantt chart program, or a personal information manager.

Keys to the Kingdom

When shopping for a project management package, look for an amiable interface and technical competence. Competence is defined here in seven major categories, listed roughly in order of importance: data entry, scheduling, resource management, reporting, performance, cost analysis, and capacity.

Ease of Use Because these packages are aimed at business managers instead of project professionals, ease of use is essential. Look for intuitive menus with a minimum of jargon; context-sensitive help; and understandable manuals with tutorials on project basics. Several packages help out with graphical mouse-based interfaces. *Microsoft Project for Windows*' high ranking in ease of use stems largely from its fluid graphical interface.

Data Entry This category covers the ease of entering data and the variety and flexibility of the views of that data. The more views you have of a project, the better chance you have of spotting potential problems. All the packages provide outliners that let you enter and rearrange tasks. They also offer Gantt charts, network logic diagrams (PERT charts), and resource histograms. Most provide spreadsheetlike task lists and calendars that track each resource, and some offer organizational graphs called work breakdown structure (WBS) charts. Most of the packages let you split the screen, so as you select a task in the network diagram, its resource assignments appear below.

You should be able to enter data in any view; for example, selecting a task node in a network diagram should pop up a data entry form. It's also useful to be able to change data by manipulating graphics directly. All the programs let you increase task duration by stretching

Gantt chart bars. *Project for Windows* even lets you create, edit, link, and update tasks in almost any view.

To speed data entry, you should be able to import data from other software. All the programs import WK1, DBF, and ASCII files, and all but *Harvard* can import an entire project.

Many companies use a high-end package at headquarters and want to be able to *roll up*, or combine, projects created in lower-end packages. All the packages can export to the same basic file types they import, but *Project for Windows* and *Time Line* also export

into *Primavera* and (with *Time Line*) *Artemis* format.

A good program simplifies data entry once a project is under way. All six programs let you enter actual cost and progress by inputting the percent complete for each task, but only *SuperProject* and *Time Line* let you input status by quantities, such as number of days spent. Most let you attach notes to tasks, helpful for later reference.

Error handling is also key. Unfortunately, except for *InstaPlan 5000*, all the programs let you enter actual task activity that, according to project logic,

cannot yet have started. You're warned only when the project is recalculated—which may be too late. Executing tasks in a different order violates the plan's logic and skews resulting calculations.

Scheduling It's crucial that you closely model real-world circumstances. All the packages help you do this by using a technique called the critical path method (CPM). The CPM figures the finish and start dates for each task and shows which series of tasks determines the project finish date. *Project for Windows* and *SuperProject* go one step further by letting you set a threshold that highlights the most critical items.

To better reflect reality, look for a program that lets you set more than one task as the start or finish of a project. For instance, to model a political fundraiser with task groups for handling the press and the event itself, you'll set up tasks common to each group. A package should also be able to model all possible link logic, including start-to-finish relationships.

Look for a package that lets you schedule not only by days and hours but by fractional durations (such as 2¼ days). It should also report *negative float*—how many days of work a series of tasks has to make up to get back on schedule. Look for the ability to compare actual performance to the original target deadlines.

Project Scheduler 4 and *SuperProject* provide PERT analysis (not to be confused with PERT charts, which are the same as network diagrams). PERT analysis tells you the most likely completion date for a task and the odds of meeting this deadline—helpful in predicting the timing of a crucial event such as a product launch.

Resource Management Integrating people, materials, and other resources with a schedule is also important. All the programs let you assign resources by task, and all offer automatic resource leveling—the reallocation of resources to better match availability. Look for the ability to prioritize resources, which gives you some control over these pack-

A PROJECT MANAGER'S DICTIONARY

Cost loading—The assignment of budgeted and actual costs to tasks in a CPM schedule to show the cost flow of a project over time.

Cost profiles—A method for distributing cost over the duration of a task. A front-loaded profile places the cost at the start of a task; level loading distributes it evenly.

Cost variance—The difference between money paid for work and actual value received. A negative variance means too much was spent.

Earned value analysis—A method common in U.S. government contracts that relates the planned expense and durations of tasks to the true value of what is accomplished.

Gantt chart—A staggered, horizontal bar chart that shows the planned duration of each task in a project.

Histogram—A vertical bar chart that shows the planned and actual use of resources by cost or by hours.

Lead/lag relationship—Applies to a pair of linked tasks. If two tasks should start together according to their logical connections, but you need one to start two days ahead of the other, you assign it two days'

lead time. If a task should start two days later, then you assign it two days' lag time.

Network logic diagram—Also referred to as a PERT chart. A chart that shows tasks linked graphically, illustrating the sequence of task execution. Any sequential run through the network is called a path.

PERT (program evaluation review technique)—A cousin to the CPM method, which relates tasks, durations, and ordinal logic to produce schedules. PERT analysis estimates the probability of a task ending on a certain date.

Resource leveling—The redistribution of resources across tasks to minimize underutilization and overutilization.

Task constraints—Dates assigned to fix the planned period of performance of a task to prevent it from occurring earlier or later than planned.

Work breakdown structure (WBS)—An organization of project tasks, often shown in a top-down flowchart. Each task is tagged with a sequential code that shows tasks by subject rather than by order of execution or by responsibility. —M. S. B.

ages' imperfect leveling algorithms.

Three packages let you modify a resource's application profile so you can devote more of a resource to one part of a task than another. For example, with an ad campaign, it's more realistic to allocate up-front costs to the beginning of the campaign than to have them spread evenly throughout the ad's run. If your project is split into many sub-projects, look for the ability to easily share and level resources across multiple projects. *InstaPlan 5000* and *Time Line*, for example, force you to merge subprojects into the master to do this.

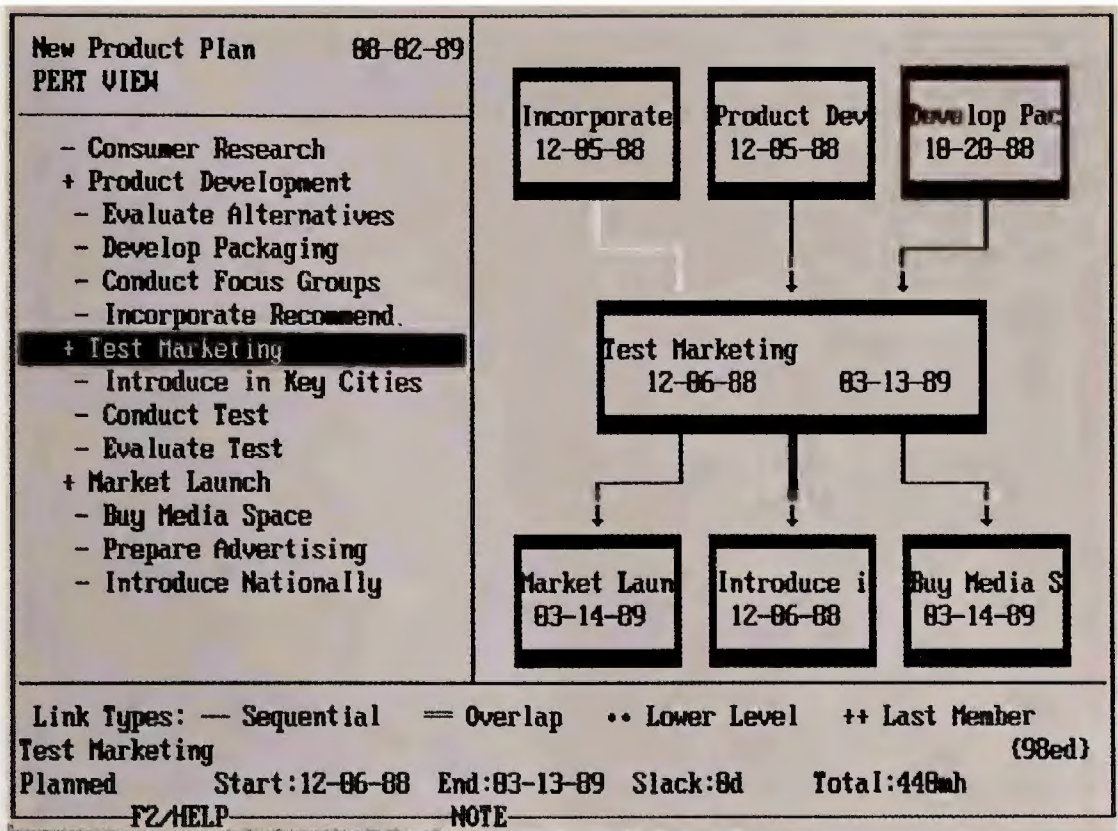
Cost Analysis Usually tied closely to resource features, cost controls let you monitor the costs of a project. All the packages track both budgeted and actual costs, but only *Harvard* lets you assign a monetary value to each task. Only *Harvard* and *InstaPlan 5000* store cost targets separately, so they can track revised budgets against an original plan.

Earned value analysis is also useful. Often required in U.S. government contracts, it's the only technique that shows the value of what's been accomplished versus expended time and money.

Reporting Reporting features not only communicate progress but help you initially sell a project. All the packages let you select the items to include in a tabular report, but none gives you a full-fledged report writer for selecting ranges, modifying column widths, and sorting or filtering. *Project for Windows* comes the closest.

Presentation graphics are much improved in this year's crop. Most of the packages let you output various on-screen views to printers, plotters, and slides. A good package can output all of its on-screen views. Except for *Project for Windows*, none of the packages lets you print out exactly what you see on screen for every view. *Time Line*, however, lets you preview graphics reports.

All the packages allow you to add titles to charts, but otherwise you're mostly stuck with default formats. Look for easy-to-understand network diagrams and clear symbology. *Time Line*



Here, *InstaPlan 5000*'s network diagram shows the tasks that precede and follow the task highlighted in the list on the left. To display more task nodes, you must open a separate module.

gives you the most control over the look of titles and legends, followed by *Project for Windows*, and only these two and *Scheduler 4* let you select fonts. Only *Time Line* can export reports in popular graphics formats.

Performance Speed counts—if you can't quickly play what-if games by recalculating a schedule or leveling resources, you simply won't. *PC World* tested each package with a 300-activity project (one main 200-task project and two 50-task subprojects). The tests included switching between displays, recalculating critical paths, leveling resources, and printing graphics. Overall, *Project for Windows* and *SuperProject* logged the fastest speeds, with *InstaPlan 5000* and *Scheduler 4* also turning in respectable scores.

Capacity Generally, these packages can ably handle projects with up to 500 activities, but calculation speed drops off as the number climbs. Except for *Harvard*, all the packages fully support expanded memory, increasing their raw ability to manage more tasks and resources. Without expanded memory, the programs become unworkably slow long before they reach their stated capacities

of thousands of tasks.

Other features to examine are price, technical support, and—if you're on a LAN—multiuser skills. Only *SuperProject*, *Time Line*, and *Project for Windows* offer full LAN support.

Before you select a package, study how your company does business. This should help you choose one of the following packages.

Harvard Project Manager 3.01

Software Publishing's \$695 *Harvard Project Manager* is as easy to use as ever, but its features could use updating. Cost control features stand out, but there's no LAN support, and scheduling options are inflexible. The lack of true expanded memory support limits capacity—you can use expanded memory to speed calculations but not to hold tasks. Also, *Harvard*'s performance was the slowest in the roundup. All told, it's only a fair value.

Harvard Project Manager uses the same intuitive function keys and pick list menu interface as *Harvard Graphics*. The program is character based, but its graphics look remarkably good

PROJECT LOGIC: A PRIMER FOR WOULD-BE MANAGERS

Using a project management program efficiently means not only learning the discipline's considerable jargon but grounding yourself in its procedures. Here are some basic concepts:

Say you're starting a company newsletter. The first thing you would do as a project manager would be to draw up a network logic diagram—a series of boxes (tasks) linked in a horizontal flow-chart, as shown in **SCREEN 1**. This diagram is based on the critical path method (CPM), similar to the program evaluation review technique (PERT). This method diagrams the logical flow of project activity. It's here that you input each task's duration, resource limits, costs, and logical dependencies. The CPM then calculates completion dates, final cost, and resource requirements.

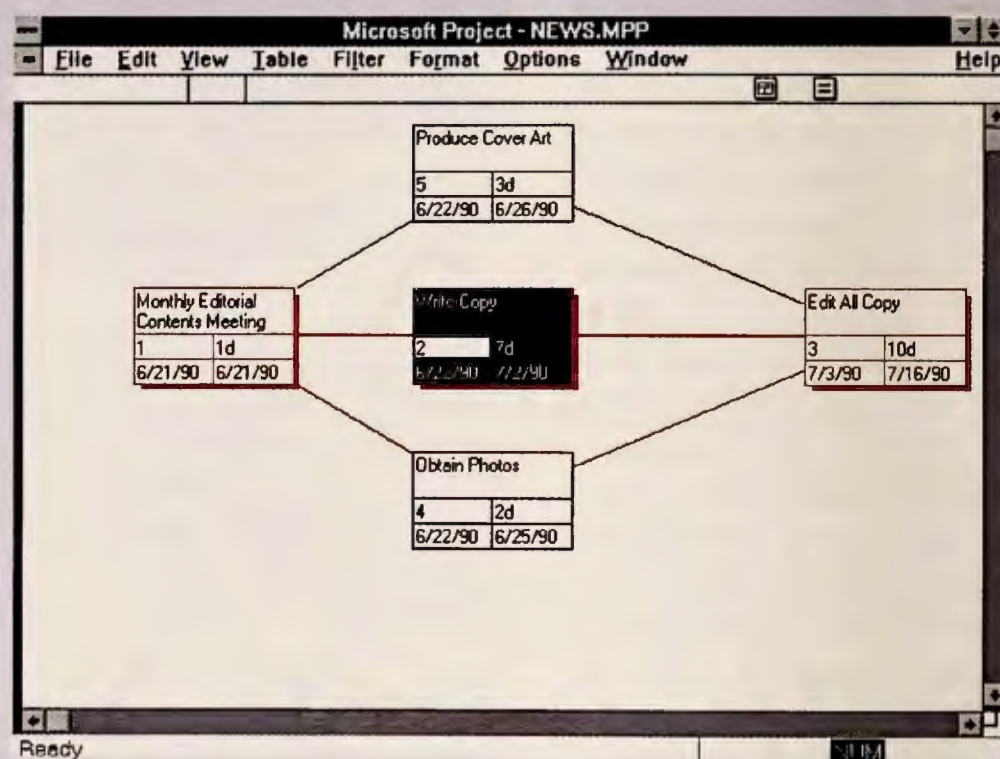
Whenever tasks run in parallel, as the middle three tasks do in **SCREEN 1**, you must decide which task sits upon the critical path—the longest path through the network of tasks using the earliest date each task can start. This will show you the tasks that require the closest monitoring initially, because any delay in them immediately delays the project. For example, if it will take longer to obtain photographs than to write the copy

or create the artwork, getting photographs becomes a critical task.

Project management software formalizes this process by letting you enter data on each task into electronic forms. You list all the activities (tasks) involved in the project, then specify who will perform them (resource assignments), how long each task will take (duration), and how much it will cost (cost loading). The

next step is to map out the order of tasks, noting which must precede or follow which (linking).

Assigning Resources. A resource can range from an employee to a rented laser printer. You must know when each resource will be available and its cost over time. One of the most common tools to track this information is a resource histogram (see **SCREEN 2**).



SCREEN 1: This Project for Windows network diagram shows that the writing task falls on the critical path—any delay of this task will delay the entire project.

thanks to its use of the extended ASCII set. Like its graphical rivals, it lets you split the screen and show two views side by side, including Gantt charts, network diagrams, WBS charts, outlines, fast tracks, and task lists. You can automatically load a custom view combination, and you can hot key between views.

Harvard's fast track entry method lets you quickly enter each series of dependent tasks in a modified Gantt chart that shows task names and durations. You can easily extend or shrink task durations graphically, but you must delete and reenter a task to change its

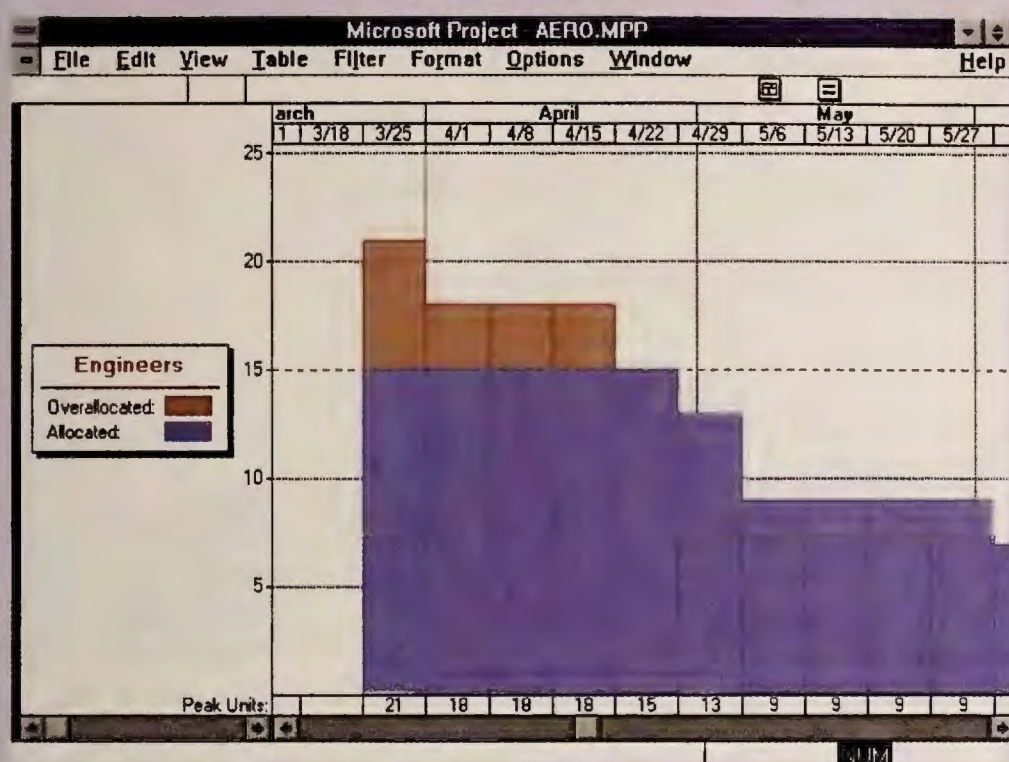
type or actual duration.

In addition to a traditional network diagram, you can display a pseudo-time-scaled network chart, a combination Gantt chart and network diagram, which shows dependencies but aligns tasks by time period. *Harvard's* work breakdown structure charts are a plus—you can't directly edit the WBS block, as you can in *SuperProject*, but you can enter data in a pop-up form.

Importing projects from other software is difficult. Unlike its rivals, *Harvard* makes you build the project skeleton before importing data.

Harvard's scheduling features are somewhat behind the times. You can't create an independent starting task or set critical path thresholds, and there's no PERT analysis or priority coding of tasks. The good news: You get a full range of logical linkages between tasks, and *Harvard's* ability to automatically update subprojects—even if they're not loaded in memory—helps compensate for poor expanded memory support.

Resource handling is average. You can't fine-tune resource assignments with tools like prioritized resource leveling or hold a project finish to a fixed



SCREEN 2: This Project for Windows histogram shows that the engineering department will be overworked in late March and early April. The red area indicates overallocation.

You'll undoubtedly discover resource conflicts—people or material scheduled to be doing the wrong things at the wrong time. In the newsletter example, you may find that the photographer has too much work and the artist too little. Most packages solve such problems with a resource-leveling feature that suggests ways to avoid overscheduling. If your plan is resource-driven (it must ad-

just to resources), the program may advise that you slip your deadlines. If your plan is schedule-driven (meeting the deadline is all-important), it might suggest hiring a second photographer.

Cost Loading. Estimating costs is key to project management. You can relate cost to activity to time by assigning costs to resources, which you in turn assign to tasks. Another helpful budgeting

feature is cost loading—giving each task a monetary value. Either way, when you calculate the schedule, you can see how the total project cost spreads across all the tasks. Billings and progress payments are often based on cost loading.

Linking Tasks. You must link all tasks to show their relationship to or dependency on each other. There are various forms of link logic: A start-to-start link means that two or more tasks can start at the same time; a finish-to-start link means an activity cannot start until the previous one has been completed; and in finish-to-finish links, tasks must finish at the same time. Start-to-finish links ensure that a task cannot finish until another starts.

The CPM calculates early and late start and finish dates for each task and returns the float—the amount of time a task can be late in starting or finishing and still not delay its successors (free float) or the entire project (total float). If you stay on schedule, the float remains positive; fall behind, and you run into negative float, a situation best avoided. For more information on project management, contact the Project Management Institute, P.O. Box 43, Drexel Hill, PA 19026; 215/622-1796. —M. S. B.

date and ask *Harvard* to allocate resources within that limit. Instead, it will always extend the end date to accommodate overcommitted resources—bad news for schedule-driven projects.

With cost tracking, however, *Harvard* rises toward the top. It's the only package reviewed that lets you assign all three elements of cost—budget, actual, and target—directly to a task. Uniquely, *Harvard* doesn't require that you assign cost as a type of resource—you can cost-load the task itself.

Harvard's reporting facilities are middling—you can't create custom on-

screen reports. However, default designs are acceptable, printed output is similar to what appears on screen, and you can create custom templates. And its cash flow diagram, which shows expenditures over time, is a rare find.

Harvard Project Manager's easy interface is appealing, but it can't quite compensate for a dated feature set.

InstaPlan 5000 2.0

The \$495 *InstaPlan 5000* is far more sophisticated than the original \$99 *InstaPlan*, which is still available. It inte-

grates three options previously offered at extra cost: Tracker (which provides superb earned value and variance analysis), Notepad (an editor), and Classic PERT (which prints a network logic diagram). Despite fast performance and a low price, it's only a fair value. The Classic PERT module is flawed, there's no LAN or plotter support, and its poor support of subprojects limits its usefulness to smaller projects.

The 1-2-3-style menu interface is adequate but not very flexible. You can choose from outline, Gantt, PERT, task sheet, resource worksheet, and histo-

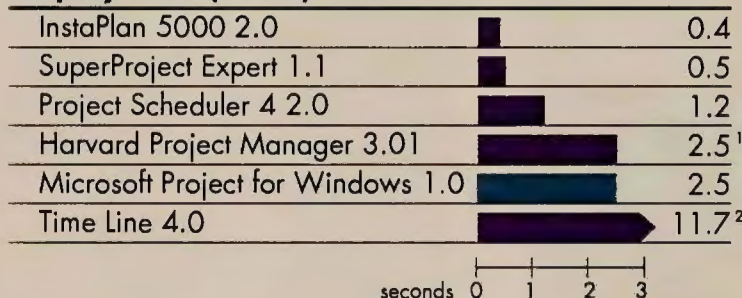
PC WORLD TEST REPORT

Project for Windows: Faster Than You'd Think

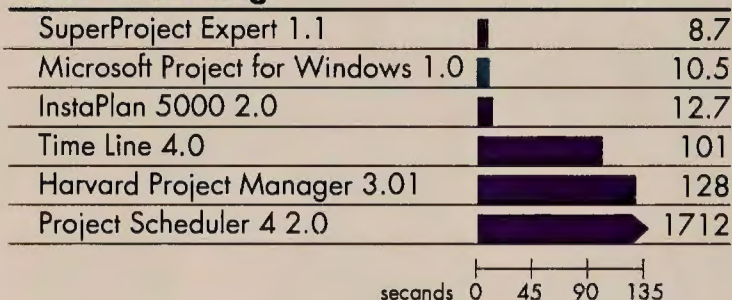
Although Microsoft Project runs under Windows 3.0, it's surprisingly fast, especially where it counts: displaying results of resource leveling and critical-path recalculation.

■ Best Buy

Display PERT (Gantt)



Resource leveling



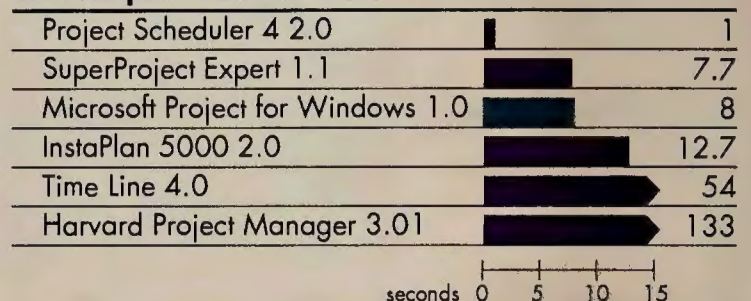
¹ First time; 0.4 for all subsequent changes.

² First time; 0.61 for all subsequent changes.

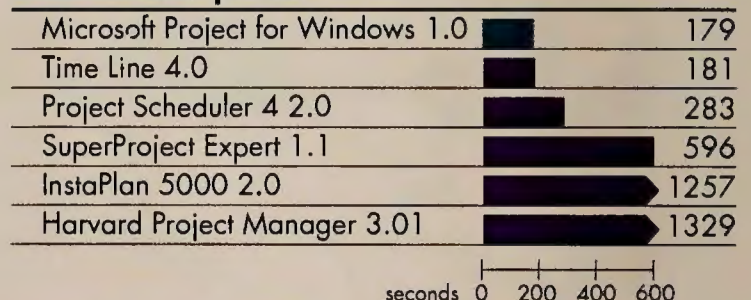
Methodology

All tests were run on a Compaq Deskpro 386/20e with 5MB of RAM and a 110MB hard disk. Compaq CEMM was used to provide 2MB of expanded RAM. The test project consisted of a master project (200 activities) with 2 subprojects (50 activities each). The master project incorporated 2 critical paths with 2 activities having no predecessors and 3 activities with no successors. Two of the final tasks (with no successors) were given a fixed completion date—one equal to the planned finish for the project and one with a completion date about midproject. The 2 subprojects had 2 critical paths with 2 tasks having no successors. One of the tasks in the master schedule with a fixed rate of completion represented subproject 1. Resources consisted of 4 resource types with different availabilities. Each activity in the master and in both subprojects was assigned all 4 resources for its entire duration.

Critical-path recalculation



Print to laser printer



Display PERT (Gantt)

This test measures the time expended in switching from a PERT to a Gantt chart display (or from a Gantt to a PERT chart display in some programs).

Resource leveling

This test measures the relative time necessary to level the test project when one resource's availability is cut from 8 hours to 4 hours.

Critical-path recalculation

This test measures the time spent recalculating the critical path after the end date is pushed back 10 days.

Print to laser printer

A PERT chart is printed to a Hewlett-Packard LaserJet III with 3MB of RAM. The printing was timed from the start of the print job to the return of cursor control.



Data based on tests designed and conducted by National Software Testing Laboratories (NSTL), Conshohocken, PA 19428. All rights reserved.

gram views, but you can't display them side by side or change their layout. Project control features, however, are tops. Notepad is great for documenting a project, and Tracker makes it easy to compare the original baseline schedule to actual performance.

The well-designed outline view is the heart of *InstaPlan*. You can easily enter task descriptions and durations or change the hierarchy of tasks simply by

moving them with the cursor keys. You can modify the printed Gantt chart to show dependencies, giving you a pseudo-time-scaled network.

But the built-in network diagram is abysmal. You can show only seven tasks on screen at once, and you can't print the diagram. To display a complete network, you must exit *InstaPlan*, load the Classic PERT module, and reload the project. Worse, the module won't display

the chart on screen, and it's quirky. When printing a 300-activity project, Classic PERT occasionally omitted printing some logical links. Also, the links cross over each other, making the chart hard to read.

Scheduling features are the weakest of the lot. You can't prioritize tasks or have multiple independent starts and finishes; there's no finish-to-finish logic; and subproject support is poor. To recal-

culate a schedule or level resources, you must append subproject tasks to the master. With most packages you just change a setting.

If you have subprojects, you'll find resource leveling so tedious that you'll rarely attempt it. But otherwise, resource features are capable and cost controls superb. The resource worksheet lets you view resource descriptions with capacity, unit cost, and profile (accrual method), so you can see the effect a resource assignment has on any task. An *x-y* chart displays the original resource plan versus actual use.

InstaPlan's character-based graphics are primitive. You can easily choose formatting defaults from a pick list for each supplied report style, but customization options are few.

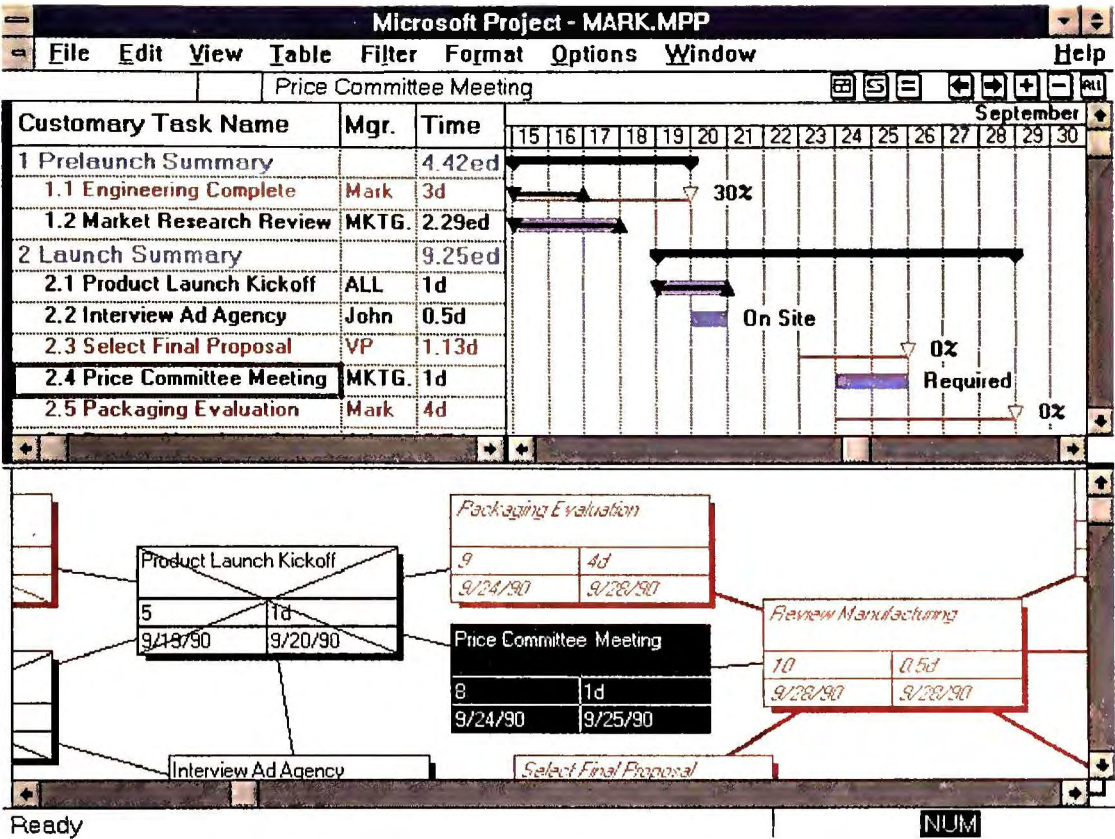
At \$99, *InstaPlan* was a great scheduling bargain. But at \$495, *InstaPlan 5000* doesn't cut it. This fall, look for an improved version 3.0. It will add plotter and LAN support, WBS coding, on-screen network diagrams, and more.

Microsoft Project for Windows 1.0

Microsoft Project for Windows all but replaces the character-based *Microsoft Project*, which is still being sold but not upgraded. With its graphical interface and exceptional integration between views, the \$695 *Project for Windows* gives you extensive control over the way you examine a project. It wins a Best Buy based on fast performance, a well-rounded feature set, and the most accessible interface of the group.

Designed for *Windows 3.0* (but also compatible with *Windows 2.x*), the program offers well-designed dialog boxes and pulldown menus. Thanks to *Windows 3.0's* improved memory management, *Project for Windows* was one of the fastest of the pack, delivering zippy leveling and recalculation.

Unfortunately, Microsoft omitted Dynamic Data Exchange (DDE), which enables *Windows* applications to automatically update each other—DDE



Project for Windows lets you combine views—in this case, a Gantt chart on top and a network diagram on the bottom. If you modify the Gantt chart, the network diagram changes, too.

would be a natural for project management. As a work-around, you can load the program alongside any *Windows* program and swap data via the Clipboard. LAN support is good and includes file locking.

Except for the lack of a WBS chart and time-scaling in the logic diagram, you enjoy a full complement of views—and they're the most flexible in the roundup. Aside from the histogram, every view is also an interactive doorway to data entry. To add a task box to a network diagram, for example, you click on the screen, draw a box, and drag a line from inside an existing task box to a new place on the screen. Release it, and a new task box appears.

You can construct and save any custom combination of views and add it as a menu option. Project control features are first-rate: You can attach unlimited notes to a task and globally copy tasks between projects.

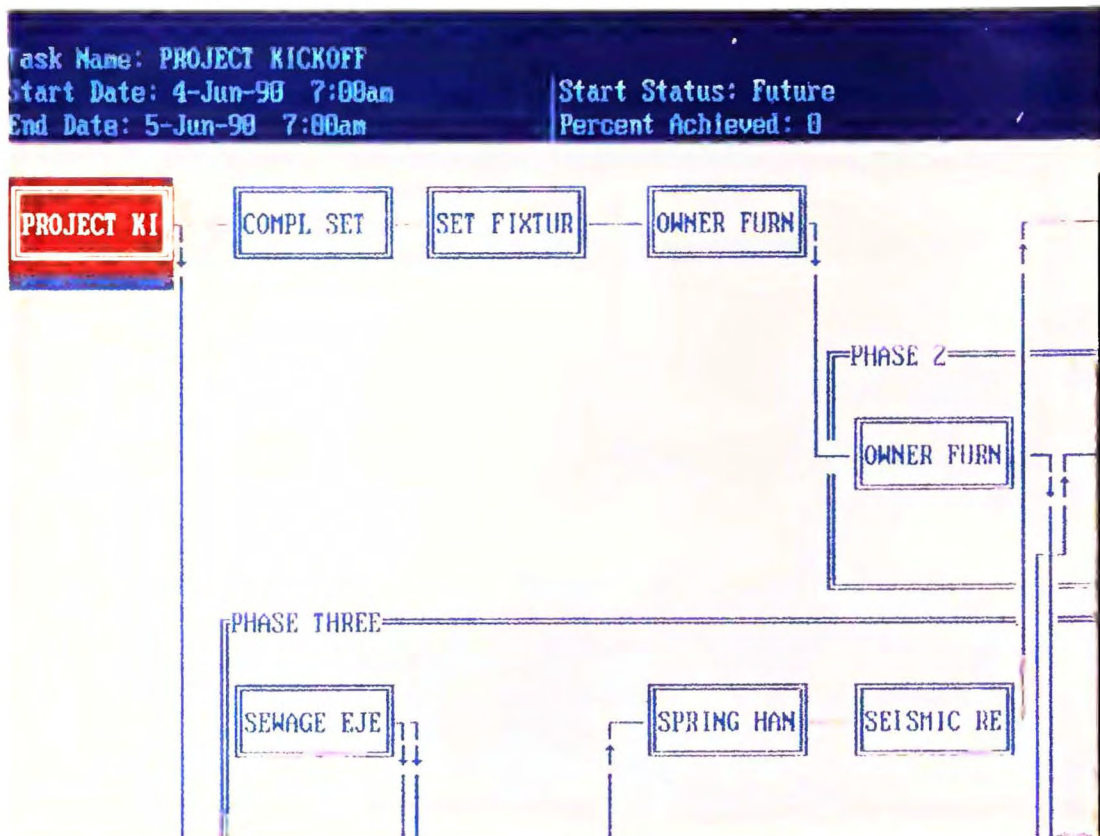
Project for Windows is a talented scheduling tool. You get capable task constraints and a full set of lead/lag features. The latter lets you enforce delays in a project when a task to which other tasks are linked is late. You can

even define two activities as the start of a single project. This would be handy, for example, if two different divisions were making parts for one product. You can assign priorities to a task and change the CPM threshold. The only major omission is PERT analysis.

Project for Windows's support for expanded memory is a blessing if you're juggling subprojects. Like *Harvard*, it can automatically update multiple projects in memory. The top-notch resource planner offers overtime calculations and shift scheduling. However, unlike *Harvard*, it doesn't support non-resource-based cost features. Worse, its histogram limits you to one resource at a time—you can't view all resources in a project simultaneously.

The report writer is the best of the bunch, and printed charts mimic screen versions. A few layouts are poorly designed, but you can change them by rearranging elements, changing fonts, and customizing legends.

If PERT analysis, WBS charting, or cost analysis isn't high on your list, the choice is clear. *Microsoft Project for Windows's* intuitive interface and impressive features add up to a Best Buy.



Time Line 4.0's pseudographical interface lets you arrange task nodes with a mouse, but unlike with *Project for Windows*, establishing new linkages still requires keyboard input.

Project Scheduler 4 2.0

Until *Project for Windows* arrived, Scitor's \$685 *Project Scheduler 4* was the only full-featured, graphical project manager around. Fast and fairly easy to use, it remains a superb choice, and it's your best bet if you need PERT analysis, which is handy for time-critical projects. It edges out all but *Project for Windows*.

Scheduler 4 is fast unless you want to level resources. It zips between views more quickly than *Project for Windows*, and its recalc time beats all comers. However, leveling a 300-task project took an unacceptable 26 minutes.

Scheduler 4's, GEM-like interface is a pleasure to use. You can change expertise levels, reducing error and help messages for advanced users and guiding beginners with suggestions.

Compared with *Project for Windows*, however, the interface is only partially interactive. To enter a task on a network diagram, you must first access the task entry form and create the task definition before clicking the task onto the screen. In addition, because tasks in the network snap to a grid when

moved or created, you can't squeeze them as close together as you can with *Project for Windows*. You can connect tasks by clicking and dragging, but you must drag the line in the opposite direction of the dependency—not very intuitive. On the plus side, you can see the critical path shift as you add or delete

For a graphical interface and PERT analysis, Scheduler 4 is the answer.

tasks, and you can even zoom the diagram to four magnification levels.

Scheduler 4's ability to handle real-world logical relationships between tasks, such as start-to-finish links, makes it the most flexible scheduler in the group. It gives a full report of negative float, and it offers PERT analysis. It's easy to switch between subprojects, but you can't automatically update them until you load them into memory.

Resource features are also respectable. You can draw from a common re-

source pool and easily level multiple projects. Cost controls are tightly wedged to resources, but you can get separate cost reports based on resource use. *Scheduler 4*'s unique inflation factor accurately reflects cost over time.

Graphics support can't quite match *Project for Windows*. For text-based reports, a modest report writer provides various templates and lets you select data elements but not their widths. On the other hand, you have good control over network diagrams, including zoomed printouts, and the default layout is easy to read. You can select fonts, but you can't customize the placement of legends and other elements. You can also print a handy cash-flow diagram.

If you want a graphical interface and PERT analysis, *Project Scheduler 4* is the answer. But most will find *Project for Windows* the better choice.

SuperProject Expert 1.1

Computer Associates' \$695 *SuperProject Expert* is the most powerful project manager in the roundup, offering the best resource features of the pack. Performance is superb, with fast recalc, leveling, and view switching. Although its confounding interface and limited graphics keep it from the top slot, it's a solid value for project professionals who don't need the huge capacities of higher-end systems.

SuperProject's 1-2-3-style interface lacks mouse support, and it often skimps on good manners. There are too many conflicting methods for navigating and for entering data. When you make a menu selection, you're kicked back several levels to a main menu and have to claw your way back. (Fortunately, you can hopscotch menus with hot keys.) Also, within data entry forms, there's no clear indicator for where to enter data.

You can enter data via an outline, Gantt chart, network diagram, or WBS chart, but there's no spreadsheet view. Data entry can be awkward—if you try to assign a nonexistent resource, *Super-*

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- Edward Mendelsohn,
PC MAGAZINE Associate Editor

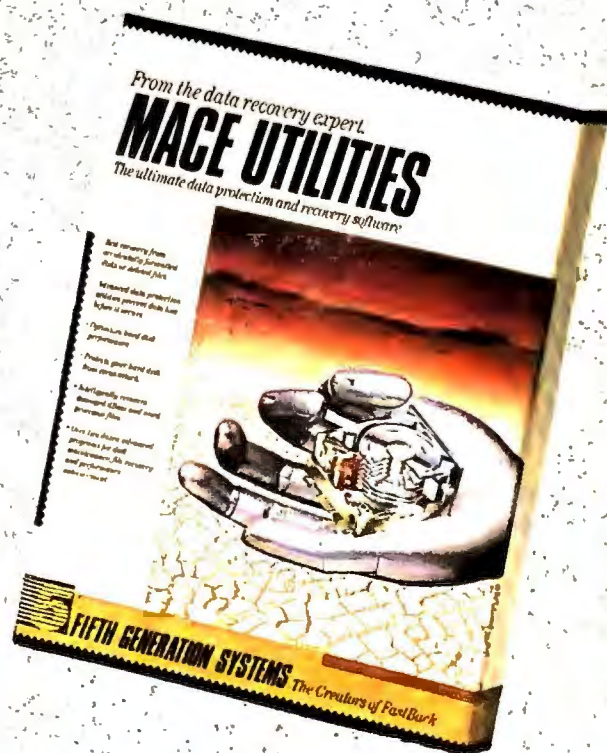
Now that the jury is in, a lot of people who bought Peter Norton's Norton Utilities Advanced Edition *wish* they had bought Paul Mace's Mace Utilities Version 1990 *instead*.

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EXECUTIVE SUMMARY

Project Management Gets Graphical

Flexible new interfaces and presentation graphics lead the way.

Project management software can help you keep projects on deadline and under budget. Designed for planning and monitoring complex jobs, these midrange packages also help you persuade others to go with the project in the first place, thanks to their ability to create impressive presentation graphics.



Microsoft Project for Windows wins a Best Buy based on its superb tools for juggling resources and its stunning graphics. Its real charm, though, is its malleable graphics-based interface, which makes it a hands-down pick for top honors in the ease of use category. The other graphical contender, **Project Scheduler 4**, takes second place. It's not quite as flexible, but it's your best bet if you need PERT analysis.

	Harvard Project Manager 3.01	Instaplan 5000 2.0	Microsoft Project for Windows 1.0	Project Scheduler 4 2.0	SuperProject Expert 1.1	Time Line 4.0
Data entry	Foir	Foir	Excellent	Good	Fair	Good
Scheduling	Foir	Poor	Good	Excellent	Excellent	Good
Resource management	Foir	Foir	Excellent	Good	Excellent	Poor
Reporting	Fair	Fair	Excellent	Good	Fair	Excellent
Performance	Poor	Good	Excellent	Good	Good	Foir
Cost analysis	Good	Good	Fair	Foir	Good	Foir
Capacity	Foir	Good	Good	Good	Good	Good
Ease of use	Good	Fair	Excellent	Good	Poor	Good
Overall value	Poor	Foir	Excellent	Good	Good	Good
			BEST BUY			
Reader service no.	660	661	662	663	664	665

How we rate project management packages
We rate these packages based on information in the Features Evaluation and the PC World Test Report, combined with our hands-on evaluation of user benefit and ease of use. Data entry and scheduling features are of prime importance, followed by resource and reporting features and then performance, cost analysis, and capacity.

Data entry refers to the ease and effectiveness of entering data. This covers the quality and variety of the views and the simplicity of ways to enter data. To earn an Excellent rating, a package must demonstrate multiple views of a project and allow direct editing and entry. Important but less critical features include the abilities to add notes to tasks, handle errors effectively, and impart a project from another program.

Scheduling refers to realistically modeling the scheduling idiosyncrasies of a real-life project. To earn an Excellent rating, a package must conform to the critical path method and provide a full range of start and finish link logic, including the ability to delay or otherwise constrain tasks. Also critical is the ability to integrate and update subprojects.

Important but not critical features include flexible duration measures and the ability to change the critical path threshold.

Resource management applies to the handling of people and things to avoid under- or overutilization. To earn an Excellent rating, a program must be able to perform resource leveling across multiple subprojects and handle multiple resource assignments across several tasks with associated costs. Important but less critical features include lead/lag assignments and application profile functions.

Reporting evaluates the programs' ability to generate presentation graphics and examines the quality and flexibility of text reports. To earn an Excellent rating, a program must generate attractive graphic output of all on-screen views and work with a variety of printers, plotters, and slide cameras. Also important is the ability to define column widths in text reports, control legends and fonts, and modify default graphics layouts.

Performance evaluates speed tests shown in the PC World Test Report. To earn an Excellent rating, a program should provide fast network recalculations and resource leveling and be able to quickly

send data and graphics to plotters and laser and dot matrix printers. The ability to quickly switch between views is also measured.

Cost analysis refers to financial management features. To earn an Excellent rating, a program must be able to tag and track the cost of each task and provide earned value analysis.

Capacity refers to the number of activities and resources a program can handle before it slows considerably. To earn an Excellent rating, a package must fully support expanded memory and easily handle more than 500 activities in a single project.

Ease of use evaluates the ease of learning and using the program. To win an Excellent rating, a program should provide understandable manuals, good tutorials, context-sensitive help, clear menus, and straightforward data entry and project manipulation.

Overall value combines the scores for all the above criteria, given the weights indicated, with an eye toward price and technical support.

Project reports the error but forces you to quit the task form and call up the resource form to create the resource. Only then can you return to the task

form to enter the resource. Purely character based, *SuperProject Expert* doesn't tap the extended character set that makes *Harvard's* di-

agrams so readable. On the plus side, you can edit a task block right in the network diagram. Fortunately, superb scheduling fea-

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The term *project management* embraces everything from shareware Gantt-chart packages to mainframe programs costing millions of dollars. In the PC realm, however, a typical high-end package costs \$1000 to \$5000 and requires a project management professional at the keyboard. Not surprisingly, many of these powerful programs are descended from mainframe farebears and can

share data with larger systems.

Most high-end programs are aimed at tackling huge projects (like managing the construction of a housing development) and tracking an incredible array of important details (such as precise budget breakdowns for each element of a task). Most offer extensive network functions, can track tens of thousands of activities with hundreds of data items,

and come with a variety of sophisticated canned reports. They offer far more comprehensive resource management and cost analysis features. Here is contact information for the major high-end PC packages. —M. S. B.

For more information about all products in this sidebar, circle reader service no. 905.

WHERE TO BUY

Advanced Project Workbench

Applied Business Technology Corp.
361 Broadway
New York, NY 10013-3908
212/219-8945
LIST PRICE: for 1-4 users, \$1275 per user; for 5-9 users, \$1083 per user; for 10-29 users, \$956 per user
Reader service no. 690

Artemis Project

Metier
2900 North Loop W #1300
Houston, TX 77092
713/956-7511

LIST PRICE: \$3750
Reader service no. 691

Micro Man II

POC-IT Management Services, Inc.
429 Santa Monica Blvd. #460
Santa Monica, CA 90401
213/393-4552
LIST PRICE: \$2895
Reader service no. 692

Open Plan 3.2

Welcom Software Technology
15995 N. Parker's Landing #275
Houston, TX 77079

713/558-0514
LIST PRICE: \$4200, for 4 users \$14,000; OPERA (Open Plan Extension for Risk Analysis) \$2200, for 4 users, \$6100; COBRA (Cost Breakdown Application) \$5000, for 4 users, \$15,700
Reader service no. 693

Primavera Project Planner 4.0, Primavera Finest Hour

Primavera Systems
2 Bala Plaza
Bala Cynwyd, PA 19004
800/423-0245,

215/667-8600
LIST PRICE: Planner \$2500 (\$4000 with graphics), Finest Hour \$5000
Reader service no. 694

Promis 3.0

Strategic Software Planning
150 Cambridgepark Dr.
Cambridge, MA 02140
800/783-1504, 617/354-1504
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Reader service no. 695

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Professional 2.0

Project Software Development Inc.
20 University Rd.
Cambridge, MA 02138
800/366-7734, 617/661-1444
LIST PRICE: \$2500, for 4 users \$8600
Reader service no. 696

ViewPoint 4.0

Computer Aided Management
1318 Redwood Way
Petaluma, CA 94954
800/635-5621, 707/795-4100
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Reader service no. 697

tures make up for an awkward design. Like *Scheduler 4*, *SuperProject* offers true PERT analysis, and it also lets you set critical path thresholds. And you can easily tag activities and copy them en masse into a new subproject.

SuperProject's resource tools are tops. The package offers the best earned value analysis of the lot, with both schedule and cost variance reporting—a must for government or military contracts when you need to report real progress versus the original plan. The program can handle overtime rates (good for projects with multiple work shifts or projects on a do-or-die dead-

line), independent resource calendars (handy for adjusting for sick days), and fixed and variable costing of the same resource (good for equipment with both an initial cost and an hourly operating cost). You can also make a resource lag behind the start of a task, so you can begin charging after the task has begun. However, there's no separate costing module.

The report writer is mediocre, and the program's character-based graphics are uninspiring. However, you get superior plotter color control. Comprehensive LAN support includes file locking and the ability to create, link, and

lock LAN subdirectories.

With its LAN support, technical depth, and strong subproject handling, *SuperProject Expert* would work well for group planning. If the program's promised graphical interface arrives this fall, it might move to the top.

Time Line 4.0

This newest version of Symantec's *Time Line* still offers a character-based interface, but it looks and feels graphical, and you can now drive it with a mouse. Also new are WBS charting, macros, and a spreadsheet view. At \$695, version

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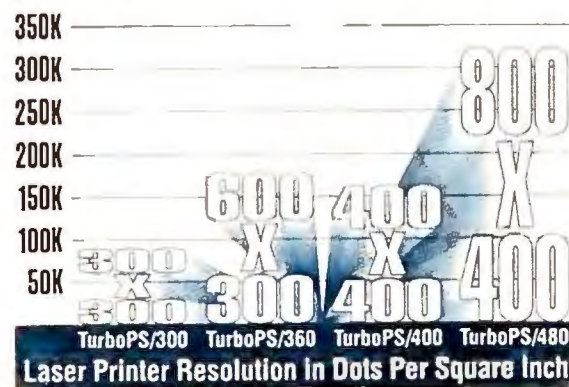
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4.0 adds \$100 to its price tag, but it includes some charts that were previously available only in the now-defunct \$195 *Time Line Graphics*. Although *Time Line* is a good value if you need top-notch graphics, its sluggishness (it takes almost 12 seconds to switch between views) and poor resource and subproject handling keep it from winning top honors.

Time Line's reputation for ease of use is enhanced by two macros that walk you through your first project—a real boon to novices. Data entry is much simpler thanks to a new spreadsheet view. You can't edit a task right in a spreadsheet cell, but you can click on the data and fill in a pop-up form.

The new network diagrams look better, but *Time Line* makes poor use of the mouse when linking tasks. Although you can point, the actual linking requires typing. As with *Harvard*, *Time Line*'s pseudo-time-scaled network displays activities' timing but not their duration. The new WBS input mode automatically numbers WBS levels, but the graphic is based on outline levels, not WBS structure.

Resource management is the weakest of the group. You can level within available slack, so if an employee's assignment is impossible to accomplish, the task's duration is stretched out. You can also exclude tasks from leveling—an employee can remain overcommitted because you expect him or her to work overtime. But there are no individual resource calendars, and you can't level a common pool of resources across projects. Worse, as with *InstaPlan 5000*, you must copy subprojects into the master in order to level them. Cost features are adequate—you get variance and earned value analysis and fixed and variable resource cost functions.

Time Line's presentation graphics even best *Project for Windows*. You can generate true graphics files and preview them on screen. You can design your own charts with shadows, drop lines, and fonts, and you can place dotted lines around zones of tasks. Support for output devices is superb, and the ability to output to formats such as CGM lets you easily polish graphs in a true graphics program.

Time Line 4.0 improves on a good

product. But it can't compete with pure graphical packages, especially if you need solid resource management.

Going Graphical

Considering the respectable speed of the two graphics-based packages, there are few good reasons not to go graphical. The ability to manipulate views with a mouse and customize multiple-view displays takes a lot of the sting out of project management. *Microsoft Project for Windows* wins the Best Buy by virtue of its speed, ease of use, and technical competence, and *Project Scheduler 4* comes in second.

Increased competition calls for better project handling. Thanks to easier software, you don't have to be an expert to keep your projects on track. ☺

Mark Burgess is president of Knowledge Works, Inc., in San Diego and of the Project Management Institute's San Diego chapter.

For more information about all products in this article, circle reader service no. 904.

WHERE TO BUY

Harvard Project Manager 3.01
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94039-7210
415/962-8910
LIST PRICE: \$695
REQUIREMENTS: 512K, hard disk, DOS 2.0 or later version
TECHNICAL SUPPORT: unlimited, toll number, M-F 7-4
OTHER SUPPORT: 90-day warranty, CompuServe SPC
Reader service no. 660

InstaPlan 5000 2.0
Micro Planning Int'l
655 Redwood Hwy.
#311
Mill Valley, CA 94941
800/852-7526,
415/389-8046 (fax)

LIST PRICE: \$495
REQUIREMENTS: 510K, hard disk, DOS 2.0 or later version
TECHNICAL SUPPORT: unlimited, toll number, M-F 9-5
OTHER SUPPORT: 30-day guarantee, training available
Reader service no. 661

Microsoft Project for Windows 1.0
Microsoft Corp.
One Microsoft Way
Redmond, WA 98052-6399
206/882-8080
LIST PRICE: \$695,
\$595 per LAN user
REQUIREMENTS: 1MB, hard disk, Windows 2.11 or later version, DOS 3.0 or later

version
TECHNICAL SUPPORT: unlimited, toll number, M-F 6-6
OTHER SUPPORT: newsletter
Reader service no. 662

Project Scheduler 4 2.0
Scitor Corp.
393 Vintage Park Dr.
#140
Foster City, CA 94404
415/570-7700
LIST PRICE: \$685
REQUIREMENTS: 512K, DOS 2.0 or later version, graphics display, hard disk
TECHNICAL SUPPORT: unlimited, toll number, M-F 8-5
OTHER SUPPORT: BBS, training courses
Reader service no. 663

SuperProject Expert 1.1
Computer Associates Int'l, Inc.
1240 McKay Dr.
San Jose, CA 95131
800/531-5236,
408/432-0614 (fax)
LIST PRICE: \$695,
three-user LAN Pack \$695
REQUIREMENTS: 360K (LAN version 460K), DOS 2.0 or later version, hard disk
TECHNICAL SUPPORT: 6 months free, toll number, M-F 7-5
OTHER SUPPORT: 6-month warranty, toll-free number, additional support \$195 per year, newsletter
Reader service no. 664

Time Line 4.0
Symantec Corp.
10201 Torre Ave.
Cupertino, CA 95014
800/441-7234,
800/626-8847
California
LIST PRICE: \$695, LAN Pack \$295 per LAN user
REQUIREMENTS: 640K, DOS 3.0 or later version, hard disk
TECHNICAL SUPPORT: unlimited, toll number, M-F 8-4
OTHER SUPPORT: 30-day guarantee, training available, newsletter, CompuServe forum (GO SYMANTEC)
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Ten Tips for Project Sanity

If project management software is the right tool for your job, following these tips can put your company and your career in the win column.

Mark S. Burgess

More and more businesses are finding project management software helpful in the battle against delays and cost overruns. But it's not fail-safe. Some users waste time mastering a complex package when a simple scheduling program would work better. Others fail to monitor projects accurately or to update schedules. Often companies don't provide enough training and support.

Yet project management can pay off substantially if you learn how to avoid common pitfalls. Here are ten tips that can keep your project on the critical path. They're illustrated with anecdotes and advice from project experts and casual business users who have been down that path before.

1. Plan Realistically

Define the project accurately and be realistic about how many tasks you can monitor. If you lump tasks under a single heading, you'll quickly lose control. As a rule of thumb, no task should exceed two weeks. Like a project, a task must have a specific start and finish, and there must be a way to tell when it's done. Lengthy tasks often hide smaller segments that should be tracked more closely.

On the other hand, if your plan is too detailed, you'll never be able to monitor it. "I don't have time to track 400 activities on a project that will only last a month or two," says Floyd Keneipp, senior manufacturing engineer with Unisys in San Diego. Keneipp turned to *Time Line* to schedule improvements to a semiconductor assembly facility. "I have to compromise between having

enough detail to show reality and having so much that I spend all my time updating the schedule."

2. Plan Ahead

Is the project schedule- or resource-driven? Set the ground rules early for how your company will deal with project snags. To meet the original deadline,



Liz Walton used *Time Line* to coordinate the single-day acquisition of 25 bank branches.

will you spend more money to acquire more human and material resources? Or is your budget so tight that you're willing to let the schedule slip?

For Liz Walton, project specialist with Walton Enterprises in San Diego, project management software helped establish where to draw the line. Walton tapped *Time Line* to help install a communications network between Great American Bank in San Diego and 25 branches of newly acquired Capital Savings and Loan in Seattle. Instead of phasing the system in gradually, Great American opted for a "flash cut," in

which all 25 branches switched systems on a single day.

The flash-cut deadline could not slip without great expense and trouble, so the project was decidedly schedule-driven. "*Time Line* forced me to scope out the specifics ahead of time," says Walton. "It showed us before we started that our plan overcommitted human resources. Because we knew from the start that 10- or 12-hour days would be the rule, we avoided schedule slips, and there was no panic at the end."

3. Develop A Master Project

If your projects tend to be similar, you can save time by creating a master model that you can modify for each new project. Keith Liggett, product manager for Backroom Systems Group, a 40-person software development firm in North Carolina, uses this system to speed project acceptance: "We've developed a model that represents our project baseline tasks," says Liggett. "I copy that model for a new project, populate it with new resources and costs, and add new tasks and delete irrelevant ones. Because everyone concurred on the master, getting agreement on each new project schedule is much easier."

4. Assign Responsibility

To make progress reporting consistent, each task should have only one person responsible for it. This not only helps ensure that the job gets done but makes it easier to track the project.

5. Be Skeptical of Resource Leveling

When using automatic leveling to determine how to adjust underutilized and overutilized resources, inspect the resulting schedule carefully. Usually, the advice is good, but these packages don't always take into account factors that humans take for granted. For example, if you find the program showing that resources should be applied 100 percent

(continues)



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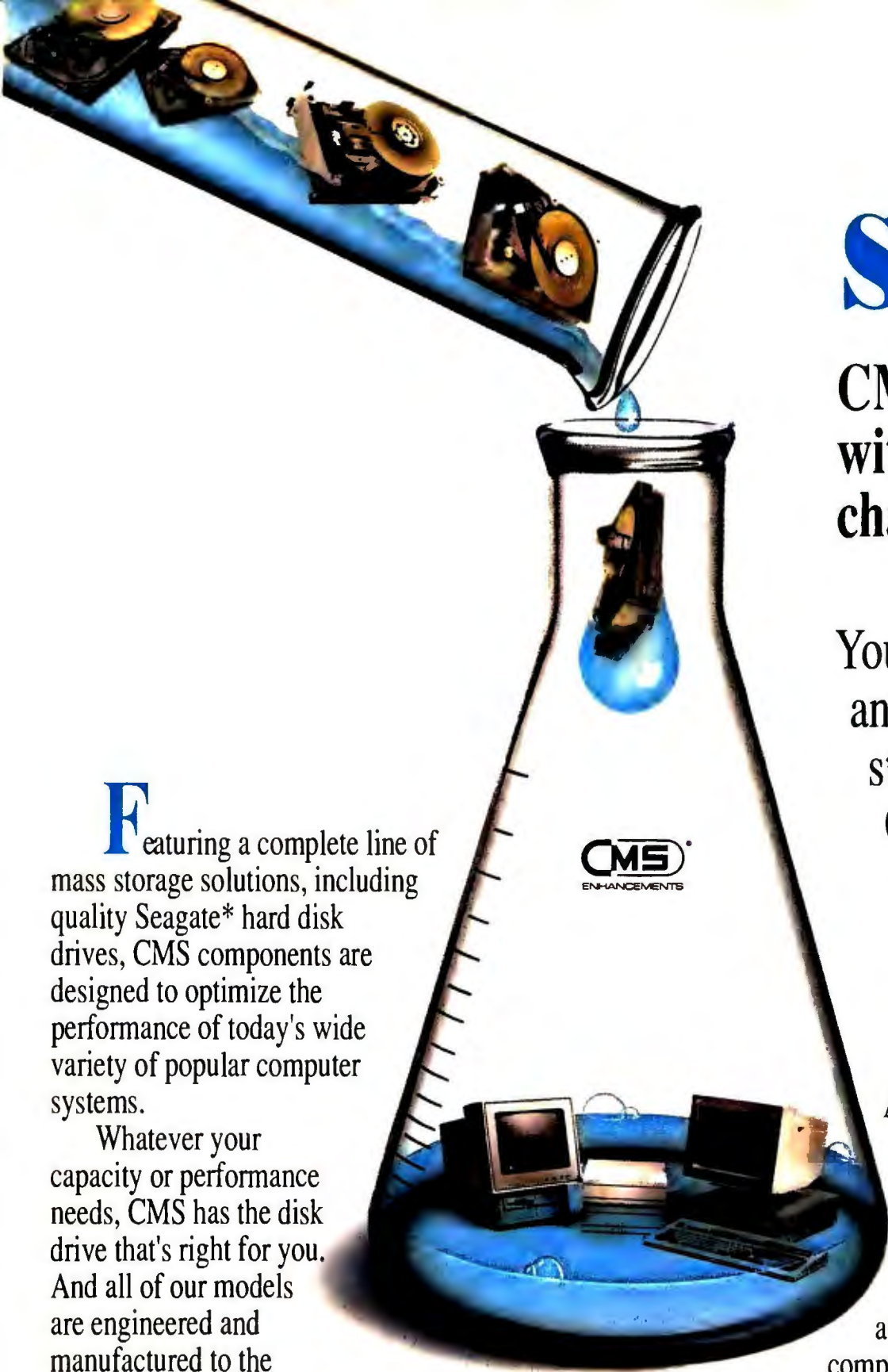
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Ten Tips

(continued)

between Christmas and New Year's, change the project calendar or resource availability rules—or, if you subscribe to the Scrooge school of management, start canceling vacations.

6. Avoid Including "Trust Me" Activities in the Schedule

These are long-term activities, performed by employees such as security guards or receptionists, that can't be broken down into smaller tasks. If you have to include such activities for costing or resource planning, use a program that supports level of effort (LOE) calculations, which spread resource and cost figures over the length of the project.

7. Use Graphics to Explain

Generating a good plan is important, but tracking and communicating progress can be almost as crucial. Project management fails if the manager is the only one who understands what's going on. The people involved need to know how they fit into the project as a whole.

This is where graphics come into play. "Time Line's graphics let me shorten my conversations with everyone, so I can get more done," says Unisys's Keneipp. "Now when I go to Quality Assurance to persuade them to certify a machine, I can point to a Gantt chart they've seen before and show them why I need priority."

Skip Andrews, manager of information systems at Hybritech, a biotech firm in San Diego, used *Harvard Project Manager* graphics to help the data processing department coordinate a site move. Seeking to minimize computer downtime, Andrews visited each department member with charts in hand. "The charts let me show each person's move and how it affected their neighbors," he explains. "It made it easier to handle the requests for 'just one more day' delays."

8. Use Graphics to Persuade

Graphics are even more important if you need to sell the project at the initial presentation. Many businesses include project management graphics in their customer proposals to communicate project logic and planning ability. Use the right graphic for the audience. Don't present a network logic diagram to show progress, and don't use a Gantt chart to show project logic.

Also, don't be afraid to show off. "Our clients are always impressed when the network diagram for their project is up on the wall," reports Bob Miller of Practice Management Professionals, an engineering firm in San Diego. "Sometimes it's the first time they've ever seen the whole project described. It gives us a place to point to in our discussions."

9. Monitor the Project Until It's Done

Too many managers use project software to plan and persuade, only to set it aside and let the project take its own course once it's approved. Simple projects may not require much scrutiny, but larger projects can quickly go astray without a guiding hand.

Another benefit: Saving ongoing updates develops a record that may come in handy later. "Sometimes we don't maintain the schedule when a project gets rolling," says Miller, "but we end up paying for it when we try to reconstruct what happened later. We try not to let that happen too often."

Project software depends on the critical path method (CPM), which spotlights tasks whose delay would hold up the overall project. But to stay focused on the truly critical tasks, it's vital that you update the model as the project changes.

Hybritech's Andrews found the CPM to be an indispensable ally in his moving project: "In the beginning, it looked like we could move everyone when it was convenient," says Andrews. "But the schedule showed that the order we did

things in mattered." *Harvard Project Manager* helped Andrews spot hidden problems. "Sometimes one person needed to move to free up three new spaces. It wasn't obvious without the software."

10. Discriminate Between the Critical and the Merely Important

If all your tasks are critical (that is, a one-day delay in any of them will delay the project), you need to change your plan's logic. You may need to work on some tasks simultaneously—which may mean shifting resources.

Ben Martin, president of the civil engineering firm CEPA in San Diego, relates a common story that points out the perils of ignoring the critical path. "A manager gets chewed out because his building project is behind schedule," says Martin. "He looks over the unfinished work and searches for a way to get back on schedule. He finds he has the material and personnel to build the sidewalk around the building, so he gets everyone in gear to build it. Next week, the sidewalk is built, but because it wasn't a critical task, the project is further behind than before."

Time to Do It Right

There's an old saying: "You never have time to do it right the first time, but you always have time to do it over." Project management software helps you do it right the first time by forcing you to devise a strategy and prioritize specific actions. As resources become scarcer and competition in business grows keener, project management can separate the profitable companies from the also-rans. If you make the commitment to follow the project through to the end, you might just put your company in the win column. ☺

Mark S. Burgess is president of Knowledge Works, Inc., in San Diego and of the Project Management Institute's San Diego chapter.

The Spreadsheet Connection:

Your spreadsheet is the ideal analytical tool, but the numbers are locked up in a data base? No problem. Simple add-ins make the connection easy today, and big payoffs are just around the corner, when high-powered network servers can connect your spreadsheet to far-flung corporate data bases.

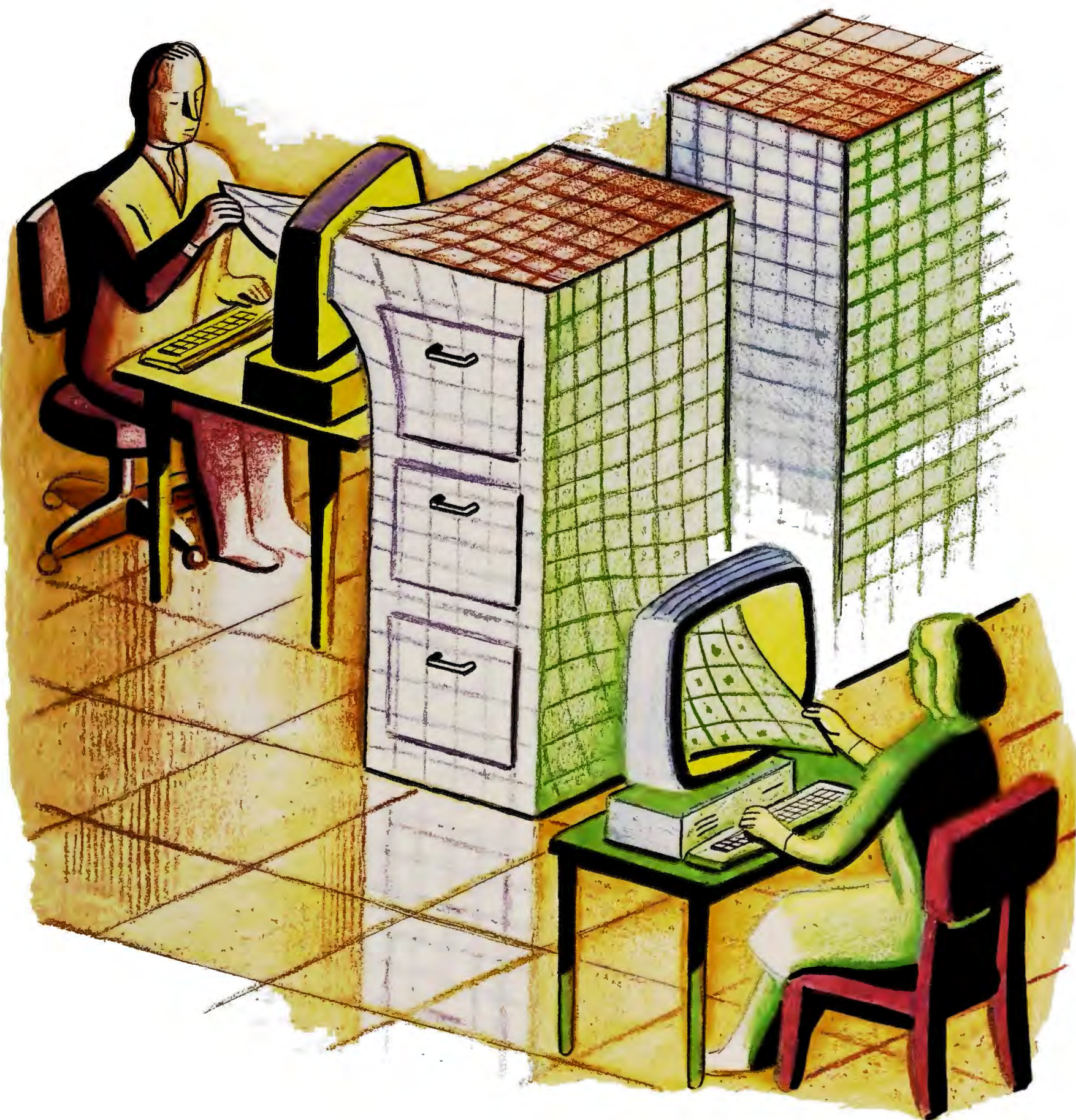
It's hard to imagine a more perfect union than that of the spreadsheet and the data base. Developers on both sides of the aisle are creating ties that will let you quickly and easily bring your company's data—regardless of its location or the hardware platform on which it resides—into the application best equipped to make sense of it all: your spreadsheet. And none too soon.

Consider this scenario: As sales manager for a midsized retail chain, you need to provide your boss with sales reports by product and region. But the data you need isn't collected in

Roberta

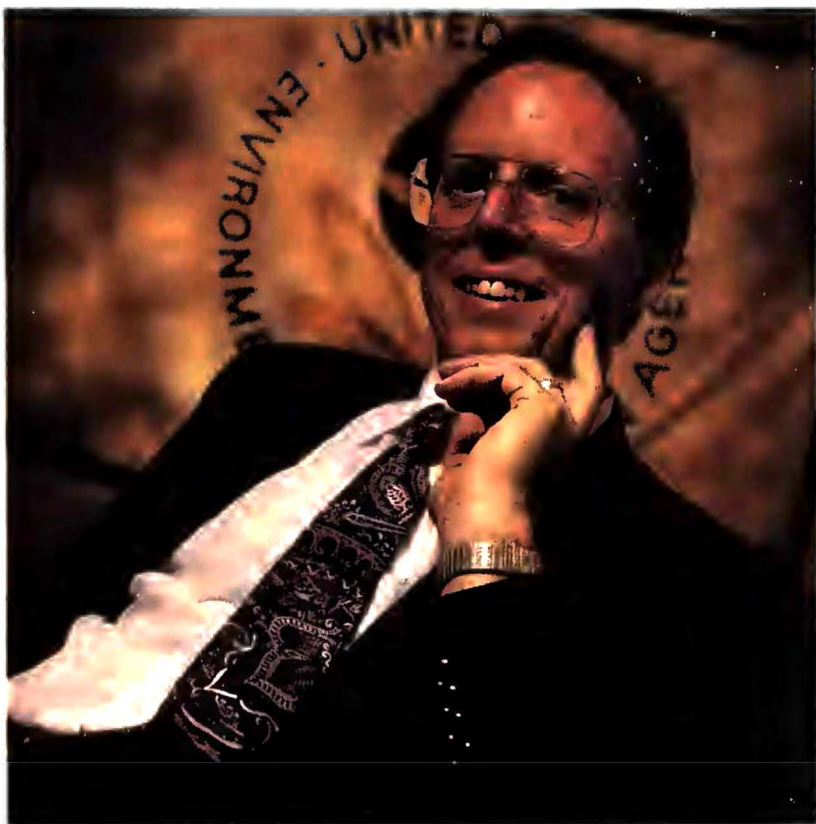
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From Data Base to Decision



PC format; it's stored on your company's minicomputer, under the data processing staff's lock and key. You dutifully complete a programming request, swap a few telephone calls and memos, and wait patiently for your batch job to be completed.

Unfortunately, there's a backlog, and by the time you get the numbers you need—hidden amidst a mass of unusable data—the market has changed, and so has your boss's opinion of your management capabilities.



"It used to be a struggle to get the information," says EPA staffer Brand Niemann, who uses a 1-2-3/dBASE link to calculate pollution allowances under the Clean Air Act.

Sound familiar? Although today's spreadsheets are equipped with unparalleled analytic potential, the raw data you need to conduct analyses and make more informed decisions is often held captive on larger systems or in formats not easily manipulated by your spreadsheet.

Even if you're lucky enough to have a 3270 board in your PC, you've got to step through a complex conversion process to bring the information into a file format and data structure you can use. Extracting data from a mainframe generally involves exiting your spreadsheet, using PC-to-mainframe software to go into terminal emulation, downloading an entire data base to your PC, exiting the terminal emulation program, and then importing the data into your spreadsheet. And after all that work, you don't always end up with the precise information you need.

Making Connections

Leading spreadsheet and data base developers are working to smooth the data connection so you can tap directly into corporate data bases—across hardware platforms and file formats—from the comfort of your favorite spreadsheet. In fact, you already have a pretty good reach when the data is held in PC data bases; with Lotus's *1-2-3*, Microsoft's *Excel*, and Borland's *Quattro Pro*, you can read the endless ranks of *dBASE* files without ever leaving your spreadsheet. *Quattro*

Pro also reads *Paradox* and *Reflex* files, and you can expect all these companies to add more hooks in the future.

Brand Niemann, a special assistant with the Acid Rain Staff of the Environmental Protection Agency in Washington, D.C., knows firsthand the difference a driver can make. Niemann is responsible for calculating pollution allowances under the provisions of the Clean Air Act for each of 2400 U.S. power plant units. To do so, he needs to pull in data from seven *dBASE* data bases according to one of 14 different allowance categories.

"It used to be a struggle to get the information," Niemann recalls. He could either spend hours typing all the necessary data into his worksheet or import an entire data base into *1-2-3*. But if the data base had more than 8000 rows, he'd run out of memory and have to break the data base into different worksheets. Then he couldn't analyze and query the whole data base in one pass. Now Niemann can grab all the *dBASE* data he needs from within *1-2-3* release 3 with only a few keystrokes, and he doesn't need to know a thing about *dBASE*. "That's the big advantage," says Niemann.

Spreadsheet-to-data-base links of this kind cost little or nothing in learning and training time. And since they're either bundled with the spreadsheet or sold as low-cost add-ons, they'll have little impact on your budget. But what you really want is to grab *all* appropriate business data—wherever it resides and regardless of file format. To do that you'll need more sophisticated software and a bigger budget.

Parlez-Vous SQL?

A new generation of powerful data base software, network SQL (Structured Query Language) servers, suggests a far more flexible (if more expensive) solution (see "Well-Connected Data Bases," August 1989). Your company may already be planning to install one of these servers to handle transaction processing and other traditional data base tasks, but you may ultimately find SQL data base servers even more useful for slicing off chunks of valuable data for spreadsheet analyses.

For example, Canadian National Railways in Montreal, Canada, has installed the *Microsoft/Sybase SQL Server*, enabling its staff of financial analysts to access data via *1-2-3* and *Excel*. One of the biggest benefits of the connection, says Ronan McGrath, vice president and controller, is that each user can take a unique view of the same data. One analyst, for example, may use the information to determine the profitability of a particular train route based on the level of traffic and on maintenance costs, while another evaluates the railway's competitive position vis-à-vis other modes of transportation based on the type of cargo and the distance it is carried. The biggest task when setting up the system was extracting all the historical data required to complete detailed cost analysis and bringing it into *SQL Server*. Now relevant data is downloaded once a week, which is a relatively straightforward process, says McGrath.

Despite the sophistication of the technology, you don't need to be a Ph.D. to use this querying system, which supports users from "a very basic level to more sophisticated levels in the same environment," according to McGrath.

Why a Spreadsheet?

Data base vendors are furiously grinding out front-end ("client") packages and promising users easy and straightforward access to SQL data base servers. But regardless of how user-friendly these applications become, they still are basically report generators without the what-if tools spreadsheets provide. Then too, "spreadsheets represent a familiar environment for users," says David Kaplan, manager of developer relations for Microsoft. Most business PC users are quite adept with spreadsheets, while the relational data base model remains something of a mystery. The spreadsheet's easily grasped structure makes it an ideal mechanism for tapping into corporate data bases, even for novices.

Although spreadsheet links to data base servers haven't garnered a lot of attention so far, they're "the dark horse" in data management, Kaplan says. "No one's mapping their role [in client-server computing], but spreadsheets are going to be very important. It's a powerful combination—spreadsheet computing and access to truly robust data."

What's attractive about this approach is that it makes the best use of spreadsheet and data base technology. "A data base is the ideal tool for writing forms and reports, for managing data," says Chuck Sullivan, senior product manager for Lotus's 1-2-3 release 3. "It's not a tool for ad hoc analysis of information. By anyone's account, the spreadsheet is the premier analytical tool, enabling users to do things they could never dream of doing in a data base." By contrast, spread-

sheets are relatively poor places to store data, particularly if quick searches and frequent updates are anticipated.

Both Lotus and Microsoft recognize the value of providing the millions of spreadsheet users with direct access to stand-alone and dedicated SQL data base servers. The two leaders are taking different approaches but aim to provide users with the same end result: the ability to access remote data bases without having to memorize arcane SQL commands or remember where data resides.

Aiming to Excel

Key to Microsoft's plans is *Q+E* from Pioneer Software of Raleigh, North Carolina (see "The Data Base Connection," October 1989, p. 108). As first released, *Q+E* runs under *Windows* and supports *dBASE II, III, and IV*. Version 2.5, which includes links to *SQL Server*, is due out soon. A Presentation Manager version, which will provide the link to the Data Base Manager in IBM's OS/2 Extended Edition, will follow. Microsoft also will "extend the back end of *Q+E*" to facilitate hooks into a wider variety of servers, according to Rich Tong, product manager for *Excel for OS/2*.

Q+E for Windows is sold as a separate product that installs on top of *Excel* and then allows the user to run SQL queries from within the spreadsheet. Its retail price through Pioneer is \$149, but a coupon included with every copy of *Excel* brings the price down to \$9.95 when purchased through Microsoft. Any other *Windows* application that supports dynamic data exchange (DDE) can also profit from the link.

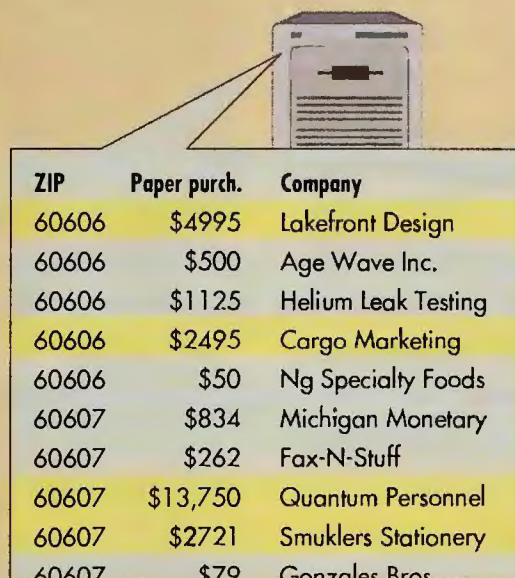
With version 2.5 of *Q+E*, Microsoft will be providing data base vendors with driver specifications to link their products to *Q+E*. Microsoft adopted this approach, which Lotus has taken with regard to 1-2-3 connectivity, "to get the connec-

Making the Spreadsheet-to-Data Base Connection

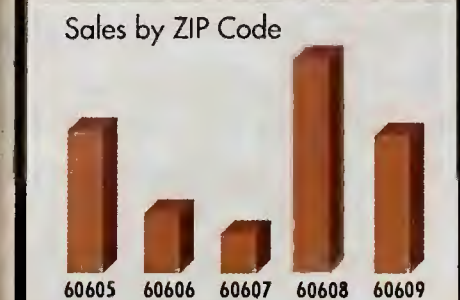
Step 1: Excel or 1-2-3 user links up with SQL server via appropriate driver; Q+E or DataLens translates request into SQL query.

Step 2: Data base executes query and returns only requested data.

Step 3: Driver translates data into spreadsheet format; Excel or 1-2-3 user analyzes data using familiar spreadsheet tools.



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60607	\$834	Michigan Monetary
60607	\$262	Fax-N-Stuff
60607	\$13,750	Quantum Personnel
60607	\$2721	Smuklers Stationery
60607	\$79	Gonzales Bros.





The spreadsheet/data base server combo gives each user a unique view of the data, says Canadian National Railways' Ronan McGrath.

tions out more quickly," says Dawn Trudeau, product manager for the Analyst Business unit. She adds that Oracle is currently working with Pioneer Software on a driver.

1-2-3 Data Focus

Lotus, for its part, offers its DataLens tool kit, which enables any data base developer to create a driver connecting its product with 1-2-3 release 2.01 and above. Under this scheme, the company hopes to have data base developers write the links. "They know the data base environment better than anyone else and are poised to support it," explains Sullivan.

Ideally, says Sullivan, Lotus spreadsheet users should be able to access data from any product on the market. "We don't want to have the connection with only one partner," he says. By making the driver specification public, Lotus has provided developers with all the tools necessary to link their products with Lotus's.

The downside of this approach is that users must wait until data base developers release the necessary drivers. That could take anywhere from several months to several years. To date, only Novell has released its DataLens driver, which provides the connection between 1-2-3 and NetWare SQL. Gupta, Oracle, and Microrim all have detailed plans to develop DataLens drivers for their servers. Lotus has also written its own driver for SQL Server and is currently working on drivers for OS/2 Extended Edition, Paradox, and ASCII files.

The *DataLens Driver for SQL Server* works with 1-2-3 release 3 and 1-2-3/G. Users of 1-2-3 releases 2.01 and 2.2 can gain access to SQL Server data bases through Lotus's @SQL add-in. Both the driver and the separate add-in product sell for \$75.

Other Approaches

Among other major spreadsheet suppliers, neither Computer Associates nor Borland International has announced a time frame for linking its spreadsheets and server products. *Quattro Pro*, however, will benefit from the connections established in an upcoming release of *Paradox*, since the core *Paradox* engine has been built into the spreadsheet. "We plan to leverage the *Paradox* engine technology to cover a full range of data base connectivity solutions," says Paul Davoust, Borland product manager for advanced spreadsheet products.

Informix Corporation, which just broke into the PC spreadsheet market with the introduction of *Windows* and *Presentation Manager* versions of *Wingz*, currently provides hooks to external data bases from within both its spreadsheets and *Smartware II*, its integrated package. Using a technology called the Informix DataLink, PC users can now connect up to Informix SQL data bases. Like its competitors, Informix will eventually connect to the variety of SQL data base servers on the market, according to Doug Edwards, executive director of software marketing.

Implementation Issues

These spreadsheet/server combos are targeted at white-collar professionals who need access to company information to do their jobs. But not all of those workers will have the skills necessary to access the information. At Canadian National Railways, for example, some users receive "canned" reports prepared by the data processing staff rather than access the information themselves. Although these users do not have direct access, they still benefit by getting information more quickly and in a more appropriate format, because the data

processing professionals find extracting data from *SQL Server* much simpler than writing a new program.

Corporate users and software developers alike emphasize that easier access doesn't necessarily mean better analysis of the data. It may take several attempts before users find the information they really need. But even then, they don't have the answer they're looking for, they just have the raw data, points out Informix's Edwards. "But it's as close to an ultimate solution as there is."

"It gives people a powerful tool—you might even call it a weapon, and the user could hurt himself with it by not analyzing the data correctly," adds Cheryl Currid, director of applied information technology for Coca-Cola Foods in Houston. "You can pull out the necessary data, pop it in the spreadsheet, and be 100 percent wrong." But that's a necessary risk, she adds, since there's no way the data processing staff could write a program to fit every user's needs.

Although the potential cost savings are considerable, the move to data base server technology will require a substantial investment up front. Start-up costs will vary, depending on whether companies are downsizing applications from a mainframe or a minicomputer or upgrading their local area network. Application development work—with by far the largest up-front costs—can run anywhere from \$5000 to more than \$100,000, depending on the nature of the project.

Although Canadian National Railways installed *SQL Server* specifically to provide widespread access to corporate data, many companies will concentrate initially on implementing servers for cost savings in transactional processing. But whatever the first applications, this is a complicated

Is the Spreadsheet/SQL Data Base Server Link Right for You?

Initial start-up costs—covering hardware, software, and programming time—may be steep, but the spreadsheet-to-data base connection is worth investigating if your organization has any of the following:

- a transaction processing system on a mini or mainframe which you're considering moving down to a PC local area network
- an in-house technical staff with sufficient expertise to install and support a dedicated data base server
- a policy of promoting widespread employee access to data
- a backlog in data processing, with employees waiting months before they receive requested reports
- a large contingent of spreadsheet users with the technical expertise and analytical skills to exploit additional data resources

As links between spreadsheets and data base servers mature, they'll address a variety of business needs for customers ready to tackle the complex installation and support issues.

Short-Term Investment Versus Long-Term Costs

The initial outlay for installing a SQL data base server will vary, depending on the number of users and the current hardware setup. For many companies the programming costs of designing a SQL data base and moving the relevant information from a mainframe or minicomputer may prove to be the most significant expense. Whatever your starting configuration or the initial development work required, though, the spreadsheet-to-SQL data base server connection can mean substantial long-term savings over the mainframe or minicomputer alternative.

What You'll Need

Server: \$25,000¹

- 33-MHz 386 with 16MB of RAM, two 300MB hard drives
- SQL data base server
- Network operating system

Client: \$4000¹

- 386SX with 4MB of RAM, 40MB hard drive, and VGA graphics
- Windows/Excel/Q+E
or
1-2-3 release 2.01 or 2.2 and @SQL, or 1-2-3 release 3 or later and DataLens driver

Benefits

- Eliminates maintenance costs for mainframe or minicomputer
- Saves application development time and costs
- Reduces downtime associated with backlogs in MIS
- Offers simplified, widespread access to data

¹Actual costs will vary, depending on software combinations and brands of hardware selected.

technology that requires either experienced data processing personnel or an outside consultant.

"Knowledge of both micro and mainframe data bases is crucial," says Canadian Railways' McGrath.

For many companies, the move to spreadsheet/server combinations may bring about a clash of cultures, as PC users invade the data processing group's turf. With the introduction of SQL data base servers comes the need to resolve a whole set of questions concerning access to and control of the information—issues that early adopters are struggling to address.

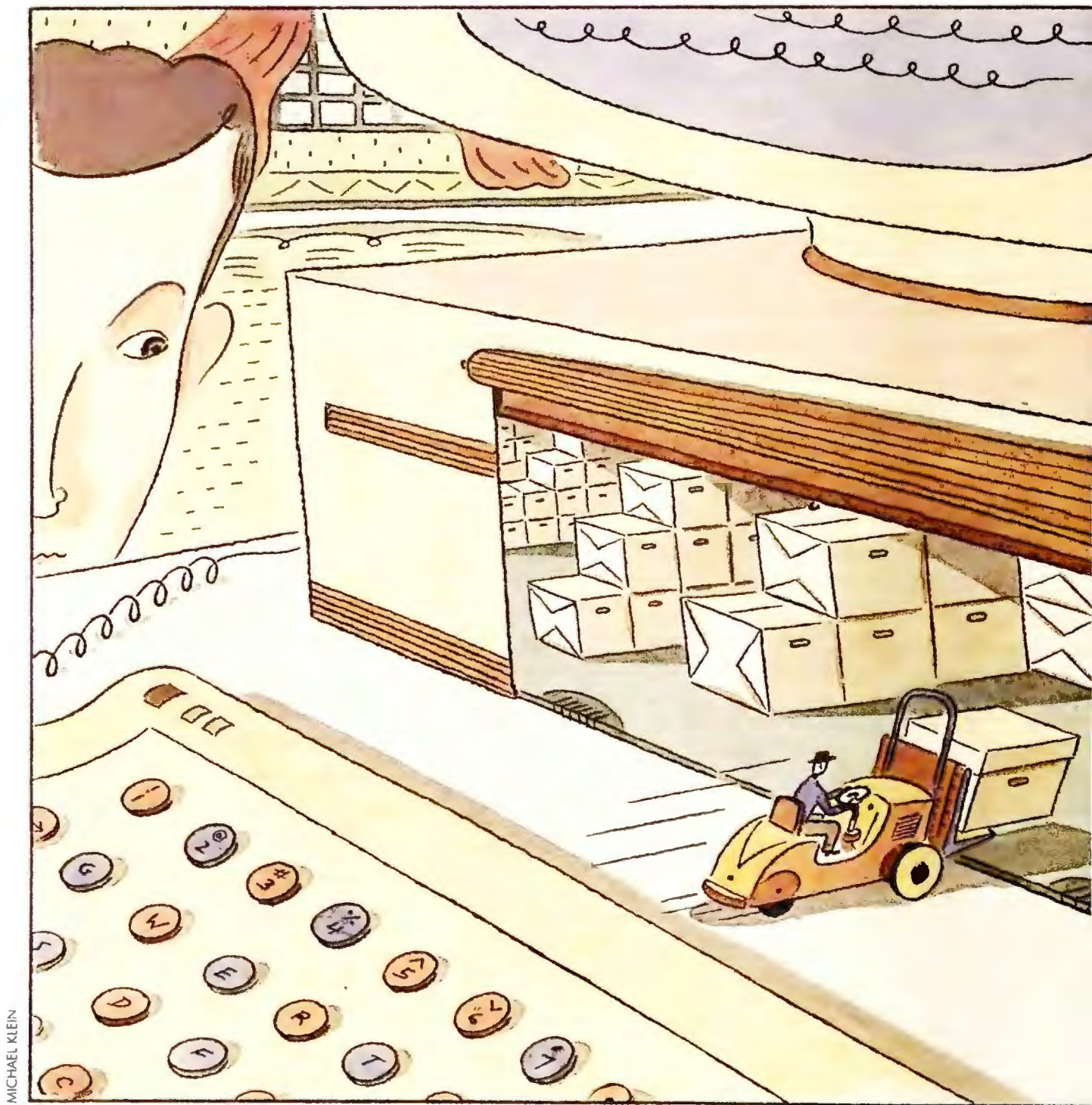
Despite the costs and complications, though, early users can't speak highly enough of the connections. Lower maintenance and development costs, improved access to data, and more timely analysis of information and trends are only a few of the benefits associated with these powerful links.

"The payoff is tremendous," says Niemann. "People are amazed we're able to do all this on a PC." ☺

Roberta Furger is an associate editor for PC World.

80 MB

Is your
PC's once-
spacious
hard disk
packed
to the
platters?
A fast
new high-
capacity
drive
could
be your
most cost-
effective
solution.



Upgrades

SUSAN LUSTY AND LINCOLN SPECTOR

Hard disks are like closets—they fill up fast. As applications and operating environments demand more space for code, data dictionaries, and fonts, the standard hard disks of yesterday quickly become obsolete. A capacity of 20MB is no longer adequate for most users, and today's standard of 40MB is headed in the same direction. Though 60MB disks may seem the logical next step, 80MB drives offer you more breathing space and better performance for just a few dollars more. If you're not serving a network, an 80MB drive can be the perfect choice.

Once you've decided to replace your hard disk, you immediately face some knotty issues. Do you buy a drive that works with your PC's existing (and probably slower) controller, or do you pick a unit that requires a different controller that may not run your PC's floppy disk drive? Should you buy a hard disk with a controller, cables, mounting brackets, and setup software? Is it compatible with your hardware and software? And are you getting the most storage and performance bang for your buck? One thing is certain: An internal drive is a better bet, because external drives cost more and take up valuable desk space.

Installing an internal drive isn't, however, for novices. The process typically involves taking the hood off your PC, replacing the existing hard disk and controller with the new unit, connecting a handful of obdurate cables, and then formatting and partitioning the drive. If money's no object, pay your dealer or another PC professional to do the job. Another painless solution is to buy a miniature hard disk on a



80MB HARD DISK DRIVES

Company	Product	List price with controller/adaptor	Formatted capacity (megabytes)	Cost per megabyte stored	Drive size	Drive width (inches)	Average access time (ms)	Minimum interleave
CMS ENHANCEMENTS	K080A2-AF	\$959	80	\$10.99	HH	3.5	25	1:1
	K080M2-A	\$1359	80	\$14.50	HH	3.5	17	1:1
	K080A3-N	\$839	80	\$10.50	HH	3.5	24	1:1
	ZeroSlot 80 K80M30286-Z	\$1499	80	\$18.70	HH	3.5	24	1:1
	Data Card D080A2-XA	\$961	80	\$12.00	n/a	n/o	29	1:1
CORE INT'L	AT80	\$1970 ¹	80	\$24.63	HH	3.5	15	1:1
CUMULUS CORP.	Cumulus 80MB IDE HardDrive	\$1076 ¹	82.4	\$12.00	HH	3.5	25	1:1
FUJITSU AMERICA	M2612T	\$875 ³	90.1	\$9.71	FH	3.5	25	1:1
HARD DRIVES INT'L	ST296N	\$529 ⁴	80	\$5.36	HH	5.25	28	1:1
	Connor CP3184	\$599	84	\$6.35	HH	3.5	25	1:1
IBM	IBM PS/2 70MB Fixed Disk	\$2580	70	\$36.86	FH	5.25	30	1:1
MINISCRIBE	7080S	\$875	80.7	\$9.85	TH	3.5	19	1:1
	7080A	\$875	81.4	\$9.76	TH	3.5	19	1:1
MICROSCIENCE INT'L	HH-1090	\$545 ³	80.1	\$6.40	HH	5.25	28	1:1
	Madel 4090	\$750 ³	93.4	\$8.02	FH	3.5	18	1:1
PLUS DEVELOPMENT	Hardcard II 80	\$999	77	\$12.97	n/o	n/o	25	1:1
PROCOM TECHNOLOGY	MD80	\$1095	80	\$13.69	HH	3.5	25	1:1
QUANTUM CORP.	PraDrive 80S	\$720 ³	84	\$8.57	HH	3.5	19	1:1
	PraDrive 80AT	\$720 ³	84	\$8.57	HH	3.5	19	1:1
SYQUEST TECHNOLOGY	SQ5110	\$848 ⁸	88.8	\$9.55	HH	5.25	20	1:1
TEAC AMERICA	TEAC SD380/AT	\$650 ³	86	\$7.56	TH	3.5	20	1:1
	TEAC SD380/SCSI	\$650 ³	86	\$7.56	TH	3.5	20	1:1
WESTERN DIGITAL CORP.	WDAC280	\$895 ³	85.3	\$10.49	TH	3.5	18	1:1

¹ Price with 16-bit controller; 8-bit controller available.

² With 8-bit controller.

³ Price does not include controller.

⁴ Price includes Seagate ST01 8-bit hard-disk and floppy controller; with Seagate ST01 8-bit, hard-disk-only adapter \$499; with Always IN2000 16-bit hard-disk and floppy controller \$599.

⁵ 30 days.

⁶ IBM does not release this information.

⁷ Controller \$349 extra.

⁸ \$699 for drive, \$149 for removable cartridge; adapter not included.

FH=full height

HH=half height

TH=third height

Y=yes

N=no

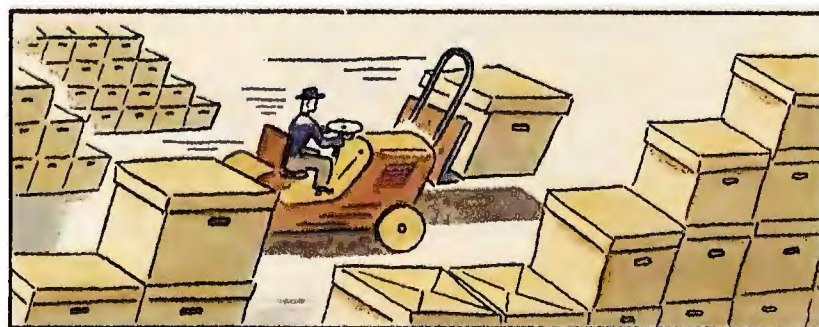
n/a=not applicable

card, like Plus Development's pricey Hardcard II80, that can be popped into a free slot and then configured by typing a few commands. If your budget is tight and you must face installing the disk yourself, make sure that both your PC and the new drive are well documented.

DRIVING CONSIDERATIONS

Not all 80MB drives are born equal. Although the products listed in the following table offer comparable storage, some are considerably more expensive than others. On a cost-per-megabyte-stored basis, you'll find a price range from \$5.36 per megabyte (Hard

Drives International) to \$36.86 per megabyte (IBM). Don't judge by price alone,



though. Core International's \$1970 AT80 is the second-most-expensive drive listed, but its bundled controller, 15-millisecond (ms) average access time, 100,000-hour mean-time-between-failures (MTBF) rate, and three-year

warranty make it worth investigating. Note, too, that the table shows only list prices. In

the real world, you'll find considerable discounts.

FACTORS TO CONSIDER BEFORE YOU BUY:

SPEED A fast microprocessor is only half the story: If your PC is anchored to a slow

hard disk, your applications are going to drag. Most of the drives here will adequately serve speedy 286 and 386 PCs, but check out a drive's average access time and minimum interleave as well as the throughput of any controller/adaptor supplied by the vendor.

Average access time essentially approximates how long it takes a drive's read/write heads to find and read data from a sector on disk. It isn't an absolute measure of a hard disk's speed but a helpful indication. For fast 286 machines and low-end 386s, an average access time above 30ms is unacceptable; less than 20ms is excellent.

Interleave indicates how

Self-parking heads	ADAPTER/CONTROLLER				RLL compatible	Throughput (mbps)	Maximum drives supported by controller	MCA version	Operating shock (g's)	Mean time between failures (hours)	Money-back guarantee	Warranty (years)	Reader service number
	ST506/41	SCSI	ESDI	IDE									
Y	N	N	N	Y	Y	10	2	N	10	30,000	N	1	630
Y	Y	N	N	N	N	5	2	N	10	35,000	N	1	630
Y	N	N	N	Y	Y	10	2	N	10	30,000	N	1	630
Y	N	Y	N	N	Y	10	2	N	10	30,000	N	1	630
Y	N	N	N	Y	Y	10	1	N	10	30,000	N	1	630
Y	Y	N	N	N	Y	5	2	Y	10	100,000	N	3	631
Y	N	N	N	Y	N	4.75	2	Y ²	10	20,000	Y	1	632
Y	N	N	N	Y	N	7.4	n/a	N	5	50,000	N	1	633
Y	N	Y	N	N	N	9.5	7	N	10	75,000	Y ⁵	1	634
Y	N	N	N	Y	N	9.5	2	N	10	50,000	Y ⁵	1	634
N	N	N	Y	N	N	10	2	Y	2	6	N	1	635
Y	N	Y	N	N	N	8	6	N	10	40,000	N	2	636
Y	N	N	N	Y	N	10.8	2	N	10	40,000	N	2	636
Y	Y	N	N	N	N	5	n/a	n/a	10	40,000	N	1	637
Y	N	N	N	N	Y	7.5	n/a	N	10	36,000	N	1	637
Y	N	N	N	N	N	10-12.5	1	N	10	60,000	N	2	638
Y	N	Y	N	N	N	8.5	7	Y ⁷	10	50,000	N	1	639
Y	N	Y	N	N	Y	4	n/a	N	10	50,000	N	2	640
Y	N	N	N	Y	Y	3	n/a	N	10	50,000	N	2	640
Y	N	Y	N	N	N	10-32	7	N	2	30,000	N	2	641
Y	N	N	N	Y	N	1	n/a	Y	5	30,000	N	1	642
Y	N	Y	N	N	N	1	n/a	Y	5	30,000	N	1	642
Y	N	N	N	Y	N	12	2	N	10	50,000	N	1	643

For more information about all products in this table, circle reader service no. 903.

many sectors of data the drive can read continuously. A 6:1 interleave means that for every sector read, five must be skipped—and the result is sluggish performance. All the 80MB drives listed can be set for 1:1 interleave, the fastest possible. Since no sectors are skipped, an entire track can be read in one turn of the disk.

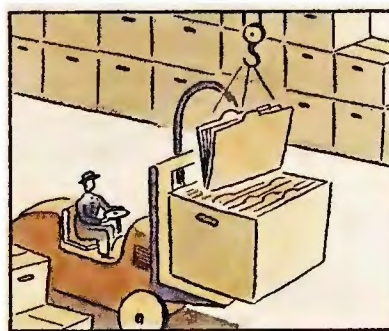
Throughput measures how quickly a hard disk's controller can pass data to the PC's microprocessor. Faster is better, and SCSI (small computer system interface) and ESDI (enhanced small device interface) drives typically move data at 10 megabits per second (mbps)—twice as fast as most traditional MFM (modified

frequency modulation) drives found in many 286 systems.

ADAPTERS AND CONTROLLERS Although some controllers are faster than others, you should look carefully at the trade-offs. If you use an 8088, 8086, or older 286-based system, chances are it has an ST506 or ST412 hard disk controller that relies on MFM encoding. Upgrading your system with many of the ST506/412-compatible drives listed here would be a matter of swapping the drives without removing the controller. The downside: These older controllers typically aren't very fast.

Note: Some MFM drives support *RLL encoding*, a technique that ups storage ca-

capacity by about 50 percent and boosts performance. Using an RLL-compatible drive with a non-RLL controller will yield less storage than you paid for; using an RLL controller with a non-RLL drive will endanger your data. So make sure



your hard drive and controller both support—or don't support—RLL.

If the hard disk you currently own has a cable that plugs directly into your PC's motherboard, you probably have an IDE drive, which has all its controller circuitry embedded in the drive. If you use an IBM PS/2 or a new 386 system with a built-in IDE connector, adding or replacing an IDE drive is the simplest (and a relatively speedy) solution.

If speed and expandability are your alpha and omega, ESDI and SCSI units are the best choice, especially for high-speed PCs that act as network servers. Both ESDI and SCSI controllers are about twice as fast as most ST506/412 boards. And in networks where storage needs

are always growing, you can install up to three ESDI controllers per PC, each running two drives. SCSI has the edge here, though, because a single adapter can connect up to seven different devices, from hard disks and tape drives to WORM and erasable-optical units. But since the SCSI "standard" is not uniform, you usually have to buy additional SCSI drives from the same vendor—and that may limit your upgrade options.

One big plus with SCSI and ESDI drives is ease of installation. SCSI drives store configuration data in a standardized form on the drive itself, so you don't have to specify drive type when you run your PC's Setup program. One big minus: Most SCSI and many ESDI boards can't run a floppy drive, so you may have to leave an existing controller in place. Ask before you buy.

COMPATIBILITY All of the drives listed in this guide should work fine in any 286 or 386 computer, provided the drive is listed in a special table stored in the computer's BIOS ROM chip. Drives are classified by type, based on the number of heads and cylinders. When you run your computer's Setup program, you

must supply the drive type. If the BIOS doesn't list your drive type, the drive may not work, may not boot, and certainly can't be formatted to maximum capacity. Upgrading the system's BIOS chip may solve the problem, or the drive vendor may supply a device driver program that does

computers, including most IBM PS/2s, accept only 3½-inch drives. If you buy a 3½-inch drive for a 5¼-inch bay, make sure the vendor offers mounting brackets.

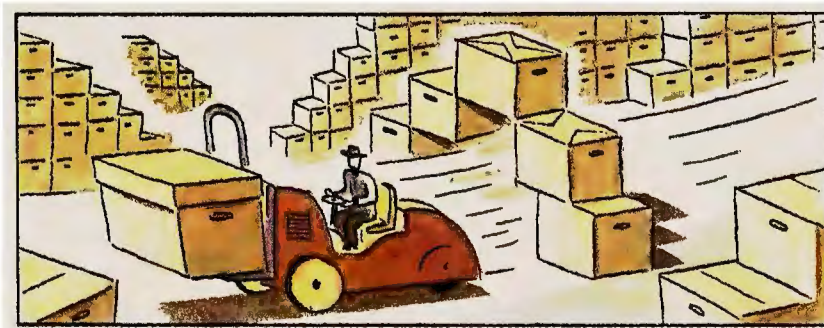
Software compatibility is a lesser concern, but some diagnostic programs, low-level formatters, and similar utilities

and shock ratings are supplied by manufacturers and are no more than a general indicator of a drive's durability.

When all else fails, the vendor's warranty is your ultimate safety net. One-year warranties are common; a two-year warranty is preferable. Before buying a drive, find out if the warranty will be honored by your dealer; if it's honored by the original manufacturer, determine who pays shipping costs and what the guaranteed turnaround time is for repairs. It doesn't hurt to verify that the dealer is an authorized reseller of the drive; if not, you could have trouble getting the service that's your right. As always, be sure to get any promises in writing. The ultimate defense against defective or damaged drives is a money-back guarantee, but only one vendor listed here, Hard Drives International, offers this extra. Many dealers do offer it, however—so don't forget to ask.

If you're careful, a hard disk can last for years—at least until 80MB no longer seems enough. ☺

Susan Lusty and Lincoln Spector are assistant editors for PC World.



the same. Just remember, there is no standard drive type numbering scheme—so verify that a drive is supported by calling the vendors on both sides of this upgrade. With SCSI drives, you don't have to worry about assigning drive types.

Don't forget, either, that the drive should fit in one of your computer's drive bays. Standard AT-style computer boxes generally have a 5¼-inch, full-height bay that can hold a single full-height or two half-height drives. Some smaller

may not work with some of these drives. For example, the Plus Hardcard II 80 doesn't work with Gibson Research's *SpinRite II*. If you can't live without *Optune* or *Disk Technician*, contact the software and hard disk vendors to make sure they *both* agree that the two products work together.

PROTECTION As computer peripherals go, hard disks are among the most delicate. That's why a high operating shock rating (in g's), a big MTBF, and a beefy warranty are a must. Note that MTBF

WHERE TO BUY

CMS Enhancements, Inc.
1372 Valencia Ave.
Tustin, CA 92680
714/259-9555,
714/549-4004 (fax)

Core Int'l, Inc.
7171 N. Federal Hwy.
Boca Raton, FL 33487
407/997-6055,
407/997-6009 (fax)

Cumulus Corp.
23500 Mercantile Rd.
Cleveland, OH 44122
216/464-2211,
216/464-2483 (fax)

Fujitsu America, Inc.
3055 Orchard Dr.
San Jose, CA 95134
800/626-4686

Hard Drives Int'l
1912 W. 4th St.
Tempe, AZ 85281
800/234-3475,
602/350-1128,
602/829-9193 (fax)

IBM
Old Orchard Rd.
Armonk, NY 10504
800/426-2468

Microscience Int'l
90 Headquarters Dr.
San Jose, CA 95134
408/433-9898,
408/954-0989 (fax)

MiniScribe Corp.
1861 Leffhand Cir.
Longmont, CO
80501-6798
303/651-6000

Plus Development Corp.
1778 McCarthy Blvd.
Milpitas, CA 95035
800/624-5545,
408/434-3309 (fax)

Procom Technology
200 McCarmick Ave.
Casta Mesa, CA
92626
714/549-9449,
714/549-0527 (fax)

Quantum Corp.
1804 McCarthy Blvd.
Milpitas, CA 95035
408/432-1100
408/943-0689 (fax)

Syquest Technology
105 Fourier Ave.
Fremont, CA 94539
415/438-5500,
415/651-3338 (fax)

TEAC America, Inc.
7733 Telegraph Rd.
Mantebello, CA
90640
213/726-0303 ext.
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Western Digital Corp.
8105 Irvine Center Dr.
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714/932-6000



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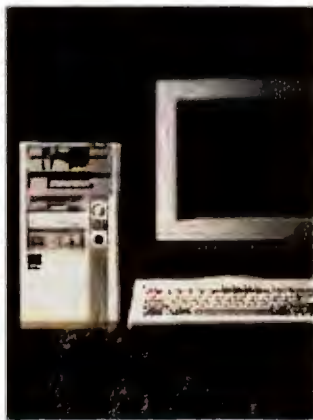
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286/16 \$599

16 MHz Clock,
Zero Wait Operation,
Norton SI 19.0
Landmark™ Speed 20.6MHz,
512K RAM,
1.2MB or 1.44MB Drive,
101-Key Keyboard,
2 Serial and 1 Parallel Ports



286/20 \$699

20 MHz Clock,
Zero Wait Operation,
Norton SI 23.0
Landmark™ Speed 26.7MHz,
512K RAM,
1.2MB or 1.44MB Drive,
101-Key Keyboard,
2 Serial and 1 Parallel Ports

Standard Features:

- 80286-16, 80286-20 operating at 16MHz, or 20MHz w/Zero Wait
- 512K RAM expandable to 8MB on the System board using 256K or 1MB RAM
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Options:

- Low profile Slim Line Case with 3 Disk Drive bays
- Mini Size desk top Tower® Case with 4 Disk Drive bays
- VGA Plasma Portable Case
- Factory Installed RAM Upgrades
- Custom configurations with Name Brand peripherals of your choice

PC BRAND 286's

Add the following amounts to the base configuration prices shown above

Hard Drives: MB/MS	20/40	40/19	71/25	110/17	200/19
Mono	\$450	\$550	\$730	\$870	\$1320
VGA-Mono	\$630	\$730	\$910	\$1050	\$1500
VGA-Color	\$860	\$960	\$1140	\$1280	\$1730
SVGA-Color*	\$970	\$1070	\$1250	\$1390	\$1840
Portable VGA	NA	\$2470	NA	\$2790	\$3240

For benchmark scores on hard drives, see "Pure Power" pages

* SVGA 1024 x 768 interlaced

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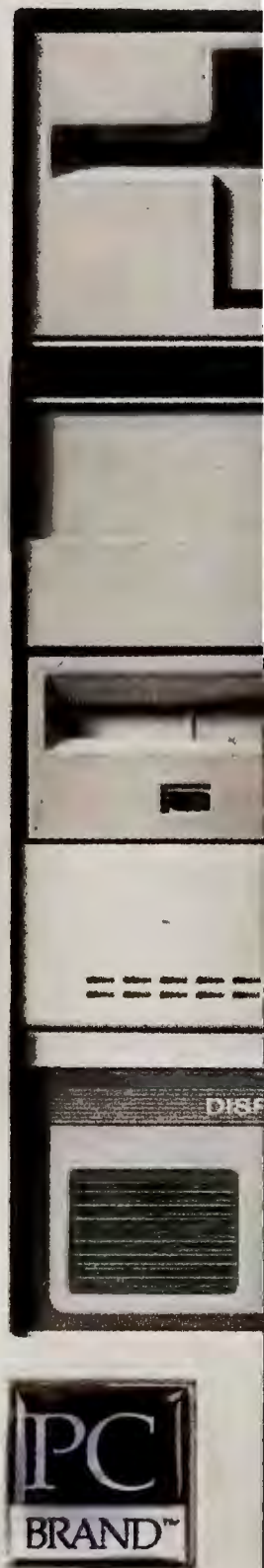
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For benchmark scores on hard drives, see "Pure Power" page

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Portable VGA	\$2670	NA	\$2990	\$3440	NA	NA

For benchmark scores on hard drives, see "Pure Power" page
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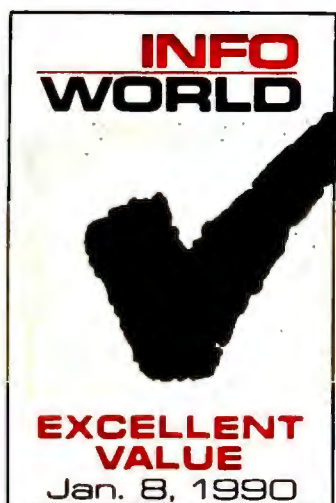
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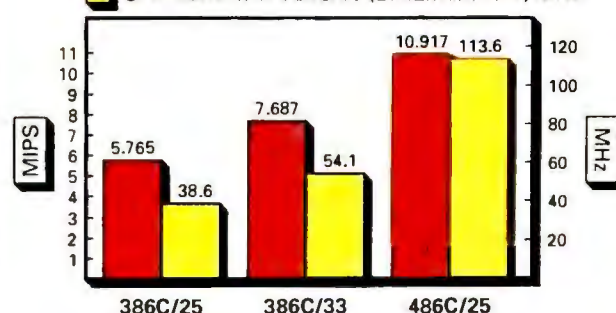
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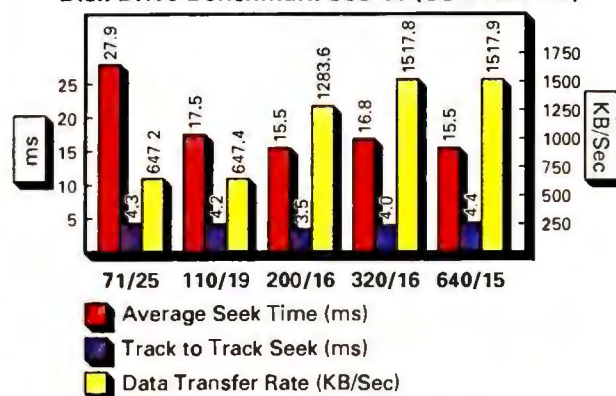
Hard Drives: MB/MS	40/19	71/25	110/17	200/19	320/16	640/15
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VGA-Mono	\$730	\$910	\$1050	\$1500	\$2050	\$2840
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PC World's Guide to Painless Backups

You know you should back up your hard disk regularly—here's how to do it right.

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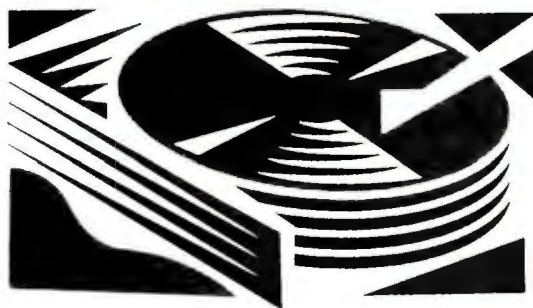
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Hard Disks

Regular hard disk backup is your PC's life insurance policy. If flood, fire, disk crash, or carelessness takes your files to data heaven, a backup can save the day—and possibly your business.

But making backup files can be time-consuming and confusing if done incorrectly. The key to fast and efficient backup is proper file organization and timely scheduling of different *types* of backup events. The following tips show you how to minimize the time and maximize the benefits of backing up files, whether you use streaming tape or floppies, dedicated backup programs like *Fastback*,

or DOS's XCOPY program. For brevity's sake, this article refers only to backing up to floppies, but the tips are equally useful for people with tape drives.

► **Divvy Up Your Hard Disk**

Obviously, you need to back up everything on your hard disk so that it can be reconstructed in the event of a catastrophe. But while there's little point in backing up programs more than once, data files change constantly and may require daily backup.

The first step is to organize the files on your hard disk. Since most backup programs can't automatically back up drive C: and then drive D:, store your programs on one logical drive and data on another. That way you have to back up only one drive.

Most hard disks exceeding 32MB are partitioned into two or more logical drives with the DOS FDISK command. You can use FDISK on smaller hard disks for the same purpose, but it may

be easier to place the SUBST command in the system's AUTOEXEC.BAT file instead; it assigns a drive letter to a directory or path. For example, SUBST D: C:\REPORTS treats the REPORTS directory (and all its subdirectories) as drive D:. You can create up to 23 logical drives (D through Z) this way.

► Choose the Right Backup Method

Most commercial backup programs offer full, incremental, and differential backup options. Each method archives data differently, and the method you use depends on how you work.

A *full backup* saves all the files you tag on the hard disk, even if they've been backed up before. (In technical terms, a full backup ignores the state of a file's "archive" bit.) Since you're saving megabytes of data, you'll need lots of floppies. You should do a full backup every four to six months, keep the floppies off-site, and do daily incremental or differential backups in between.

Incremental backup saves only those files that have been changed since the last backup. The updated files are appended to the backup floppy—they don't overwrite any previous versions. This method is appropriate for word processors, CAD users, and others who create new files every day yet need access to past versions.

Differential backup also saves only those files that have changed since the last backup, but it overwrites all previous versions of a file. If you typically work with the same files over and over—as many spreadsheet and data base users do—and you don't need to save old versions, the differential approach will save you space and time.

► Keep a Full Backup of Program Files

Even if you keep original program disks safely tucked away, it's wise to do a full backup of the applications on your hard disk to another set of floppies. If you've

TABLE 1
Backup at a Glance

	User works with same files every day	User works with different files every day
Backup method	differential	incremental
Number of disks/tapes used	constant	increasing
Data backup	daily	daily
Copy daily backups, store off-site	weekly	monthly
Do full data backup/update off-site disks	every six months	every four months
Do full program backup/update off-site disks	annually, or as changes occur	annually, or as changes occur
Copy archived files to new disks	annually	annually

customized your applications, recreating those configurations from scratch can be a pain. Also, some older applications, such as early 1-2-3 versions, use a copy protection scheme that prevents installing the program more than once from the original disks. A backup, however, can always be restored.

Program files can be either backed up file by file or imaged. The file-by-file method saves files one at a time, which makes it easier to restore individual files later, but you can't save copy-protected programs this way. An image backup takes a snapshot of the hard disk, recording both sectors and data. This method will properly back up copy-protected programs, but it also saves everything else. You can't single out individual files for transfer—you must restore the entire hard disk.

Unless you update programs and add new ones frequently, back them up just once a year and store the disks off-site.

► Basic Backup Schedules

When it comes to backing up data, the schedule is everything. Which schedule you adopt depends on whether you fit the incremental or differential profile (see TABLE 1).

Note: The following schemes devote a floppy (or floppies), which you use over and over, to each day of the week. *Don't* use a single floppy for all five daily backups, even if it has the capacity.

Start your schedule on Friday. At the end of the day, do a full data backup of your hard disk, and take the backup floppies off-site. Then, if you usually work with the same files every day, do a daily differential backup Monday through Thursday. On Friday you can save all the data files that have changed since the last full backup by using the backup program's date range option instead of doing a full backup. Keep a copy of this backup off-site. Those who work with different files every day should do a daily incremental backup Monday through Friday. Since the incremental method doesn't overwrite old files, the number of backup floppies will continue to grow. At the end of the month, make a copy of all the Monday through Friday backup floppies and store it off-site. Then you can erase the Monday through Friday floppies and start over.

► Don't Back Up Unnecessary Files

To limit the number of floppies you use and to shrink backup time, don't bother backing up BAK, TMP, and other redundant files. You may also skip backing up README files.

► Label Backup Media

It's essential to use clear and explicit labels on backup floppies, especially on daily backups.

**WHAT'S MORE
IMPRESSIVE
THAN OUR
ONE YEAR
WARRANTEE,
TOLL-FREE
TECHNICAL
SUPPORT,
& ON-SITE
SERVICE?**

A simple way to avoid mix-ups is to use a different colored floppy disk (or label) for each day of the week: Monday backups on blue, Tuesday on red, and so on. Monthly backups could go on regular black disks. At the very least, the label should note whose PC was backed up, the day and total number of disks in the set ("Monday: 1 of 2," "Monday: 2 of 2"), and the date.

If a weekly backup is all you need, simplify this scheme by using a different color for each week of the month and black for the end-of-month backup.

► Don't Keep All Your Backups in One Place

Always store a full backup of data and programs off-site, and keep your daily backups in the office. That way if your hard disk crashes, you can get vital data immediately, and if a theft or natural disaster wipes out your PC and records, you have something to fall back on.

Your off-site files don't have to be as current as the daily office backups—just reasonably current. If you do differential backups according to the above scheme, you'll always have the previous Friday's backup off-site. If you do incremental backups, you'll have the monthly consolidation of all the daily floppies.

► Back Up Your Backup Software

Always keep a copy of your backup software. In the tumultuous software world, anything can happen. Your backup software vendor could go out of business—or current versions of the program might not be compatible with your older copy. If your hard disk crashes or the original backup program floppies are destroyed, recovering backed-up data could be impossible.

If you plan on buying a tape drive, buy a popular format (such as QIC-40) from an established vendor. If the tape

drive dies someday, you'll have a better chance of finding a compatible model that can restore your data. Finally, if you archive files, copy them onto floppy disks using DOS's COPY or XCOPY commands, so that the data can always be read.

► Purge and Archive

Every so often you should tour your hard disk's directories to ferret out and erase extraneous files so that they are eliminated from future backups. Data that has outlived its usefulness but cannot be destroyed should be archived. Using COPY or XCOPY, copy the files from your hard disk to floppies (*don't* use your backup program), verify the copies with COMP or a similar utility, then delete the files from the hard disk. Prime candidates for archiving include tax records, ledgers, ancient correspondence, and old design drawings.

Remember that archived data can't

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WINDOWS-3
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MONTHS OF THE YEAR	J	F	M	A	MY	J	JY	A	S	O	N	D	J	F	M	A	MY	J
--------------------	---	---	---	---	----	---	----	---	---	---	---	---	---	---	---	---	----	---

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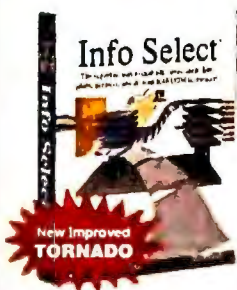


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be filed away and forgotten. Temperature extremes, humidity, and background radiation can corrupt the data on any floppy over time. Once a year, make fresh copies of all archived files to new floppies with **DISKCOPY**. Once you've verified the new copies with **DISKCOMP**, you can erase the old archive disks and reuse them.

► Exercise All Your Backup Options

You can never have too many backups. If some data is vital to your company's health, consider these often overlooked options:

Keep a working floppy in your PC at all times so you can do hourly saves of that hot file you've been sweating over all week.

You can never have too many backups.

Most backup programs offer an error-correcting feature that restores files even if some of the data is corrupted or the disk itself is damaged. Error-corrected backup takes longer, but with truly important files it's time well spent.

For triple backup protection, you can temporarily store that vital file in your LAN E-mail box or even in your MCI mailbox. Just be aware that these services are frequently purged of old messages, so use them for short-term backup only.

Finally, "when in doubt, print it out"—and put it in a fireproof safe. Hard copy is your ultimate data backup: If worse comes to worst, you can rent a scanner with optical character recognition (OCR) software and electronically recapture the data. Or you can do it the hard way, and type it back in. ☹

TJ Byers is a contributing editor for PC World.

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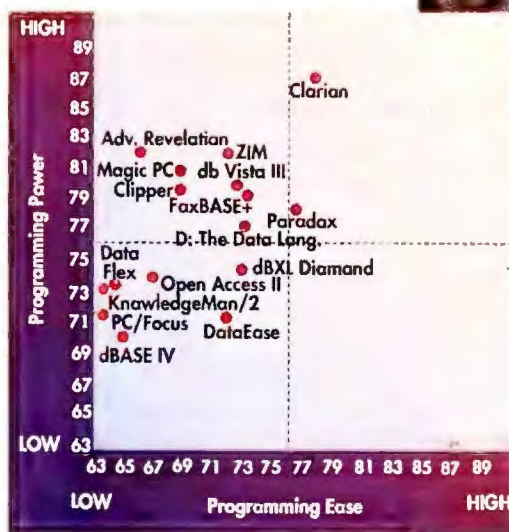
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Words Into Print



Word Processing

Tips for getting the most out of your word processor

This month: Prepare documents for desktop publishing programs, convert ASCII files into Word 5.0 format, and learn about WordPerfect 5.1's keyboard macro files.

George Campbell

Most word processors offer a smattering of desktop publishing features, but for great-looking documents, you'll often have to enlist more advanced desktop publishing programs like *Ventura Publisher* and *PageMaker*. Both programs can convert popular word processor formats, but if a document isn't properly prepared, the desktop publisher (and that may well be you) will waste a lot of time cleaning up the file. If you're using a service bureau, labor charges are passed on to you.

The following tips will help you prepare almost any document for the journey to a desktop publishing application. The tips are followed by a *WordPerfect*

macro that automates much of the preparation process.

- Don't change fonts or include lines or boxes.
- Avoid multiple columns and centered, hyphenated, or justified text.
- Keep text single-spaced.
- Separate paragraphs with one, not two, carriage returns.
- Use only one space after periods.
- Don't indent the first lines of paragraphs.
- Disable any attached style sheets.

- Create tables and charts using either single tabs or carriage returns as field separators. It's not pretty, but it saves the desktop publisher from having to strip out extra tabs.

- If there's no conversion for your particular word processor, save files in ASCII format, with carriage returns only at the ends of paragraphs. Most word processors offer this option.

- Use separate files for graphics, tables, footnotes, and sidebars so you can import and manipulate them as discrete

WORD SHORTCUT

Converting ASCII Files

This macro converts ASCII files into a form more palatable for *Word 5.0* by removing all carriage returns except for those at the ends of paragraphs. Start *Word* and enter the lines below. Type the characters—don't press the keys they indicate. Press <Ctrl>-[or <Ctrl>-] to create the chevrons (« and »).

```
«set echo = "off"»<ctrl pgdn>
<enter><ctrl pgup><down>
«ask check=?
Check for short lines and lists (y/n)?»
«if check = "y" or check = "Y"»
«while selection <> ""»
«if len(selection) < 50»
«if len(selection) > 2»
«ask keep=?Keep separate (y/n)?»
«if keep="y" or keep="Y"»
~<down>«endif»«endif»«endif»
<f10>«endwhile»«endif»
<ctrl pgup>
«set echo = "on"»
«message Converting.....»
«set echo = "off"»
```

```
<esc>r^p~<tab>^^p*k*
<tab>n<enter>
<esc>r^p<space><tab>*s*
<enter>
<esc>r^p^^t<tab>*t*
<enter>
<esc>r^p^^p<tab>*p*
<enter>
<esc>r^p<tab><space>
<enter>
<esc>r*p*<tab>^^p^^p
<enter>
<esc>r*k*<tab>^^p<enter>
<esc>r*s*<tab>^^p<space>
<enter>
<esc>r*t*<tab>^^p^^t
<enter>
```

When you're done, press <Shift>-<F10>. Press <Esc>c, and type *fixascii.mac*. To use the macro, load an ASCII file, press <Esc>i, type *fixascii.mac*, and press <Enter>. —G. C.

WORDPERFECT SHORTCUT

Keyboard Files

WordPerfect 5.1 provides keyboard files full of related macros that can help you automate your work. **SHORTCUT.WPK** offers 32 mnemonic macros for text formatting. **MACROS.WPK** contains 17 editing and document macros. **EQUATION.WPK** offers shortcuts for 5.1's equation editor. **ALTRNAT.WPK** automatically switches the Help and Cancel keys to <F1> and <Esc>. **ENHANCED.WPK** adds extra functions for 101-key keyboards. You'll find descriptions of each file in Appendix H

of the 5.1 manual.

To load a keyboard file, press <Shift>-<F1>, highlight a collection, then press s. To see a list of the included macros and their hot keys, press e (for Edit).

Press <F7> to load the macros as defaults. Now each time you start *WordPerfect*, it will reload that keyboard file. Note that keyboard file macros take precedence over other macros with the same hot key. —G. C.

elements in their own frames.

- Embed bracketed comments in your documents to specify graphics locations and special formatting. (Brackets are safe characters for all major publishing packages.) For example, instead of creating white space for a graphic, type **[Place graphic #3 here]** on its own line.

- Discuss the project with the desktop publisher. Provide sketches or printouts and note any font choices or other formatting requirements.

- If you regularly move text to a desktop publishing package, you might consider embedding that package's formatting codes in the word processing document.

Conversion Macros

The following macro removes gaps between paragraphs, deletes extra spaces between sentences, and replaces double tabs with single tabs.

Here is a conversion macro for *WordPerfect 5.0* and *5.1*:

1. To start macro recording, press <Ctrl>-<F10>.

2. To name and describe the macro, type **dtpcnvt**, press <Enter>, type **Converts for DTP**, and press <Enter>.

3. To remove double carriage returns, press <Home> <Home> <Cursor Up> <Alt>-<F2> n <Enter> <Enter> <F2> <Enter> <F2>.

4. To remove extra spaces between sentences, press <Home> <Home> <Cursor Up> <Alt>-<F2> n. <Space> <Space> <F2>. <Space> <F2>.

5. To replace double tabs, press <Home> <Home> <Cursor Up> <Alt>-<F2> n <Tab> <Tab> <F2> <Tab> <F2>.

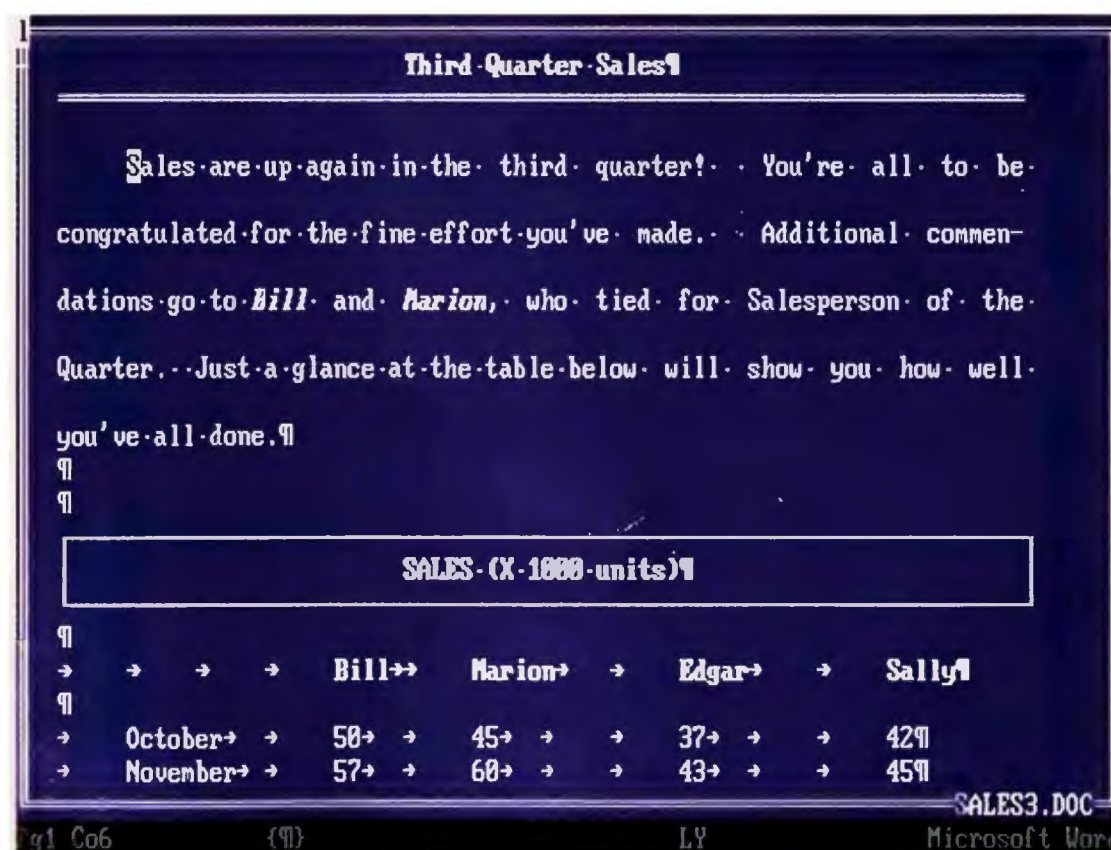
6. To finish recording, press <Ctrl>-<F10>.

To run this macro, press <Alt>-<F10>, type **dtpcnvt**, and press <Enter>.

Note: If your document has more than two tabs in a row or more than two spaces after a period, run the macro repeatedly to clean up the document. ☺

George Campbell is a contributing editor for PC World.

What's Wrong With This Picture?



The document is fine for printing but not for sending to a desktop publishing program. Before converting the file, you'd need to make several changes. How many conversion problems can you spot? Hint: It's generally a good idea to strip out all formatting.

(1) Double-spaced text. (2) Two spaces between sentences. (3) Multiple tabs in table. (4) Boxes and lines. (5) Justified and hyphenated text. (6) Indented paragraphs. (7) Two carriage returns between paragraphs. (8) Centered titles.

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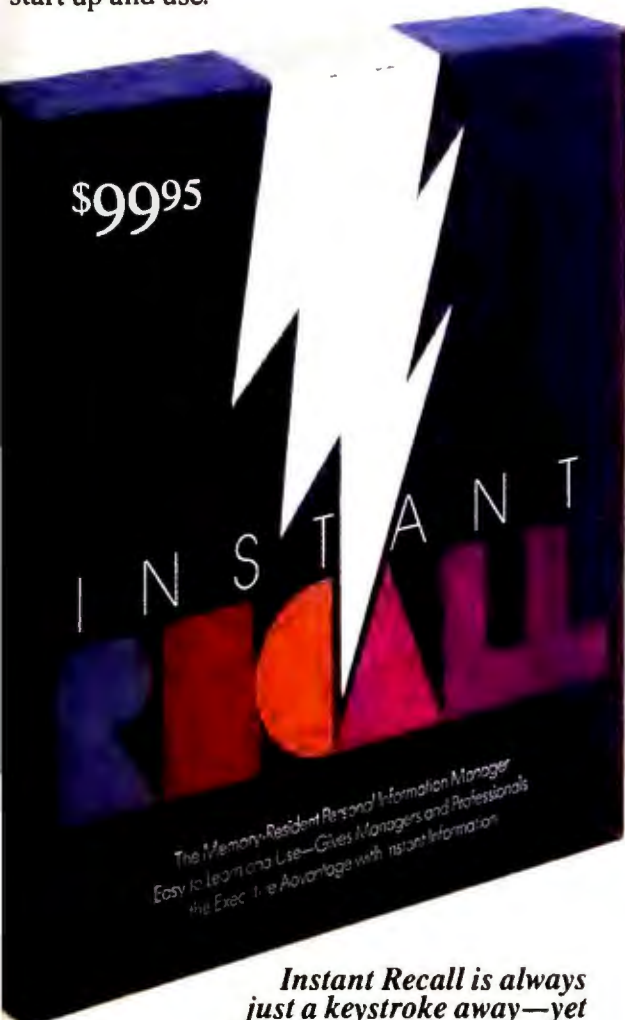
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Ready to use right out of the box

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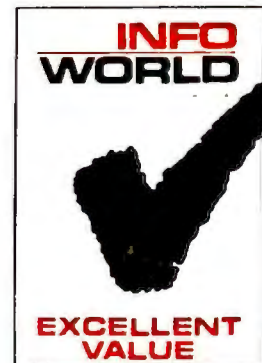
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Address _____

City _____

State _____ Zip _____

Day Phone (_____) _____

Check disk size: ☐ 5.25" ☐ 3.5"

Charge my ☐ Visa ☐ Mastercard ☐ Amex

Card # _____ Exp. _____

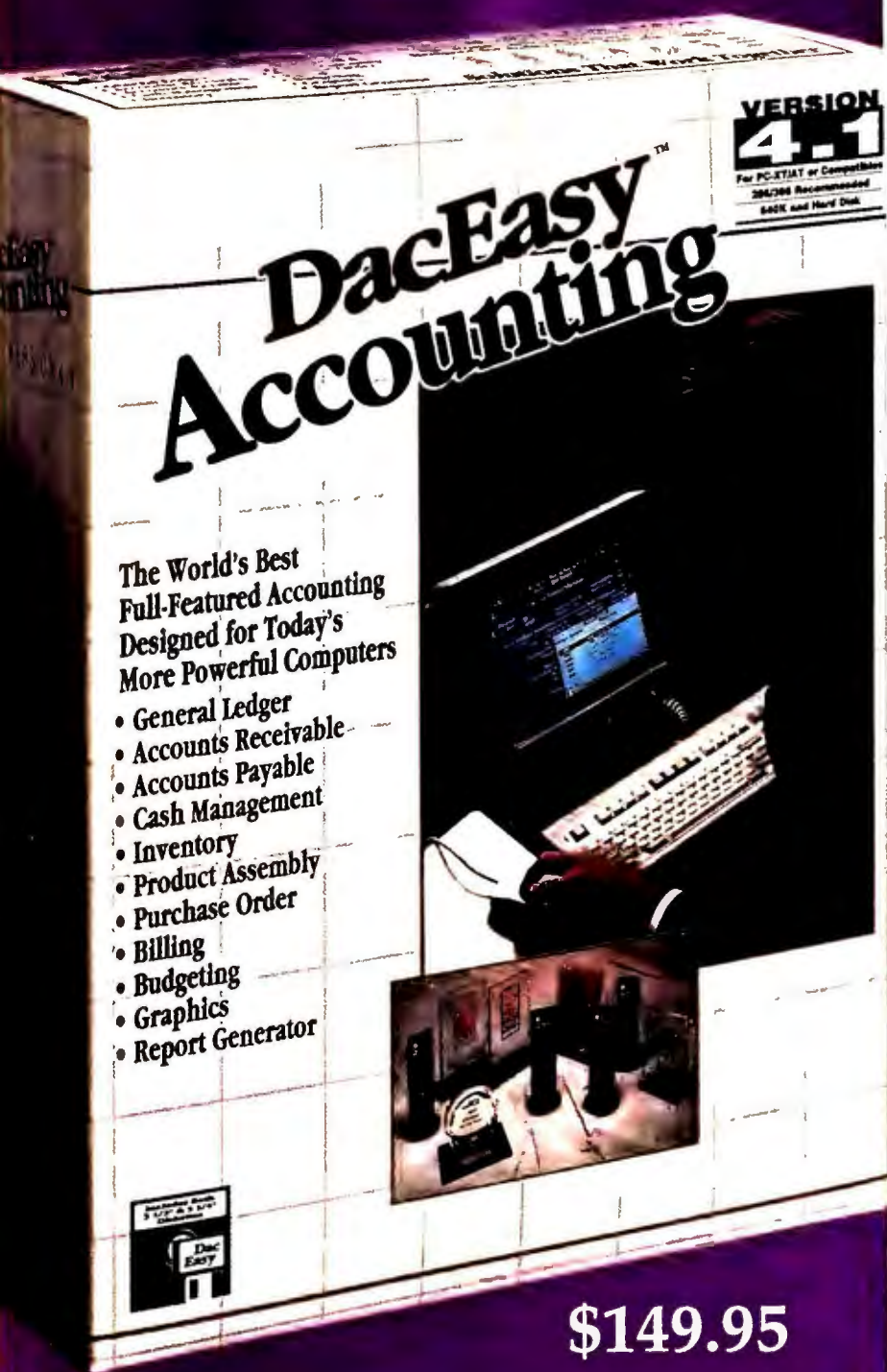
Signature _____

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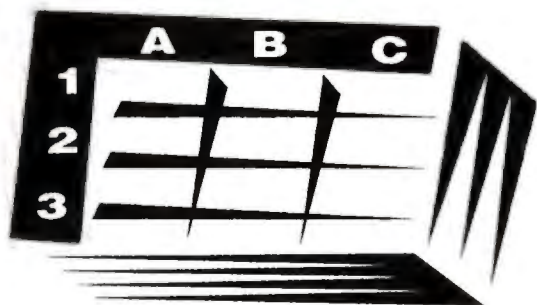
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Spreadsheets (A..Z)



Spreadsheets

Practical tips for building better worksheets

This month: Two macros speed 1-2-3 data base management.

Richard Scoville

Data bases are a core topic for 1-2-3 users because almost every worksheet beyond the elementary level contains at least one of them. Let's face it, though, managing a 1-2-3 data base can be awkward, mainly because you have to reorganize it to accommodate the changes every time you add or delete data. In this month's column, I'll briefly cover the essentials of 1-2-3 data bases and show how to create two macros to insert or delete records efficiently.

Setting Up the Model

A 1-2-3 data base lets you organize your data in a single *input range* (range C7..E15 in **FIGURE 1**), where each column represents a field, the top row holds the field names, and the remaining rows are the data records. Entries in the *criteria range* (F17..F18) select records from the data base; the Data Query Find command lets you examine or change

them. When records are needed for analysis or reports, you use the same criteria with the Data Query Extract command to copy them into the cells below the *output range* (G17..H17).

To get the feel of using a 1-2-3 data base, reproduce the worksheet shown in **FIGURE 1**. Enter the macros shown in A1..B4, the labels and values shown in C7..E16 and F17..H17, D16's label, and D17's @SUM formula, shown at the top of the screen. (Type an apostrophe before entering labels that begin with a slash.) Note that the formula's range (D7..D15) extends beyond the data records (C8..E14) to accommodate insertions. Finally, format the AMOUNT column (D8..D17) for dollar amounts using */Range Format Currency 2*.

Even though this tiny specimen doesn't really require range names, we'll use them to structure our data

base system; in a larger worksheet, they would prove indispensable. Using */Range Name*, define the range names CUST_CR (criteria), CUST_EOF (end of file), CUST_IN (input), CUST_OUT (output), \D, and \I, as shown in the range name table at G1..H6. The input range, CUST_IN, extends beyond the data records themselves to include the field names in row 7 and a blank row, 15. The range CUST_EOF denotes the empty bottom row of CUST_IN. Execute */Data Query Input*, press <F3>, and select *CUST_IN* to specify it as the input range. In the same way, specify *CUST_CR* as the criteria range and *CUST_OUT* as the output range.

Now you're ready to find or extract records. To select individuals with code C, enter a C into the criteria range at F18, as shown, and select */Data Query Find*. 1-2-3 highlights the first such rec-

SPREADSHEET TOOLBOX

Plugging In With @SQL

Lotus's new @SQL add-in gives you easy access to *SQL Server* data bases from within the familiar environs of 1-2-3. It makes *SQL Server* data look just like a regular 1-2-3 data base, and you can manipulate the data using commands very similar to the regular Data Query choices. For release 3.x or 1-2-3/G users, *DataLens Driver for Microsoft SQL Server* offers the same transparent access. (*Excel* users can get similar results with Microsoft's *Q+E* add-in.)

@SQL adds several tricks to 1-2-3's bag. You get a third sort

key, and you can join tables and write formulas to calculate values from field contents during Query Extract. A new Query Modify command lets you update the server's records by editing data in the output range. Release 3.x and 1-2-3/G users also get the ability to join a server table with a sheet-resident data base. —Richard Scoville

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ord; press <Cursor Down> to view the others. You can edit during the search by pressing <Cursor Right> or <Cursor Left> to position the cursor on the cell you want to change, then entering or editing the contents with <F2>. To copy the selected records to the output range, use /Data Query Extract.

Inserting and Deleting Records

Normally, to insert a record in a 1-2-3 data base you go to the bottom of the input range, type a new row of data below the last record, then redefine the input range to include the new item. Formulas that operate on a column within the input range (like the @SUM shown in D17) must then be redefined to accommodate the new record. The range names we've created make this process less tedious: When you insert a row at CUST_EOF, CUST_IN and the @SUM formula stretch to fit it; then you can format the row by copying CUST_EOF into it. Let's try it. Go to the end of the input range and insert a row: Press <F5> <F3>, select CUST_EOF, press <Enter>, select /Worksheet

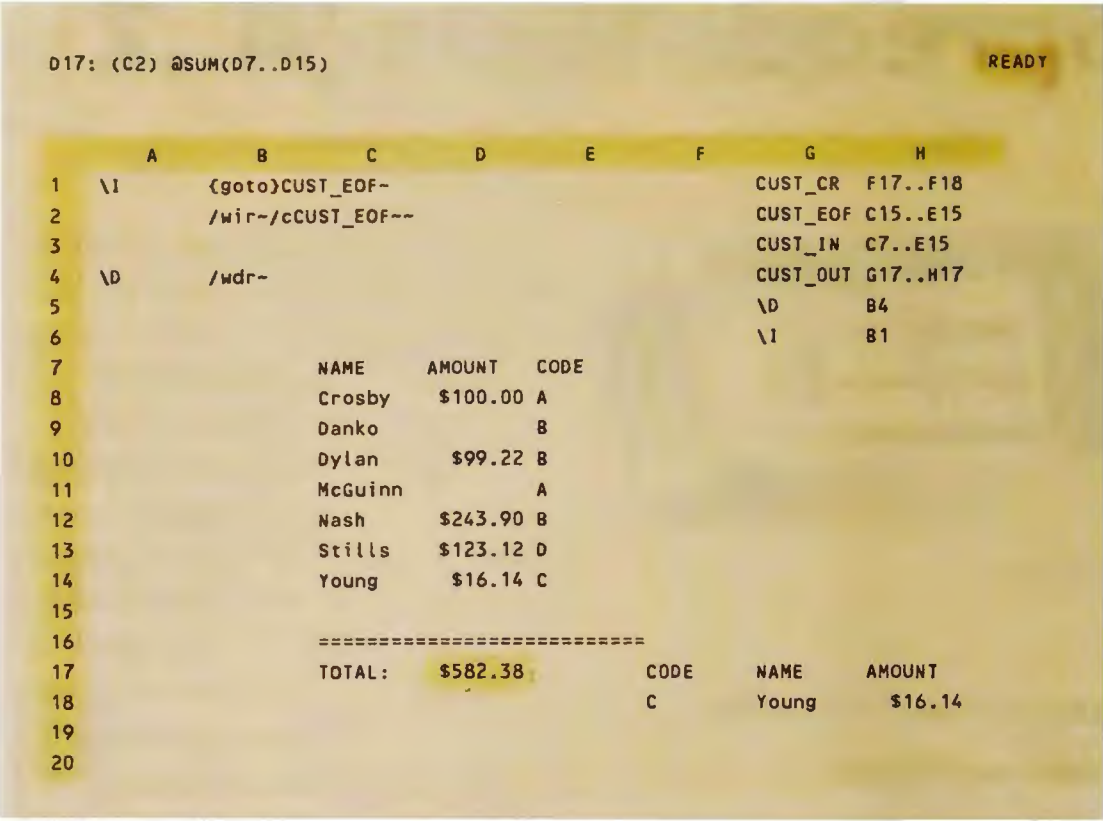


FIGURE 1: To avoid disrupting other parts of the worksheet when you insert rows for new records, the example's input range (center) has rows 7 through 15 to itself.

Insert Row, and press <Enter>. CUST_IN now covers C7..E16, and CUST_EOF is C16..E16. To format the new row, select /Copy, press <F3>, select CUST_EOF, and

press <Enter> twice. Now enter some data into the new record. Note that the @SUM formula, now in row 18, has stretched and now sums D7..D16. In this way, new AMOUNTS added to the data base are included in the sum.

The \I macro at B1..B2 automates these steps. To insert a new record with the macro, just press <Alt-I>.

Deleting records in this example means deleting the rows containing the records. To delete Mr. Nash, put the cell pointer on row 12, select /Worksheet Delete Row, and press <Enter>. Notice that you can delete any record in the data base without disturbing either CUST_IN or the @SUM function. The \D macro at B4 automates this command.

Two caveats: First, check that there are no cell entries in the same rows as the data base input range—inserting and deleting rows will wreak havoc with adjacent work areas. Second, because performance slows as data base size increases, note that this system works best with spreadsheet-sized data bases, not monster ones. ☺

Richard Scoville is a contributing editor for PC World.

EXCEL SHORTCUT
Saving a Group of Files

Ralph Soucie

Usually Excel users work on a group of related files—say, several worksheets and a graph. You can save such a group as a workspace for faster retrieval. First, close any unrelated files. Then select File Save workspace. (If you don't find this command, select Options Full menus and try again.) Type a descriptive name of up to 8 characters (or accept the RESUME.XLW default) and press <Enter>. Excel adds the re-

quired XLW extension as it creates the workspace file. The next time you need to work on this group of files, simply select the appropriate XLW file from the File Open list box. Excel will bring up all the files that were open when you saved the workspace in the same window sizes and positions as before. Ralph Soucie is a contributing editor for PC World.



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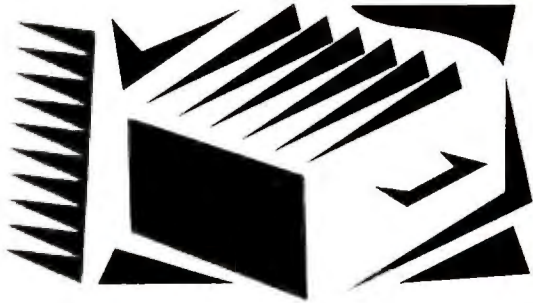
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Data Basics



Data Management

Tips and techniques for managing your data

This month: lookups—the key to good foreign relations

Alan Schwartz

When new data must refer to existing data, as it does in any relational system, complete accuracy is essential. If you're building a data base for Acme Tool Rental, for instance, how do you ensure each new invoice will point to the right customer record? A computer won't recognize *Charles Jones*, *Charles M. Jones*, and *Chuck Jones* as the same person. You ensure accuracy by comparing a *foreign key*—in this case, the customer ID field on the invoice—with a *primary key*—the customer ID in the customer table.

A *key* is a field or combination of fields, like an invoice number or a customer ID, that is unique for each record. Every table must have at least one key, referred to as its primary key. Placing this key in the records of another table (for example, putting a customer ID in an invoice record) makes it possible to relate the tables. A key that points to

another table so that the two can be related as child to parent is called a foreign key.

Maintaining the accuracy of primary keys is simple. Design your program so that when you add a customer, it checks that the assigned ID is not already in use. Once a key is added, never allow this ID field to be changed.

Validating a foreign key in a child table is trickier. The moment a user enters a foreign key during data entry, have your system search for the matching primary key in the parent table. If it's found, the program should display some descriptive data—such as a name—from the parent record to make sure it has identified the right person.

If the key is not found, the user will have entered an incorrect key, and the program should produce a *lookup*, a scrollable list from the parent table from which the user can select a key. You can always spot a system written without lookups even when the PC is turned off—there are invariably dog-eared printouts of customer IDs and names taped to the walls.

Looking at Lookups— The dBASE Way

In *dBASE III Plus* this procedure involves adding quite a bit of code around the foreign key's @...SAY...GET statement. In the following example, the parent file is CUSTOMER, the child file is

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Before *Data Extract* can read a report, you must "map" it by taking a sample of it and using a mouse or the cursor keys to

specify which lines are headers, details, totals, and so on. *Extract* uses this map to read the full report and copy the data into a form you can use. This last operation also can be run from the DOS prompt using a previously created map. With *Datatrope Extract*, those odd-looking reports you get from the mainframe upstairs can be added to your data base quickly and easily. —A. S.

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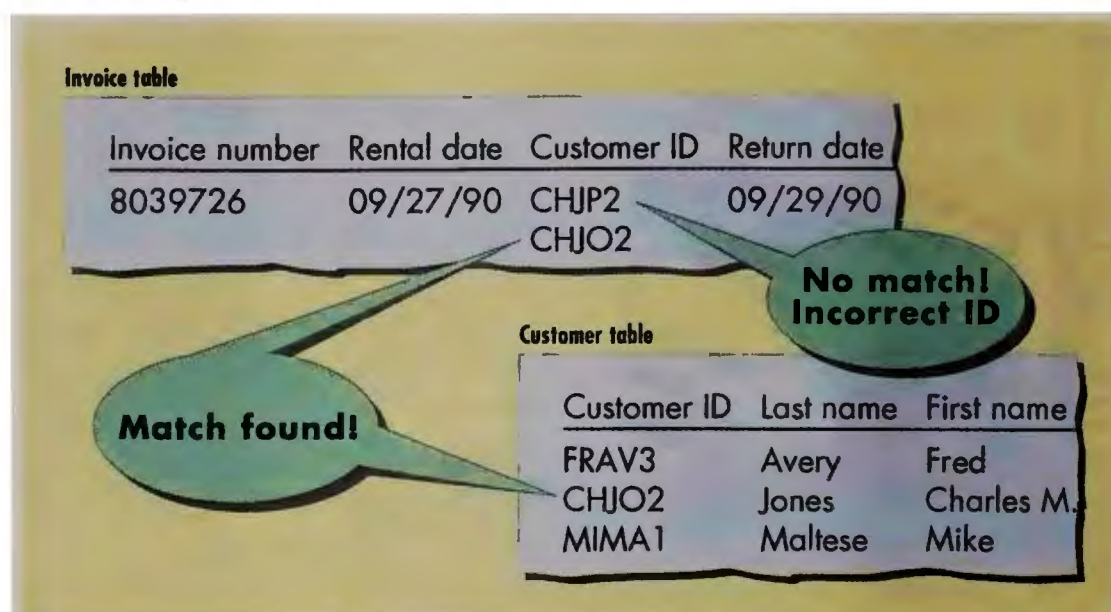
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INVOICE, and the key field is Cust_ID; change these names for your own use. Place this code inside the invoice-entry routine after STOREing blank spaces to the mcust_ID variable and before REPLACEing the invoice's Cust_ID with the code.

```
store .n. to cust_ID_ok
do while .not. cust_ID_ok
  @ 5,10 say "Customer ID :" get mcust_ID
  read
  select Customer
  seek m_cust_ID
  if found()
    @ 5,15 say Customer->Name
    store .t. to cust_ID_ok
  else
    seek left(m_cust_ID,1)
    browse freeze Name
    if mod(readkey(),256) = 12
      loop      &&Go to start of loop
    endif
    @ 5,15 say Customer->Name
    store Customer->Cust_ID to mcust_ID
    store .t. to cust_ID_ok
  endif
enddo
select Invoice
```

This DO WHILE loop lets you enter a customer ID, pick one from a list, or start over from scratch. The loop ac-

Lookups and Accurate Relations



For an invoice to find its customer, each invoice's Customer ID—a foreign key—must have a match in the customer table, where Customer ID is the primary key.

cepts data entry into a customer ID variable, then tries to match the ID with one in the customer table, CUSTOMER.DBF. If a match isn't found, a BROWSE is initiated; the FREEZE Name option keeps the cursor out of the Cust_ID field, where mistyping could do considerable damage. The IF MOD(READKEY(),256) = 12 statement checks to see if the user exited BROWSE by pressing <Esc>. If so, the loop starts over; otherwise, the content

of the Cust_ID in the CUSTOMER.DBF's current record is saved as the variable.

Unfortunately, *dBASE III Plus's* BROWSE command is awkward. It erases and takes over the entire screen, so you'll have to rerun the previously displayed @...SAY...GET statements. It's far too easy to change data inadvertently while BROWSEing. Even with the FREEZE option, it's possible to accidentally change a field. To exit BROWSE, you're limited to <Esc>, <Ctrl>-W, or <Ctrl>-<End>; users will be hesitant to use <Esc> unless they are aborting a procedure, and they won't use the other keys unless told to.

dBASE IV, *FoxPro*, and *Clipper* offer better tools for doing lookups, including a noneditable browse window that doesn't wipe out the existing screen. These data managers use different commands for this purpose; for example, *Clipper* uses the DBEDIT() function instead of BROWSE.

Enforcing the accuracy of foreign keys gives your relations rock-solid accuracy—the foundation you need to build accurate relational reports. ☺

Alan Schwartz is a partner in San Francisco-based Micromega Systems, which specializes in custom data base application development.

PARADOX SHORTCUT

Queries and Case Sensitivity

Celeste Robinson

When *Paradox* searches for values in a table, the query is usually case sensitive; if you enter *Jones* as a selection criterion, *Paradox* will not include records with the value 'JONES' in the Answer table. The same is true when *Paradox* looks for linking values in a query, a form, or a report. The only exception is when you use wild cards: A que-

ry with the selection criterion *Jones..* will find all records with 'Jones', 'JONES', and 'jones'. Note that when you use wild cards, indexed queries won't search as fast as when you use specific criteria.

Celeste Robinson is the author of The Best Book of Paradox (Howard W. Sams and Company, Carmel, Indiana, 1990).

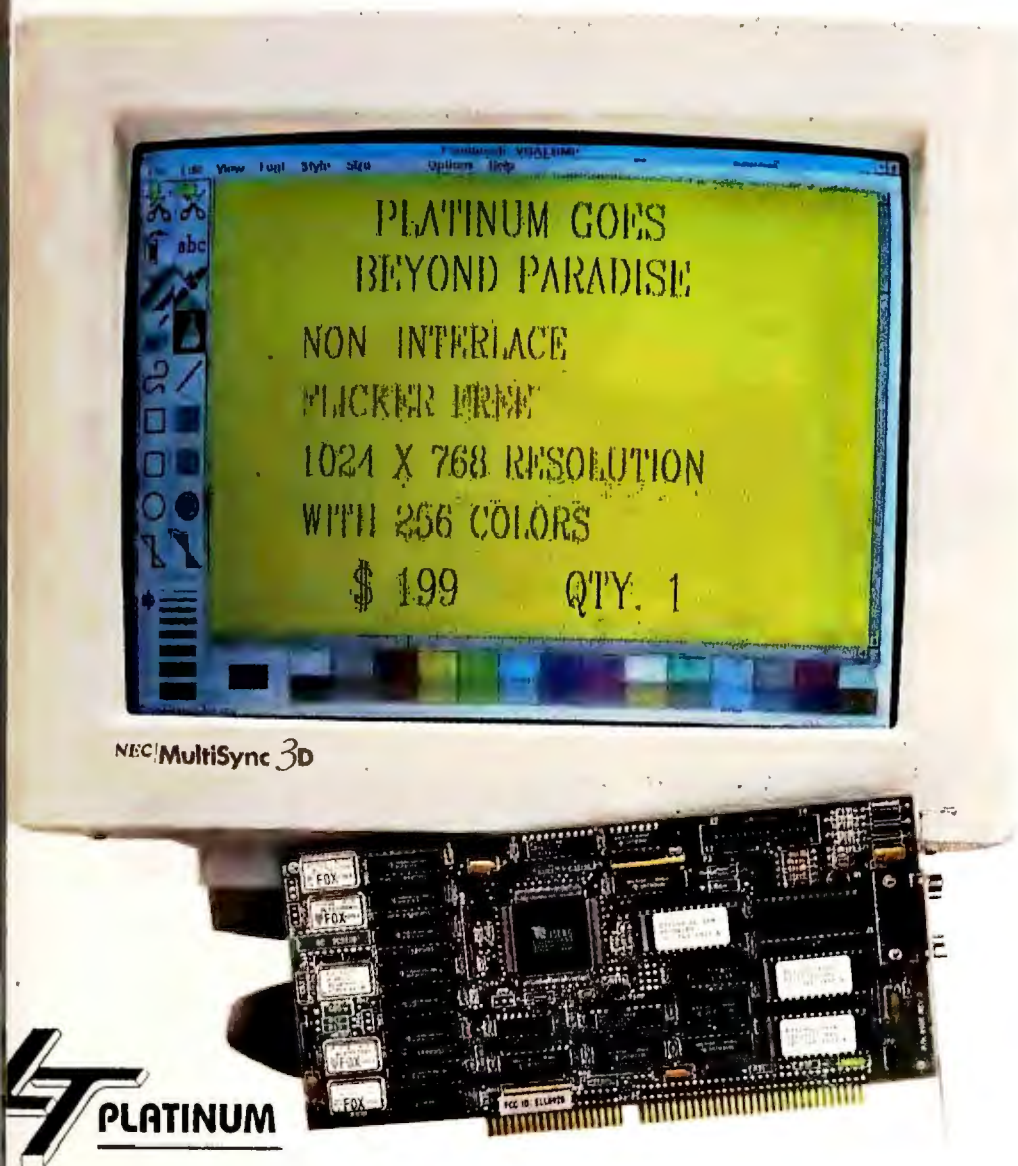
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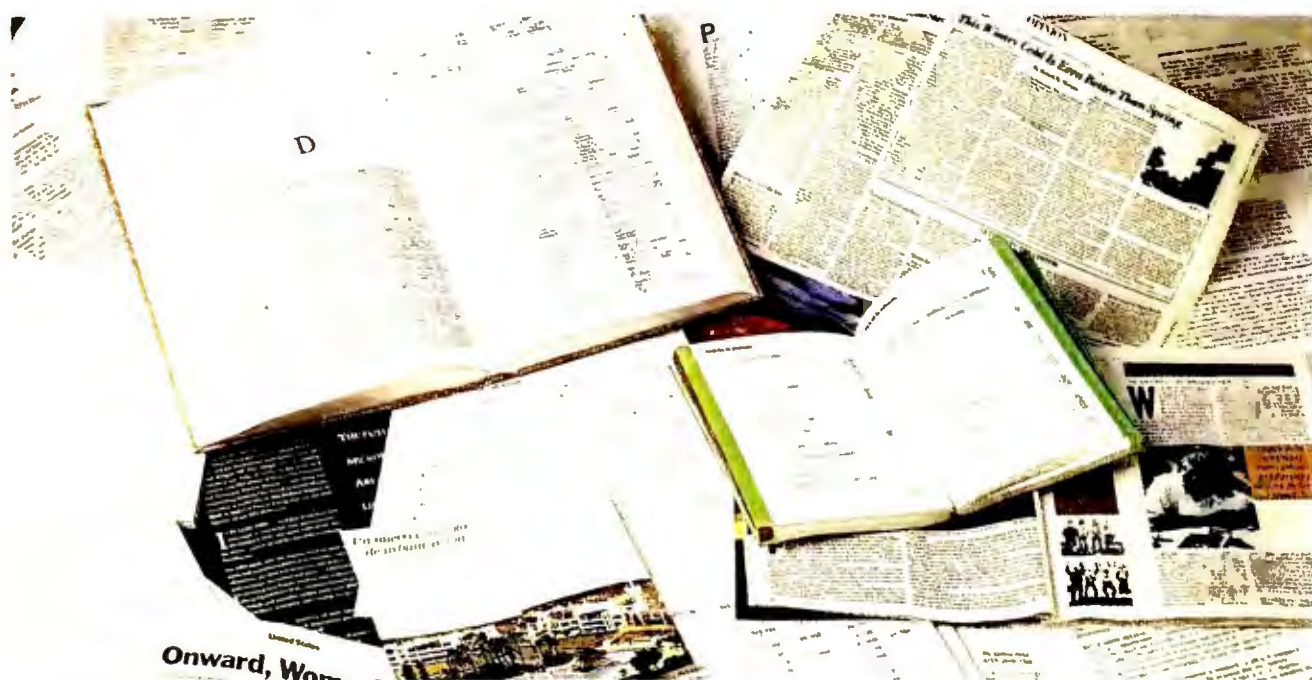
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The Art of Persuasion



Publishing & Graphics

Expert advice for creating high-impact documents and presentations

This month: tips for effective headlines, and how to create gray rules in PageMaker

Richard Jantz

Whether you're producing the company newsletter or an important sales brochure, the headlines you use can determine how quickly your document is understood—or whether it's read at all. A good headline grabs the reader's attention and conveys the most important information at a glance.

This month we focus on creating effective headlines for newsletters and other multicolumn documents. In planning headlines, as with all good design, consistency is the key. Establish a hierarchy and stick to it. Use the largest heads for the most important articles, smaller heads for secondary items, and so on. Similar-level heads within a document should use the same face, size, and style. A well-designed headline scheme allows readers to discern a document's

structure and glean its essential points in an instant.

Here are some tips for keeping your heads above water:

- Use short headlines, from three to seven words each, or about 10 to 36 characters.
- Limit to two lines large headlines that cover half the width of the page or more. Smaller, single-column heads should be no longer than four lines. For ease of reading, avoid hyphenating words at the end of a line.
- Use manual line breaks to split up headlines—don't rely on your desktop publishing program to do it. This way you'll avoid headlines whose meaning

might be misunderstood, like this one:

Board Kills Employee

Plan for Merger

- Newsletter headlines should be at least 18 points high but rarely larger than 36 points. For other types of documents, make headlines at least 50 percent larger than body text.
- Manually reduce the leading (line spacing) in heads until the lines of type nearly touch. Most page layout programs automatically add about 20 percent leading to the type size—for example, 33-point type would receive 40 points of leading (33/40). Using *solid leading* (33/33) produces a more attractive head—but check that the descend-

NUTS & BOLTS: PAGEMAKER

Creating Gray Rules

An easy way to enliven black-and-white documents is by using gray-shaded graphics. With *PageMaker 3.0*, creating gray text and boxes is a snap, but producing a gray rule is trickier: You must draw a gray box, then collapse the sides until they're the thickness of the rule you want. Here's how to create a horizontal gray rule approximately 4 points thick.

1. Start *PageMaker* and open a document.
2. Select the rectangle tool, then choose *Lines* and click the *2 pt* option.
3. Select *Shades* and choose a gray shade, such as 20%.
4. Draw a rectangle one column in width. Select *Page Actual size* to get a closer view of the

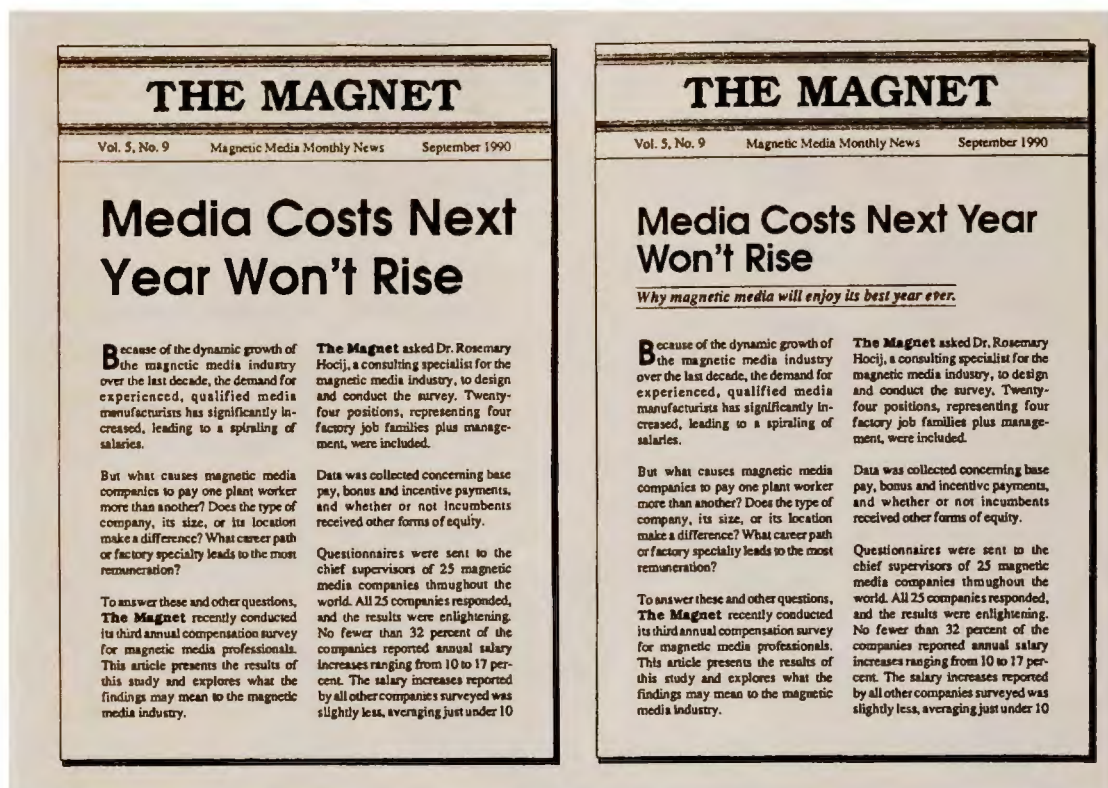
rectangle.

5. Select the rectangle with the pointer, then drag the bottom line toward the top line until they're touching. Since the space in between has been deleted, the rectangle's thickness is the sum of the top and bottom lines, or 4 points.

6. Make the border lines transparent by selecting *Lines None*. Now only the inside of the rectangle, which is 20 percent gray, is visible.

That's it. The rectangle is now equivalent to a 4-point gray rule. Using the same procedure, you can create a 2-point gray rule using a 1-point rectangle, and so forth. —R. J.

The Distinguished Head



With headlines, bigger isn't always better. To improve the crowded headline in the newsletter on the left, the designer added more white space above and below the headline by using a smaller type size with tighter leading (33/33 points instead of 44/51). The designer also used Ventura Publisher's automatic kerning option to reduce the space between certain letter pairs (such as the "Ye" in "Year"). Finally, a brief tag line was added to provide more information and help draw readers into the story.

DESKTOP PUBLISHING TOOLBOX

VP to the Max

Aristocad's long-awaited *VP to the Max* adds valuable text editing features to *Ventura 2.0*. Although it costs a hefty \$199, the thesaurus and customizable spelling checker can save you from hours of going back and forth between *Ventura* and your word processor.

Installing directly into *Ventura*'s Desk menu, *VP to the Max* lets you search and replace style tags, text codes, and text strings of up to 45 characters (including spacing and punctuation). You can scan an entire *Ventura* chapter file, including all linked text and caption files,

and view a list of all your style tags, with the name, typeface, point size, alignment, and so on displayed.

If you perform extensive text editing inside *Ventura* or import files from a variety of word processors, *VP to the Max* is easily worth the money. —R. J.

VP to the Max \$199; Aristocad, Inc., 1650 Centre Pointe Dr., Milpitas, CA 95035; 800/338-2629, 800/426-8288 (California), 408/946-4032 (fax)

Reader service no. 602

ing stems of some letters (such as lower-case *g*) don't overlap type below.

- Use a typeface that contrasts with body text. For example, heads traditionally take a bold or bold italic typeface. It's a good idea to set the body text in a serif face (such as Times Roman) and the heads in a sans serif face (such as Helvetica)—or vice versa. Try using the special *display type* included in font packages specifically for headlines.

- Avoid using only capital letters; a combination of uppercase and lowercase makes heads easier to read. For a less formal tone, capitalize only the first word and proper names. This will also give you more room for words, since lowercase letters require less space.

- Insert white space above and below the headline to help it stand out. A smaller headline with ample white space is often more effective than a big headline engulfed by text.

- Avoid centered or right-justified heads. Aligning heads flush left with a ragged right margin makes them easier to read and prevents the uneven word spaces typical of justified text.

- Use *kerning* to remove the excess space that shows up between certain pairs of letters, such as in *Ye* and *Wo*. Most page layout programs let you kern letter pairs manually or automatically, but you'll have to experiment to find the best-looking results.

- Use no more than three headlines per letter-sized (8½-by-11-inch) page. When many headlines compete for attention, they lose their effectiveness.

- Finally, to draw readers further into your document, use *tag lines*—brief phrases that provide more information about the text—like the one that spells out the contents of this month's column. Keep tag lines smaller than the headline but larger than the text, and use a contrasting type style, such as italics, to set them off. ■

PC World contributing editor Richard Jantz is the author of *Ventura for Windows 3.0* (John Wiley & Sons, New York, 1990).

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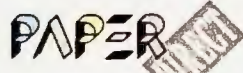
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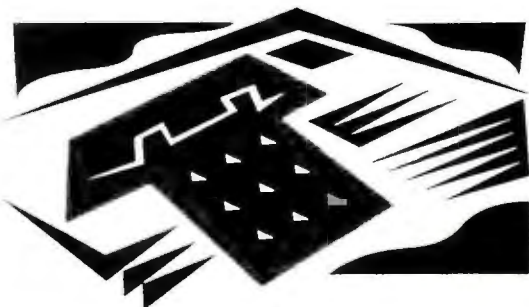
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Communications

On-line resources for business and professional users

This month: Prodigy, a home users' service with E-mail, stock quotes, and bulletin boards; and Dun & Bradstreet's Market Identifiers, an on-line sales lead data base

Judy Getts

Whether you consider it the most innovative on-line service of the century or the IBM/Sears, \$800 million, dial-up equivalent of the PCjr, there's no denying that Prodigy has established a formidable presence. Its Mardi Gras interface is so simple a three-year-old could use it, and its easy E-mail, breezy "infotainment" content, and low, low price have attracted an alleged 350,000 subscribers to the service.

Prodigy subscriptions cost a mere \$9.95 per month for unlimited use—a sign of the service's decidedly mass-market, homebound emphasis (by comparison, CompuServe is a steep \$12.50 an hour). Prodigy is certainly not for business use: The E-mail is toylike, and

although you get free stock quotes and access to a variety of bulletin boards, you can't capture or upload data.

To call Prodigy, you need a copy of the \$49.95 Prodigy software, a TSR-hostile 512K behemoth available at Sears and selected computer retailers (it's being given away free through mass mailings in many cities). When you dial the service, the software generates splashy video game-like screens that let you travel around the service using only the <Tab> and <Enter> keys. Unfortunately, the graphics-intensive interface is quite slow.

Most of Prodigy's content is conspicuously family-oriented, from the on-line *Weekly Reader* to the cooking and quilting forums. An on-line *Consumer Reports* library, *USA Today*-like weather maps, and advice on pet care are other typical offerings. Ads for sneakers, appliances, cars, and T-shirts adorn the bottom of screens like electronic billboards. You can "fold out" ads to read additional screens, but sometimes you

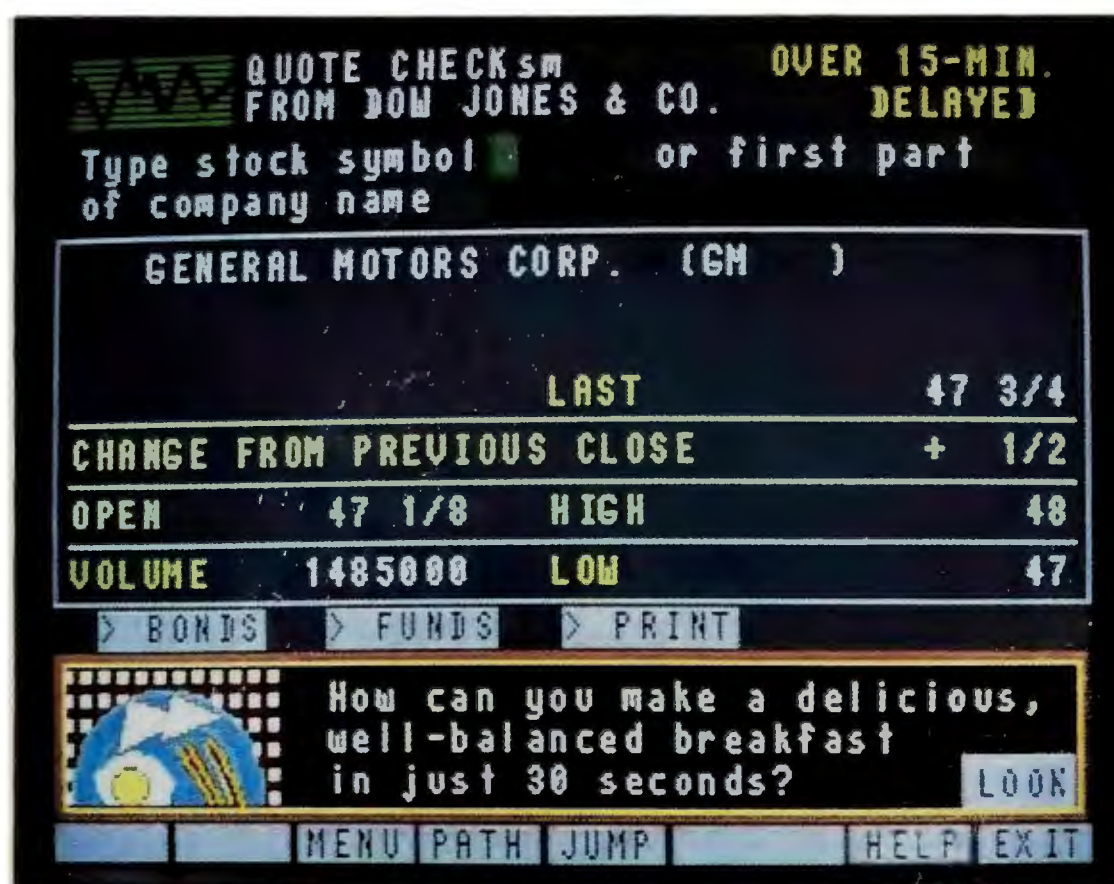
can't return to the Prodigy screen where you left off.

There are no file collections from which to download software, and Prodi-

ON-LINE TOOLBOX

Display Control Tips

If you're on line and information is whizzing across the screen too fast to be read, try hitting <Ctrl>-S. If the on-line service's software supports XON/XOFF characters—and chances are it does—this will pause the screen. To resume scrolling, press <Ctrl>-Q. To break out of an operation (to end the display of a long help file, for example), try <Ctrl>-C.
—J. G.



Prodigy gives you free stock quotes with the \$9.95 subscription, but you can't capture data.

THE PROFESSIONAL EDGE

Sales Leads by Modem

Fishing for sales prospects can be as time-consuming as trolling for the wreck of the *Edmund Fitzgerald*. You can fork over big bucks to one of the many conventional brokers of business information, but it may take as long as two or three weeks to get it.

Dun & Bradstreet offers a more convenient alternative. Its Market Identifiers on-line data base provides sales, product, and employee information on over 8.6 million American businesses.

For a yearly fee of \$49.95, you get a one-year license to Dun's *Direct Access* record-search software and access to the encyclopedic Market Identifiers data base. Records cost 65 cents each.

Company records list company name, address, telephone number, type of business, name of chief executive, number of employees, number of locations, and annual sales. Records can be printed out or downloaded in any of over a dozen file formats including 1-2-3, *Symphony*, *dBASE*, and ASCII.

Direct Access, which requires 640K and a hard drive, enables you to search for businesses by sales volume, year founded, number of employees, and industry type (defined by Standard Industrial Classification codes). You can also search by region, including area code, ZIP code, state, city, county, and Standard Metropolitan Statistical Area. Currently, you can't search by company name, but a new version of *Direct Access* (due to ship by the time you read this) promises to remedy this failing.

You define searches before logging on. *Direct Access* then provides one-button execution: It dials the data base, counts company records that fall within your search parameters, and downloads ten sample records. *Direct Access* will also tell you the total number of records located by your search.

If you like the sample results, you then tell *Direct Access* to redial the data base and start downloading the number of company records you specify. *Direct Access* will choose them at random from the total number that match your search criteria.

For sales and marketing personnel who need to target sales prospects in a particular area for direct mail or telemarketing campaigns—and who want to have that information in a hurry—the D&B Market Identifier data base offers immediate gratification at a comparatively good price. —J. G.

Dun's Direct Access Dun's Marketing Services, 3 Sylvan Way, Parsippany, NJ 07054-3896; 800/654-7834, 201/605-6960 (fax)

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gy has no plans to offer them. The Prodigy software won't permit you to upload or capture to disk on-line information—even E-mail—although you can print it out. E-mail messages are limited to four screens of about 75 giant characters each, and you can't carbon copy messages or do anything more than just send them.

Although public bulletin boards are many and varied, ranging in topic from finance to PCs, content is tightly controlled by Prodigy Services. A message may remain on the service only for a week or so before being removed. A full-time Prodigy staff screens all messages and returns to users those deemed unsuitable for public posting. Prodigy often cuts off the ability to post replies to a public message once it has garnered what Prodigy Services considers to be enough responses.

Even though you can't capture them, Prodigy's free stock quotes alone may be reason enough for casual home investors to subscribe. Quotes for stocks, bonds, and mutual funds are provided by Dow Jones with the same 15-minute delay as with Dow Jones News/Retrieval (DJN/R)—but without that service's \$1.46 per minute charge (at 1200 bps). You can retrieve quotes individually, or you can set up one or two portfolios of 15 stocks each; Prodigy retains the stock list for easy retrieval each time you log on. Unlike with DJN/R, however, you can't get real-time quotes for an extra monthly fee.

For all its quirks, Prodigy is a fun system to call. If you're new to the modem world and looking for a cheap way to get your feet wet, if on-line pen pals are your bag, or if you're a casual investor with no more than a few companies to track, Prodigy is a good deal. Users with more serious needs, however, will find that the ineffectual E-mail, lack of upload and capture facilities, and other limitations make Prodigy more a playtime service than a pinstripe one. ☹

Judy Getts is a contributing editor for PC World.

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User Group Tips

Helpful hints from members of the nation's user groups

Automating Passwords in Qmodem

Some communications systems require you to use your password many times during a session. With *Qmodem*, you can assign the variable \$password to a function key.

The password for the system must be in the dialing directory, so enter Terminal mode, and press <Alt>-D to go to Phone Book. Cursor to the entry you wish to modify, and edit the password by pressing r and then p. Type in your password, and press <Enter> followed by <F10> to save your changes. Press <Esc> to exit Phone Book.

Now press <Alt>-J to go to the Function Key Assignment menu. Press 1, 2, 3, or 4 to assign the password to a function key or to a <Shift>-function key, <Ctrl>-function key, or <Alt>-function key combination, respectively. Cursor down to the key you want, and type \$password ^ m. The last two characters (^ m) save a keystroke by adding an automatic hard return. For versions prior to *Qmodem SST 4.0*, you'll have to use { instead of '^ m'. Press <F10> to save your additions, then press <Esc> to exit the menu. Now when you're queried for your password, pressing a single key or key combination will insert it automatically.

Don Simpson

Tucson Computer Society

Tuning DOS PRINT

Users frequently employ the PRINT command to send files to the printer while they continue to execute commands at the DOS prompt. The first

time you invoke PRINT, DOS sets several switches that affect printer and system performance. You can change default settings and improve performance by placing this command at the end of your AUTOEXEC.BAT file: `print /d:prn /q:32 /b:4096 /m:64 /u:16`. Here's an explanation of the command.

The /D:PRN switch causes PRINT to automatically choose PRN as the default parallel printer port and suppress the 'Name of list device [PRN]:' prompt. If you're using a serial printer connected to COM1, replace 'prn' with `com1` in the command. /Q:32 enlarges the capacity of the print queue from the default 10 entries to 32. /B:4096 increases the print buffer from the default size of 512 bytes to 4096 bytes, thereby reducing disk operations and improving performance. Although PRINT allows a buffer as large as 16,386 bytes, most users find the suggested size sufficient.

The PRINT command lets you execute other DOS commands while you're printing by quickly exchanging control of the CPU with DOS. The /M:64 switch increases the amount of time that PRINT maintains control before relinquishing it to DOS.

However, sometimes PRINT gets control of the CPU only to find that the printer is still busy and not quite ready for the next sequence of characters. The /U:16 switch specifies that PRINT wait 16 clock ticks for the printer to become available before PRINT returns control to DOS. The default is 1 tick, but a value of 8 or 16 can provide better performance for older printers with less built-in memory.

Kris Jamsa

Las Vegas PC User Group

Easy Report Processing

Data base report columns lose their alignment when printed with proportional fonts. Here's a simple technique

to straighten them out: Modify your report program so that it places a unique character string, such as '%%', before each data line item in your report. Then import the report into a word processor, and search and replace to substitute a tab setting for each string. Set the tab grid to make the columns line up properly.

Don Druker

DataEase Users' Group

Washington, D.C.

Use Paradox Instant Scripts to Speed Report Design

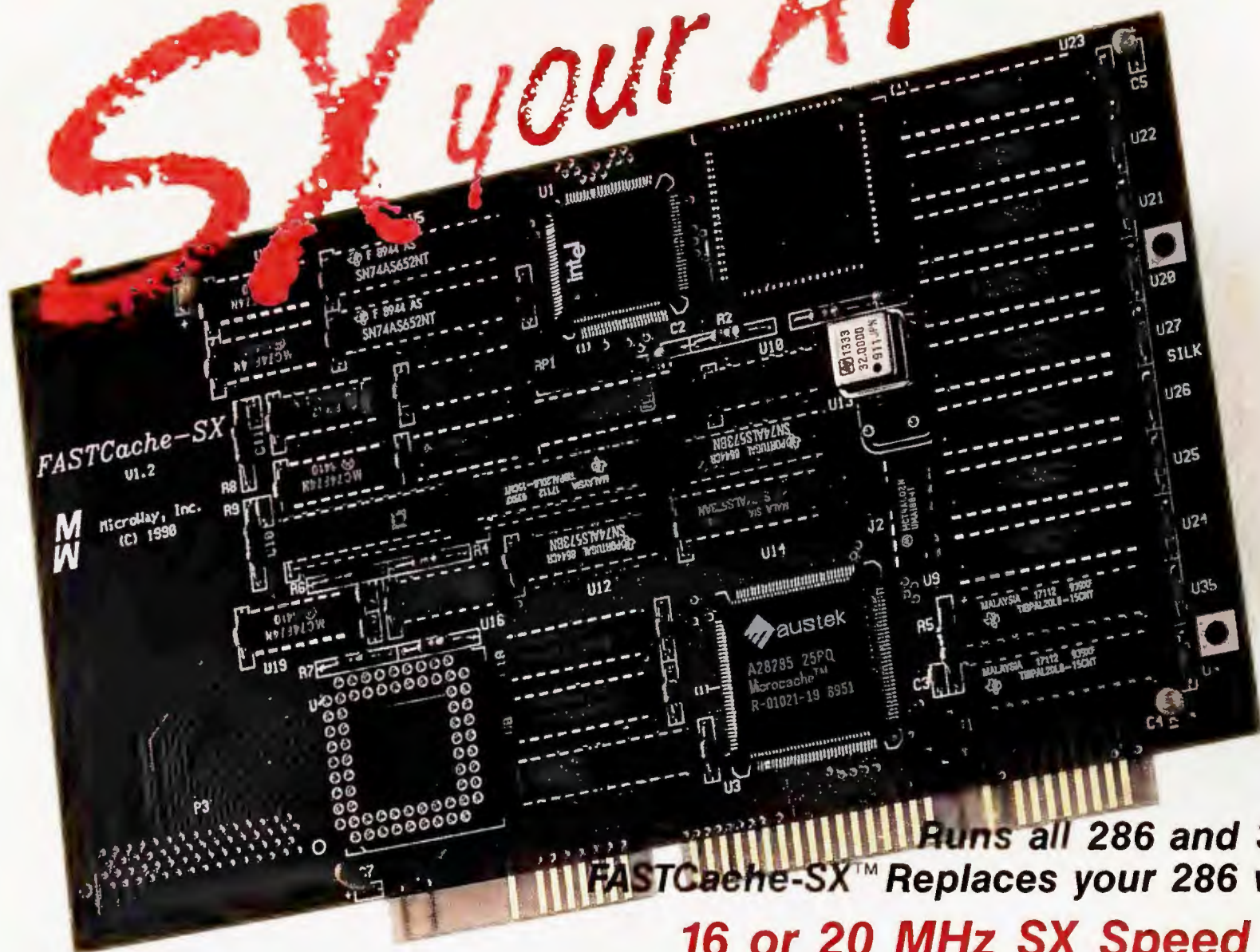
Report design often requires repetitive keystrokes, but *Paradox's* Instant Script feature can automate these sequences and speed the process.

Here's an example of how scripts ease the design of a new tabular report: At the main menu, select *Report Design*. Press <Enter> to see the list of tables, and choose the one you want to report on. Select R for Standard report, type a report description, press <Enter>, and choose *Tabular: Paradox* then presents a design containing every field in the table. Move to the first unwanted field, and press <Alt>-<F3> to begin recording keystrokes. Press <F10> for the menu, select *TableBand Erase*, and press <Enter> to erase the column. Then press <Alt>-<F3> again to stop recording keystrokes. Now the script is set up, and you can delete a column simply by moving the cursor to it and pressing <Alt>-<F4>.

Brian J. Smith

Southern California Paradox Users Group

Are you a user group member with a tip to share? Would you like to see your name in PC World and earn \$50 plus a PC World T-shirt in the bargain? See How to Contact PC World, page 4. ☺



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Edited by Tom Swan

Fail-Safe DOS Commands

DOS commands like DEL *.OLD can wipe out files before you can say press <Ctrl>-C! To make such potentially dangerous commands prompt for verification, I wrote VR.C [see LISTING 1] in Microsoft C.

VR displays a 'Y/N?' prompt for each file affected by DOS wild-card commands. The commands must be entered in the form `vr cmd path [args]`, where `cmd` is a command such as COPY or DEL, `path` is a path specification with wild cards, and `[args]` are optional arguments. (continues)

```
/* VR.C by Anthony Whitford */
#include <dos.h>
#include <process.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#define VERSION 1.0
#define _MAX_COMMAND 128

void main (int argc, char *argv[])
{
    struct find_t file_info;
    char path[_MAX_PATH], drive[_MAX_DRIVE], dir[_MAX_DIR];
    char file[_MAX_FNAME], ext[_MAX_EXT], switches[_MAX_COMMAND];
    char cmd[_MAX_COMMAND];
    int userInput, counter;

    printf("Verify %1.1f (c)1990 by Anthony Whitford\n", VERSION);
    if (argc < 3) { /*If wrong args, print usage and example*/
        puts("Use:    VR command filespec [switches]");
        puts("Sample: VR COPY *.COM A: /V");
        exit(1); /*Incorrect use*/
    }
    _splitpath(argv[2], drive, dir, 0, 0); /*Get drive, directory*/
    if (_dos_findfirst(argv[2], 0, &file_info) {
        puts("Error: Invalid path or no matching files.");
        exit(2); /*File not found*/
    }
    switches[0] = '\0'; /*Reset string*/
    for (counter = 3; counter < argc; counter++) {
        strcat(switches, " "); /*Get program options*/
        strcat(switches, argv[counter]);
    }
    do {
        _splitpath(file_info.name, 0, 0, file, ext);
        _makepath(path, drive, dir, file, ext);
        sprintf(cmd, "%s %s%s", argv[1], path, switches);
        printf("%s? (Y/N) ", cmd); /*Verify action*/
        do {
            userInput = toupper(getch());
        } while ((userInput != 'Y') && (userInput != 'N'));
        printf("%c\n", (char)userInput); /*Echo input*/
        if (userInput == 'Y')
            if (system(cmd)) /*Do action*/
                puts("Error: Can't execute command.");
        } while (!_dos_findnext(&file_info));
    }
    exit(0);
}
```

LISTING 1: Use this Microsoft C program to add fail-safe verification to most DOS commands.

ments. Press Y to execute or N to skip each file that VR displays.

Here are a few samples to illustrate how VR works. To copy all COM files with disk verification (/v) from the current path to A:, type `vr copy *.com a: /v`. You will be prompted to copy each COM file in the directory. To delete BAK files in C:\WP, enter `vr del c:\wp*.bak`. To rename TXT files to OLD, use `vr rename *.txt *.old`.

If you supply fewer than two arguments, VR will print an error message. If it detects errors, the program exits with an errorlevel of 1 for incorrect use or 2 for an invalid path or file not found. You can examine these values with an `*if errorlevel 1 goto error*` statement in a batch file.

Anthony Whitford

Sidney, British Columbia, Canada

Editor's note: VR works with most DOS commands and programs but does not allow pipes (|) or redirection (>) symbols. To compile the program with Microsoft C 5.1, enter `cl vr.c`. To compile from the QuickC 2.01 editor, press <Alt>-MB. To compile with Microsoft C 6.0, use `cl /f 2000 vr.c`, increasing stack space to 8192 bytes (2000 hex). With QuickC 2.51, press <Alt>-OML and set stack space to 8192 before compiling.

Call Me Irresponsible, But Call Me Anyway

Calling batch files as subroutines cluttered my disk with many small files and complicated error handling. It just seemed irresponsible of DOS not to let me call subroutines from within the (continues)

POWER TIP NO. 130

Turning Off Page Breaks in WordStar

If you're preparing a document in WordStar 4.0 or a later version for conversion to ASCII, you'll find it easier to see all the line spacings if you remove the automatic page breaks. Put the dot command `.pl` at the top left margin of the document, and the entire document will become a single page.

Rex Farrance
Assistant Editor

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CHANGE FILE ATTRIBUTES	✓	✓	✓	✓
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```

@echo off
if "%1"=="proc" goto %2
echo main %1
call %0 proc proc1 %1
call %0 proc proc2 %1
call %0 proc proc4 %1
goto end
:proc1
echo proc1 %3
goto end
:proc2
echo proc2 %3
call %0 proc proc3 %3
goto end
:proc3
echo proc3 %3
goto end
:proc4
echo proc4 %3
: end

```

LISTING 2: MAIN.BAT demonstrates one way to call subroutines in batch files.

batch file as I can in BASIC, Pascal, and C.

Then I discovered how to do exactly that, as shown by MAIN.BAT [see LISTING 2]. First, the program checks whether parameter %1 equals 'proc', which represents a procedure call. If so, GOTO jumps to a label passed in parameter %2.

If %1 does not equal 'proc', execution begins at the label ':start'. After displaying a message, three CALL commands execute the same batch file, using %0 to obtain the file's path name. The CALL statements pass parameters 'proc' and 'procn', where n is the number of a procedure to call.

Each procedure begins with a label (:proc1, for example) and ends with 'GOTO end'. You can pass additional arguments beginning with %3; 'proc2'

demonstrates this by calling 'proc3'.

Steve Hardy

Bainbridge Island, Washington

Editor's note: As printed here, MAIN.BAT requires DOS 3.3 or later. Under DOS 3.2, change '@echo' to echo and replace 'call' with c:\command /c, substituting a: for 'c:' if you boot from a floppy.

After entering the program, type main with or without parameters at the DOS prompt. You can also force the batch file to run only a selected subroutine. For example, enter main proc proc2 to run the statements under the label 'proc2'.

When simulating subroutines this way, you can reduce disk activity—and thereby improve performance—(continues)

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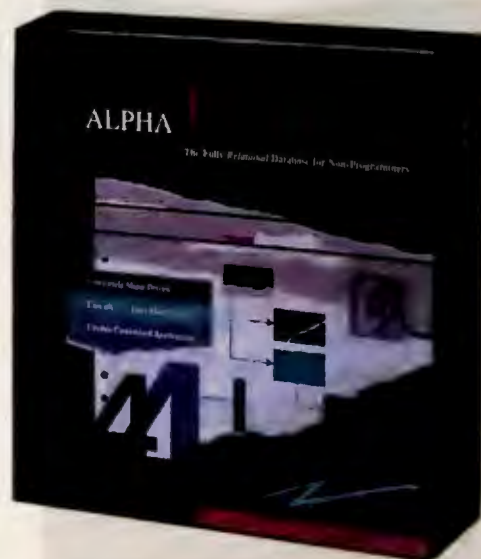
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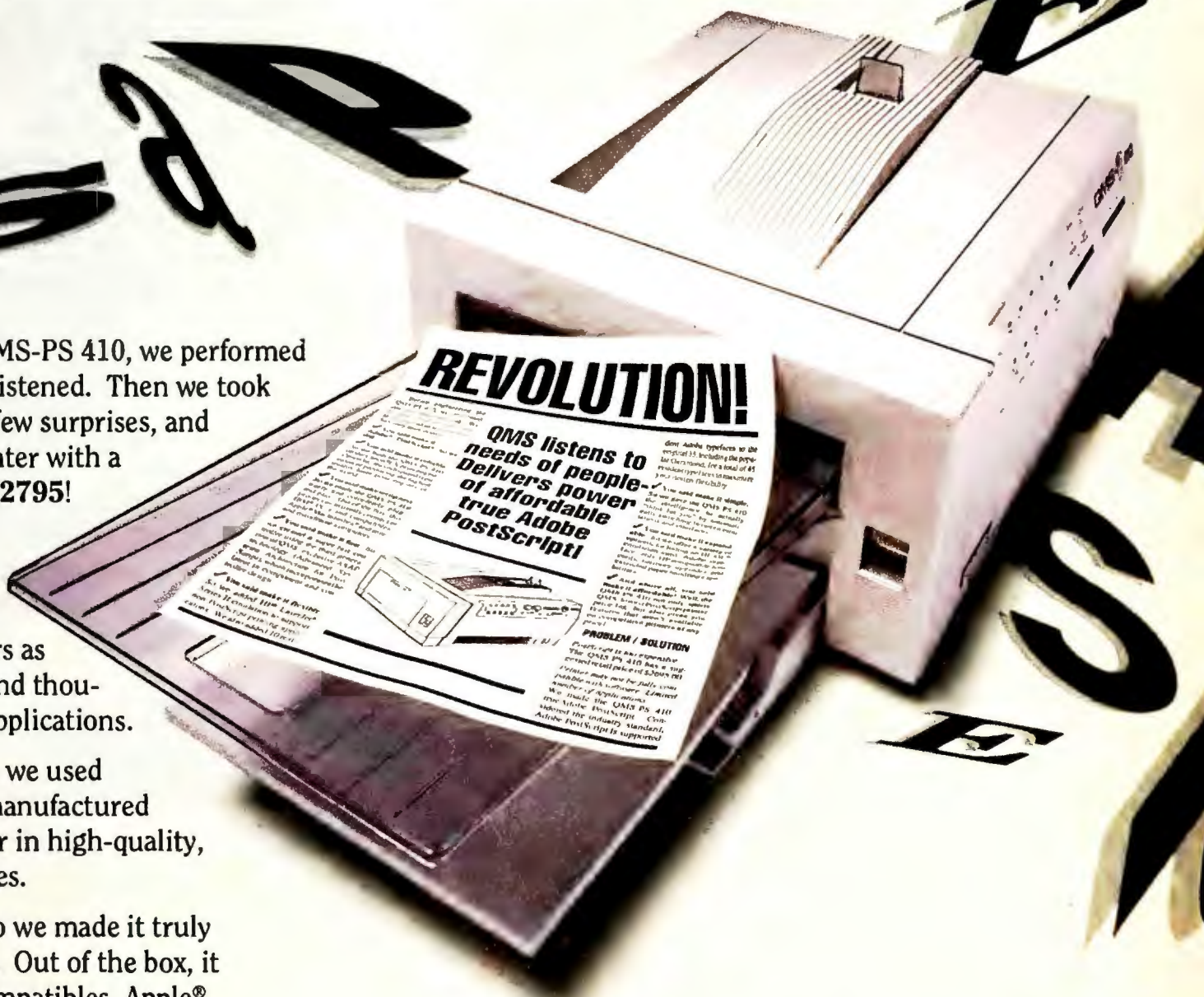
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STAR - DOT - STAR

by installing a disk cache such as PC-Kwik or by running the batch files from a RAM drive.

Validating Dates in dBASE

In *dBASE III* and later versions, it's difficult to create a blank date variable if you're not appending a new record. So I wrote a program that verifies dates entered as text strings [see **LISTING 3**]. Unlike the usual method of checking day, month, and year components, my procedure works by converting an input string (td) to a date, then translating the result back to a string variable (tdchk). If the two strings match, the date is valid; otherwise, the program displays an error message and lets you correct your typing or enter a new date.

Dan O'Brien

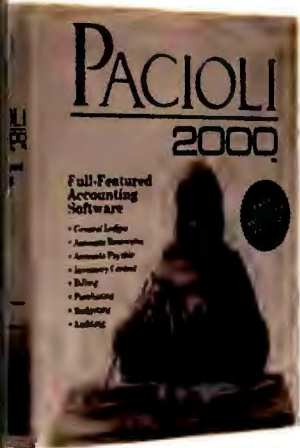
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*Editor's note: To try out this method, create CHKDATE.PRG and type **do chkdate** at the dot prompt. The final statement converts the verified result to a date variable, still called td, which you can store in a data base field, display in a report, or use anywhere else you need a validated date.*

(continues)

```
set talk off
store space(8) to td
store "01/01/80" to tdchk
clear
@ 7,14 say "Date"
do while td # tdchk
  @ 7,19 get td picture "@D"
  read
  tdchk = dtoc(ctod(td))
  if tdchk # td then
    @ 6,28 to 8,49
    @ 7,29 say "Date error "+td
  else
    store space(25) to blank
    @ 6,28 say blank
    @ 7,28 say blank
    @ 8,28 say blank
  endif
enddo
td = ctod(td)
```

LISTING 3: Run CHKDATE.PRG for a demonstration on validating dBASE dates.



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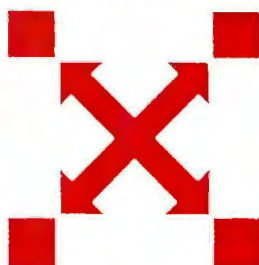
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DEVELOPER'S TOOLBOX

Have C, Will Program

Like rivals in an old Western movie, Barland and Microsoft grapple over the C language market. Barland, ever the pioneer, is blazing new territory with *Turbo C++ 1.0*; Microsoft holds down the standard ANSI C fort with *Microsoft C Professional Development System 6.0* and *QuickC with QuickAssembler Development Environment 2.5*.

Meanwhile, back at the ranch, we cowpoke developers are champing at the bit while trying to decide which of these superb products to buy. What's a hired hand to do?

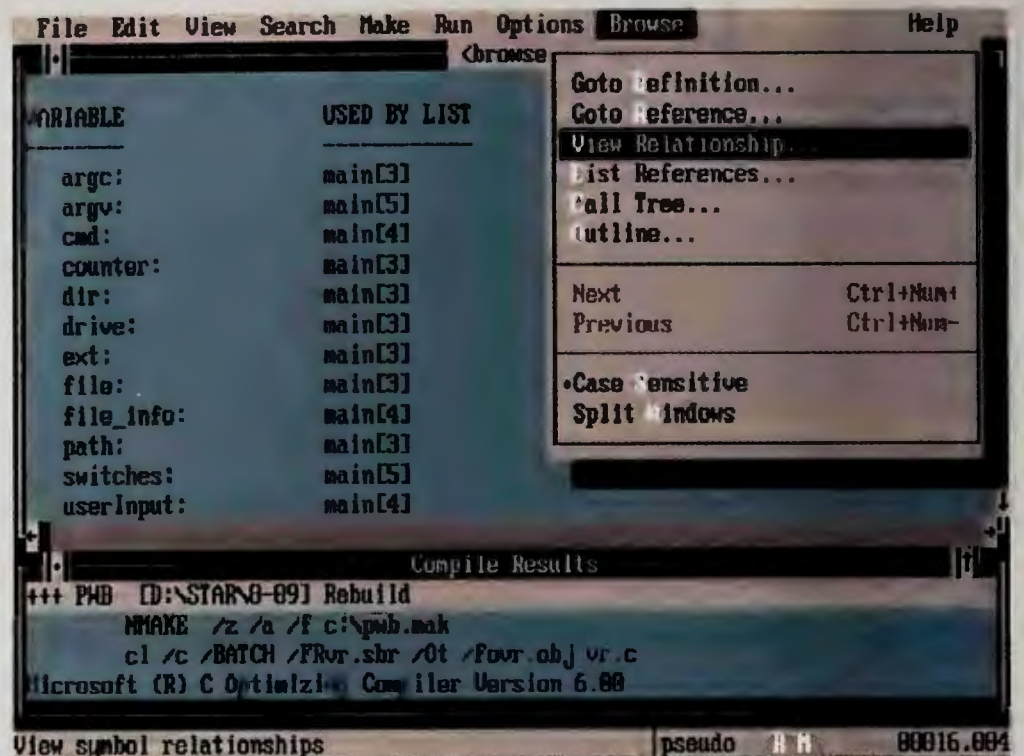
It's a tough call, but if you're out rustling up a first-class professional programming language for DOS, Windows 3.0, and OS/2, hang up your spurs. *Microsoft C 6.0* is clearly the top choice.

The new 6.0 compiler is ANSI C compatible (well, almost, but diversions from the standard are minor). It optimizes run-time performance as slickly as any competitor, and it comes with a stripped-down version of *QuickC* that's suitable for quick tests and prototypes.

Microsoft C 6.0 jangles with new features. Most striking is the *Programmer's WorkBench*, an integrated environment that combines elements of the old *Microsoft Editor* with the text-based windows and pulldown menus familiar to users of *QuickC* and other *Quick* languages. A mouse makes the *WorkBench* easier to use, but it's not required. Of course, I can also compile in the traditional way from the DOS command line.

Of the *WorkBench's* many features, one, called the *Browser*, rides herd over a project's source code. After compiling, the *Browser* lets me track symbols in hypertext fashion, and it gives me new ways to examine relationships among functions and variables.

Other new 6.0 features include an improved project manager called



Microsoft C 6.0's Programmer's WorkBench, an integrated environment, includes an innovative *Browser* for viewing symbolic information.

NMAKE (new make), 16-bit base painters, six memory models, an incremental linker that saves time by reusing existing links, and an updated *CodeView* that uses extended RAM for debugging large programs.

As good as it is, however, the *WorkBench* is often more difficult to control than a bull gone loco. For example, changing display colors requires inserting color values for dozens of screen parts one by one. These and other options would be more accessible if they were carried into dialog boxes.

Similar complexities make the *Programmer's WorkBench* suitable only for experienced developers willing to make a full-time commitment. Less sophisticated programmers may want to consider *QuickC with QuickAssembler 2.5*.

This new version of Microsoft's quick-an-the-draw C compiler looks and feels much like the earlier 2.01. But the new *QuickC* is upwardly compatible with *Microsoft C 6.0*, letting you compile any *QuickC* program with C 6.0 (but not necessarily the other way around). You

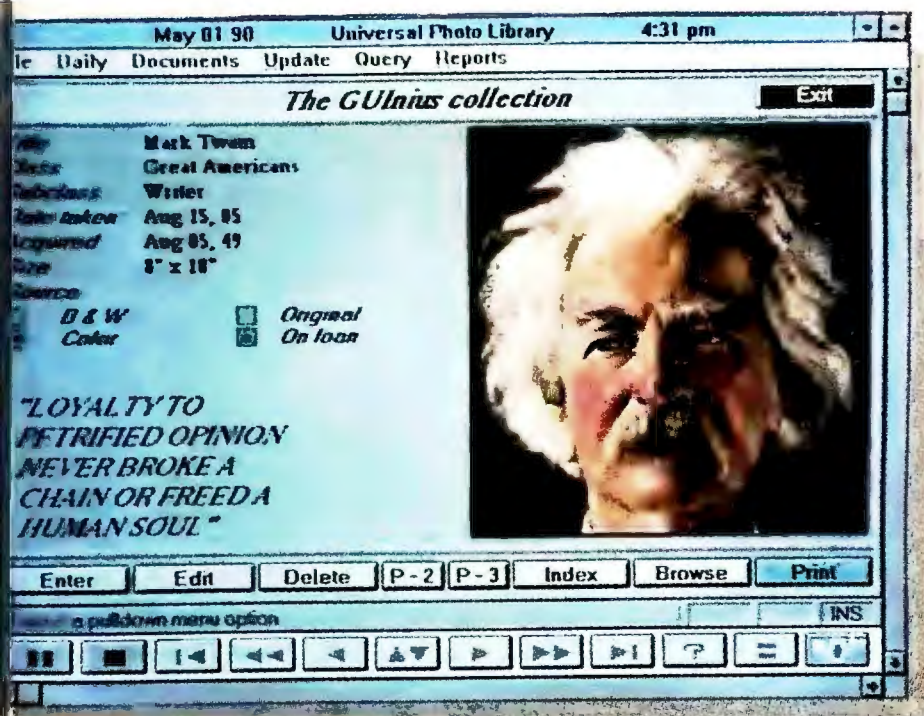
can develop code with *QuickC* at home and later compile with the full 6.0 compiler to take advantage of performance optimizations. By itself, *QuickC* is more than adequate for writing small to medium-sized programs.

QuickC's compiler and linker run quickly and are simple to use. The built-in assembler lets you optimize selected C functions or even develop stand-alone assembly language code. Other new features include a *QuickWatch* command for viewing variables—useful for informal debugging.

Unfortunately, both Microsoft compilers lack C++ object-oriented programming (OOP) extensions. But that may be coming round the mountain soon. According to Greg Labdell, senior C product manager, "the next major upgrade of *Microsoft C* will be C++."

Barland has already headed them off at the pass with *Turbo C++ 1.0*, an upgraded version of *Turbo C 2.0*. (Version numbers start again with 1.0, emphasizing that *Turbo C++* is a new language.) (continues)

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Telephone: (212) 549 2345 Facsimile: (212) 549 2385

Client Statement

May 31, 1989

Our reference: CIL0004
Your telephone: 9 127843

Trading Balance \$4,143.42
Cash Receipts 8,477.00
Net Due 13,620.42

Date	Buy/Sell	Stock	Quantity	Price	USD Value	Commission	Unsettled Due
May 05, 89	B	20000.00	10000.00	8.1750	817.50	51.93	3310.43
May 22, 89	S	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 25, 89	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 28, 89	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 31, 89	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
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May 02, 90	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 03, 90	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 04, 90	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 05, 90	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 06, 90	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
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May 04, 93	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
May 05, 93	B	10000.00	10000.00	8.1750	817.50	51.93	3310.43
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May 08, 93	B	10000.00	10000.00				

DEVELOPER'S TOOLBOX

(continued)

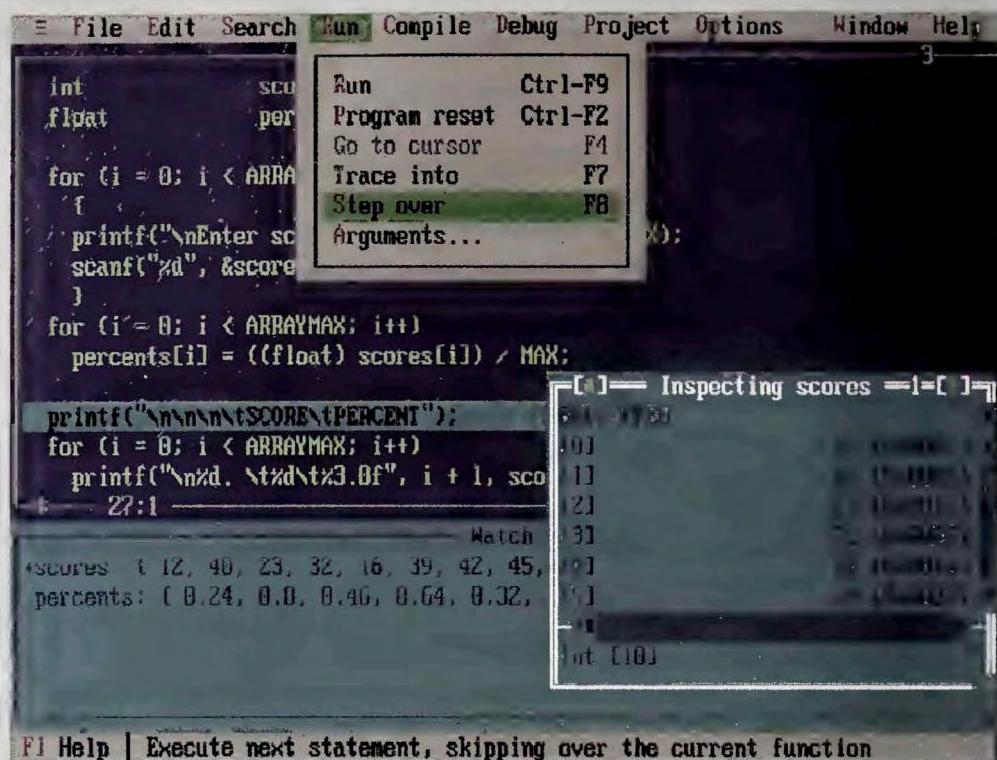
Not only is Turbo C++ ANSI C compatible, it supports the complete AT&T 2.0 C++ specification, the newest official design for the C++ language. Improvements over past Turbo Cs include reworked and expanded function libraries, VROOMM code segment overlays for squeezing big programs into small memory spaces, and an improved project MAKE utility. There's also a C++ class library to get you started with OOP development.

Despite its many new extensions and improvements, Turbo C++ remains the fastest C compiler in the West. I don't know how Borland programmers manage it, but Turbo C++ gallops through code where other compilers merely trot. It's ideal for developing DOS-only programs in a hurry, but unlike Microsoft C 6.0, it can't generate Windows or OS/2 applications.

On screen, Turbo C++ is well organized, combining an editor, a compiler, and a debugger into an optionally mouse-driven environment. The new IDE can transfer control to another program—for example, Turbo Debugger 2.0, supplied with Turbo C++ Professional. With this version of Turbo C++, you also get Turbo Assembler 2.0 and Turbo Profiler 1.0 (see "Developer's Toolbox," May 1990). However, those who upgrade their Turbo C Professional don't receive new assembler manuals unless they request them. Those who use a separate editor can run Turbo C++ from the DOS command line.

I suppose you expect me to brand one of these as the hottest C on either side of the Mississippi. Sorry, partners, I can't do that. As we say around the campfire, one buckaroo's steed is another wrangler's mule.

If you're a sharpshooting C programmer developing for DOS, Windows 3.0,



Speedy Turbo C++ 1.0 combines an editor, a compiler, and a debugger in a well-organized development environment.

and OS/2, Microsoft C 6.0 is the best all-around choice. If you don't care about Windows or OS/2, the speedy Turbo C++ 1.0 is tops for DOS-only work. (I also prefer Borland's Turbo Debugger over Microsoft's CodeView.) If you're just learning C or need a second 6.0-compatible compiler, QuickC with QuickAssembler 2.5 offers an unbeatable bargain—two languages for the price of one in an easy-to-use package.

So it's up to you. You can blaze new trails, or you can follow one of two tried-and-true paths. In this battle, the C slingers are all good guys, and nobody has to lose.

Let's talk it over. My MCI Mail handle is TSWAN; my CompuServe ID is 73627,3241. —Tom Swan

WHERE TO BUY

Microsoft C Professional Development System 6.0

Microsoft Corp.
One Microsoft Way
Redmond, WA 98052-6399

800/426-9400
LIST PRICE: \$495
REQUIREMENTS: 512K, DOS 3.0 or OS/2 1.1 or later version, hard disk
TECHNICAL SUPPORT: unlimited, toll number, M-F 6-6
Reader service no. 645

Microsoft QuickC with QuickAssembler Development Environment 2.5

Microsoft Corp.
LIST PRICE: \$199
REQUIREMENTS: 512K, DOS 2.1 or later version, hard disk
TECHNICAL SUPPORT: unlimited, toll number, M-F 6-6
Reader service no. 646

Turbo C++ 1.0

Borland Int'l, Inc.
1800 Green Hills Rd.
Scotts Valley, CA 95066-0001
800/331-0877 (sales), 408/438-8400 (customer service)
LIST PRICE: \$199.95 (\$299.95 with Turbo Debugger and Tools 2.0)
REQUIREMENTS: 640K, DOS 2.0 or later version, hard disk
TECHNICAL SUPPORT: unlimited, toll number, M-F 8-5
Reader service no. 647



The reasons to use tape backup keep stacking up.

And up. And up.

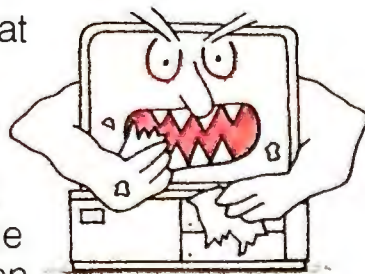
In fact, it would take a stack of 166 standard floppies to back up a 60MB hard drive.

But an ArchiveXL™ tape system brings backup back down to a manageable level. All the data on your hard disk will fit on just one tape—up to 124MB using our new 80MB drive with an extended length tape cartridge.



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And all that data is too valuable to leave unprotected from damage or destruction.



Just think how long it would take to rebuild a mailing list, to re-layout a 20-page publication or to recreate all your accounting records.

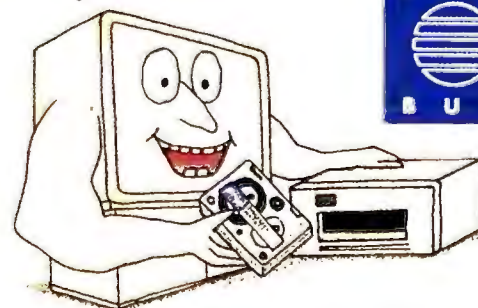


Since you never know when your operating system might hiccup, when the computer might catch a virus or when you might commit one of a zillion possible operator errors, your backup has to be "restore ready"

on a moment's notice.

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STAR-DOT-STAR

Fancy Passing

My *QuickBASIC* program became too large to be one file, so I divided it into modules. This change made it necessary to pass data between the modules. But with stand-alone EXE files, I can't use COMMON variables to pass data.

An assembly language routine, SETCMD.ASM [see LISTING 4], saved the day. CALLing SetCmd before a RUN statement copies a string argument into the tail end of the command line, passing the string to another program.

Bob Manookian

Corona, California

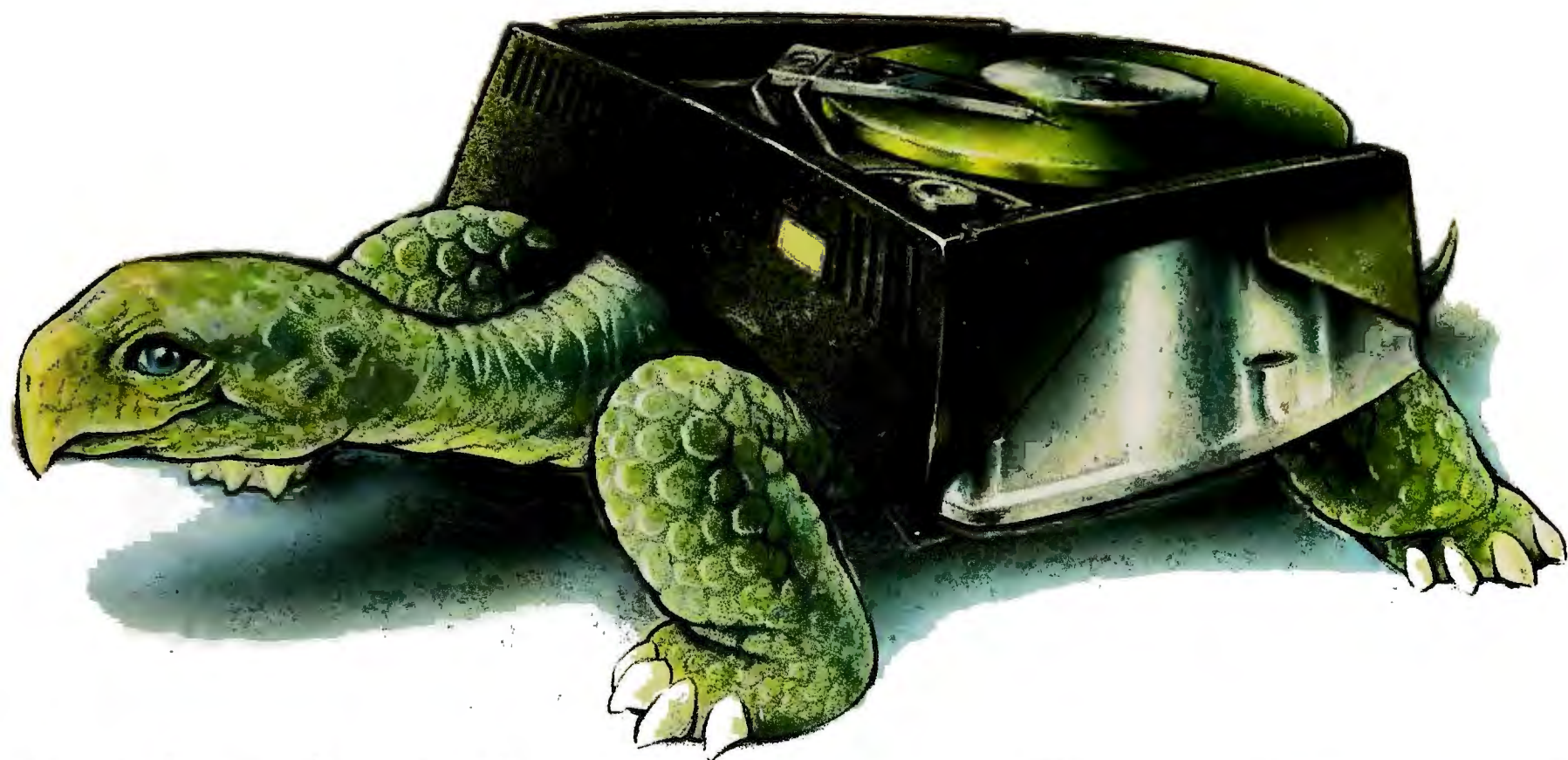
*Editor's note: If you have Microsoft's Macro Assembler 5.1, assemble SETCMD.ASM using the command **masm setcmd**. Or add the DATA statements in LISTING 5 to X-MAKER2.BAS (see LISTING 6) and run the program to create the object-code file SETCMD.OBJ with BASIC.*

LISTING 7 and LISTING 8 demonstrate how to use SETCMD. With the QuickBASIC compiler and linker on the current path, enter the commands **bc /o prog1**; and **link prog1 + setcmd**. Then issue **bc /o prog2**; and **link prog2**.

(continues)

```
.MODEL Medium,BASIC
.CODE
SetCmd PROC USES di si,arg:Ptr
    mov ah,62h    ;Call DOS for
    int 21h       ;PSP address
    mov es,bx     ;es=PSP
    mov di,80h    ;di=cmd offset
    mov bx,arg    ;bx=argument
    mov cx,[bx]   ;Limit length
    and cx,127    ;to 127
    mov si,2[bx]  ;si=source
    cld           ;Forward copy
    mov al,cl     ;Set string
    stosb         ;length
    rep movsb     ;Copy string
    mov al,0dh    ;al=ASCII cr
    stosb         ;Store in str
    ret          ;Return
SetCmd ENDP      ;End SetCmd
END              ;End of text
```

LISTING 4: SETCMD.ASM lets a QuickBASIC program use RUN to pass an argument to another program.



Quick: What's the Slowest Part of Your Computer?

Stop Waiting for Disk Access— Get Vcache 5!

Even the fastest computer can move like a turtle when it's reading the same disk records over and over again.

The problem is the repetition built into DOS disk access. When your program reads or writes a record, your disk drive actually reads several records—FATs, directories and file records—on the way to the one you want. And when your application accesses its next record, DOS reads many of those same records over again! All that reading takes a lot of time, and causes a lot of wear and tear on your hard disk drive.

Vcache 5 stores hard disk data in system memory, giving you direct access—without waiting. Vcache uses fast electronic memory to cache the data you read from disk—even FATs and directories. When your application accesses the disk, Vcache looks in memory for the records you need before the disk is activated. If they're in cache memory, Vcache delivers them to you much faster than if they were read from disk.

The result: Vcache increases effective program speed by 300% or more—and extends the life of your hard disk!

Maximum Memory Flexibility—And More!

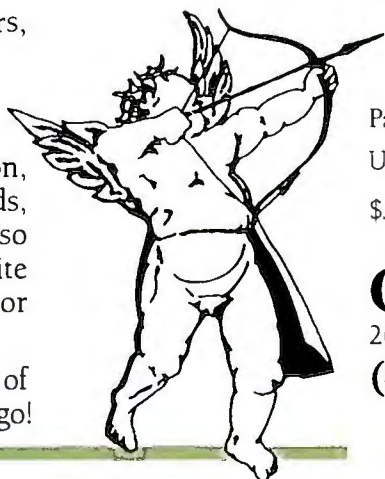
Vcache requires less than 9K of resident memory. Yet it can handle up to 15 MB of cache in extended or expanded memory.

Vcache lets you choose both the type and the amount of memory you want to use in the cache. The more memory you assign to the cache, the better Vcache performs.

Vcache is fully compatible with all XMS managers, DOS networks, DesqView, and Windows. In fact, benchmark tests show Vcache is 41% faster than SMARTDrive!

Vcache also includes the exclusive LookAhead option, that notices when you're accessing sequential records, and automatically stays a step ahead of you. Vcache also gives you options for maximum safety (with Write Through) or maximum speed (with Delayed Sector Writes).

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- Vscreen: Accelerates monochrome displays up to 300%
- Vkeyrate: Speeds up your keyboard with faster typematic rate and less repeat time delay

Other Vcache auxiliary programs display information about resident programs, perform comparative disk timing and more. And they're all FREE with your copy of Vcache!

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```
1000 DATA "setcmd.obj"
1010 DATA 1,80,0C,00,0A,73,65,74,63,6D,64,2E,41,53,4D,DB,96,-1,52
1020 DATA 2,25,*2,06,44,47,52,4F,55,50,04,44,41,54,41,04,-1,17
1030 DATA 3,43,4F,44,45,05,5F,44,41,54,41,0B,53,45,54,43,4D,-1,44
1040 DATA 4,44,5F,54,45,58,54,44,98,07,00,48,28,00,06,04,01,-1,7C
1050 DATA 5,E6,98,07,00,48,*2,05,03,01,10,9A,04,00,02,FF,-1,A6
1060 DATA 6,02,5F,90,0D,*2,01,06,53,45,54,43,4D,44,*3,9C,-1,00
1070 DATA 7,88,04,*2,A2,01,D1,A0,2C,00,01,*2,55,8B,EC,-1,64
1080 DATA 8,57,56,B4,62,CD,21,8E,C3,BF,80,00,8B,5E,06,8B,0F,-1,77
1090 DATA 9,83,E1,7F,8B,77,02,FC,8A,C1,AA,F3,A4,B0,0D,AA,5E,-1,D9
1100 DATA 10,5F,5D,CA,02,00,E1,8A,02,*2,74,-1,DA,-1
```

LISTING 5: Merge these DATA lines with X-MAKER2.BAS (LISTING 6) to create the object-code file SETCMD.OBJ using BASIC.

```
10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 MSG$="Now testing for data errors...please wait" : GOSUB 190
30 SUM=0:READ LN:IF LN<0 THEN 80
40 READ H$:IF VAL(H$)<0 THEN 70
50 IF LEFT$(H$,1)="*" THEN GOSUB 210 : GOTO 40
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 40
70 READ CKSUM$:IF (SUM MOD 256)=FNHEX(CKSUM$) THEN 30 ELSE GOTO 170
80 MSG$="Press any key except ESC to create "+F$+": "
90 GOSUB 190 : A$=INPUT$(1) : PRINT : IF A$=CHR$(27) THEN END
100 LOCATE 6,1:PRINT "Working...";
110 OPEN F$ AS #1 LEN=1 : FIELD #1,1 AS BX$
120 READ LN:IF LN<0 THEN 160
130 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 120
140 IF LEFT$(H$,1)="*" THEN GOSUB 240 : GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)) : PUT #1 : GOTO 130
160 CLOSE:PRINT:PRINT F$;" has now been created." : END
170 PRINT:PRINT "Error in DATA line";STR$(LN);".";
175 PRINT:PRINT "SUM=";SUM
180 PRINT "Check your work.":BEEP:END
190 CLS : LOCATE 3,1 : PRINT "X-Maker II" : RESTORE : READ F$
200 LOCATE 5,1,1 : PRINT MSG$; : RETURN
210 ZZ=VAL(MID$(H$,2)) : FOR I=1 TO ZZ
220 SUM=SUM*2 : SUM=(SUM\256)+(SUM MOD 256)
230 NEXT : RETURN
240 ZZ=VAL(MID$(H$,2)) : FOR I=1 TO ZZ
250 LSET BX$=CHR$(0) : PUT #1 : NEXT : RETURN
```

LISTING 6: X-MAKER2.BAS, *.*'s program-making program.

Run the test program by entering
prog1 arg1. After PROG1 displays
'Prog1:Arg1', it calls PROG2, which dis-
plays the argument passed to SetCmd.

Tom Swan is a contributing editor
for PC World and the author of
several books, including Mastering
Turbo Debugger (Howard W. Sams,
Carmel, Indiana, 1990).

Share your tips and discoveries with
PC World readers; see How to Contact
PC World, page 4. ☺

```
PRINT "Prog1:";COMMAND$
CALL SetCmd("ARG2")
RUN "prog2"
END
```

LISTING 7: PROG1.BAS calls PROG2 (LISTING
8), using SETCMD to pass the argument 'Arg2'.

```
PRINT "Prog2:";COMMAND$
END
```

LISTING 8: PROG2.BAS receives the passed
argument from PROG1 (LISTING 7).

BASICS: dBASE III Plus

What to do: The following commands are typed at dBASE's dot prompt and executed by pressing **<Enter>**. If the Assist menu appears when you load dBASE III Plus, press **<Esc>** to reach the dot prompt.

Most of the following commands work with dBASE IV as well as with Fox-base +, dBase, and other dBASE clones. However, you'll find that it's easier to perform these tasks with dBASE IV's menu-driven Control Center or a clone's equivalent.

OPEN DATA AND INDEX FILES

Command used: USE

USE acct_rec Opens ACCT_REC.DBF.

USE acct_rec INDEX acct_name, acct_zip
Opens ACCT_REC.DBF and two indexes. Because 'acct_name' is listed first, records are listed in name order.

SELECT WORK AREA

Command used: SELECT

SELECT 2 Selects the second work area.

SELECT WORK AREA (continued)

SELECT 2 Loads ACCT_REC.DBF in the second work area,
USE acct_rec CUSTOMER.DBF in the third. Work area 1 is selected
SELECT 3 by default when you start dBASE.
USE customer

SELECT acct_rec Selects work area by the data base file's name, in
this case, ACCT_REC.DBF.

Note: A different data file can be opened in each area, so you can easily view, browse, and work on multiple data files.

CREATE AND CHOOSE INDEXES

Commands used: INDEX ON...TO, SET ORDER TO

INDEX ON inv_num TO Invoice
Creates an index file called INVOICE.NDX in which
records are listed in order of the invoice number in
the inv_num field.

INDEX ON Lname+Fname TO Inv_Name
Creates an index called INV_NAME.NDX that lists
records in last name-first name order.

CREATE AND CHOOSE INDEXES (continued)

SET ORDER TO 2 Orders records according to the second index in the
USE command that opened the data file. For exam-
ple, if ACCT_REC.DBF is opened with 'USE acct_rec
INDEX acct_name, acct_zip', records are put in ZIP
code order.

DISPLAY DATA

Commands used: DISPLAY, LIST

DISPLAY Displays the current record's contents one screen at
a time.

DISPLAY ALL Displays all records in the current data base one
screen at a time.

DISPLAY FIELDS Name, Address FOR Zip='94107'
Displays the Name and Address fields for all records
in the current data base with the ZIP code 94107.

LIST Lists all records in the current data base in one con-
tinuous stream.

LIST TO PRINT Outputs all records to the printer.

LIST FIELDS Fname, Lname, Address FOR Zip='94107' TO PRINT
Prints the Fname, Lname, Address, and Zip fields for
records with the ZIP code 94107.

Tip: Use DISPLAY for viewing data on screen and LIST for printing data.

FIND DATA

Commands used: GOTO, LOCATE, FIND

GOTO 54 Jumps to record 54 in the current data base.

FIND DATA (continued)

LOCATE FOR Lname = 'Smith'
Goes to the first record with an Lname field begin-
ning with the text string 'Smith'.

FIND Smith Goes to the first record with an indexed field (or
fields) that starts with the text string 'Smith'.

Note: FIND will not work unless the appropriate index is active.

EDIT AND ADD DATA

Commands used: EDIT, BROWSE, APPEND

EDIT Displays the current record's fields in full-screen, ed-
itable form.

EDIT 5 Displays the fifth record in the current data base for
editing.

EDIT FIELDS Fname, Address FOR Lname='Smith'
Displays only the Fname and Address fields from
records with the last name of 'Smith' for editing.

Tip: You can use <Page Up> and <Page Down> to go from one record to
another.

BROWSE Displays the current data base file in a full-screen,
spreadsheetlike scrollable table, with fields as col-
umns and records as rows. All fields are editable.

BROWSE FIELDS Name, Address, City, State, Zip LOCK 1 FREEZE address
Displays the Name, Address, City, State, and Zip
code fields. The first column (Name) is locked into
place and always remains in view; only the Address
field can be edited.

APPEND Displays an empty record that you can fill in and add
to the current data base file.

ADVANCED: dBASE III Plus

What to do: This side focuses on fundamental dBASE programming. The sample program fragment below (part of a program for editing and adding records to a data base) illustrates how flow control (commands that direct a program's execution), screen draw, and data entry work together.

Note: This sample program requires a data base named SAMPLE.DBF with name, cost, and inv_date fields (character, numeric, and date types, respectively). Create the program with any text editor and save it as SAMPLE.PRG. Run the program by typing DO SAMPLE.PRG at the dot prompt.

FLOW CONTROL

DO WHILE condition Creates a loop that repeats until condition is false.

```
DO WHILE condition
...
ENDDO
```

DO CASE Allows listing of any number of conditions. Only the commands following the first true CASE condition are processed.

```
DO CASE
CASE condition
...
CASE condition
...
ENDCASE
```

DO filename Calls another PRG program.

FLOW CONTROL (continued)

IF condition Processes commands following IF only when the condition is true. When an optional ELSE command is included, the commands following ELSE are processed if the condition is false.

```
IF condition
...
ELSE
...
ENDIF
```

SCREEN DRAW AND DATA ENTRY

STORE expression TO variable Stores the contents of an expression in a memory variable. The expression can contain literal contents between quotes (STORE '0' TO choice) or a field name (STORE Name TO mname).

CLEAR Clears the screen.

WAIT 'prompt' TO variable Prompts for user input. The program stops and the prompt text appears; press a key, and that character is saved to the variable.

SCREEN DRAW AND DATA ENTRY (continued)

@ line, column TO line, column Draws a box. The first set of coordinates (line, column) defines the upper left corner; the second set, the lower right.

@ line, column SAY expression Displays expression text—which may be literal (between close quotes), fetched by a function, from a field, or from a variable—on screen starting at the specified coordinates. The optional GET adds an on-screen box containing data from the specified field or memory variable. You can edit this data after issuing a READ command.

READ Stops a program so that the user can edit data from GET statements. Each group of @ SAY...GET statements must end with a READ.

REPLACE field WITH variable Saves a variable to the named field on disk, overwriting what's already there.

USEFUL FUNCTIONS

A function returns a value (text, numbers, date information, a true/false value) that can be used at the dot prompt or anywhere in a program. Functions are always used within a command.

UPPER(string) Converts lowercase letters to uppercase.

REPLICATE(character,number) Returns a character the specified number of times. ?REPLICATE('*',5) displays '*****'.

CHR(ASCII code number) Returns the character corresponding to a number on the ASCII chart. CHR(205) returns ==. The command ?REPLICATE(CHR(205),80) draws a double line 80 characters wide.

USEFUL FUNCTIONS (continued)

DTOC(date) Returns a date as a text string, which can be mixed with other text, such as in a screen prompt or report. The date expression can be a date field, date variable, or the result of the DATE() function, which returns the current date.

SAMPLE PROGRAM

```
USE SAMPLE.DBF
STORE '0' TO choice
DO WHILE .NOT. UPPER(choice) $ 'AEX'
  CLEAR
  WAIT '(A)dd, (E)dit, or e(X)it?' TO choice
ENDDO
DO CASE
CASE UPPER(choice) = 'A'
  DO Addrec
CASE UPPER(choice) = 'E'
  STORE Name TO mname
  STORE Cost TO mcost
  STORE .T. TO save_it
  @ 5,0 SAY REPLICATE(CHR(205),80)
  @ 7,5 SAY 'Invoice due: ' + DTOC(Inv_Date)
  @ 10,30 TO 18,60
  @ 12,32 SAY 'Name: ' GET mname
  @ 14,32 SAY 'Cost: ' GET mcost
  @ 16,40 SAY 'Save to disk?' GET save_it
  READ
  IF save_it
    REPLACE Name WITH mname
    REPLACE Cost WITH mcost
  ELSE
    @ 20,30 SAY 'Edit abandoned.'
  ENDIF
ENDCASE
RETURN
```


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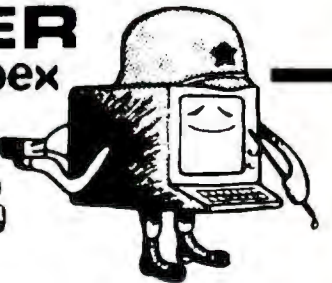
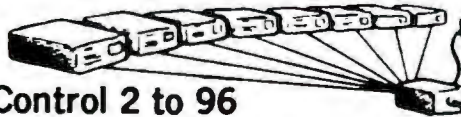
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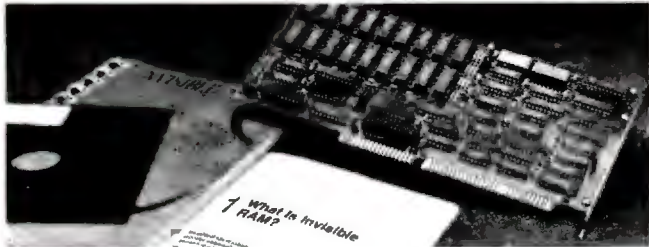
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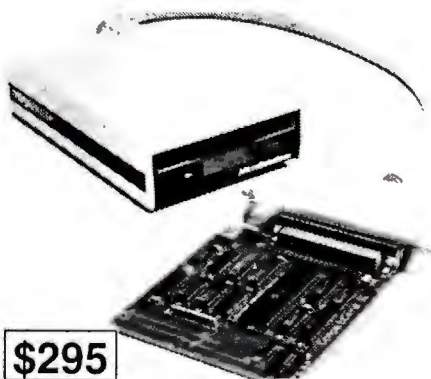
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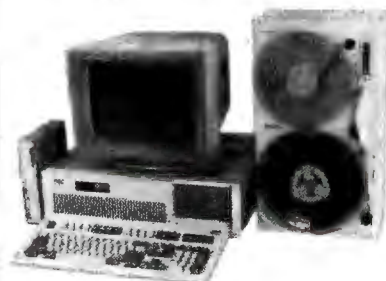
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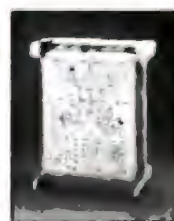
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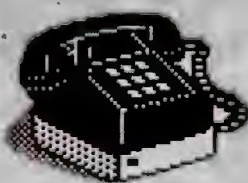
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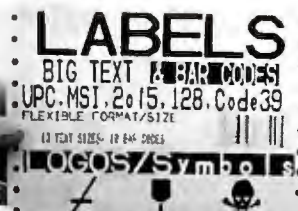
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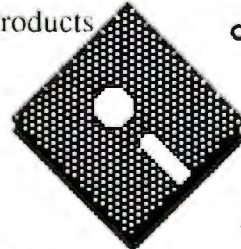
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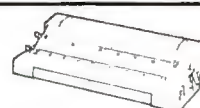
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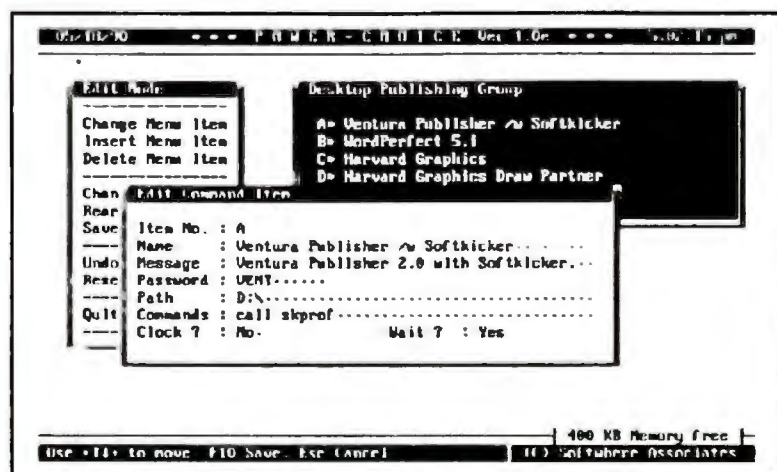
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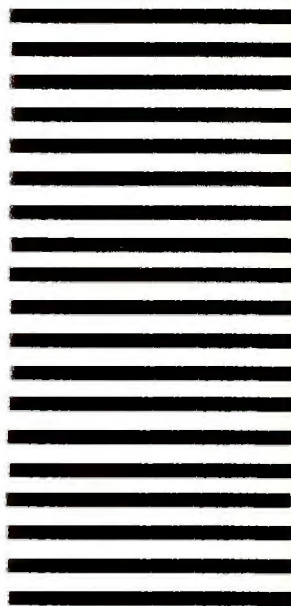
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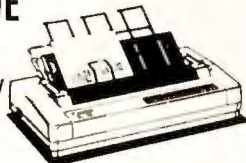
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- Clock calendar, parallel port, and two serial ports.
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- Phoenix BIOS.
- FCC Class B approved.



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Complete with 40mb
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- Five available drive bays.
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- Tactile enhanced 101 key layout or alternate left function keys keyboard.
- 8 expansion slots, 5 available.
- Phoenix BIOS.
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- FCC Class B approved.

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SYSTEM OPTIONS



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OPTIONS

Whether its a larger hard drive or more memory to run today's sophisticated software, we can configure your system to meet your needs.

- We ship systems with hard drives from 40 to over 600 megabytes of storage from manufacturers like Seagate, Toshiba, Mitsubishi, Western Digital and others. All systems are formatted, bootable and ready to go when you open the box. See the prices listed to the left on our most popular models, call for larger drives.
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Choose from a wide array of video systems for your new FastData personal computer.

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GSX140	285
Diconix 150 Plus	329
Fujitsu	
DL3400	419
NEC	
P2200XE	309
P5200	495
P5300	659
P6200/P6300	Call
LC290	2495

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393 (IBM)	999
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KXP1191	239
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KXP1624	429
KXP4420 Laser	995
KXP4450/4455 Lasers	Call

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Seiko Smart Label Printer	179
Star	
NX1000-II	167
NX2410	279
XB2410 / 2415	429 / 569

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1410 EGA	325
Diamond Scan 1381	479
NEC	
Multisync 2a	489
Multisync GS 2a	199
Multisync 3d	629
Multisync 4d	1095

Panasonic	
C1381 VGA 1024x768 new!	439

Princeton	
Max15	237

Ultrasync 12"	479
Ultrasync 14" (now 1024x768)	509
Ultra 16	835

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CM1450	659

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14" Amber Monochrome	119
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14" White VGA Monochrome	129
14" CGA Color .52 dot pitch	199
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14" VGA Color .31 dot pitch	319
14" VGA 1024 x 768i .28 dp.	399

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Curtis Ruby Plus	59
Datashield 100	57
Emerson UPS Model 10 new!	139
Masterpeace Plus	95

Call On Non-Listed Items

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2400 ETC Internal	147
2400 ETC External	187
VGA Wonder 256	209
VGA Wonder 512	239
Brown Wagh Sound Blaster	157
Everex	
1200B Int Modem	55
2400B Int Modem	105
EGA 480 Card	79
RAM3000 16 bit RAM card	75
RAM8000 16 bit RAM card	169
FastData (satisfaction guaranteed)	
16 Bit VGA 256K	99
16 Bit VGA 512K	139
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Parallel/Dual Serial/Game Card	35
XT 1.44 Dual Floppy Controller	35

FastData 16-Bit VGA \$99

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Intel	
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287XL New!	209
387-DX20	369
387-SX16	319
Logitech Scanman Plus	159
Orchid	
ProDesigner	229
ProDesigner II 512/1mb	299/349
Tiny Turbo 286	207
Tiny Turbo Xtra	267

Paradise	
Basic VGA - 8 bit	109
VGA 1024 256K	175
VGA 1024 512K	229

Practical Peripherals	
1200B Int Modem	59
2400B Int Modem	125
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Prometheus	
Promodem 1200B Int.	48
Promodem 2400B Int.	98
Promodem 2400B Mini-Pocket	119
Promodem 2400G Ext.	149

The Complete PC	
Answering Machine	239
Fax 4800	229
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Tiara Networking	
Lancard/A PC (Arcnet)	79
Lancard/E Star 8 (Ethernet)	139
Lancard/E AT (16 bit Ethernet)	249

USRobotics	
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Courier HST 14,400 Int.	539

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VGA 1024i 512K	237
Vega VGA	149
V-RAM VGA 512K	355

Western Digital Controllers	
WD1006V-MM2 MFM AT 1:1	109
WD1006V-SR2 RRL AT 1:1	129
WE1007V-SE2 ESDI AT 1:1	199

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30MB XT Kit #238	249
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360K Floppy	69
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SOFTWARE

DATABASE

Clarion Personal Developer	104
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DataEase	459
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Managing Your Money	113
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Peachtree with Data Query	209
Quicken	35

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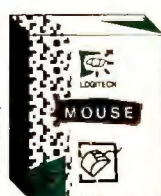
First Choice	105
SmartWare II	417
Windows 3.0	89
Works	89

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Keytronics Professional	65
Logitech HiRes C9 Serial	65
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Allways	106
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Call On Non-Listed Items

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CoreFast	60
Carbon Copy Plus	109
Desqview	68
Desqview 386	115
Direct Access	46
Fastback Plus	109
Formtool Gold	52
Formfiller	85
Headroom	59
Laplink III	85
MS-Dos 3.3 or 4.01	59
Mace Utilities 1990	79
Norton Advanced	Call
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ProComm Plus	52
QEMM 386/QRAM	Call
SideKick Plus	119
Sideways	37
Super PC Kwik	43
XTree Pro Gold	67

Windows 3.0

\$89 This hot graphical environment runs even non-Windows software and breaks the 640K barrier. Buy Windows from FASTMicro and we'll throw in 10 Windows shareware applications for free! Requires a 286 or above with 640K or more of memory.



WINDOWS SOFTWARE

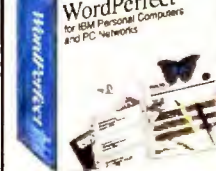
Adobe Illustrator (GR)	279
Ami (WP)	115
Ami Professional (WP)	287
Asymetrix Toolbook	279
Corel Draw (GR)	309
DBfast/Windows (DB)	189
Excel (SS)	299
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Windows 3.0	89
WingZ for the PC (SS)	309
Word for Windows (WP)	309

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Multimate 4.0	267
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Word Perfect 5.1	239
Word Perfect Add'l Station	153
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Also See Windows Software Category

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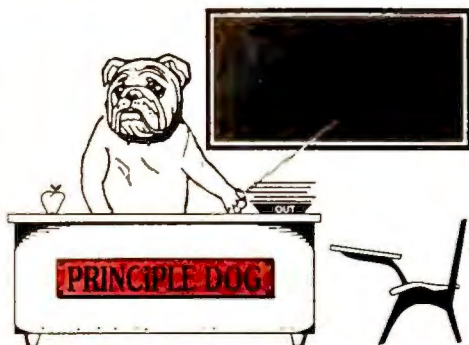


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COMPAQ

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III 20/40	3595/4289
286E 40/100	2450/2999
386S 1/40	2350/3049
386-25 110/300	6529/8695
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Toshiba 3100SX	4149
Toshiba 3100E 40	2979
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Toshiba 5200 40/100	4915/5339
Panasonic CF150B	765

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Toshiba 3600	825
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LQ 1050	589
LQ 2550	859
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391 Plus	645
393 Plus	995
393 Color Plus	1075

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Plotter in a Cartridge IIP	239
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LB P4	955
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Hayes 1200B/2400B	199/289
Hayes 1200/2400	295/345
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Megahertz 24 for Toshiba	175
Practical Per. 2400 int.	127
US Robotics 2400/9600	139/635
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Orchid Pro Designer w/256K	249
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Orchid Pro Designer II w/512K	279
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ARC Net PC 500WS	235
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Seagate 30mb w/contr. ST238	265
Seagate 40mb for AT ST251-1	335
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Toshiba 5-1/4" 360K int.	79
Toshiba 5-1/4" 1.2mb int.	89
Bernoulli Box II 5-1/4" 20mb int.	989
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dual 20mb ext. w/card	1939
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Plus Hard Card 40	599
Plus Hard Card 20	499
Plus Hard Card II 40/80	595/695

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Mousesystems Mouse	95
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Harvard Graphics	315
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Lotus 3.0	389
Lotus Symphony	489
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Microsoft Excel	299
Multimate 4.0	265
Peachtree III Complete	155
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Super Calc V	299
Ventura Desktop Publ.	535
Word Perfect 5.1	254
WordStar 5.5	225
Wordstar 2000 +	299
Peachtree Double Bonus	239
Microsoft Windows 3.0	109

Lots of other software available and all the prices are byte size!

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AST 6 Pack Plus w/384K	185
AST 5251-11 Enhanced	535
AST Rampage 286	395
Everex Mini Magic w/o K	75
Intel Above Board w/512K	359
Intel Above Board I/O w/512K	379
Intel Inboard 386 w/adaptor	985
Intel Inboard 386 for PC w/1 mb	529
Intel Above Board II Plus for PS/2 w/o K	299
Imma Board III	435
Logical Connection 256/512K	386/465
Orchid Rampage 16-32 w/o K	295
Orchid Ramquest 8-16 w/1 meg	329
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Orchid Tiny Turbo Extra	259
Orchid Tiny Turbo AT	365

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8087-8	195
8087-10	229
8087-16	345
8087-20	385
8087-25	485
8087-33	585
8087-SX	299
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3D	659
4D	1150
5D	2350
IBM	
8503	229
8512	499
8513	59
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MAX15	Call
Ultra 16	875
Ultra 14	549
MAGNAVOX	
Amber 776	99
RGB80 8762	255
EGA 9CM053	365
MITSUBISHI	
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ZENITH	
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AST

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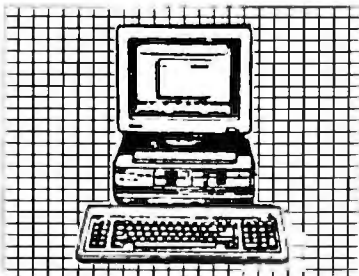
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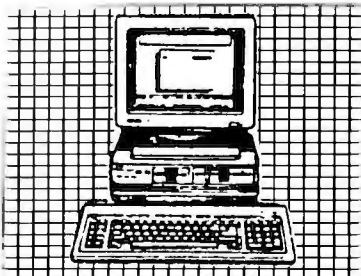
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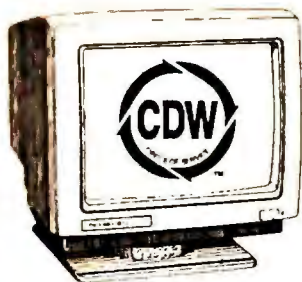
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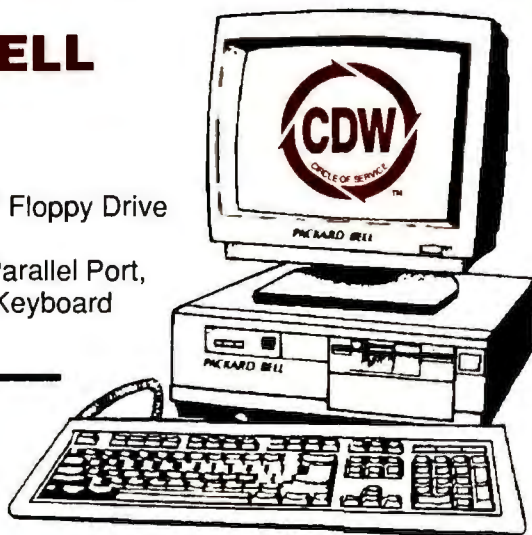
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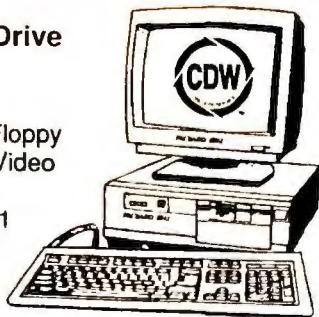


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**NEW VERSION 2.0
JUST \$179.95!**
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Replace your cash register with the Microbiz Controller Series... the #1 point-of-sale system.

**Business Solutions for
Retail Stores, Liquor Stores,
Video Stores, Hair & Nail
Salons, Auto Repair Shops...**

Flexible Enough to Work for You

You didn't go into business for yourself to do things someone else's way. Fortunately, we did. We've already computerized thousands of different retail stores, video stores, auto repair centers, beauty salons, clothing stores, health clubs, pet, furniture, liquor, and hardware stores . . . So we've learned how to make **The Retail Controller Jr.** flexible enough to do the job for you by building in a number of custom-designed options. Use it with or without a bar code reader, cash drawer, or receipt printer. And, if at a later date you need the additional features of **The Retail Controller Sr.** (accounts receivable, purchase orders, layaway plans), you can upgrade easily and economically at any time.

"Update . . . or Evaporate!"

That's how one of our customers put it. And it's true. In today's increasingly competitive retail environment, store owners need better ways to control their inventory, streamline their operation, and keep in touch with their customers. **The Retail Controller, Jr.** is a powerful point-of-sale program that's so cost-effective and easy to use, you can't afford *not* having it!

Replace Your Cash Register with a Cash Generator!

Can your cash register tell you what's in stock, control your inventory, check and correct prices automatically, provide quicker service, get more repeat business, and optimize your purchasing? **The Retail Controller Jr.** will help you leapfrog past your competition, reduce shrinkage, billing errors, costs, and time. It puts the profit-building speed, accuracy, and power of microcomputers to work for you. It's like replacing your cash register with a cash generator!

Record Control in Record Time

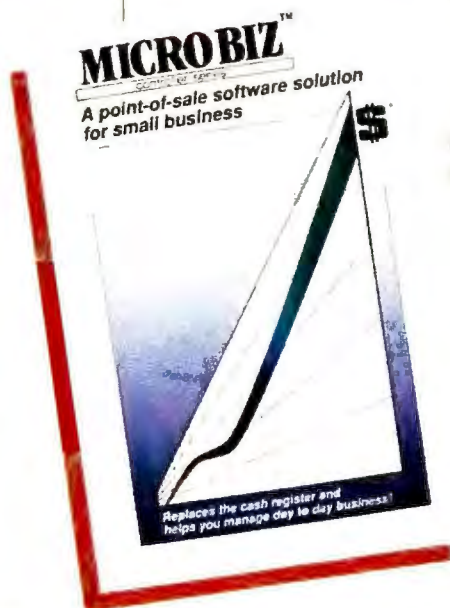
With **The Retail Controller Jr.**, you'll make smarter management decisions because you'll have pushbutton-quick, down-to-the-penny information. Operating at your sales counter, the program captures vital customer and sales data, organizes it, and presents it in neat, accurate reports that eliminate guesswork and improve control.

Bar Code Easy, Feature Packed

The Retail Controller Jr. is designed for first-time computer users. Even a brand new clerk can learn how to process transactions in minutes. The speed and efficiency of barcoding (optional) can keep keystrokes to a minimum. Pull-down menus, on-screen help windows, and "point

and select" customer and product lookup all help to make the program almost intuitively easy to use. All transactions are performed from just one Work Screen. Yet it incorporates many of the features you'd expect to find only in systems costing hundreds of dollars more, features like:

- ✓ automatic credit card verification
- ✓ bar code compatibility
- ✓ color/size matrix
- ✓ multiple pricing levels
- ✓ tracks inventory by size/color/style
- ✓ mailing labels
- ✓ tracks customer history
- ✓ daily closeout reports
- ✓ accepts split tender
- ✓ view in-stock status
- ✓ pull down menus
- ✓ pop-up windows
- ✓ source code available
- ✓ 99 levels of password protection
- ✓ tracks promotional sales
- ✓ prints bar code labels
- ✓ reorder reports
- ✓ extensive sales reports
- ✓ item/invoice discounts
- ✓ tracks sales by employee
- ✓ set limited-time promos
- ✓ links to Quicken, ACCPAC and other popular accounting programs
- ✓ receiving reports
- ✓ pop-up calculator



"I can't imagine running my shop without it. The program gives me much better control over all my items and has more than paid for itself."

—G. Truglia, Car-Tune, New City, NY

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(The Controller Jr. Series automatically links to Computer Associates' ACCPAC modules)



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TAKING IT HOME

The practical guide to home/office computing

Windows goes home.

Lawrence J. Magid

Windows isn't just for the office anymore. After years of trying, Microsoft has finally given us an easy-to-use, multitasking operating environment that fits the average PC—well, maybe the slightly above average PC. In any case, the new *Windows 3.0* will be a major platform for home as well as business computing, although, as you might expect, there's still a "gotcha" or two for those working on more than one system.

Say your office standardizes on *Windows 3.0*, but the 8086-based XT compatible you bought in 1984 has refused to die; it probably doesn't have the horsepower and memory capacity for even this slimmer, trimmer version of *Windows*. Or maybe you bought *Windows* to juggle your spreadsheets, memos, and Rolodex-style data base at home, but your office has a huge investment in character-based software. In either case, you'll have to switch gears as you move from platform to platform.

Word Processing Gotchas

Although *Word for Windows* can import and export standard ASCII text and files from and to DOS-based *Word* and *Microsoft Works*, *WordPerfect 4.2*

and *5.0*, and *WordStar 3.3* through *5.0*, don't expect embedded graphics or text enhancements like special fonts to travel smoothly.

Word for Windows, which I use on my home-based PC, won't run on my 8086-equipped laptop, so I continue to use *SideKick Plus* as my mobile text editor, exporting ASCII text files to *Word*. But *SideKick* places a carriage return at the end of each line, so *Word for Windows* reads every line as a separate paragraph. I've solved that by double-spacing between paragraphs in *SideKick*. I then import the file into *Word* and execute a macro that replaces any two consecutive carriage returns with the string 'X*X', deletes all car-

Most major vendors say they intend to move their programs to Windows.

riage returns, and, finally, goes back and turns all those strings back into two carriage returns. Going from *Word for Windows* to *SideKick*, I just save my files as ASCII text.

Data Bases and Spreadsheets

Most data bases can read *dBASE* files directly or, at the very least, data files saved as comma-delimited ASCII (commas are between each field). Similarly, just about any spreadsheet can read and write WKS and WK1 files from all versions of 1-2-3 prior to release 3. To move data from 1-2-3 to, say, *Excel* or *Wingz*, just open the file, and the program translates your keystrokes and formulas. Unfortunately, your macros and

graphs won't make the trip. Going the other way, remember to save your files in WKS, WK1, or one of the other 1-2-3-compatible formats instead of the application's native format. Again, you sacrifice *Windows* graphics.

Remembering to convert your files to the right format as you move between home and office is a hassle. But for me, a more serious challenge is switching between computing styles. I often find myself reaching for the mouse when I'm in a character-based program or using a <Ctrl>-key combination in *Windows*.

Eventually, all programs will have graphical interfaces. In the meantime, you can reduce your frustration by using *Windows*' Recorder to build macros. You can assign virtually any set of keystrokes or menu items to any function key or <Ctrl>- or <Alt>-key combination. I use that feature and *Word for Windows*' macro recorder to emulate program commands like *WordStar*'s convenient cursor movement keys. You can do the same for DOS applications using macro programs like Borland's *SuperKey*.

This sounds like a lot of work, but most of it can be automated. Besides, most of the major vendors have recently (and belatedly) declared their intention to move their programs to *Windows*. Even *WordPerfect* has done an about-face and will ship under *Windows* before an OS/2 version appears, probably by the end of the year. This time *Windows* is worth investing in. ☺

Lawrence J. Magid is a nationally syndicated computer columnist.

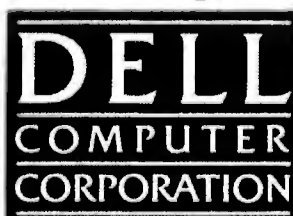
Microsoft Windows 3.0 \$149, **Word for Windows** \$495; Microsoft Corp.; 206/882-8080

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1. Which products are you most interested in?

- | | |
|--|---|
| <input type="checkbox"/> 286-based systems | <input type="checkbox"/> UNIX®based systems |
| <input type="checkbox"/> 386-based systems | <input type="checkbox"/> Laptops |
| <input type="checkbox"/> 386SX-based systems | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> 486™-based systems | |

2. Are you interested in computer products for:

- ☐ Home ☐ Business ☐ Resale

3. How many PCs does your company plan to purchase in the next twelve months?

Quantity	Timeframe	Quantity	Timeframe
_____	Less than 1 month	_____	6-12 months
_____	1-3 months	_____	More than 12 months
_____	3-6 months		

4. What do you plan to use computer products for?

5. How many PCs do you have installed now at your company?

6. Are you interested in leasing? ☐ Yes ☐ No

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| <input type="checkbox"/> 386-based systems | <input type="checkbox"/> Laptops |
| <input type="checkbox"/> 386SX-based systems | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> 486™-based systems | |

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5. How many PCs do you have installed now at your company?

6. Are you interested in leasing? ☐ Yes ☐ No

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SOME POWERFUL READING.

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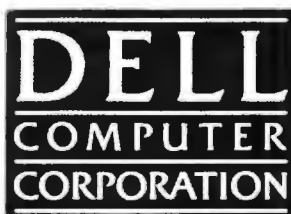
25 MHz 486 EISA-based Dell Systems® 433E™ and 425E™ deliver speed and power at a price unequalled in the industry. With all

the attention of a company that's been voted number one in all six *PC Week* polls for customer satisfaction for personal computers. And while we're on the subject of speed and power, the Dell™ 320LX offers both at an incredibly affordable price. This 20 MHz 386SX is one of the fastest SX's around. Obviously, there's nothing

lightweight about our reading material. Call (800) 873-1130 now or return this card today. In Canada, call (800) 387-5752.

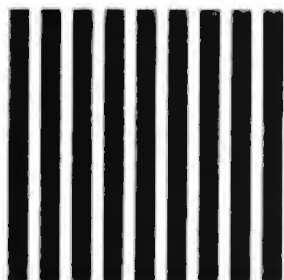
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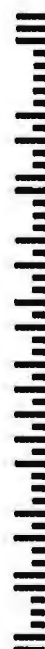


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THE NEW DELL SYSTEM 433E 33 MHz i486™ AND DELL SYSTEM 425E™ 25 MHz i486.

STANDARD FEATURES:

- i486 microprocessor running at 33 MHz (Dell 433E) or 25 MHz (Dell 425E).
- EISA architecture (downward compatible with ISA).
- Standard 4 MB of RAM,* expandable to 16 MB on system board, using optional 1 MB and 2 MB SIMMs.
- Integrated 387 compatible math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- 5 half-height drive bays.
- Six 32-bit EISA (ISA compatible), plus two 16-bit ISA expansion slots.
- High performance IDE (80 MB, 100 MB, 190 MB), and ESDI (330 MB, 650 MB) hard disk drives.
- Enhanced 101-key keyboard.

- 1 parallel and 2 serial ports.
- 230-watt power supply.
- 12-month On-Site Service Contract provided by Xerox.△

****Commercial Lease Plan. Lease for as low as \$286/month (433E) and \$232/month (425E).**

△Xerox Extended Service Plan pricing starts at \$672 (433E) and \$617 (425E).

	433E	425E
80 MB VGA Monochrome System	\$ 7,899	\$6,399
190 MB VGA Color Plus System	\$ 8,699	\$7,199
330 MB Super VGA Color System (800 x 600)	\$ 9,599	\$8,099
650 MB Super VGA Color System (800 x 600)	\$10,799	\$9,299

Prices listed include 4 MB of RAM. 100 MB hard drive configurations also available.



THE DELL SYSTEM 325 25 MHz 386 AND DELL SYSTEM 310 20 MHz 386.

The best combination of performance and value available in their class.



STANDARD FEATURES:

- Intel® 80386 microprocessor running at 25 MHz (Dell 325) or 20 MHz (Dell 310).
- Standard 1 MB of RAM, optional 2 MB or 4 MB of RAM* expandable to 16 MB (using a dedicated high-speed 32-bit memory slot).
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high-speed static RAM cache.
- Page mode interleaved memory architecture.
- Socket for WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.

- 1 parallel and 2 serial ports.
- 8 industry standard expansion slots (6 available).
- 12-month On-Site Service Contract provided by Xerox.△

****Commercial Lease Plan. Lease for as low as \$131/month (325) and \$112/month (310).**

△Xerox Extended Service Plan pricing starts at \$370 (325) and \$251 (310).

	325	310
40 MB VGA Monochrome System	\$3,599	\$2,999
80 MB VGA Color Plus System	\$4,099	\$3,499
80 MB Super VGA Color System (800 x 600)	\$4,199	\$3,599
190 MB Super VGA Color System (800 x 600)	\$4,699	\$4,099

Prices listed include 1 MB of RAM. 100, 330 and 650 MB hard drive configurations also available.



THE NEW DELL SYSTEM 320LX 20 MHz 386SX. One of the fastest SXs around.

STANDARD FEATURES:

- Intel 80386SX microprocessor running at 20 MHz.
- Standard 1 MB of RAM,* optional 2 MB or 4 MB expandable to 16 MB (8 MB on the system board).
- VGA systems include a high-performance 16-bit video adapter.
- LIM 4.0 support for memory over 1 MB.
- Socket for Intel 20 MHz 80387SX math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Integrated high-performance hard disk interface and diskette controller on system board (ESDI-based systems include a hard disk controller).

- 1 parallel and 2 serial ports.
- Enhanced 101-key keyboard.
- 200-watt power supply.
- 8 industry standard expansion slots (7 available).
- 12-month On-Site Service Contract provided by Xerox.△

****Commercial Lease Plan. Lease for as low as \$98/month. △Xerox Extended Service Plan pricing starts at \$261.**

40 MB VGA Monochrome System	\$2,599
40 MB VGA Color Plus System	\$2,899
80 MB Super VGA Color System (800 x 600)	\$3,199
100 MB Super VGA System (800 x 600)	\$3,399

Prices listed include 1 MB of RAM. 190, 330 and 650 MB hard drive configurations also available.



THE DELL SYSTEM 210 12.5 MHz 286. The price says it's an entry-level system. The performance says it's a lot more.



STANDARD FEATURES:

- 80286 microprocessor running at 12.5 MHz.
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- Page mode interleaved memory architecture.
- LIM 4.0 support for memory over 640 KB.
- Integrated diskette and high-performance 16-bit VGA video controller on system board.
- Socket for Intel 80287 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.

- Integrated high-performance hard disk interface on system board.
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- 1 parallel and 2 serial ports.
- 3 full-sized 16-bit AT expansion slots available.
- 12-month On-Site Service Contract provided by Xerox.△
- **Commercial Lease Plan. Lease for as low as \$62/month. △Xerox Extended Service Plan pricing starts at \$158.**

	210
20 MB VGA Monochrome System	\$1,649
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40 MB Super VGA Color System (800 x 600)	\$2,249
80 MB Super VGA Color System (800 x 600)	\$2,449

Prices listed include 1 MB of RAM. 2 MB versions of the above systems are available for an additional \$100. 100 MB configurations also available.



THE DELL SYSTEM 316LT 16 MHz 386SX.

This full-featured, battery powered 386SX laptop costs less than most 286 laptops.



STANDARD FEATURES:

- Intel 80386SX microprocessor running at 16 MHz.
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- LIM 4.0 support for memory over 1 MB.
- Adjustable and detachable 640 x 480 VGA LCD.
- One industry standard half-size 8-bit expansion slot.
- Socket for 16 MHz Intel 80387SX math coprocessor.
- 3.5" 1.44 MB diskette drive.
- 83-key keyboard with embedded numeric keypad and

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- Connector for 101-key keyboard or numeric keypad.
- Connector for external 5.25" 1.2 MB diskette drive.
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- AC Adapter.
- 12-month On-Site Service Contract provided by Xerox.△

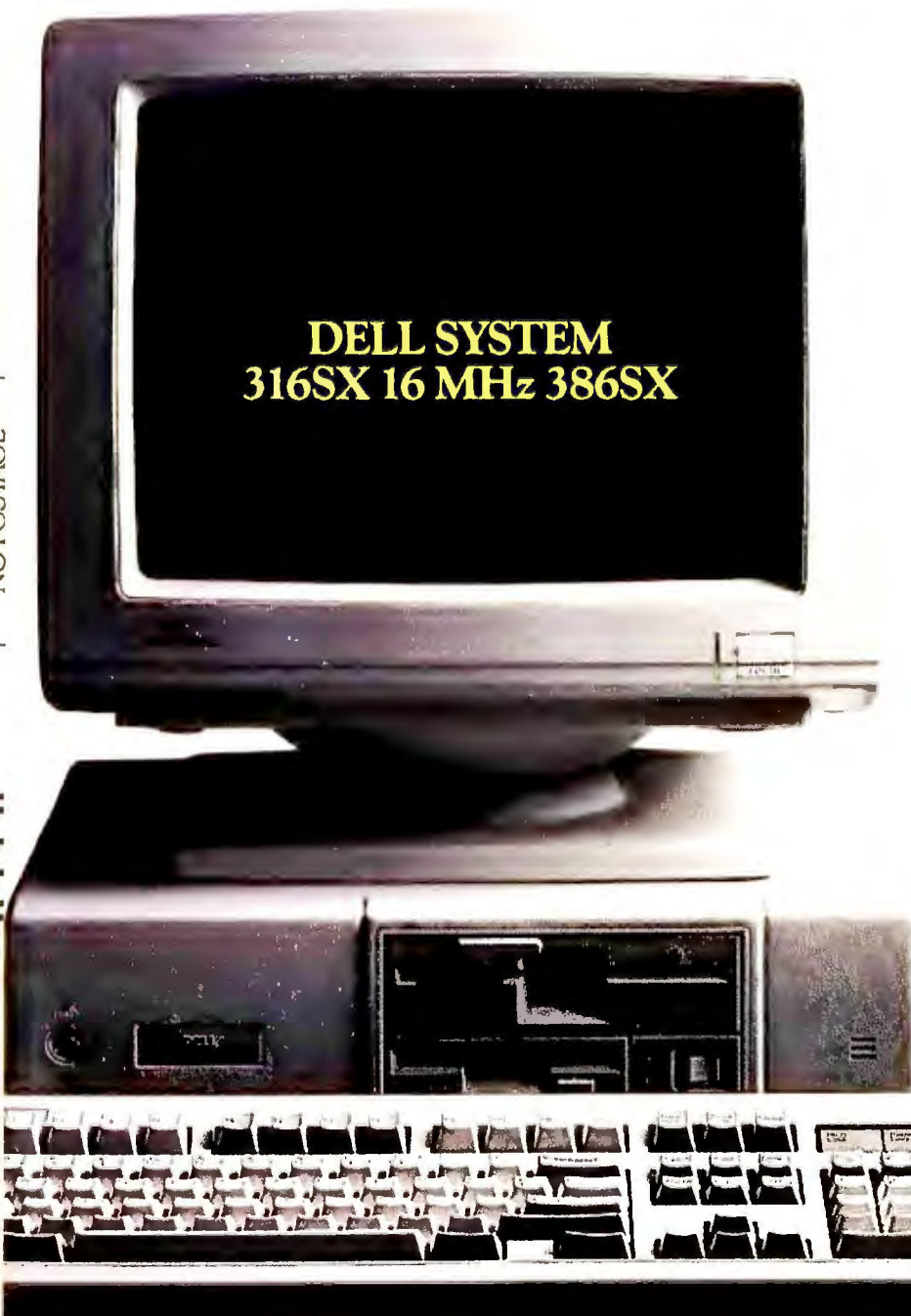
****Commercial Lease Plan. Lease for as low as \$120/month. △Xerox Extended Service Plan pricing starts at \$303.**

20 MB, 1 MB RAM	\$3,199
20 MB, 2 MB RAM	\$3,399
40 MB, 1 MB RAM	\$3,499
40 MB, 2 MB RAM	\$3,699

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STANDARD FEATURES:

- Intel 80386SX microprocessor running at 16 MHz.
- Standard 1 MB of RAM, optional 512 KB, 640 KB or 2 MB of RAM* expandable to 16 MB (8 MB on the system board).
- Page mode interleaved memory architecture.
- LIM 4.0 support for memory over 640 KB.
- Integrated diskette and high-performance 16-bit VGA video controller on system board.
- Socket for Intel 80387SX math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Integrated high-performance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 3 full-sized 16-bit AT expansion slots available.
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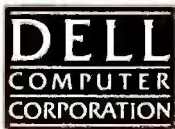
△Xerox Extended Service Plan pricing starts at \$196.

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20 MB VGA Monochrome System	\$1,949
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40 MB Super VGA Color System (800 x 600)	\$2,549
80 MB Super VGA Color System (800 x 600)	\$2,749

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1. It's pretty obvious from the specs on the opposite page that the Dell™ 316SX will deliver the power you need for 32-bit computing. And it will do it for the kind of price you might expect to pay for a

in depth the products they sell, but will also give you clear and concise answers to your questions to help you decide exactly the right configuration that will meet your needs.

a continually updated data base. It's that kind of attitude to customer service that's helped us become one of the top ten manufacturers of PCs in the world, with more than one million units shipped

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286 machine. But there are some other things you might want to consider before you make up your mind.

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3. The Dell 316SX is also made by the company that has been rated #1 in the 6 out of 6 *PC Week* customer satisfaction polls of corporate volume buyers for PCs.

4. A company that has won more worldwide awards for technical innovation and excellence than the rest of the mail order computer industry combined.

5. When you deal with Dell you'll be talking to knowledgeable sales people who not only understand

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7. You get a one-year limited warranty that covers parts and labor. And a 30-day Total Satisfaction Guarantee to let you try out the Dell 316SX where you're going to use it. In your home or office. If you don't love it, just send it back for a full refund no questions asked.

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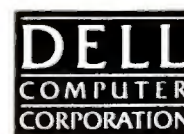
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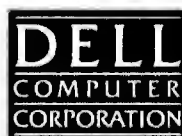
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