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The Business Magazine of PC Products and Solutions
August 1987

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PS/2, OS/2, and You Know Who

David Bunnell

"There's something happening here. What it is ain't exactly clear...." But isn't that par for the course when you're dealing with IBM? All you crystal-ball gazers and PS/2 watchers are on your own. Download two aspirin and call me in the morning.

If there is a new industry standard in the MS-DOS world following IBM's announcement of its PS/2 line of computers, it has to be the standard governing the confusion level in the marketplace.

It seems that everyone is confused.

I'll admit that I am. You may be too. Most likely even IBM is confused. If it's not, it should be.

I have never seen so many contrary viewpoints expressed on one aspect of personal computing in all my years in the industry.

Software developers are confused about what programs they should write for OS/2. Will Extended OS/2 be OS/2 compatible, or will the code be different? Will people flock to buy PS/2 machines, or will this entire venture prove to be an IBM bust? Will the clone makers manage to reverse engineer the Micro Channel bus? Can they do it legally, or will they be hounded to Boca Raton and back by the IBM intellectual property rights police?

Is there an alternative to the OS/2 operating system? Will the compatibles be able to unite under their own rival standard, or will we witness further fragmentation of the technology?

In the face of such horrendous confusion, the only thing certain is that we will not be changing the name of *PC World* to *PS World*.

You have my word on that.

So who benefits from all this confusion? Apple Computer comes out looking good, of course—simple, uncomplicated, the "natural computer."

Ironically, IBM stands to benefit, too. Why? Because the Insecure 1000—you can call them that, because that's what they really are—will opt for IBM. They'll feel safer knowing they're in the fold.

After all, IBM offers people the total solution, from mainframes to typewriters, right? With the unveiling of the PS/2 line, IBM carries on the impression that its machines are the new generation of computing and that it still has all the answers.

To my mind, the introduction of PS/2 and OS/2 is essentially a marketing challenge for IBM.

(continues)

When you think about it, what can you do with a PS/2 that you can't do on a 386-based machine? There's actually nothing new in the technology. It's state of the art, certainly. It's great that IBM went to a 3½-inch disk. But you can do all the same things on a 386-based clone using the old bus architecture.

So the PS/2 isn't a functional leap forward. Sure, it has some nice qualities—for example, the size of the footprint, and the VGA Graphics Array with its 640-by-480, 256-color resolution.

But as Will Zachmann, vice president of corporate research for International Data Corporation and leading analyst, recently observed, "The 640-by-480-resolution aspect, which is really going to be relevant for the next two years or so, will be an absolute piece of cake to replicate on the 386 machines."

My conclusion is that no one's going to deep-six the 386 in favor of the unknown PS/2. Certainly, Compaq and other 286 and 386 makers will keep selling well. And companies may not want to convert to 3½-inch disks. Just think how many trillions of files would have to be copied from 5¼-inch disks to 3½-inch disks. It would probably take 10,000 years to effect this file transition.

Other PS/2 drawbacks abound. At the top of the list, of course, is the fact that the real advantages of the Micro Channel bus won't be realized for years to come. That's

a long time to wait, even if you have a lot of faith in IBM. It's not entirely clear, either, when OS/2 will be released. And when it finally does appear, will it be accepted as the new standard?

Is it true, as speculation has it, that OS/2 is slow and eats up a great deal of memory? Will Zachmann points out that to use

Will MS-DOS running under UNIX become the new standard?

OS/2 at all, you'll need at least 1 or 2 megabytes of memory in your system—and to use it optimally, you'll need 3 or 4 megabytes. That's a lot of overhead.

Speaking of standards, another possibility is lurking in the PC woodwork—that MS.DOS 3.*xx* running under UNIX will become the new standard. This configuration will give you the power, the memory, and the multitasking capability of the 386 machine. Although UNIX continues to be blasted by businesspeople who complain that it's too difficult and too confusing to use, I think there is a way around that argument. With a proper user interface—*Windows,* for example—UNIX could be made so transparent that you wouldn't even know you were running it. What you'd have would look exactly like a DOS *Windows* program, except that your office could perform multitasking functions and be elegantly networked. You'd have, in effect, the power of UNIX and the look and feel of *Windows.* This could

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David Bunnell

be such a compelling option that OS/2 might not win out after all.

Here's another burning question: Why is the PS/2 Model 50 such a defanged, declawed, and defeatured machine? I agree with Will Zachmann, who believes that the Model 50 really is the "PSjr" in disguise.

With its single non-upgradable 20MB, 80-millisecond hard disk, this 286-based kludge doesn't get two-and-a-half times the performance of anything, except maybe an 8088-based system. "This thing is clearly a bait-and-switch machine in my book," says Zachmann. "I don't think it's ever going to be a reasonable vehicle for running OS/2."

Will IBM ever upgrade the Model 50's pathetically slow and small hard disk? Stay tuned, stay glued, and don't be rude.

Further up the PS/2 ladder, it's intriguing to speculate about what desktop publishing schemes IBM may have in store for its as yet unannounced Model 70 machine. The Model 30 turnkey desktop solution that IBM has already announced is, of course, weak tea compared to Apple's Macintosh-based desktop publishing system.

But industry scuttlebutt has it that IBM is planning to release a turnkey desktop system designed around the 386-based PS/2 Model 70. Now, that would certainly give the Macintosh a good run for its money. People who have seen it say *PageMaker* on the Model 70 runs more than twice as fast as on the Model 30. Suddenly, the desktop stakes appear much higher.

So what can we deduce from all this confusion about IBM's PS/2

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computers? Where is Big Blue leading us with its OS/2 and Extended OS/2?

Here are some of my speculations.

I believe that IBM urgently needs to control how the market perceives the PS/2 line. Although many corporate users appear to buy the idea that the PS/2 machines represent a new generation of personal computers, reports from analysts and much of the computer press suggest that this may not actually be the case. Furthermore, while most major clone makers are busy reverse engineering the Micro Channel, the 386-based machine with the old bus continues to look like a strong bet and an able contender against the PS/2. The 386 clone, far from being a lame duck, is a powerhorse.

I think there are three possible scenarios for the outcome of IBM's PS/2 computers.

First of all, IBM may have made a strategic blunder with the PS/2. It could end up in the boneyard along with other dead-end products. On the other hand, it's also possible that IBM will win this big gamble and take the world by storm with the PS/2 line. The emperor's new clothes might be the PC fashion statement for the next decade.

Finally, there is the likely possibility that the picture will not clear, that the outcome will remain uncertain, and that the PC world will continue to muddle along much as it does today with its variety of different standards, some of them competing, some of them compatible.

Any more questions? ⬢

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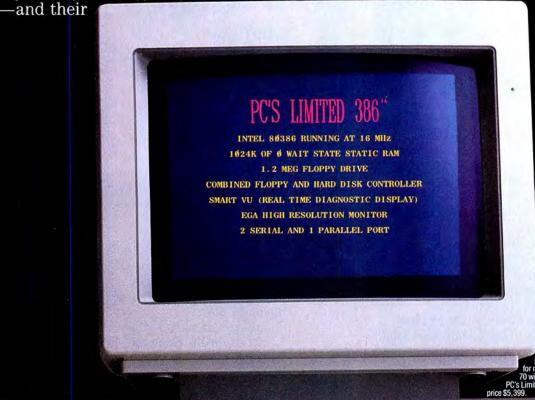
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SMART VU (REAL TIME DIAGNOSTIC DISPLAY)
EGA HIGH RESOLUTION MONITOR
2 SERIAL AND 1 PARALLEL PORT

*PC's Limited 386 Benchmark Study is available upon written request.
**Based on current suggested retail price, effective May 1st for most comparable system: Compaq Model 70 with a 70 Meg hard drive list price $8,699. PC's Limited 386¹⁶ with a 70 Meg hard drive list price $5,399.

PC'S LIMITED 386¹⁶

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Space saving chassis

The 386¹⁶ Monochrome System

Includes the following standard features and options.
Intel 80386 running at 16 MHz
1024K of 0 Wait State Static RAM
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101 key Keyboard
192 watt Power Supply
System Clock/Calendar/Configuration Data in
    CMOS RAM with battery backup
Hercules compatible Monochrome Graphics card
2 Serial and 2 Parallel ports
High Resolution Monochrome Monitor
Smart Vu™ (Real Time Diagnostic Display)
12 month, on-site Honeywell Bull service contract
With a 40 Meg, 28 MS hard drive
    and standard chassis $4,499
With a 70 Meg, 28 MS hard drive
    and standard chassis $4,899
With a 150 Meg, 18 MS hard drive
    and standard chassis $5,899

The 386¹⁶ EGA Color System

The above system with the following substitutions.
EGA Video card
2 Serial and 1 Parallel port
The EGA High Resolution Monitor
    with a 40 Meg, 28 MS hard drive
    and standard chassis $4,999
With a 70 Meg, 28 MS hard drive
    and standard chassis $5,399
With a 150 Meg, 18 MS hard drive
    and standard chassis $6,499

The 286¹² Monochrome System

Includes the following standard features and options.
Intel 80286 running at 6 and 12 MHz
1024K on board • 1.2 Meg floppy drive
Combined floppy and hard disk Controller
84 key Keyboard
192 watt Power Supply
Clock/Calendar with battery backup
Hercules compatible Monochrome Graphics card
2 Serial and 2 Parallel ports
High Resolution Monochrome Monitor
Standard chassis
Smart Vu™ (Real Time Diagnostic Display)
12 month, on-site Honeywell Bull service contract
With a 40 Meg, 28 MS hard drive $2,699
With a 70 Meg, 28 MS hard drive $2,999

The 286¹² EGA Color System

The above system with the following substitutions.
EGA card
2 Serial and 1 Parallel port
The EGA High Resolution Monitor
With a 40 Meg, 28 MS hard drive $3,199
With a 70 Meg, 28 MS hard drive $3,499

We have technical support people that you can talk to for free by calling 1-800-624-9896.

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Our One Year Limited Warranty says we warrant each system we manufacture to be free from defects in materials and workmanship for one year following the date of shipment from PC's Limited. During the one

AT NEW, LOWER PRICES BEYOND COMPARE.

Standard chassis

The 286⁸ Monochrome System

Includes the following standard features and options.
Intel 80286 running at 6 and 8 MHz
1024K on board • 1.2 Meg floppy drive
Combined floppy and hard disk Controller
84 key Keyboard • 192 watt Power Supply
Clock/Calendar with battery backup
Hercules compatible Monochrome Graphics card
2 Serial and 2 Parallel ports • High Resolution Mono-
  chrome Monitor • Smart Vu™ (Real Time
  Diagnostic Display)
12 month, on-site Honeywell Bull service contract
With a 20 Meg, 65 MS hard drive
  and the space saving chassis $1,799
With a 40 Meg, 40 MS hard drive
  and standard chassis $2,149

The 286⁸ EGA Color System

The above system with the following substitutions.
EGA card • 2 Serial & 1 Parallel port • EGA High
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With one 20 Meg, 65 MS hard drive
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year period, we will repair or replace, at our option, any defective products
at no additional charge.

Optional Honeywell Bull On-Site Service Contract provides for on-site
service for parts and labor within the next business day if your system is
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A system is defined as a CPU, monitor, video card and the disk drives
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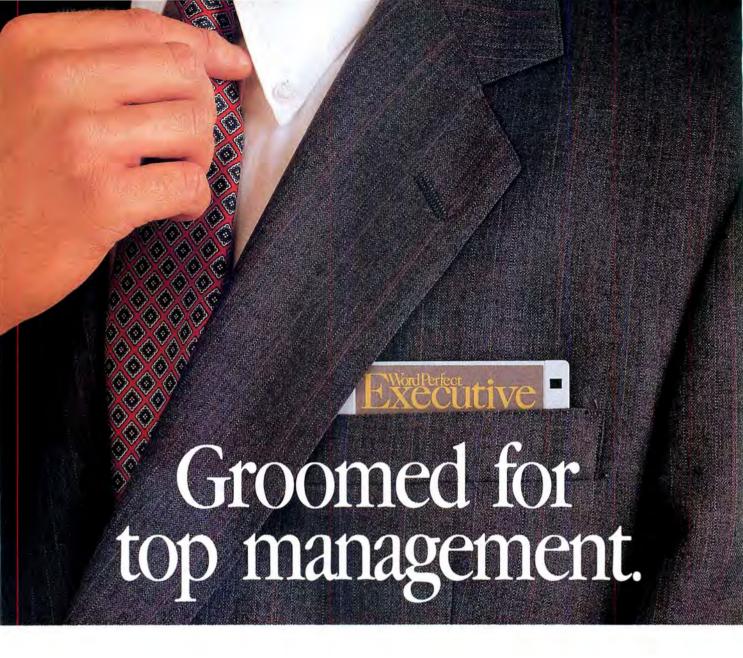
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Includes the following standard features and options.
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  20 Meg, 65 MS hard drive $1,699
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  40 MS hard drive $2,199

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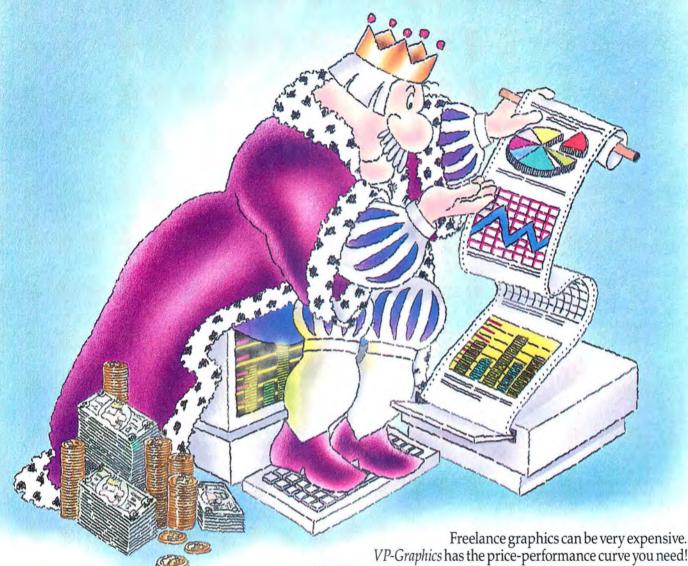
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Letters

Reactions and responses from the PC World community

The Software Remains the Same

As a musician and a PC user, I appreciate the protection of the creative process at the heart of the "look-and-feel" controversy ["The Software Inquisition," *David Bunnell, PCW, May 1987*]. A music arranger who takes a copyrighted song and sets it to a different key, uses different instruments, or embellishes certain passages has nonetheless copied a composer's melody. Failure to seek permission to use the melody or to compensate that composer is plagiarism—a euphemism for theft.

Likewise, although makers of software clones may place the menu at a different location on the screen, embellish the product with a few colors or functions, or avoid using the original code, the results are blatantly obvious to even the casual *1-2-3* user: The harmony may be different, but the melody is unmistakably the same.

Roy D. Wood
Camden, South Carolina

It's All in the Game

The law should protect against code theft. If another company produces an equally functional and reliable product (like *1-2-3*) at half the price, that's competition. Lotus should respond by improving its product, not by bludgeoning its competitors. If I choose to buy an expensive brand name software program instead of a clone, I do so because its publisher has a reputation for quality—not because it has acquired a monopoly through spurious means.

Eric Dynamic
Cambridge, Massachusetts

How Soon They Forget

The "look-and-feel" lawsuit will deter people from copying successful programs outright. However, Jonathan Sachs, probably the most successful software developer to date, says in "Jonathan Sachs After 1-2-3" [*PCW*, December 1986], "I'm not a real creative designer, but, for example, I'll read manuals of other products and pick ideas out of the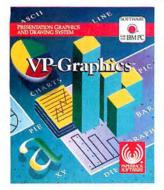m, and ... try to make them into something that incorporates the best of everything." He also admits he got the idea to add a data base to *1-2-3* from *Context MBA*, a competing product at that time.

1-2-3 might never have made it to market if Lotus had been threatened with a "look-and-feel" lawsuit when it introduced the program. The software industry needs the uninhibited exchange of ideas. I hope the Lotus lawsuit deters the thieves, without deterring the innovators.

Thomas Grubb
San Francisco, California
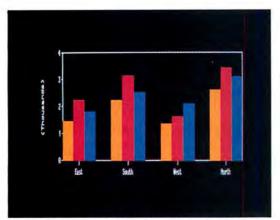
Software or Service?

One of the problems with the software industry is that software is considered a product when it's really more like a service. Software companies fill a need for their customers much the way an accountant does. Their expertise helps their customers achieve some goal through an interactive process. While customers don't talk to software developers directly, as they would to an accountant, they interact indirectly through a program.

Protecting the "look and feel" of a program is no more valid than trying to protect a successful

(continues)
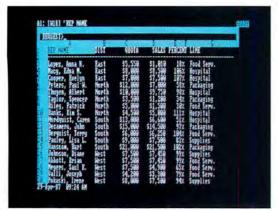
To get Lotus 1-2-3 to do all this more quickly and easily, we didn't make it more powerful.

Lotus HAL doesn't change 1-2-3 or the worksheet. It makes things easier. For instance, to graph sales by district from January to March just request "graph Jan to Mar."

You can spend a lot of time setting up your spreadsheet. Summing up sales figures is a good example. With Lotus HAL, just request "total all rows" and 1-2-3 and Lotus HAL will create the formulas.

Say you want to extract just the information you want from a database. For example, you want to determine your top sales reps. Simply request "who has sales ≥ 8000."
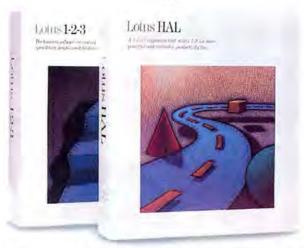
You may find yourself in the position of figuring out how a spreadsheet was built. Well, with Lotus HAL, you simply request "list the relations in the sheet." And away you go.

Do you find it hard to sort things by district or sales or any other criteria? Just request "sort by dist."

To create macros, well, you may not believe this. What you see here isn't a description of what's happening—it's the actual macro. See, we told you you wouldn't believe this.

We made you more powerful.

How? With Lotus HAL™—a Companion product for 1-2-3® that helps you take shortcuts, undo mistakes, link spreadsheets, use your own words for commands and basically get more out of 1-2-3 than ever.

So much more, that Computerworld has named Lotus HAL "Product of the Year."

The screens on the left will give you an idea of how easy it is to get more out of 1-2-3. And these are only a few of the enhancements and new features Lotus HAL brings to 1-2-3.

Lotus HAL gives you the ability to perform 1-2-3 tasks using simple English phrases—called, logically enough, "requests." This has advantages for all kinds of 1-2-3 users: the newer users will find that difficult tasks are now simplified; the more experienced users will find that many time-consuming tasks can now be performed in a fraction of the time.
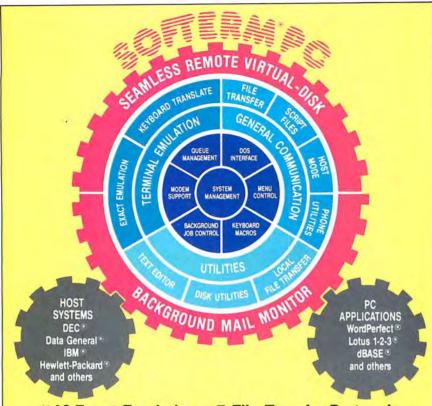
In addition to this powerful capability, Lotus HAL also allows you to test assumptions, correct mistakes and simply change your mind with ease. Because through a special capability called "undo", Lotus HAL lets you reverse your last command—even retrieving a file before saving your work.

Besides all this, Lotus HAL gives 1-2-3 a number of other useful and powerful new features—like spreadsheet auditing and the ability to link cells or ranges between worksheets.

One obvious benefit of all this is that you save time. This is what led Business Software to say, "...(Lotus) HAL gives users the ability to move through 1-2-3 at least twice as fast."

And what does that savings in time mean to a business person? It means you're more powerful, more productive, more effective than ever before.

Make yourself more powerful, and buy yourself Lotus HAL. You'll find it at your Authorized Lotus Dealer, for just $150.* Or, you can call us directly at 1-800-345-1043 and ask for Product PG-1377, or ask for PG-1385 to receive more information about Lotus HAL. See? Everything with Lotus HAL begins with a simple request. Lotus HAL

Requirements: Lotus HAL is a memory-resident program that requires 1-2-3 Release 1A, Release 2, or Release 2.01 for personal computers from IBM;** COMPAQ and AT&T, plus 1-2-3 certified compatibles; two disk drives; DOS 2.0 to 3.1; 512K RAM. Please refer to your 1-2-3 package or 1-2-3 documentation for appropriate hardware configurations and DOS requirements or consult your dealer. **Lotus HAL does not operate with 1-2-3 for IBM PCjr., or IBM PC Convertible or Release 1A for the IBM 3270 PC. When you purchase Lotus HAL directly from Lotus, take your first 30 days to try it. If after 30 days, Lotus HAL does not perform as described and you've purchased it directly from Lotus, we'll gladly give you a full refund. © 1987 Lotus Development Corporation. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. Lotus HAL is a trademark of Lotus Development Corporation.
Lotus HAL is distinguished from HAL which is a trademark of Qantel for its Hotel And Leisure software.   *Suggested Retail Price (Plus Sales Tax)

method of bookkeeping. Lotus has placed its quarterly earnings ahead of the long-term health of the software industry.

John Piscioneri
San Francisco, California

The Dearth of Ideas

Really, the "look-and-feel" controversy is inane. There have been few original ideas in this world anyway. Most of them have been copied with minor improvements. Has Ford sued General Motors?

David H. Sherman
Columbus, Ohio

Late to the Polls

I applaud your efforts to obtain reader views about the "look-and-feel" conflict confronting the PC software industry [*PC World Reader Poll: The "Look-and-Feel" Controversy,* PCW, May 1987]. Now if only you could explain why my issue arrived on April 24 and the poll closed on April 18.

Jeff Coleman
Tucson, Arizona

We launched the "look-and-feel" telephone poll as a means to get immediate feedback from a sampling of our readers on this important issue. We're sorry we were unable to record your opinion. Reader input is very important to us, and we'll continue to explore ways to get you involved in the editorial content of PC World. Look at Harry Miller's column in this issue for the results of the "look-and-feel" poll. —Ed.

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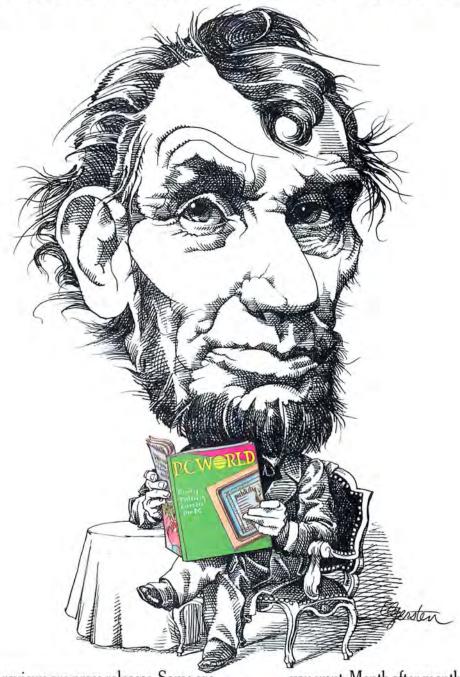
The entire PalettePlus system costs only $2,999,** and you can make brilliant slides with it for as little as 60¢ apiece. And PalettePlus comes with a 21-day satisfaction guarantee.

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Letters

MicroPro's Message

"Teaching WordStar New Tricks" [*PCW*, May 1987] reported that *WordStar* users didn't have to be registered owners to receive the 4.0 upgrade. I called MicroPro International, reported the registration number for my bootleg copy, and then discovered that only registered owners were eligible for upgrades. Not only did I find myself in a very embarrassing situation, but I could get the original owner in serious trouble if MicroPro chooses to pursue the matter.
[Name withheld]
Omaha, Nebraska

We rechecked the WordStar 4.0 upgrade policy with MicroPro president Leon Williams, and according to him, you don't have to be a registered owner to get the upgrade as long as you have a valid registration number. "We will not check to see if you're registered," says Mr. Williams. "I don't personally know of anyone who's been refused an update. If anyone complains to PC World, tell them to phone me personally. If they have a serial number or a photocopy of the cover of the manual, I'll send them an upgrade." MicroPro's number is 415/499-1200. For upgrades, call 800/227-5609. –Ed.

Fundamental Technology

David Bunnell's recent flight of new-age fancy concerning Dr. Timothy Leary and *Neuromancer* ["Neuromancing the PC," *PCW*, April 1987] would be humorous if it weren't terrifying. The prospect

The New Standard In PC-Compatible Keyboards.

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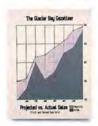
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What made the original IBM Proprinter so popular was speed, versatility and convenience.

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Speed, versatility and convenience. There's now Fastfont,™ an extra-fast draft mode. Switching to "near letter quality" is faster too, because now there's a button for changing modes.

The IBM Proprinter II.

There's also a choice of typestyles, and of course you can still load envelopes from the front and put in single sheets any time you want.

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The improvement is easy to see.

So is the performance. When

The IBM Proprinter X24 with optional sheet feed.

compared to current, best-selling, comparably priced 24-wire printers, the Proprinter X24 and Proprinter XL24 print 1½ to 2 times the draft output in the same amount of time.*

The Proprinter XL24 has a wide carriage for spreadsheet printing, and both have an optional sheet feed for added paper-handling convenience, plus FontSet," an option that lets you choose from 11 other typestyles.

The IBM Quietwriter III Printer.

Earlier IBM Quietwriter printers have always been easy on the ears, but the new IBM Quietwriter III Printer is even quieter and goes nearly twice as fast, printing executive letter quality text and graphics in an executive hurry.

There's new flexibility in style, as well. The Quietwriter III Printer

The IBM Proprinter XL24 has a wide carriage, ideal for spreadsheets.

comes with four different type fonts built in and you can combine typestyles within the same document.

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There's also a new dual-drawer sheet feed (with optional envelope feed) that lets you use letterhead stationery for the first page of a letter, then plain paper for the rest.

No matter what level of price or performance you need, there's an IBM personal printer to fit the bill. And they fit very nicely with the IBM Personal System/2."

So call your IBM Marketing Representative, or visit an IBM authorized dealer.
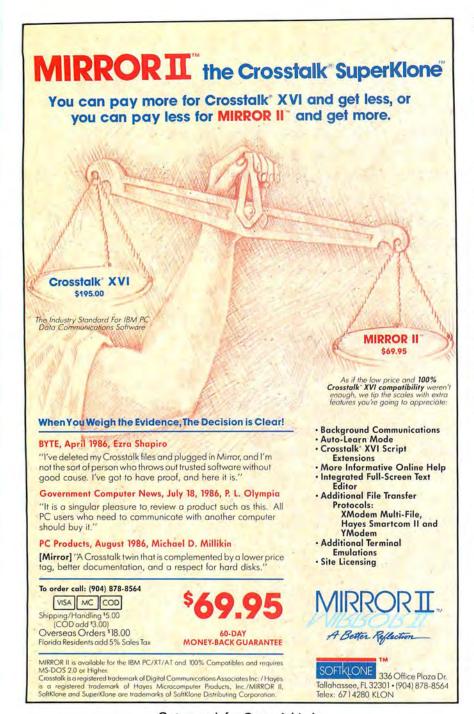
For the dealer nearest you, call 1-800-447-4700, ext. 9. (In Alaska call 1-800-447-0890, in Canada 1-800-465-6600.) **IBM**®

The IBM Quietwriter III Printer with single-drawer sheet feed.

There's also an innovative multiple-drawer sheet feed.

of "unredeemed" computer users with the instantaneous, limitless capability to use and alter information conjures up images of a bleaker, not brighter, future.

Technology must be tempered by an understanding of the fundamental moral and intellectual weakness of human beings. Endow that flawed being with cybernetic power and you have the potential for disaster. Amoral technocracy has been attempted before—in 1933-1945 Germany. We know what that produced.

W. P. Cunningham
San Antonio, Texas

U.S. Out of the Chips

"Save Our Chips" [*Letters, PCW,* March 1987] perpetuates the mistaken notion that government intervention protects the consumer and prevents monopolies. In fact, it's almost exclusively the case that where you find monopolies you'll find government involvement—Amtrak, local Bell operating companies, and most public utilities, to name a few examples.
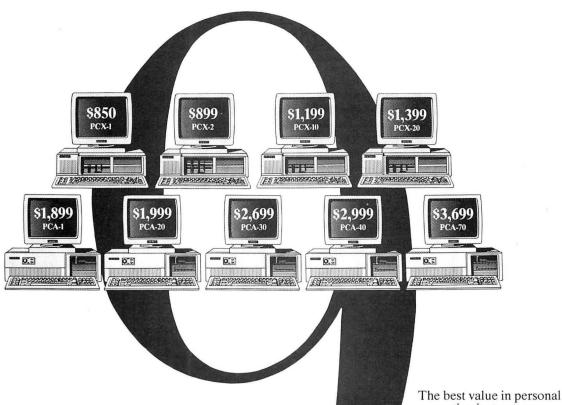
I recently added 512K of RAM to my Leading Edge computer for less than $60. I don't feel I've been taken by big business. And, by the way, the computer and RAM chips were made in Korea. It seems to me that fair-market-value pricing (which keeps prices artificially high) between the United States and Japan will do little except make the Korean manufacturers very happy.

The PC industry has done quite well without imposed fair-market-value pricing. It will surely con-

From 360K to 70MB, we've still got your number.

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| $1,899 PCA-1 | $1,999 PCA-20 | $2,699 PCA-30 | $2,999 PCA-40 | $3,699 PCA-70 |
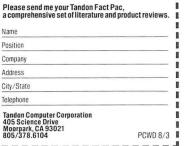
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WHY WAIT FOR OS/2? RUN LARGE APPLICATI
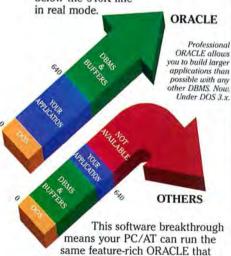
All PC DBMSs have three serious limitations. First, very little room is left for your application after deducting the size of DOS and the DBMS from the available 640K. Second, they don't provide easy, transparent access to minicomputer and mainframe data. Finally, multi-user applications are impractical because of long delays caused by LAN data lock-out. Three serious limitations. Not any more.

In 1979, Oracle Corporation delivered the very first relational DBMS. Oracle also delivered the very first implementation of SQL. And now, we're delivering the first ever distributed DBMS for PCs: *Professional ORACLE,® Networkstation ORACLE® and LANserver ORACLE.®* Three DBMS products that bring mainframe applications, mainframe data, and mainframe power to the desktop. All of which incorporate ORACLE's breakthrough technology. And all deliverable today.

EXPLOITS 286/386 PROTECTED MODE. NOW.

Professional ORACLE is the very first DBMS to exploit the advanced technology of PCs like the Compaq 386, IBM's PC/AT, and the new Personal System/2.

The ORACLE kernel—the relational DBMS engine—executes in protected mode. Above the 640K line in extended memory. At the same time, your ORACLE applications, tools, and DOS 3.x execute below the 640K line in real mode.

ORACLE

Professional ORACLE allows you to build larger applications than possible with any other DBMS. Now. Under DOS 3.x.

OTHERS

This software breakthrough means your PC/AT can run the same feature-rich ORACLE that mainframes run. Not a down-sized subset. Plus it leaves you plenty of memory to develop and execute major database applications. Without giving up your memory-resident utilities.

SEAMLESS CONNECTIVITY. NOW.
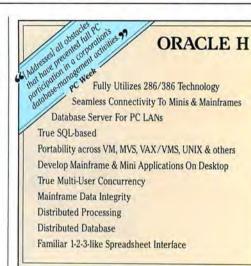
When other PC DBMSes claim "connectivity," they mean terminal emulation or file transfer, downloading and uploading static data snapshots.

With Networkstation ORACLE, an ordinary PC (XT as well as 286 or 386) becomes a true distributed application processor. You can dynamically access and update a remote database—either ORACLE or IBM's DB2†—as if it were stored on your PC.

What's more, ORACLE's SQL*Star distributed database architecture—the first ever on PCs—lets you query or update local PC and remote databases simultaneously. Even join them into a single view. Without knowing where your data is located. So you can distribute your data to where it's used the most. Control, secure, and back it up however you want. And still network it all together whenever you need to.

ORACLE Connectivity — PC to Database Server		
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Medium	3270 Coax	50 Kbps
High	Ethernet	10 Mbps
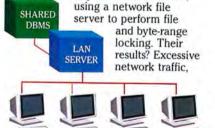
Networkstation ORACLE works over Ethernet using DECnet protocols. Over 3270 coax using LU2 data streams. And over RS-232 and dial-up phone lines. With TCP/IP, APPC LU6.2 and other industry-standard protocols to come.

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[Addresses] all obstacles that have prevented full PC participation in a corporation's database-management activities. PC Week

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SHARED DBMS

LAN SERVER

frequent waits for busy records, and corrupted databases from aborted transaction streams.

ORACLE's database-server architecture ensures minimum network traffic, maximum concurrency, and data integrity for the most demanding multi-user applications. Just like a mainframe. And at one-fifth the cost of the least expensive proprietary database machine.

tinue to do so as long as governments do not intervene.
Walter Turberville III
Phoenix, Arizona

The Ventura Adventure
"Ventura: Complete Desktop Publishing" [PCW, March 1987] was the most comprehensive and informative review of the program I've read. I thoroughly agree with Ted Nace's assertion that "Ventura is assured a long and successful life in the desktop publishing marketplace." In fact, I'm so impressed by Ventura's power and versatility that I've formed the Ventura Users of North America (VUNA). Interested readers can contact the group at: 20 Glen Elm Ave., Toronto, Canada M4T 1T7, 416/482-3710, BBS 416/488-0677.
Daniel Wilson
Toronto, Canada

Correction
Readers looking for TranSec Systems' *dAnalyst*, mentioned in "dBASE Power Tools" [PCW, March 1987], can contact the company at 220 Congress Park Dr., Del Ray Beach, FL 33445, 305/276-1500.

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

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—Patrick Honan

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The A★Star
14
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—Jake Epstein

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—Jon Pepper

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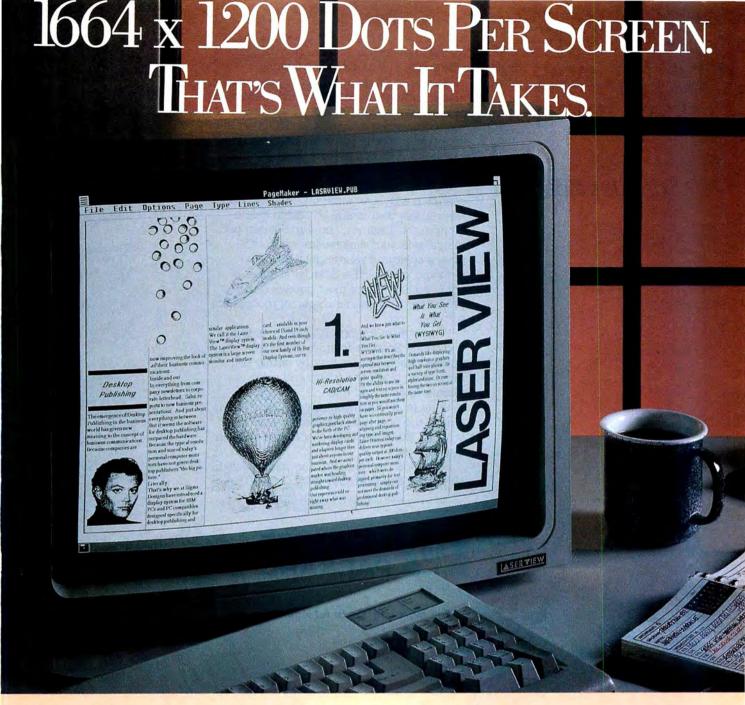
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Harry Miller

Results of our reader survey on the "look-and-feel" debate show that you find product innovation, ease of learning, and brand name loyalty more important than the self-protective instincts of some vendors.

Lookin' Good and Feelin' All Right

As the "look-and-feel" litigation drags through the American judicial system, *PC World* readers have deliberated and reached their own verdict: Short of copying the actual program code, emulation of a software product isn't wrong. In fact, it helps users learn a new package more quickly and may increase sales of the emulated product.

In the May issue we printed a phone-in reader poll, asking six questions about the look-and-feel controversy. We specifically refrained from asking for judgments about the legal issues. Instead, we wanted to know how our readers felt about the ethics involved and how one vendor's emulation of another's product might affect the respondents' use of that product. The responses are heartening and sensible.

As the responses presented here show, the vast majority of *PC World* readers don't feel it's wrong to emulate a program's appearance or command sequence. How-

ever, there is general agreement that protection for program code is just and appropriate. Thus, it is the program's code rather than its commands or screen style that constitutes the intellectual property. Following that line of reasoning, look and feel is not the stuff of which licenses are made.

Our readers don't think the size of the company emulating a product is germane to the argument. A large company emulating a smaller organization's product is as fair as the converse. But as anyone who has learned to use several software packages can attest, keyboard commands, command sequences, and menu style are more important than overall appearance in speeding the learning process.

Reader response to questions about brand name preference and the effect of imitators on a product's sales might be surprising. But

(continues)

Still thi

40 MB. In a 1" card. We told our engineers it couldn't be done. That everybody else uses a 2" card. Or an add-in drive the size of a breadbox.

Of course, they had a few words on the subject: "No pain, no gain."

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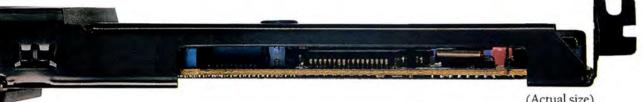
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thick. So it fits in a single slot. And leaves the other slots wide open for anything you like.

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n at 40.

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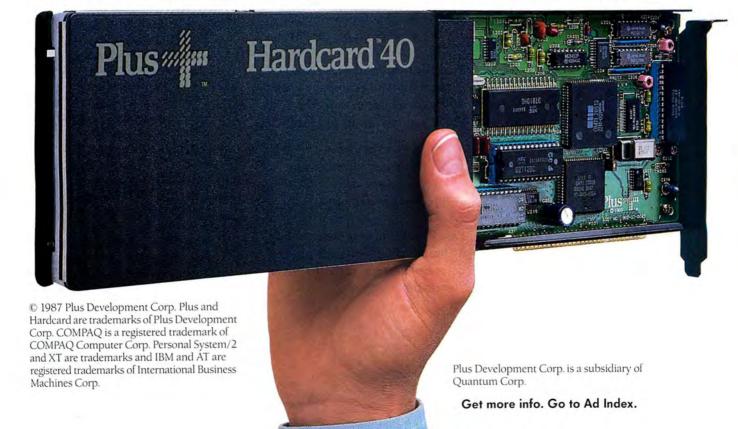
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the sincerest form of flattery is also a clear confirmation that the imitated product is the standard in its genre. And what could be more reassuring than buying a brand name product that has won the loyalty of so many other users? *PC World* readers recognize the benefits of buying standard products from well-established companies. They know that reliability, service, and support are more important than saving a few dollars and that long-term savings in training and maintenance often offset initial discounts. Thus, the preference for brand name products over work-alike clones might explain why our readers think the existence of imitators would increase the sales of the imitated.

On behalf of the *PC World* staff, let me thank all those who shared their opinions with us in this poll. If there's a message here for the software industry, it's to protect your code vigorously but refrain from imposing false constraints on those who seek to flatter your product by emulating it (and in the process, perhaps, adding value to it). It's better and far more important to put resources and effort into improving your product, serving and supporting your user base, and establishing your position as the brand name standard. The emulators will help you maintain and enhance that position—if you let them.

PC World "Look and Feel" Reader Poll Results

Part I: Are there any forms of emulation or copying of the "look and feel" of a software product that you think are wrong?

82.0%   Copying the actual program code
21.8%   Emulation of a program's appearance *and* commands
12.1%   Emulation of a program's appearance and menu style—the "look"
10.9%   Emulation of a program's commands and keyboard sequences—the "feel"

Part II: Should a company be required to secure a license or permission if it wishes to emulate the "look and feel" of a product from another company?

68.3%   No, a company should not be required to get permission
24.2%   Yes, a company should be required to get permission

Part III: Does it increase or decrease a software company's sales if others emulate or copy the "look and feel" of its product?

35.6%   It increases sales
26.8%   It neither increases nor decreases sales
16.9%   It decreases sales

Part IV: Would you prefer to buy a "brand name" software product, or would you prefer to buy a "work-alike" clone?

55.0%   Brand name product
24.4%   No preference
11.3%   Work-alike clone

Part V: In which cases is it fair for one company to emulate the "look and feel" of a product produced by another company?

52.9%   When a small company emulates the product of a large company
47.2%   When a large company emulates the product of a small company
24.5%   It is not fair in either case

Part VI: When you buy new software, which forms of emulation of the "look and feel" of established software products help you to learn the new product more quickly?

73.7%   Emulation of keyboard command names and sequences helps
63.3%   Emulation of the menu style helps
47.7%   Emulation of the overall appearance helps
 3.8%   No form of emulation helps ⬡

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communication software.
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```
FREEWAY-55   Version 2.0                    by Henry Tebeka, KORTEK

   Main Menu            Name            : KORTEK Bboard
                        Phone Number    : 1 (415) 327-4589
 Dial from phonebook
   Teach autopilot      Terminal Type   : ANSI-VT100
     Manual dial        Baud Rate       : 2400
 Switch to terminal     Data Format     : 8 data + 1 stop bits
   Wait for a call      Parity          : No parity
   Other commands       Call/Host Mode  : Call
   Basic settings
 Advanced settings
       Help
       Quit

                                        10:55:32

 Port: COM1          Elapsed: 00:00:00        Connected: No
```

The most powerful

Just because Freeway is easy to use, doesn't mean it's weak. Freeway is communication software by and for the power user.

Automation: You shouldn't waste your time with simple chores. So Freeway automates your communication. It stores over 20 settings for each host you call in its Phonebook. If a number is busy, Freeway will redial until you get through. And, in addition to the Autopilot, Freeway includes a powerful script facility, with access to all Freeway's features. For instance, a script can wait until 2 a.m., call a BBS, check for mail, and download any new files, leaving you an exact transcript.

Control: Freeway gives you far more detailed control than just the usual baud rate and parity. You have seven filters for incoming and outgoing text. You can specify the characters used for flow control, and the length of a Break. In all, you have control of over 50 settings, most of which can be different for each phone number.

And remember, just because Freeway is powerful, doesn't mean it's difficult. The advanced features are as accessible as the basics, via fast menus with keyboard shortcuts.

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is the best commu
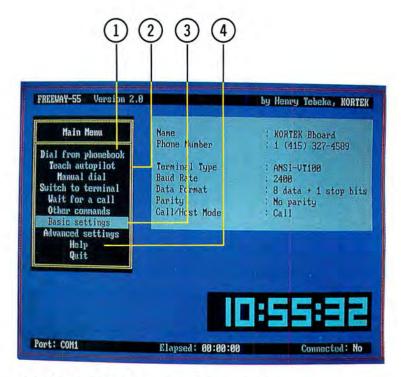
The easiest to use

Take Freeway's simple menus and clear displays. Add the arrow keys and the Escape and Enter keys. The result is powerful but straightforward communication — at your fingertips.

(1) **Phonebooks:** Freeway lets you store the phone numbers (and other settings) for up to 100 computer systems. You just use the arrow keys to pick the number you want, hit Enter, and leave the dialing to us.

(2) **Autopilot:** Computer communication is more than just placing a call. You have to log on to the other computer, and often type introductory commands. Freeway provides an "autopilot" to relieve you of this chore. You simply go through these preliminaries once, with the autopilot noting your every move. Then, when you next call, the autopilot will do the work for you.

(3) **Setting Up:** Setting up Freeway is a piece of cake! The parameters you need — baud rate, parity, and even the number to call — are gathered in simple menus. To set them, you just zip through with arrows and Enter, and then save them in the Phonebook. Later, changing one or all of them is just as easy!

(4) **On-Line Help:** Even though Freeway is very easy to use, we all need a hint now and then. Every line of every menu has on-line help at the touch of a key.

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color monitor and the undisputed industry standard.
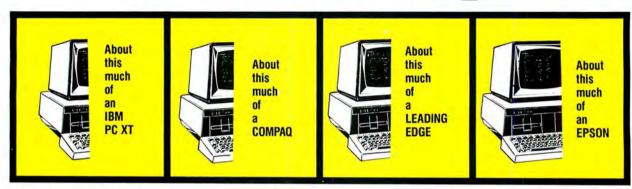
MultiSync offers a maximum resolution of 800 x 560 for bril-

liant business graphics. And compatibility with old and new sys-

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IBM's Personal Touch

Stewart Alsop

Although the look of the Personal System/2 line isn't all that new, IBM's approach to personal computing is.

Based on cocktail party conversation before IBM's Personal System/2 announcement, you could reasonably have expected Big Blue to introduce what amounted to powerful, low-cost versions of its 3278 terminals. But despite the machines' new architecture, disk drives, and graphics modes, IBM didn't change things as much as it might have.

Like the original PC, the Personal Systems/2 are clearly designed to be *personal* computers. They're speedy, attractive, and easy to install. You might even say they're sexy.

Given IBM's heritage, the personality of the new computers indicates a remarkable step forward. Remember that IBM became a corporate giant by selling mainframe computer systems to very large corporations. Personal computers represented a radical departure from its traditional ways of doing business. Most companies, even good ones, couldn't handle such a big change in their corporate game plan. Indeed, many people (myself included) worried that IBM had calcified to the point

that it couldn't respond to the PC challenge and might ultimately lose its dominant position in the computer industry. The personality and pizzazz of the PS/2 line, however, show that Big Blue is back and has figured out what it was doing wrong.

When IBM's Entry Systems Division built the first PC back in 1981, ESD was an independent business unit, free from the usual constraints placed on the company's operating divisions. So, Don Estridge (ESD's first president and godfather of the PC) and his merry band focused strictly on the problem of creating a product that would get them into the marketplace quickly, not one that squeezed strategically into IBM's corporate computing and communications plans. At the time, PCs were generally considered toys and played no part in IBM's long-range business objectives.

But ESD's PC—based on a simple open architecture—was so successful it became the cornerstone

(continues)

of a product line that sent ripples throughout the company. Because IBM's long-term marketing plans and its existing product line had been devised before the PC took off, the company was ill-prepared to respond to emerging competition. As a result, it produced a series of marginal products—the PC Portable, the PCjr, the 3270-PC, the PC Convertible, the PC XT/286—that tried to meet numerous needs, without great success.

When it finally admitted—probably sometime in 1984—that the PC was more than just an interesting opportunity to make a little money, IBM had to rethink what a personal computer should be, how it should be designed, and how it should fit in with IBM's other systems. For a company with more than $50 billion in revenues, nearly 400,000 employees, and thousands of products in hundreds of categories, that was no simple task. It meant designing a personal computer that satisfied the interests of its mainframe, minicomputer, and communications divisions as well as its sales and marketing departments and corporate officers.

When Bill Lowe became ESD president in 1985, the reevaluation of the PC's role in IBM's business strategy began in earnest. In the past two years, Lowe has succeeded in integrating ESD so completely into overall IBM operations that virtually every division and engineering group participated in the PS/2's design. Now, instead of looking at PCs as a remarkable but irrelevant phenomenon in another department, each IBM division sees personal computers as central to its own success and, ultimately, the success of the company.
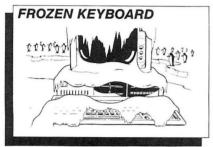
The aftermath of IBM's personal computer angst could hardly have been more positive for the computer industry. IBM has decided that personal computers should remain personal, despite the influence of its mainframe jockeys. The PS/2 offers vastly improved graphics capabilities, durable 3½-inch disk drives, faster processors, and sleek new styling. It embodies IBM's vision of the personal computer as a personal productivity tool, rather than being some semifunctional, obstreperous appendage to IBM's larger systems.

IBM has created a personal computer to appeal to both individual users and corporate customers. In the long run, this focus means we'll all have better computers for some time to come. Despite the worst doom-and-gloom predictions of pundits and propeller heads alike, we can look forward to exciting new applications and technologies from IBM. ◉

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

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DATE _____

1. **Industry** (check one only)
   Non-computer related businesses
   ☐ 1. Aerospace
   ☐ 2. Agriculture, mining, construction, oil
   ☐ 3. Business consulting (non-computer related)
   ☐ 4. College/university
   ☐ 5. Elementary/high school
   ☐ 6. Engineering/architecture
   ☐ 7. Finance/banking/accounting/insurance/ real estate
   ☐ 8. Government
   ☐ 9. Health/medical services
   ☐ 10. Legal services
   ☐ 11. Manufacturing
   ☐ 12. Military
   ☐ 13. Other business services
   ☐ 14. Publishing/advertising/public relations
   ☐ 15. Research & development
   ☐ 16. Retail/wholesale
   ☐ 17. Transportation/communications/utilities
   ☐ 99. Other (please specify) _____

   Computer-related businesses
   ☐ 18. Computer consultants
   ☐ 19. Computer retail stores
   ☐ 20. Distributor/wholesalers
   ☐ 21. Manufacturer (computers, software, peripherals)
   ☐ 22. Service bureau
   ☐ 23. VAR/systems house/integrator
   ☐ 99. Other (please specify) _____

2. **Title** (check only one)
   ☐ 1. Chairman/president/owner/partner
   ☐ 2. Vice president
   ☐ 3. Controller/treasurer/accountant
   ☐ 4. Director/supervisor/manager
   ☐ 5. Project manager/chief/group leader
   ☐ 6. Art director/writer/creative head/technical writer
   ☐ 7. Engineer/scientist
   ☐ 8. Administrator
   ☐ 9. Consultant/advisor
   ☐ 10. Microcomputer specialist/manager/ analyst
   ☐ 11. Programmer
   ☐ 12. Educator
   ☐ 13. Professional (lawyer, doctor, etc.)
   ☐ 99. Other (please specify) _____

3. **Department or function** (check only one)
   ☐ 1. Accounting/finance
   ☐ 2. Administration/management/personnel
   ☐ 3. Consulting
   ☐ 4. Education/training
   ☐ 5. Engineering/R&D
   ☐ 6. Manufacturing/production
   ☐ 7. Microcomputer center/office automation
   ☐ 8. MIS/DP
   ☐ 9. Purchasing
   ☐ 10. Sales/marketing/distribution
   ☐ 99. Other (please specify) _____

4. **What windowing environment do you currently use?**
   ☐ 1. DESQview
   ☐ 2. GEM
   ☐ 3. IBM GDDM
   ☐ 4. Macintosh
   ☐ 5. Microsoft Windows
   ☒ 6. SUN NEWS
   ☐ 7. XWindows
   ☐ 8. None
   ☐ 99. Other (specify) _____

4a. **If you do not currently use a windowing environment, which are you considering for your workstation(s)?** (Check all that apply)
   ☐ 1. DESQview
   ☐ 2. GEM
   ☐ 3. IBM GDDM
   ☐ 4. Macintosh
   ☐ 5. Microsoft Windows
   ☐ 6. SUN NEWS
   ☐ 7. XWindows
   ☐ 8. None
   ☐ 99. Other (specify) _____

5a. **Does your company own or lease any mainframe computers at this location?**
   ☐ Yes ☐ No

5b. **Does your company own, lease, or plan to buy any minicomputers at this location?**
   ☐ Yes ☐ No

	Existing (quantity)	Plan to buy (quantity)
☐ 1. IBM		
☐ 2. DEC		
☐ 3. Hewlett-Packard		
☐ 99. Other (specify)		

6. **Does your firm have or plan to buy any of the following types of personal computers or workstation systems at your location?**
   ☐ Yes (indicate quantity below)
   ☐ No

Manufacturer	Currently own (quantity)	Plan to buy within 1-12 Mos. (quantity)	13-24 Mos. (quantity)
☐ 1. IBM PC			
☐ 2. IBM XT			
☐ 3. IBM AT			
☐ 4. IBM RT			
☐ 5. IBM Personal System/2			
☐ 6. IBM Compatible (Compaq, Tandy, etc.)			
☐ 7. Macintosh Plus			
☐ 8. Macintosh SE			
☐ 9. Macintosh II			
☐ 10. Sun/Apollo workstation			
☐ 99. Other scientific or engineering work-stations (non-mini)			

7. **Please indicate your involvement with each of the following types of personal computers or microcomputer systems.** (check all that apply)

	Micros	Software	Networks & peripherals
☐ 1. Approve purchase			
☐ 2. Develop or manufacture			
☐ 3. Evaluate or select vendors			
☐ 4. Own (at least one)			
☐ 5. Own (two or more)			
☐ 6. Purchase or acquire			
☐ 7. Establish specifications			
☐ 8. Recommend to others			
☐ 9. Sell them			
☐ 10. Train people to use/ or provide support			
☐ 11. Use them			
☐ 99. Other (please describe by name and quantity)			
No involvement			

If you have no involvement with any of the above, skip to question 9.

(Please answer questions on reverse side.) •

8. **For approximately how many total personal computers or microcomputer systems do you have the above involvement?** (check only one)

☐ A. 1-3 ☐ B. 4-9 ☐ C. 10-19
☐ D. 20-49 ☐ E. 50-99
☐ F. 100-499 ☐ G. 500+

9a. **How many people work at your location?** (check only one)

☐ A. 1-9 ☐ F. 1000-2499
☐ B. 10-24 ☐ G. 2500-4999
☐ C. 25-99 ☐ H. 5000-9999
☐ D. 100-499 ☐ I. 10,000 or more
☐ E. 500-999

9b. **How many people are employed by your entire company?** (check only one)

☐ A. 1-9 ☐ F. 1000-2499
☐ B. 10-24 ☐ G. 2500-4999
☐ C. 25-99 ☐ H. 5000-9999
☐ D. 100-499 ☐ I. 10,000 or more
☐ E. 500-999

10. **What percentage of people who work at your location actually use a personal computer?** (check one only)

☐ A. 1-24% ☐ D. 75%-100%
☐ B. 25%-49% ☐ E. None
☐ C. 50%-74%

11. **The personal computers purchased for this location are:** (check all that apply)

☐ 1. For internal use ☐ 2. For resale
☐ 99. Other (please specify) _____

12. **How are personal computers normally obtained for this location?** (check all that apply)

☐ 1. Direct from manufacturer
☐ 2. Manufacturer's representative
☐ 3. Distributor or wholesaler
☐ 4. Retail computer store
☐ 5. Mail order
☐ 6. VAR/systems house
☐ 7. In-house (company or university store)
☐ 99. Other (please specify) _____

13. **Personal computers or microcomputer systems at your location are or soon will be used for the following activities:** (check all that apply)

☐ 1. Communicate with internal company mainframe or mini
☐ 2. Communicate with other micros via modem
☐ 3. Communicate with outside mainframe or mini through service bureau, database, or time-sharing service
☐ 4. Local area network
☐ 5. Desktop publishing
☐ 6. Desktop engineering/CAD/CAM/CAE
☐ 7. Presentation graphics
☐ 8. None of the above
☐ 99. Other (please describe) _____

14. **Over the course of one year, how would you quantify your level of involvement in total microcomputer systems products?**

☐ Recommend ☐ Influence ☐ Specify ☐ Buy
(check all that define your involvement)

(check only one)

☐ 1. Less than $10,000 ☐ 5. $100,000-$249,000
☐ 2. $10,0000-$24,999 ☐ 6. $250,000-$499,999
☐ 3. $25,000-$49,999 ☐ 7. $500,000 +
☐ 4. $50,000-$99,999 ☐ 8. None of the above

15. **Are you involved in any of the areas shown below?**

☐ Yes (check all that apply) ☐ No
☐ Recommend ☐ Influence ☐ Specify ☐ Buy
(check all that define your involvement)

Software
☐ 1. spreadsheets
☐ 2. word processors/outline processors
☐ 3. database management
☐ 4. accounting
☐ 5. statistics
☐ 6. communications/networking
☐ 7. analytic graphics
☐ 8. presentation graphics
☐ 9. project management
☐ 10. desktop publishing
☐ 11. CAD/CAM
☐ 12. programming/languages
☐ 13. utilities
☐ 14. micro-to-mainframe
☐ 15. other (specify) _____

Computers
☐ 16. personal computers
☐ 17. multiuser microcomputers
☐ 18. laptop microcomputers
☐ 19. portable microcomputers
☐ 20. engineering workstations
☐ 21. minicomputers
☐ 22. mainframe computers
☐ 23. other (specify) _____

Peripherals
☐ 24. dot matrix printer
☐ 25. letter quality printer
☐ 26. plotter
☐ 27. laser printer
☐ 28. local area network
☐ 29. file server
☐ 30. optical disk
☐ 31. monochrome monitor
☐ 32. color monitor (standard)
☐ 33. hi-res color monitor
☐ 34. add-on board
☐ 35. external hard disk
☐ 36. internal hard disk
☐ 37. back-up systems
☐ 38. modem
☐ 39. other (specify) _____

Outside Services
☐ 40. on-line services
☐ 41. education/training
☐ 42. maintenance
☐ 43. custom applications
☐ 44. service bureau
☐ 45. other (specify) _____

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REMark:
Does IBM Still

R. Bruce Johnson

The days when manufacturers told customers what to buy are gone. Today, end users create PC standards by purchasing products that best suit their needs.

Standards From the Bottom Up

IBM would like to legislate a new PC standard with its Personal System/2 product line, but that will take more than one company's clout. Standards exist because end users support them, not because manufacturers create them.

At Deloitte Haskins & Sells (DH&S), we consider the PC an extension of the individual accountant or consultant, not of the MIS department. Our PC applications are closely tied to client service, so software and hardware must be available when the client needs them. We can't always plan PC purchases according to vendor delivery schedules, and we can't serve clients with products that haven't reached the market.

We purchase products not because they adhere to prevailing industry standards but because they help solve business problems. Our experience shows that product acceptance, which fosters standards, depends on factors such as user satisfaction, product loyalty, company support, and connectivity requirements.

User satisfaction is the first priority. For instance, DH&S purchases Lotus 1-2-3 and Compaq

machines because they're easy to use, they're readily available, and—most important—they meet our needs. Factors such as vendor stability, cost, and compatibility with client systems affect product selection, but satisfying user needs is the bottom line.

Product loyalty also helps set standards. When a product becomes established in the workplace, user familiarity with it overshadows its functionality. End users won't switch to a better, lower-priced alternative unless it's *dramatically* better.

Companies reinforce standards when they make organization-wide PC purchases. For example, at DH&S we support one word processing program nationally and recommend that local offices support a second package if it's popular with the staff. But we *ignore* the other 25 word processing programs that only a minority of the staff uses. It would be counterproductive to do otherwise. PC purchases are capital expenditures; business economics prompts

Own the PC Standard?

IBM by Any Standard

Danielle D. Barr

At one time, the PC symbolized the independent thinker who wasn't afraid to try something new. At the corporate level, however, the PC's maverick status is changing. It's time to join the rest of the herd—and for PC users, that means connecting to the company mainframe.

The trend toward mainframe connectivity bodes well for IBM's grasp on the PC standard. The Personal System/2 line will link the PC to the entire IBM computer family. IBM's supremacy in the mainframe market places it in an ideal position to dictate the way PCs will connect to host systems as well as the ways other manufacturers will build PCs.

Since entire departments and work groups will share data, the promise of smooth communications between mainframes and PCs will compel users and manufacturers alike to turn to IBM. Corporate customers faced with immediate needs and complex buying decisions will find in IBM a one-stop shopping solution. Hardware and software manufacturers hoping to secure a position in the corporate marketplace will be forced to follow the IBM standard.

Microcomputer managers currently confront myriad issues concerning PC connectivity. How will PCs connect to a host mainframe? Can PCs replace dumb terminals as workstations? How can we implement cooperative processing between mainframes and PCs to improve the use of computer resources? Do we network or not? It's impossible to answer these questions without acknowledging IBM standards, and micro managers have waited to see what direction Big Blue will take before committing to solutions from other vendors.

IBM's influence in the corporate market is unequivocal: No major computer manufacturer today markets products without an IBM interface. The competing companies recognize IBM's commanding presence in the corporate arena and realize that to survive, they must conform. It's no surprise that

In the land of corporate computing, the mainframe is king and IBM is kingmaker. The PC's evolution toward mainframe connectivity means the IBM standard still rules.

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most companies to protect their PC product investment.

Connectivity concerns also influence product choices. DH&S's internal network supports PCs, Wang OIS word processing systems, and Honeywell minicomputers and mainframes. Since new hardware and software must be compatible with those systems, purchases are tied to the investment the company has made in that technology.

Although the PS/2 announcements have rattled the PC standard, they actually illustrate how user needs will prevail. The 3½-inch disk has greater storage capacity and more durability than the 5¼-inch floppy disk, but

DH&S will embrace the smaller format only when the majority of its users request the change. We currently have thousands of 5¼-inch floppies containing data files and programs, and for now the business advantages of staying with the disk standard outweigh the potential advantages of the 3½-inch format.

Similarly, DH&S will adopt the OS/2 operating system only when client needs demand it. OS/2 offers the prospect of a new generation of high-powered application programs with a graphics-oriented user interface and multitasking capabilities. But it won't be available until 1988, and it won't run on existing 8088- or 8086-based PCs. When OS/2 application software

demonstrates significantly better performance than existing programs, end users will initiate the change.
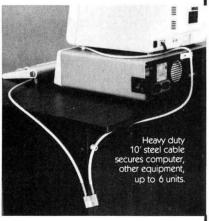
A vendor's logo no longer ensures success in the PC marketplace. PC users are educated consumers who base their buying decisions on business needs rather than on sales pitches or a fascination with technology. In the end, they will determine if IBM—or anyone else—sets a standard. ⊜

R. Bruce Johnson is manager of the Personal Computer Resource Center for Deloitte Haskins & Sells in New York.

Stewart Alsop speaks his mind in *PC World* every month beginning with the August issue. Look for his column.

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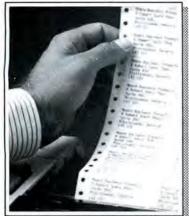
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successful IBM competitors—for example, DEC and Compaq—also offer the best IBM compatibility and interfaces. Even Apple plans for IBM compatibility in its future.
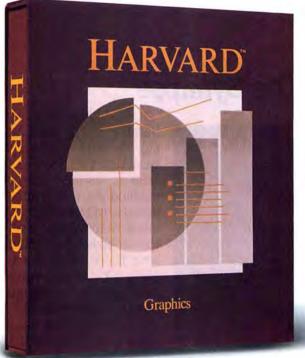
The PS/2 reveals IBM's master plan to link its systems. Large corporations are already developing strategies for transition to the second-generation PC family, in part because the PS/2 promises streamlined networking capabilities. In addition, IBM's future operating system, OS/2, will provide the first implementation of Systems Application Architecture (SAA), a blueprint for developing consistent applications across all IBM hardware.

Although the new PS/2 bus architecture and operating system may create some problems initially, these innovations are a necessary step toward IBM system-wide connectivity. Big Blue has established aggressive performance guidelines, and clone vendors will be hard-pressed to meet or beat the PS/2's system design and functionality. A new standard is set. The decision for corporate users is when and how to migrate to it.

Corporate users have stretched existing PCs to the limit. Now they're ready for the new era of PCs and the operating systems that will optimize their use. As long as information needs require connectivity with mainframes, the IBM standard is secure. ◖

Danielle D. Barr is vice president of corporate automation planning for the Bank of New England in Boston.

The Synapse

Because of the synapse, you're reading. Because of the synapse, you've turned to this page. You see, the synapse is as fast as you think. It's nothing you didn't already know. And because of the synapse, you knew you knew that. What's really neat is that the synapse is something that isn't. It isn't there. Well, it's there, but you can't pick it up, wave it around a room, and yell, "I found a synapse!!". But you already knew that. And because of the synapse, you knew you knew that. Okay, let's stop.

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1208

Unite—
and Divide—
and Conquer

Robert Pizzo

As personal computing splits into various hardware and software camps, armies of 1-2-3 users will be marching in several directions.

Spreadsheets have never been the rage on big computers. *1-2-3*'s natural, interactive fit on the PC certainly helped to arrest that development. Now suddenly Lotus's spreadsheet standard is headed upscale—all the way to IBM mainframes.

The big new kid on the block is 1-2-3/M, developed and marketed jointly by Lotus and IBM. The package, slated to ship early next year, will offer *1-2-3*'s familiar look, feel, and functions—plus, perhaps, the potential for some truly enormous worksheets.

At about the same time, PC users will have their pick of at least three new flavors of *1-2-3*. Release 3 will account for two of them: one that runs under the familiar DOS 3.*xx* and another that exploits Operating System/2's multitasking and 16MB of RAM. And *1-2-3/G*, a new graphics version, will be tailored to run under OS/2 release 1.1 (which will include IBM's Presentation Manager interface, a variant of *Microsoft Windows*).

(You say you're happy with vanilla? Not to worry. "It's currently not clear that many customers

want an upgrade path [for *1-2-3*]," notes Dan McMillan, Lotus senior vice president for software products. Lotus vows to keep release 2.01 on the market indefinitely.)

The new offerings, outlined briefly at Lotus's annual meeting last spring, "will be explicitly designed to work side by side," says Lotus CEO Jim Manzi. All three will support multidimensional, layered, and linked worksheets; they will also run faster, offer snappier graphics, be easier to learn and use, and include safeguards against that scourge of the spreadsheet, human error.

Lotus also lifted the veil on its long-awaited data management strategy, announcing a line of multiuser relational products code-named *Lotus/DBMS*. Scheduled to appear after the release of OS/2 1.1, the products will target local area networks and will support IBM's Structured Query Language standard. *Lotus/DBMS* will be on excellent terms with the company's spreadsheets; for example,

users will be able to query a data base from within a worksheet cell.

But the real news at Lotus's annual shindig was the disclosure of one of the headiest alliances in personal computerdom. In the wee hours the night before the annual meeting, Lotus wrapped up a strategic agreement with IBM that mandates cooperative development and marketing efforts, commencing with 1-2-3/M. The two companies will jointly explore the development of spreadsheet and data management software, and possibly other applications. In response, Ashton-Tate's stock dipped.

Symphony is also due for a face-lift. A revision of the integrated best-seller will follow on the heels of the new *1-2-3s*, with release 2 ready sometime during the second half of the year and an OS/2-specific release 3 due in 1988. HAL's fate as a separate product isn't clear; some of its features will be built into the new versions of *1-2-3*. Existing macros will run in applications up to but not including *1-2-3/G*.
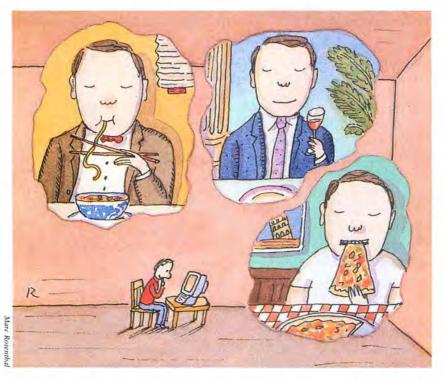
If you find all this confusing, consider the plight of those who develop add-in and add-on software for these programs. They'll

need to become conversant with a new set of application development tools called the Lotus Extended Applications Facility (LEAF). Taking advantage of OS/2, LEAF will enable users to establish "live" data links between major Lotus applications. Over time, LEAF will replace the current add-in tool kits.

With OS/2 as the foundation, applications will be designed from day one with multitasking and multiple users in mind. "Single-user, stand-alone applications will simply be a degenerate form of this [new breed of application]," proclaims David Gilmour, Lotus's general manager of advanced products. *—E. B.*

PC World View *reports items of interest to computer enthusiasts and significant insights about industry trends and personalities.* *—Eric Bender*

Eating Your Way Through Cuisine America

Marc Rosenthal

You're stuck in L.A. on a smog-choked afternoon. Suddenly, you are overwhelmed by the need to lounge on a veranda in Martinique, caressed by gardenia-scented breezes, a tureen of scampi sauteed with whole garlic cloves and butter placed before you.

You turn to your PC, start up a global guide to eating establishments, select 'Caribbean', ask for 'seafood', and request 'restaurants with outdoor seating'. In seconds, the program proffers five options, each thoughtfully detailed down to the maître d's name. A few phone calls, and you're on your way....

Well, perhaps not this year. But if an outfit called Cuisine America has its way, colossal data bases listing thousands of restaurants could soon be as ubiquitous as Baedeker guides, at least for travel agents and corporate jet-setters.

Last April, the Manhattan company released three versions of *Appetite for Business: New York*, on-disk data bases reviewing approximately 5000, 1500, and 500 New York City eateries, respectively.

Also slated for release are two restaurant data bases covering North America and Canada, according to executive director Ian Erlandsen. One offers consumers 2400 tempting choices. The second, aimed at corporations and travel agencies, lists 5000 options

and will also be available in an on-line version. Similar package deals for the Caribbean and Mexico should be ready before year's end.

With annual fees ranging from $69.95 to a projected $1800 for the plumpest data base, the tab for Cuisine America's intelligence is a bit heftier than for your average restaurant guidebook. The electronic directory's appeal lies in its regular revisions, with updates available yearly, quarterly, or monthly, depending on the version. (The better restaurant guidebooks are revised twice each year.)

Cuisine America looks to a budding nationwide army of several hundred hungry gourmands to volunteer capsule reviews. Structure is paramount; reviewers check off descriptive entries on a Cuisine America form, passing judgment on food, decor, location, and other categories. (Under Restaurant Clientele, for example, the form lists Computer Types; Electronics Types; Executives, Up and Coming; and Arty People.) Erlandsen's eventual goal is 10,000 reviewers worldwide.

Find a need and fill it, the old business maxim advises. How about a Bolivian restaurant in a bowling alley in the Bronx with a dessert cart, leather chairs, Bauhaus decor, and a masculine atmosphere? If such a place exists, you can bet that Cuisine America will find it. *—Marina Hirsch*

* *

The Buick That Couldn't

Perhaps drivers aren't ready for personal computers in their cars after all. General Motors officials now admit they rushed things slightly in making the 1986 and 1987 Buick Rivieras the world's first cars to include a video display screen as standard equipment.

The in-dash CRT encountered "a bad reception, and we're stepping back from it," reports Oliver McCarter, executive engineer on GM's advanced product engineering staff. Car buyers didn't much care for the screen's position and the need to reach out and touch it, he adds.

The Buick's 5-inch touch-sensitive screen, called the Graphic Control Center (GCC), replaces 91 separate controls on conventional low-tech cars. It can display 41 screens, conveying everything from radio station frequencies and air conditioning levels to distance estimates based on available fuel (see *PC World View*, *PCW*, April 1986).

But the bionic Buick and its GCC have proven a bust on the showroom floor. Sales failed to meet Buick's expectations for 1986. Many observers maintain that the screen is potentially dangerous because it tends to divert the driver's eyes from the road. (And just try dialing your cellular phone at the same time.)

Although Buick can't sack the GCC without totally redesigning the car, it did try a quick fix on the 1987 Riviera by replacing the six touch-sensitive keys on the screen's perimeter with mechanical buttons. "There's a feeling that buttons are easier to find than using your finger on the screen," explains Larry Gustin, a Buick spokesman. He denies, however, that Buick intends to eliminate the GCC.

While he admits "the reviews are mixed" on the GCC, Gustin is baffled by critics' ambivalence. In the only survey that addressed the video screen specifically, 62 out of 72 drivers rated the GCC at 7 or above on a 10-point scale.

Despite both the controversy surrounding the GCC and the unit's adverse impact on sales, GM officials insist video displays will live to flicker another day. "The Riviera GCC's bad reception doesn't mean we won't have a CRT in the car of the future," McCarter says. *—John Eckhouse*

A Few Minutes With . . .

David Gilmour, general manager, advanced products division, Lotus Development, on customers agonizing over the PS/2 versus PC debate: "Hey, relax—when you need to buy something, you'll know it."

Vern Raburn, chairman of Symantec: "With very few exceptions, all newly introduced hardware looks underwhelming. Originally, people thought the PC was no big deal. I have no patience with that kind of drop-kick analysis. It's like looking at newborn babies and saying, 'This one is going to be an Einstein, that one's going to be a bum.'"
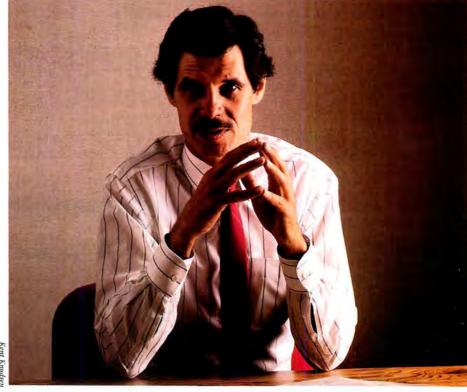
Roger Schank, professor of computer science and psychology at Yale University: "Artificial intelligence is about building transparent products. The key is that they have to understand when you talk to them or type into them. Instead of expert systems, dumb systems are what we really need; the de facto example is an automated bank teller."

Franchising the Information-Rich Society

*MicroAge chairman
Alan Hald beats
the drums for a global
information
village.*

At the World Future Society's 1975 convention, Alan Hald spied a small magazine ad for Altair computers. "I said, 'That's it, that's it!,'" he recalls. "'That's the foundation of the information-rich society: kit computers! Got to do this!'"

Today the MicroAge Computer Stores chain that Hald and partner Jeffrey McKeever founded has more than 170 franchisees, including a sprinkling in Europe and Japan. But Hald's enthusiasm for brainstorming the future remains undiminished. "One of our mis-

Kent Knudsen

**Alan Hald planned for
a billion-dollar
business in seven years.**

sions is really to change the way the world works," he says matter-of-factly.

Mission control for Hald is MicroAge's rambling headquarters in Tempe, Arizona. His office features a stuffed piranha (a gift from McKeever, not a franchisee), a statue of a dragon and a small Merlin-type figure holding a crystal ball, and an objet d'art Hald calls "the tree of knowledge."

MicroAge has weathered a turbulent decade for dealers by specializing in complete packages of hardware, software, and services; the chain began calling its outlets Solution Stores way back in 1978. A faithful disciple of technology,

Hald also preaches the gospel of "office automation from the bottom up"—a theology in which company work groups seize on new technology and spread it throughout an organization.

Born 41 years ago ("on the cutting edge of the baby boom"), Hald earned a management science degree and a Harvard MBA, briefly ran a government small-business-assistance office, joined the Army as an intelligence officer, and ended up in Fort Huachuca, Arizona. After completing his military stint, he stayed in Arizona and took a job with a bank.

At the bank he met McKeever, and when the Altair inspiration hit, "I went back and got Jeff excited," he says. "We opened up a Byte Shop in the fall of 1976, and the rest is history." With McKeever concentrating on operating details and Hald providing the grand schemes, MicroAge grew rapidly. "We thought we'd be able to build a billion-dollar sales organization within seven years," Hald recalls.

"It would have worked had the external environment not deviated from our plans," he notes wryly. "We didn't count on 25 percent interest rates, and that just destroyed the business plan." A nervous banker called in the MicroAge loan, triggering the company's Chapter 11 bankruptcy.

On December 31, 1981, Hald flew to New York to ask Olivetti's top venture capital executive for a timely infusion of cash. On that New Year's Eve, "I made the best two-hour presentation of my life," he remembers, speaking slowly for once. Olivetti was moved, MicroAge got the money, and, says Hald, "From there, we just grew."

MicroAge has backed up its "solutions" approach with some innovative services, highlighted by a direct-broadcast satellite network that the firm eventually abandoned as too costly. The chain now mails out a monthly magazine on videocassette that blends training information with touches of "60 Minutes" and "Entertainment Tonight." For this venture, Hald says, "We didn't have to build a postal system."

Currently, Hald expects new PC technologies to usher in four exciting years. Spearheading the charge will be an onslaught of 80386-based systems, speeding today's applications and running tomorrow's powerful, smoothly integrated packages. He also looks forward to the emergence of desktop publishing "out of a specialized role in graphics departments and into office environments, where the primary concern is how to integrate information from a variety of sources."

As a futurist, Hald doesn't stop with a four-year plan. He expects industry sales growth to level off by 1992. "We're going to reach a plateau, very similar to what we experienced in 1985 and 1986, except that it won't last long." Artificial intelligence technologies will create explosive changes in the industry by the mid-nineties, Hald says.

Hald thrives on selling concepts, frequently employing quick sketches or metaphors such as windsurfing, a sport he enjoys. "We often talk about riding the waves of technology. You can get up on a surfboard and ride the waves in, but you lack control. With a Windsurfer, the board itself is like your organization, the sail is your strategy. With your sail, you can even pilot your Windsurfer against the waves."

Beyond piloting MicroAge, Hald would like to write books: on the industry, about his personal experiences, and science fiction. And, says this quintessential entrepreneur, "I've always been interested in political activity—franchising is inherently political.

"I tend to be a libertarian, which fits quite well with being an entrepreneur," he says. "And I view franchising as a way an idea can spread internationally through fellow entrepreneurs.

"The only way you can move toward information-rich societies is through the worldwide expansion of individual freedoms," Hald declares. "Technology liberates when we are free to choose how we use it, and its use gives us a richer choice of opportunities. Personal computing is a liberating technology. Entrepreneurs in the PC industry are, indeed, the revolutionaries of the information age." –E. B.

Service manager Mike Tanner bought Santa Clara's Batram to take the load off his hard disk and avoid the risk of catastrophic disk failures.

A Battery of RAM

If a subdivision of RAM can act like a high-speed floppy disk, it stands to reason that a giant block of memory can serve as a high-speed hard disk. And that's precisely the rationale behind Santa Clara Systems' Batram.

The problem with dynamic RAM, of course, is that it's as reliable as the electricity that feeds it—in other words, not very. Batram dodges this hazard by running off a truly monstrous battery (thus the *Bat* in the product's name). This self-contained energy source can operate for two weeks before it expires.

The 32-pound device is roughly the size of a PC system unit and connects to the PC via a cable and an interface board. The Batram

isn't cheap: 4MB costs $1895, and a full substitute for a 20MB hard disk will set you back a cool $7075.

Nicolet, a Fortune 500 instrumentation company in Madison, Wisconsin, uses a Batram in its service department in lieu of a hard disk. Mike Tanner, the company's national service manager, says the device doesn't save his firm time as much as it saves hardware.

Tanner's department uses *dBASE III* extensively. Like most data management programs, *dBASE III* is disk-intensive, and a hard disk failure would be catastrophic. Rather than risk his data base and his disk, Tanner parks his information on the Batram.

"I didn't want to constantly be going to the hard disk," Tanner says. "The Batram offers a slight performance increase, and I know I'm saving the hard disk." Tanner's traditional storage medium now handles strictly backup chores.

For the time being, Tanner's Batram is a single-user device. He plans, however, to expand it beyond its current 12MB and treat it as a file server in a three-node Ethernet LAN. As it happens, Novell—which owns Santa Clara Systems—is one of the leading purveyors of local area networks.

Barry Hosking, a systems analyst at O-Cell-O, a sponge manufacturer based in Tonawanda, New York, has hooked a 16MB Batram to an AT. Like Tanner, he installed a data base on the unit. For Hosking, the big plus is speed; he cites gains of "at least 50 percent" over conventional mass storage media. The Batram is Hosking's fourth attempt at a hard disk alternative; his first two hard drives failed, and a Bernoulli Box proved too slow. —*Daniel J. Rosenbaum*

Déjà TopView?

When *TopView*, IBM's home-grown windowing package, debuted in August 1984, senior IBM officials publicly described their multitasking operating environment as both "a strategic product" and "a key foundation for future applications." Privately, they pledged to pour more money and marketing energy into *TopView* than any other piece of IBM software.

Given this kind of buildup, many observers expected the $149 offering to torpedo other windowing products, notably *Microsoft Windows*, Digital Research's Graphics Environment Manager

(GEM), and Quarterdeck's *Desqview*. Software developers took a deep breath and began to write to *TopView*'s application interface.

But when *TopView* shipped in early 1985, it received a generally lukewarm reception. Character-based instead of graphics-oriented (unlike *Windows* and GEM), it should have been quick on the draw, but it felt slow. *TopView* also was incompatible with some packages, lacked polish, and demanded 512K at a time when that seemed excessive. And—the bottom line—it just didn't seem that useful.

This year IBM mutely accepted the market's judgment, leapfrogging *TopView* for the warmer graphics waters of OS/2 release 1.1. Available sometime this decade, OS/2 incorporates a revamped *Windows*. Although Microsoft emerges the big winner, *Desqview* and GEM have carved out respectable niches in the windowing market.

And *TopView?* Well, IBM intends to continue supporting it, in both DOS 3.30 and OS/2. And it remains strategic, IBM spokespeople insist. They just don't recommend that you pay it much attention. *—E. B.*

Winning the Andrew

Fido Software president Tom Jennings has walked away with the first Andrew Fluegelman Award, along with $5000 in cash. Jennings won the award for developing *Fido/Fidonet*, a popular public domain software system that supports bulletin board and electronic mail functions. More than 125,000 users worldwide are said to swap information on *Fidonet*.

Designed to recognize programmers who make substantial and innovative contributions to personal computing, the prize is sponsored by PCW Communications and the Software Publishers Association. The annual award is a memorial to Andrew

Fluegelman, Founding Editor of *PC World* and *Macworld*, creator of the freeware concept, and author of the *PC-Talk* communications package. *—E. B.*

Appetite for Business: New York Cuisine America Guides, Inc.
245 E. 63rd St. #1723
New York, NY 10021
212/935-3427
List price: New York 5000 $250, quarterly updates $150; New York 1500 $150, quarterly updates $100; New York 500 $69.95, annual update $69.95
Requirements: DOS 2.00 or later version
Copy protected
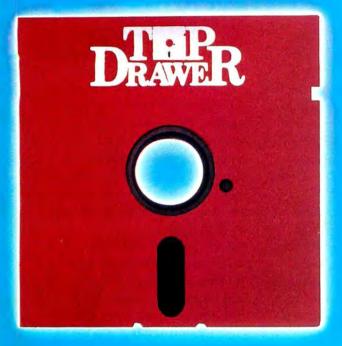
Batram
Santa Clara Systems
1610 Berryessa Rd.
San Jose, CA 95113
408/729-6700
List price: $1895 for 4MB, $7075 for 20MB

John Eckhouse reports on business for the San Francisco Chronicle, *Marina Hirsch is a writer and editor for Autodesk in Sausalito, California, and New Jersey writer Daniel J. Rosenbaum tracks the market success of promising technologies.* �

Product Outlook

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

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Hayes unleashes its new breed, Oracle cracks the 286 protected mode, the 386 fraternity welcomes new pledges, Keyworks flexes macro muscle, DRI does desktop publishing, and much more

Ken Greenberg and Mike Hogan

◆

The Hayes Wake-Up Call

Speed is the mantra of the PC faithful. From 20-MHz CPUs to graphics coprocessors to zippy disk controllers, if you're not quick, you can't play. Even ungainly networks are shuttling data around in the megabits.

So it's no surprise that asynchronous communications is finally revving up. Hayes, which is to modems what Kellogg is to cornflakes, cautiously eased the industry from 300 bps to 2400 bps; now Hayes is vaulting ahead with a technology that puts users near the 19.2-kilobit mark.

Hayes's ◆V-series modems— augmented by a hardware upgrade for installed units and a wish-list overhaul of *Smartcom*—delivers more than pure performance. The new modem line reaches out to Integrated Services Digital Network (ISDN) and a future dominated by synchronous communications.

The V-series lineup consists of internal and external models of Smartmodems 2400 and 9600. All four are half-duplex units that simulate full-duplex transmission. All provide state-of-the-art error control, data compression, and automatic feature negotiation. Improved error control has helped clear a path to X.25 and similar synchronous highways. At the same time, the V-series' Adaptive Data Compression doubles the effective data transfer rate, and enhanced handshaking checks out all the variables before the link, choosing the most efficient route. You don't necessarily need V-

series units at both ends of a connection; the products can converse with modems of just about any vintage.

By adding the $349 ◆V-series Modem Enhancer, you can outfit any existing Hayes modem with the new technology. The enhancer sits between the PC and the modem, connecting to the modem via a serial cable. The V-series 2400 internal and external units list for $899 each, the 9600 modems for $1299. *Smartcom III* is bundled with both internal models.

◆*Smartcom III,* meanwhile, is suddenly among the most malleable communications packages on the block. The refurbished $249 program sports five distinct interfaces, from menus to tables to selection dialogs. When you're up to speed, you can bypass any menu with a keystroke or two. The program's command language, dubbed SCOPE (simple communications programming environment), is ideal for automating unattended operations and routine chores. You can dress up applications with menus and windows, or simply let *Smartcom*'s learn mode record a given log-on sequence. You can even communicate simultaneously through both serial ports. *Smartcom III* also includes a text editor, a file compression capability, and a "peruse buffer" you can use to review captured text. The package supports TTY, DEC, and ANSI.SYS terminal emulation and Kermit and XMODEM file transfer protocols. Hayes Microcomputer Products, 705 Westech Dr., Norcross, GA 30092; 404/449-8791.

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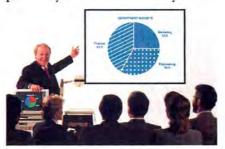
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Different Strokes

Need to fashion a bulletproof application for your work group? One that permits a respectable level of user interaction, is relatively easy to modify, decorates the screen with attractive menus, and won't shred your budget?

Alpha Software's answer is ◆*Keyworks Advanced,* a $299 package that may well elevate the macro processor genre to new levels of sophistication—and prove to be a hit in information centers. In *Keyworks,* the idiom is KPL, a programming language that makes short work of stitching separate packages into a seamless whole.

With KPL, you can write time-delayed and looping macros, generate context-sensitive help screens, and draw interactive data entry forms. The program comes complete with printer control macros, macros that capture screens and test for passwords, and hooks to C and Pascal. If you're binding a communications program into a larger application, *Keyworks Advanced* should prove especially resourceful; it's fully capable of retrieving E-mail and smart enough to sift through the junk. Better still, there's virtually no limit to the string of strokes *Keyworks Advanced* can support. Alpha Software, 30 B St., Burlington, MA 01803; 617/229-2924.

Delphic Data Management

Your client data base can't wait for OS/2, even if you're disposed to give IBM the benefit of the doubt. If you've been bumping your head against DOS's low ceilings for too long, Oracle's new line of data management tools may be what you (or your team of in-house developers) need to raise the roof.

The company, best known for its SQL-based mainframe data manager, has refined the product for AT-class and 386 machines—including the once and future Personal Systems/2. At $1295, ◆*Professional Oracle* hurdles DOS's 640K barrier, liberating 16MB of RAM for appropriately written applications. The program parks its kernel in 286 or 386 protected mode (that is, RAM above 1MB), leaving roughly 500K of conventional RAM free for applications and data. In moving from mainframe to micro, Oracle didn't shed a single key feature of its big-league version 5.1. *Professional Oracle* is also compatible with ANSI SQL and IBM's SQL-based DB2.

Professional Oracle is a developer's picnic basket, stocked with an application generator; SQL*Calc, a spreadsheet with a nose for Oracle SQL data bases; SQL*Plus for ad hoc queries; SQL*Report, a multitable report generator; and Oracle's PRO*C precompiler.

Accompanying *Professional Oracle* are the $695 ◆*Network-station Oracle,* which gives a PC asynchronous entrée to remote data bases, and the $2495 ◆*LAN-server Oracle,* which provides network users access to PC-based data. Accordingly, any networked PC can access any program or data file on the network. Oracle, 20 Davis Dr., Belmont, CA 94002; 415/598-8000.

A Low-Priced GEM

Even with the advent of page makeup software, desktop publishing is hardly painless. At least, that's been the operative theory—one Digital Research is out to debunk. From the looks of DRI's ◆*GEM Desktop Publisher,* you can throw the book (that is, the manual) away. DRI is convinced that ease of use and a relatively low $395 price tag will set this feature-rich product apart from the madding crowd of publishing programs.

GEM Desktop Publisher offers the requisite what-you-see screen display, zoom, and facing-page view modes, but its flexibility sets it apart. Thanks to automatic reformatting, you can size or move an image around the screen, and text will simply flow around it.

(continues)

THE
ADVANTAGE

KAYPRO
286i

ENHANCED

Kaypro Corporation — electronics innovator since 1952 — has made a good thing even better. The KAYPRO 286i Model C now features a 40-MB hard drive and the 101-key AT-style keyboard. With the latest standard feature enhancements, the KAYPRO 286i is the smartest choice in advanced computer technology.

Advanced.
The heart of the KAYPRO 286i is the 80286 microprocessor — with a processing rate of 10 MHz and a 640-kilobyte RAM. The perfect match for today's high productivity software.

And Enhanced.
The KAYPRO 286i Model C has

a 1.2-MB floppy disk drive, plus a hard disk with 40 MB of storage. The KAYPRO 286i AT-style keyboard features the new 101-key layout with separate cursor control, numeric keypad, and 12 programmable function keys.

Perhaps the nicest surprise about the KAYPRO 286i/C is the suggested retail price of $2995.

You won't find distinctive metal construction, 10-MHz processing, and free name-brand software that includes WordStar Professional Release 4 in any other AT-type computer. Other company's extras are Kaypro standard features.

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COMPUTERS
The Future's Built In

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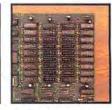
The KAYPRO 286i Model C features...

80286, 10-MHz Microprocessor.

An internal hard disk drive with 40 MB of storage.

Enhanced 101-key IBM PC/AT-style keyboard with security keylock.

A 640-KB RAM, expandable to 15 MB.

Bundled software includes WordStar Professional Release 4.

made in U.S.A.

For the Kaypro Dealer near you, call 1-800-4KAYPRO.

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Layouts can be saved in style sheets for future use.

The program accepts text and graphics files from most word processors and paint programs and can swallow ASCII text with its eyes closed. *GEM Desktop Publisher* gets along amiably with the rest of the GEM family: the *GEM Desktop* environment, *GEM Write*, *GEM Graph*, and *GEM WordChart*. All share the same icon-based graphic user interface, and that means fewer commands

to master. Digital Research, P.O. Box DRI, Monterey, CA 93942; 408/646-6005.
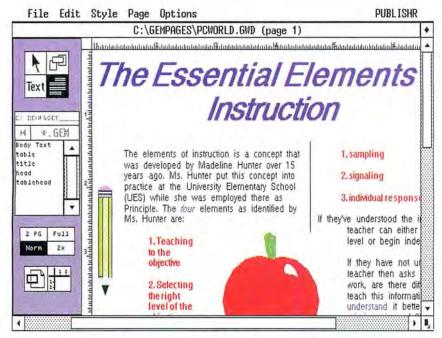
◆

Lending dBASE a Few Hands

Desktop organizers, with their sundry notepads and calculators, traditionally tango best with word processors and spreadsheets. For *dBASE III Plus* users in need of a

nimble dance partner, ◆*PolyDesk III* could be the memory-resident desktop organizer of choice. The $99 program promises smooth handling of gawky .DBF files and sets you back just 90K.

PolyDesk III is the first of the desktop clutter-busters capable of reading, writing, and manipulating *dBASE* files, employing a "cardfile" metaphor. Even if you're unfamiliar with the *dBASE III Plus* lexicon, you can perform sorts, mail merges, and various other tricks with the program's own *dBASE III Plus*-compatible files. You can customize records via pop-up windows and even write reports without straying from *PolyDesk III*'s genial environment.

PolyDesk III—a renovated version of *PolyWindows Desk Plus*—easily overshadows its former incarnation. It augments the basic calendar, appointment book, auto-dialer, ASCII table, and text editor with a text outliner, a friendly DOS shell, an on-screen calculator that emulates the Hewlett-Packard HP12C, a to-do list manager with alarms, a data import/export clipboard, keyboard macros, and a flock of other flexible features. Taking a petal from Lotus (whose encouragement of third-party *1-2-3* add-ins has rejuvenated the aging spreadsheet), you can even tack other accessories onto the kernel. *PolyWindows* users can upgrade for $45. Polytron, 1815 N.W. 169th Pl. #2110, Beaverton, OR 97006; 503/645-5110.

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C:\GEMPAGES\PCWORLD.GWD (page 1)

The Essential Elements Instruction

The elements of instruction is a concept that was developed by Madeline Hunter over 15 years ago. Ms. Hunter put this concept into practice at the University Elementary School (UES) while she was employed there as Principle. The *four* elements as identified by Ms. Hunter are:

1. Teaching to the objective

2. Selecting the right level of the

1. sampling

2. signaling

3. individual response

If they've understood the i teacher can either level or begin inde

If they have not u teacher then asks work, are there dif teach this informati understand it bette

Digital Research hopes to make a hit with its $395 GEM Desktop Publisher, which can flow text automatically around repositioned graphics. The program's command interface is consistent with the GEM Desktop line of environment, graphics, and word processing software.

Now You Can Have The Same Information Professionals Use!

"Telescan Analyzer...is easy to use and inexpensive."

Chosen by *Wall Street Computer Review* as one of "The two most popular programs among professional analysts and independent investors..."

There is simply no other stock evaluation service on the market like Telescan Analyzer and Database.

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American Express®, VISA® and MasterCard® accepted.

System requirements: *IBM PC/AT/XT Portable or 100% compatibles; IBM Monochrome or Color Graphics Adaptor Board or Hercules Monochrome Graphics Card; 1200/2400 Hayes Smartmodem or compatible modem; Double-sided Disk Drive; 256K Memory; MS DOS 2.1 or higher. Please specify if you have: IBM PCjr, IBM Enhanced Graphics Adaptor (or compatible); AT&T 6300; pr IBM 3270.*

Get more info. Go to Ad index.

*To be used within 30-days after you purchase the program.

Product Outlook

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◆

Locks and Fables

Hoping against hope for a multi-user data manager that actually permits simultaneous access to a single file by more than one user? For those who like their records shareable, Ansa Software has crafted ◆*Paradox* version 2.0, which the company dubs a "second-generation" multiuser product.

Ansa is distinguishing this release from the so-called first generation of network data managers, which limit browsing, editing, updating, and querying a locked file to a single user. Ansa claims to have overcome those limitations by circumventing DOS calls for record locking. Instead, *Paradox* relies on its own record-locking primitives. The program, available on both 5¼-inch and 3½-inch disks, also features beefed-up data protection and data update facilities, a reported 40 percent boost in its predecessor's already impressive performance, and expanded memory support.

Paradox 2.0, the second upgrade since the package debuted in 1985, runs on IBM's PC Network and Token-Ring, 3Com's *3+Share*, and Novell *Netware* LANs. A network-compatible single-user version lists for $725; a Network Pack supporting up to six users is priced at $995. *Paradox 1.1* remains available for $495. Ansa Software, 1301 Shoreway Rd., Belmont, CA 94002; 415/595-4618.

(continues)

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◆

Better Than Word of Mouth

How's this for a network user's reverie? A product offering the performance of a conventional LAN for scarcely more than the price of a serial port LAN, yet with the simplicity of a Mac—in short, a network for users, not micro managers.

Computer Pathways' ◆**Grapevine** may well be the kind of net that can convince LAN-shy small and medium-size businesses that networking needn't lead to a chronic case of ulcers. Eschewing a dedicated file server, Grapevine is expressly designed for applications that rarely retreat to disk. It's ideal for those who need to pass around electronic mail, distribute text or worksheet files, or share peripherals.

The salient virtues of this peer-to-peer, NETBIOS-compatible LAN include reliance on twisted-pair wiring, a network operating system that consumes precious little RAM, a rated speed of 3.6 megabits, pulldown menus, user-defined dialog boxes, on-screen documentation, and password security. A nifty E-form feature enables you to create a form (with any editor or the network's own notepad) on the fly and broadcast it to the network. Modifying printer settings is just as easy. And with no server to babysit, you

Dac-Easy 2.0 has more than 50 new enhancements, including multicompany, multidepartmental controls to permit revenue and cost allocations by product line or customer. Its menus provide a variety of statistical information to facilitate account analysis.

don't need a network administrator. Your stomach probably feels better already. A $595 kit consists of a network board and software; for $195, you can rent two kits for 30 days. Computer Pathways, 19102 N. Creek Pkwy., Bothell, WA 98011; 206/487-1000.

◆

Dac's All, Folks

When *Dac-Easy Accounting* burst on the scene as a $70 wonder a few years back, even Dac knew in its heart that the package wasn't prime-time accounting. With the introduction of version 2.0, Dac is

singing a different tune. Buoyed by *Dac-Easy* sales that have surpassed the 200,000 mark, Dac is pitting version 2.0's power and performance against its bulkier and more costly competitors.

◆*Dac-Easy Accounting version 2.0* is brimming with more than 50 enhancements, including multicompany, multidepartment controls that permit revenue and cost allocations by product line or customer, modifiable charts of accounts and financial statements, faster sorting, and context-sensitive help. The program has been rewritten in C for easy portability.

(continues)

A defense against cancer can be cooked up in your kitchen.

There is evidence that diet and cancer are related. Some foods may promote cancer, while others may protect you from it.

Foods related to lowering the risk of cancer of the larynx and esophagus all have high amounts of carotene, a form of Vitamin A which is in cantaloupes, peaches, broccoli, spinach, all dark green leafy vegetables, sweet potatoes, carrots, pumpkin, winter squash, and tomatoes, citrus fruits and brussels sprouts.

Foods that may help reduce the risk of gastrointestinal and respiratory tract cancer are cabbage, broccoli, brussels sprouts, kohlrabi, cauliflower.

Fruits, vegetables and whole-grain cereals such as oatmeal, bran and wheat may help lower the risk of colorectal cancer.

Foods high in fats, salt- or nitrite-cured foods such as ham, and fish and types of sausages smoked by traditional methods should be eaten in moderation.

Be moderate in consumption of alcohol also.

A good rule of thumb is cut down on fat and don't be fat. Weight reduction may lower cancer risk. Our 12-year study of nearly a million Americans uncovered high cancer risks particularly among people 40% or more overweight.

Now, more than ever, we know you can cook up your own defense against cancer. So eat healthy and be healthy.

```
‡HOME BUDGET PLANNER‡

Start of Year                                         Statement Date:
Balance: [001]                    Income:             [002]

            JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC

JOB1      [003] [004] [005] [006] [007] [008] [009] [010] [011] [012] [013] [014]
JOB2      [015] [016] [017] [018] [019] [020] [021] [022] [023] [024] [025] [026]
JOB3      [027] [028] [029] [030] [031] [032] [033] [034] [035] [036] [037] [038]
INTST     [039] [040] [041] [042] [043] [044] [045] [046] [047] [048] [049] [050]
DIVID     [051] [052] [053] [054] [055] [056] [057] [058] [059] [060] [061] [062]
GIFTS     [063] [064] [065] [066] [067] [068] [069] [070] [071] [072] [073] [074]

TOTAL     [075] [076] [077] [078] [079] [080] [081] [082] [083] [084] [085] [086]

                                  Taxes:

FEDER     [087] [088] [089] [090] [091] [092] [093] [094] [095] [096] [097] [098]
STATE     [099] [100] [101] [102] [103] [104] [105] [106] [107] [108] [109] [110]

TOTAL     [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122]

Doc: A:BUDGET                     Page  1  of  2  pages. Line 24 Column 2
```

With Cotton Software's BoxCalc 1000, cells aren't anchored to a physical locale in a matrix, as this budget-planning worksheet demonstrates.

Dac-Easy Accounting is holding fast to its $69.95 list price. For $35, current users can upgrade to the new package, complete with a revised 430-page manual and accounting primer, disk-based samples, a demonstration disk, and file transfer utilities. The general overhaul is accompanied by new versions of *Dac-Easy Payroll*, at $49.95; *Dac-Easy Mate* utilities and *Dac-Easy Report* for $39.95 each; and two new tutorials for $19.95 each. Dac Software, 4801 Spring Valley Rd., Bldg. 110B, Dallas, TX 75244; 214/458-0038.

◆

Briefly Noted

Cotton Software's ◆*BoxCalc 1000* is a mixture of spreadsheet and word processor with a twist. The wrinkle here is *BoxCalc*'s treatment of the traditional spreadsheet trappings: the $139 program forsakes cells, rows, and columns for "calculation boxes"— areas that can be freely moved around a work area, with formulas preserved intact. Formulas can apply to single or multiple boxes, and calculations can be performed in any order. You can pop in text and figures from other

(continues)

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files, which makes the package especially handy for invoices, timesheets, and budgets. As a word processor, *BoxCalc 1000* gets the job done, with block moves, automatic paragraph reformatting, boldface and underlining, headers, footers, and an array of print commands. Cotton Software, 2325 Anderson Rd. #364, Covington, KY 41017; 606/727-1600.

♦♦♦♦♦
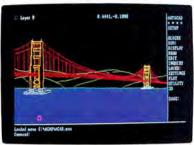
Behind every technological breakthrough is a potential commercial bonanza—and Zenith Data Systems' candidate is its ♦ZCM-1490 flat-tension mask monitor. Although its name may be a mouthful, the monitor itself is an eyeful for users accustomed to run-of-the-mill displays. According to Zenith, the $999 device is 50 percent brighter and capable of 75 percent more contrast (with 95 percent less glare) than standard curved-screen CRTs. Because the technology lends itself to the same optical nonglare coatings used on camera lenses, blacks look blacker and whites whiter. The ZCM-1490 is compatible with the Personal System/2 VGA standard and works on existing PC and AT compatibles with the addition of Zenith's $599 Z-449 video board. The board supports CGA, EGA, and Hercules modes, among others. Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025; 800/842-9000.

♦♦♦♦♦

With IBM muttering about (but not yet delivering) its 20-MHz 80386-based Model 80, Compaq has made its speedy ♦Deskpro 386 even quicker. The company has modified the motherboard for Intel's 16-MHz 80387 numeric coprocessor and has added its own disk caching software—a utility Compaq boasts can improve performance of disk-intensive applications by 50 percent. That RAM-resident utility speeds up the Compaq Expanded Memory Manager. Deskpro 386 owners can upgrade the system board for $999, plus installation charges. Compaq Computer, 20555 FM 149, Houston, TX 77070; 713/370-0670.

♦♦♦♦♦

To buy or not to buy a 386; in these perplexing times of falling prices and shifting standards, the melancholy Dane would find himself even more befuddled. Multitech Electronics, the mammoth Taiwan-based manufacturer, hopes to nudge the undecided into its column with its 16-MHz ♦PC/1100. Multitech earned its stripes building systems for the likes of ITT, and now ships the PC/1100 under its Acer Technologies logo. The $3995 PC/1100 comes with 1MB of zero-wait-state interleaved RAM, a 1.2MB floppy disk drive, and a 25ms 40MB hard disk drive. It contains room for three additional half-height storage devices and supplies eight expansion slots,

(continues)

Get more info. Go to Ad index.

including two 32-bit slots. Multitech is pitching the system to software developers, power spreadsheet and data management users, and those shopping for a network file server. Acer Technologies, 401 Charcot Ave., San Jose, CA 95131; 408/922-0333.

◆◆◆◆◆

Of course, if your allowance has just been cut and you'd like to pick up a 386 machine for slightly more than you'd pay for a PC clone, the ◆**ALR 386/2** fills the bill. Ripping a page from IBM's book, the $1990 386/2 Model 10 is a floor-standing unit, equipped with 1MB of 80-nanosecond 32-bit static column RAM (expandable to 2MB), a Phoenix BIOS, a 1.2MB 5¼-inch floppy disk drive, serial and parallel ports, a 101-key keyboard, and eight expansion slots (two of which are 32 bit). Like IBM's Model 80, ALR's $3990 40MB Model 40 adds a 30ms hard disk with a 1:1 interleave disk controller and disk caching. An EGA-compatible graphics board and monitor are optional. ALR, 10 Chrysler, Irvine, CA 92718; 714/581-6770.

◆◆◆◆◆

Those holding out for a one-stop graphics package may find ◆*Harvard Graphics* worth the wait. Software Publishing's revamped charting package has shed its middle name—Presentation—in favor of a more generic and appropriate rubric. The program's repertoire

(continues)

De-clone Your Compatible With Hercules.

Most popular IBM PC/XT/AT compatible computers really stand out with Hercules Graphics Cards.

That's because our cards can actually improve the way software runs on the COMPAQ DeskPro 286/386, Leading Edge Model D, and IBM compatible models from Epson, Hewlett-Packard, Kaypro, NCR, Tandy, Zenith, and many others.

Three Modes You Need for Your Software.

Both the Hercules Graphics Card Plus (for TTL monochrome monitors) and new Hercules InColor Card (for multi-sync and enhanced color "EGA type" monitors) contain the three modes you need to get the most out of software on your compatible. *High Resolution Graphics:* Your PC benefits from Hercules' crisp 720x348 resolution— the highest popularly supported standard— in monochrome, or up to 16 colors. *RamFont Mode:* This powerful new mode allows popular programs to display up to 3,072 software definable characters instead of the fixed 256 ASCII character set. *Text Mode:* Thousands of standard text programs run on both Hercules cards.

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Hercules 720x348 resolution and RamFont are now available in up to 16 colors on your multi-sync or "EGA Type" monitor.

can have the true text speed display of italics, subscripts and superscripts. And, it enables add-on packages to open up whole new areas of font and foreign character display for programs like WordPerfect, WordStar, and Multimate; while providing powerful capabilities for software of the future.

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So to get the most out of your software, specify a Hercules Graphic Card Plus or a Hercules InColor Card for your system. And make your compatible more than a clone.

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Includes the three modes your software needs most:
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• *Hercules 720x348 graphics— highest popularly supported standard*
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• *$299 suggested U.S. retail price.*

Hercules InColor Card
(For multi-sync and enhanced color "EGA-type" monitors.)
Runs all Hercules monochrome software in 2 colors, most popular software in up to 16 colors selected from a palette of 64.
• *Standard Text—All programs run in 2 or more colors.*
• *Hercules 720x348 graphics in up to 16 colors—15% higher resolution than EGA.*
• *Hercules RamFont—3,072 software definable characters in 16 colors up to 12,288 in 2 colors.*
• *$499 suggested U.S. retail price.*

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Plus, the Hayes V-series Modem Enhancer provides your modem with the most advanced point-to-point error control. For information that not only gets there faster, but gets there reliably.

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The Hayes V-series Modem Enhancer is available only through your Hayes Advanced Systems Dealer. Call 800-635-1225 for the one nearest you.

Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. **Hayes**®

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READY

of drawing, charting, and presentation tools is aimed at satisfying middle managers who have a point, or two dozen, to make. The overhauled edition can handle more data, display it more ways and at higher resolution, and package it more flexibly than ever. *Harvard Graphics* can now do histograms, dual *y*-axis graphs, and proportional pie charts. It supports 19 math keyword formulas; bar, line, and area charts within a 3-D frame; multiple charts per page; and a 16-color palette. The program's Screenshow module enables you to build the equivalent of a slide presentation with motion control and special effects. Using the program's template feature, you can store and recall graph attributes and even compile them into a Chartbook. And an Automatic DataLink option provides a slick means of linking a *Harvard Graphics* chart template to a *1-2-3* worksheet. Software Publishing, 1901 Landings Dr., Mountain View, CA 94039-7210; 415/962-8910.

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If water fills the space available to it, clutter on a hard disk often overflows it. Disk optimizers put your magnetic house in order, fixing fragmented regions and reshuffling diffuse data in a sensible way. Even then, slinging a few megabytes around can be as bothersome as scraping gum off the bottom of your shoe. ◆*FastTrax,* a

$49.95 program from Mark Elfield & Associates, offers visual reports on disk status, rebuilds fragmented files and subdirectories—however large the partition—and parks infrequently accessed files away from DOS's file allocation table. The last feature improves access times by as much as 25 percent. Unlike some optimizers, *FastTrax* permits you to pack files consecutively or lets the program determine an optimal order. The happy result is longer life for your disk. Mark Elfield & Associates, 4206 Terrace St., Oakland, CA 94611; 415/652-2231.

◆◆◆◆◆
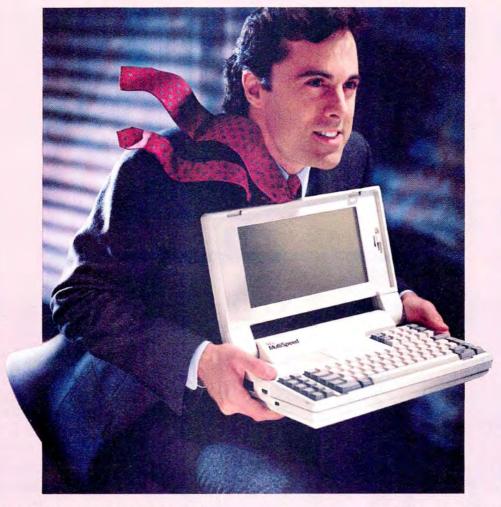
Data General's DG/One, perhaps the hardiest of laptops, has assumed a faster, more readable guise, and that's good news for mobile professionals. The ◆**Model 2T**—the T is for turbo—has emerged from the company's labs with its 80C88 CPU now running at 4.77 and 7.16 MHz. It houses a removable, rechargeable battery pack; an updated "trans-reflective" backlit liquid crystal display; 512K of RAM expandable to 2.5MB; and an optional external numeric keypad. The dual-floppy 2T runs 5 hours on a single charge. A single floppy system lists for $1695, a dual floppy system for $1895, and a 10MB hard disk system for $2895; add $1000 for an electroluminescent screen. DG is also offering a 4-pound Diconix ink jet printer for $529, replacing its thermal printer. Data General, 4400 Computer Dr., Westboro, MA 01580; 617/870-8149.

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Thinking of picking up and moving over to the IBM Personal System/2, but don't want to leave a favorite pet behind? You probably won't have to. Microsoft Corporation is shipping a PS/2 version of its popular Microsoft Mouse, but a free software upgrade kit is available for those who want to keep on clicking with the mouse they already own. The new ◆**Microsoft Mouse IBM PS/2** version plugs into the PS/2's pointing device port, its driver taking advantage of IBM's expanded video capabilities—advanced MCGA on the Model 30 and VGA on Models 50 and 60. It requires no pad, works on any surface, and is bundled with upgraded versions of *Microsoft Paintbrush* and *Show Partner.*

Expect the new version to take a $175 nibble out of your wallet, unless you're already a registered owner of either the bus or serial port version. If you don't mind using a port other than the PS/2 pointer device port, you can get a 3½-inch disk with the new software free from Microsoft. Unfortunately, those few who have the Microsoft Inport version have to buy the new one. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717; 206/882-8080. ◉

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Clock Speed	9.54/4.77 MHz
Memory	640K bytes
Built-in Software	5 programs
Disk Drives	Dual 720K (3.5")
Screen type	Super-twist LCD
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Numeric Keypad	Separate
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That means significant hardware savings, by sharing a single modem and phone line among any number of network workstations.

But your network users share something just as important—the flexibility and ease-of-use that make CROSSTALK the most popular communications software for the PC.

Any network user can exchange files with a wide variety of other PCs, PC Networks, minicomputers and mainframes, including information utilities.

They can exchange files peer-to-peer within the network, at very high speed, without the need to go through the server.

And no one has to be a computer guru to do it. CROSSTALK adjusts to each operator's skill level. It's simple for beginners, who can do useful work immediately. Yet it's fast and powerful in the hands of an expert. It gives you the option of menu operation or direct commands.

It allows you to create "script files" containing commands and entries needed to complete an individual communications session. Any user on the network can create automated "scripts" for routine sessions, and other users can repeat the sessions with a minimum of keyboard commands.

In effect, every user on the network shares communications skills as well as equipment and software.

CROSSTALK Network Version gives you the communications potential that you expect from the standalone PC version. It emulates a wide range of popular terminals. It offers most protocols, including your own CROSSTALK protocol, XMODEM, and KERMIT.

For details on making use of the network savings potential of the CROSSTALK Network Version, see your dealer or ask us for a spec sheet.

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The inventors of the 3.5" drive recommend only one floppy disk.

Theirs.

If your computer has 3.5" drives, it has a little bit of Sony. Because Sony invented the 3.5" drive technology that has taken floppy disk memory all the way to two megabytes.

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Such as the Sony Vivax™ magnetic medium, with the high coercive force necessary to suppress the "noise" that can cause disk error. And the Sony DDL™ binder system for incredibly even dispersion of magnetic particles on the disk surface. Then there's Sony's burnishing expertise that eliminates microscopic projections as small as 1/1,000,000th of a millimeter.

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From the Software Shelf

PC World offers first impressions of recent software releases

This month:
Borland's fast new BASIC compiler, a program that cuts and pastes data between worksheets, shareware word processing that hits the heights, thousands of phone numbers at your fingertips, and amnesia strikes PC adventurers

Edited by William Rodarmor

Turbo Basic
BASIC compiler

Pros: *Accepts most BASIC programs unchanged; compiles to disk quickly; supports IBM PS/2's 640 by 480 VGA mode*
Cons: *Weak debugging tools; combines BASIC modules with assembly language routines in nonstandard way*

Version 1.00
Borland Int'l
4585 Scotts Valley Dr.
Scotts Valley, CA 95066
800/255-8008, 800/742-1133
  California

List price: $99.95
Requirements: 256K, DOS 2.00 or later version
Not copy protected

When Microsoft Corporation brought out its QuickBASIC compiler last year, it had a pretty good idea of who would pick up the gauntlet. Now that Borland has released Turbo Basic, any remaining doubt has vanished. Microsoft's recently updated compiler has mouse and network support and a brawny integrated debugger (see Table 1), but in terms of raw compilation speed, it may have met its match. Turbo Basic offers BASIC programmers a comfortable working environment and lightning-fast compilation. It also has the honor of being the first BASIC compiler to support both the EGA and the 640 by 480 VGA mode of the new IBM Personal System/2 computers.

The conflict between Turbo Basic 1.0 and QuickBASIC 3.0 is more like sibling rivalry than all-out war, because the two compilers have a lot in common. Both accept programs written in Interpreted BASIC, which includes IBM's Disk BASIC (BASIC), Advanced BASIC (BASICA), and Microsoft's GW BASIC. This

(continues)

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Dac-Easy Version 2.0, The Most Amazing Combination Of Speed, Power, Flexibility, Ease Of Use And Value Ever Offered.

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PC MAGAZINE EDITOR'S CHOICE

InfoWorld 1985 PRODUCT OF THE YEAR ☑

And for the same incredible price! While others continue to provide far fewer features at far higher prices, Dac has dramatically improved the revolutionary package that won InfoWorld's 1985 overall "Best Software Value" and PC World's 1986 World Class Award.

Naturally, we've kept all the impressive features which have led nearly 200,000 users worldwide to rely upon Dac-Easy Accounting. New Dac-Easy Accounting 2.0 has over 50 major enhancements from the original record setting package. We've substantially improved its documentation, speed, flexibility, ease of installation, ease of use, and power. Version 2.0 is absolutely the best accounting package on the market, regardless of price. It offers you more than programs costing hundreds, or even thousands, more!

Experts Will Love Its Power. Beginners, Its Simplicity. And Everyone, Its Price.

New Dac-Easy Accounting destroys the myth you have to trade-off power

for ease of use. Version 2.0 has awesome power plus incredibly easy operation that can help you better manage virtually any type business--fast. You'll have quick, finger-tip access to vital information about cash flow, pricing, inventory turns, sales trends, profitability, and more.

Redesigned in C language, Dac-Easy is amazingly fast in areas such as sorting your files and reporting information. Yet, there's never been an easier accounting package than Dac-Easy Accounting 2.0. With our new, expanded manual and context sensitive help to guide you every step of the way, you'll soon be enjoying the benefits of computerized accounting.

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Table 1: QuickBASIC beats Turbo Basic in features

Feature	Turbo Basic	QuickBASIC
Program size limits		
Array (scalar) variables	64K	64K combined
String descriptors	64K	64K combined
String data	64K	64K combined
Long integer variables supported	♦	
DIM array name (min:max)	♦	
OPTION BASE	0 to 32,767	0 or 1
EGA 43-line program text display		♦
IBM Personal System/2 graphics support (640 by 480 pixels)	♦	
VIEW PRINT window support		♦
Automatic "snow" elimination during direct writes to CGA memory	♦	
Data file support		
Binary files	♦	
LOCK/UNLOCK (network file protection)		♦
Special timing support		
DELAY	♦	
MTIMER (improved-precision timing)	♦	
Keyboard status check (INSTAT)	♦	
Structured programming support		
EXIT IF	♦	
EXIT SELECT	♦	
EXIT WHILE	♦	
Recursive procedures and functions	♦	
Compiling		
Compile to .OBJ file from command line and from programming environment		♦
Compile to stand-alone .EXE file from programming environment	♦	
Link .OBJ files with external object modules and libraries		♦
Conditional compilation (controlled by $IF $ELSE $ENDIF metastatements)	♦	
Linking from command line required to produce stand-alone .EXE file		♦
Software debugger (set break points, watch variable values, execute line by line, etc.)		♦
Assembly language support		
In-line machine language code	♦	
In-line .COM file support	♦	
Link with assembled object files		♦
Support for user libraries		♦

means that programmers can compile many of their existing BASIC programs without revision, a major selling point given the huge investment that business has in BASIC applications.

Of course, the inherent differences between interpreters and compilers make it impossible to convert every program. For example, if your BASIC programs include CALL, CHAIN, DEF*type*, DRAW, PLAY, or RUN statements, you'll probably have to edit them before QuickBASIC or Turbo Basic can compile them. Also, memory locations may differ between the compiler and the interpreter, so unaltered statements using BLOAD, BSAVE, PEEK, POKE, and DEF SEG may not work properly. An appendix in the Turbo Basic manual neatly summarizes these interpreter/compiler differences, but it's woefully short on examples. You will have to do some head scratching to figure out exactly what has to be changed to compile your beloved BASIC programs without error.

Turbo Basic's working environment is both powerful and easy on the eyes. It features four on-screen windows for editing programs, receiving messages from the compiler, running programs, and tracing program flow (see Screen 1). You can have all four windows open at once (though only one can be active), or zoom the Edit or Run window to cover the entire screen. (Graphics programs cannot run in windows and therefore always occupy the full screen.)

Although it's a compiler, Turbo Basic has the same interactive feel

(continues)

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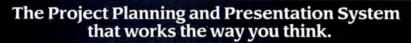
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Screen 1: Turbo Basic's comfortable four-window programming environment lets you scroll a program listing in the Edit window while the program output appears in the Run window. Commands along the top of the screen either transfer control to the compiler or invoke pulldown menus.

that has made interpreted BASIC so popular. From pulldown menus you can manipulate files, set compiler options, compile programs, and so on. If Turbo Basic encounters a syntax error, it opens the Edit window, displays a descriptive error message, and positions the cursor on the line in the source program where the error occurred.

You can compile either to memory or to disk; when compiling to disk, Turbo Basic is seven to ten times faster than QuickBASIC (see Figure 1). This is largely because Turbo Basic produces executable files directly, whereas QuickBASIC operation makes you do a compile-and-link two-step to generate a stand-alone .EXE file. In run-time tests, on the other hand, it's pretty much a draw. Numerically intensive programs that make heavy use of functions run somewhat faster when they're compiled with Turbo Basic. QuickBASIC has a slight edge with programs involving integer or straight floating-point math operations. Both compilers support 8087/80287 numeric coprocessors, so floating-point execution is speeded up dra-

(continues)

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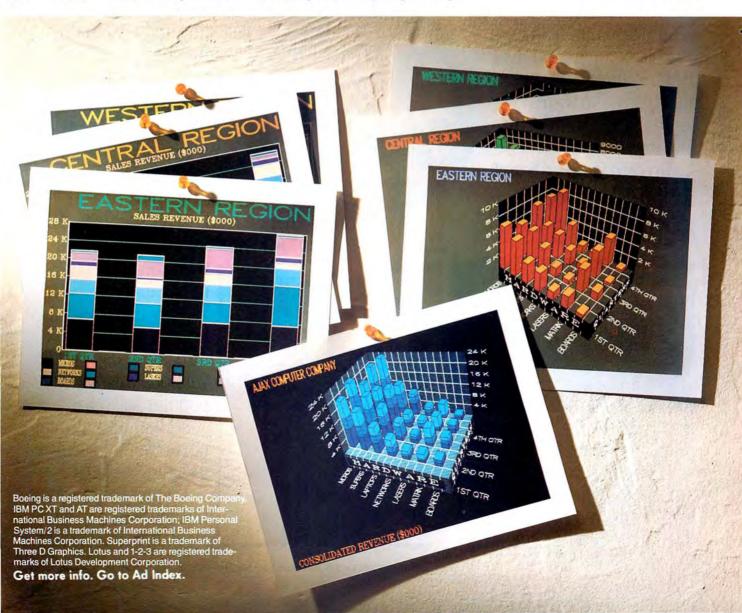
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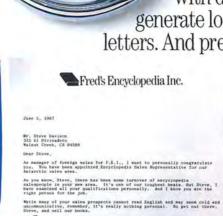
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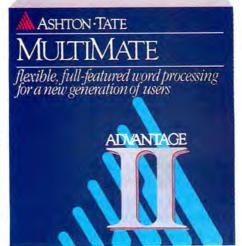
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Compilers Compared ■ Turbo Basic ■ QuickBASIC ■ BASICA

Compile time, memory[1]

Compile time, disk[2]

Run time

| Read 500 random integers, sort in ascending order, write to disk | Read 500 random floating-point numbers, sort in ascending order, write to disk | Read 500 random 3-byte "names," sort into alpha-betical order, and write back to disk | Execute 120,000 floating-point operations ■ ■ ■ single precision ■ ■ ■ double precision | Execute 120,000 integer math operations | Execute 10,000 double-precision arctangent calls |

Figure 1: When it comes to compiling programs to disk, Turbo Basic 1.0 beats QuickBASIC 3.0 hands down. QuickBASIC is slightly faster running programs that involve integer or straight floating-point math operations. Times in seconds.[3]

[1] Time required to produce an executable program from within the programming environment
[2] Processing time required to produce a stand-alone, executable (.EXE) disk file
[3] Tests run on an 8-MHz IBM PC AT with a 20MB hard disk, an 80287 numeric coprocessor, and 640K of memory, operating under DOS 3.10

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matically when a coprocessor is present. Turbo Basic's floating-point operations are comparatively sluggish on machines lacking such a chip.

BASIC users will definitely take notice when they discover that Turbo Basic-compiled programs and their data can occupy all of the computer's installed conventional memory, whereas standard interpreters impose a 64K maximum. Nonarray variables and string data are each allocated a maximum of 64K, and individual strings can contain as many as 32,767 characters, as opposed to BASIC's 255-character limit.

Like QuickBASIC, Turbo Basic makes line numbers optional and supports alphanumeric line labels, multiline IF THEN ELSEIF ELSE ENDIF blocks, multiline functions, and subroutines that are called by name and whose variables can be globally or only locally visible.

Turbo Basic will appeal to programmers who want to test and debug large programs one module at a time before combining them into a final product. They will also be able to write structured code and improve their programs' appearance and performance with such features as recursive procedures, named constants, DO WHILE and DO UNTIL loops, SELECT CASE constructs, and global, local, and static variables.

In applications where speed is critical, Turbo Basic lets you embed in-line machine language code or .COM files in procedures.

You can also branch to assembly language routines with CALL ABSOLUTE, and use DOS and BIOS functions through CALL INTERRUPT. On the downside, Turbo Basic doesn't support the conventional method of combining compiled BASIC modules with assembly language routines via the DOS linker. This may not matter to a weekend hacker, but it could be a problem for developers working on commercial applications, since they can no longer use existing libraries of specialized routines.

With the enhancements now provided by Turbo Basic and QuickBASIC, BASIC programmers no longer need spend their days writing slow, kludgy programs and their nights debugging them. For beginners, Turbo Basic's programming environment is easier to handle, but the compiler lacks QuickBASIC's mouse support and more extensive debugging capabilities. (The compilers' manuals are both excellent but won't teach anyone BASIC.)

For experienced programmers, the choice is clear. If you want to use recursive procedures or need fast compilation to disk, pick Turbo Basic. If you need built-in network support (including file and record locking) and the ability to link program modules with external libraries, QuickBASIC is the better choice. *—Dennis Dykstra*

XYZ:Spread
1-2-3 and Symphony data transfer utility

Pros: *Cuts and pastes data between multiple 1-2-3 or Symphony worksheets; good window-oriented interface*
Cons: *Expensive; confusing tutorial; manual lacks examples and illustrations*

Version 1.0
Intex Solutions, Inc.
568 Washington St.
Wellesley, MA 02181
617/431-1063

List price: 1000-worksheet version $395, 12-worksheet version $145
Requirements: 190K, two disk drives, DOS 2.00 or later version
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Few things are more annoying than having all the right information but not being able to put your hands on it. If the figures you need for a proposal are strewn across 20 different *1-2-3* or *Symphony* worksheets, you can painstakingly extract the data by hand and slowly build a summary worksheet. Or you can use *XYZ:Spread* from Intex Solutions and cull the data lickety-split.

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many sources and targets as memory allows, though the program works best with worksheets in the 50K to 100K range. At $395 (or $145 for a more limited version), *XYZ:Spread* is a power user's luxury, but it will earn its keep the first time you're facing a deadline and don't have time to sift through stacks of worksheets.

XYZ:Spread is simple to install and can be run from a floppy disk if necessary. Once you load the program by typing SPREAD, just pick an option from the menu bar at the bottom of the screen. *XYZ:Spread* does all of its transplant surgery in two windows; that way, you can keep the relevant parts of both patients on the screen at the same time.

Cutting and pasting data from source to target worksheet is so simple it's boring. As with *1-2-3*, you identify the range of cells by supplying cell coordinates or pointing with the cursor keys. To indicate where the captured data should touch down in the target worksheet, simply put the cursor in the upper-left corner where the data should start and press <Enter>.

This may sound like something you can already do with the *1-2-3* File Combine command. But *XYZ:Spread* requires fewer steps and is far more flexible. The sections you select for moving can contain any type of information, in any order, from a 20-line item to a list of 400 securities. If row and cell numbers aren't the same in both source and target work-

sheets, the program can still match them up. And *XYZ:Spread* is adaptable. Suppose the source worksheet contains monthly sales figures and the target worksheet has figures listed by month and also by quarter. Provided the columns have the same name in the column header, *XYZ:Spread* will put the monthly figures into the corresponding target columns and ignore the quarterly columns.

If moving a few numbers between single worksheets begins to pall, you can "broadcast" digits into a number of worksheets by building a list of targets and then transferring the marked data to all of them. *XYZ:Spread* first displays the worksheet files in the current *1-2-3* or *Symphony* directory. To identify targets, highlight the file name and select Go, or specify them with a wild card.

When broadcasting data, *XYZ:Spread* does more than mere number shuffling. If, for example, you want to project an across-the-board change in revenues for a group of departments, *XYZ: Spread*'s Multi-Revision function can change worksheet values by a fixed amount, a percentage, or a constant. The Allocate function will divvy up a value in a specific cell of a source worksheet to cells in various target worksheets—useful for allocating corporate overhead to different departments.

XYZ:Spread even has an Audit function that records the steps you take and saves them to disk as an ASCII file called SPREAD.AUD. Using the program's Production mode, you can play back SPREAD.AUD like a macro and automate an entire session.

Though *XYZ:Spread* is easy to use, it isn't simple to learn. Intex's disk-based tutorial doesn't always clearly explain the order of steps; the manual is well organized but spare, offering few examples and no screen shots.

The fat price tag and puny documentation make *XYZ:Spread* a mixed blessing, but if your figures are scattered like dogies across a Colorado plateau, *XYZ:Spread* can do the job of a dozen cowboys in rounding them up. *–Wayne Rash*

PC-Write
Word processor

Pros: Convenient text entry capabilities; fast; low cost
Cons: Complex formatting and printing commands; weak spelling checker

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Robotic Hands   Page 3

Recent Robotic Hand Research
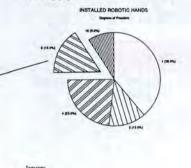
Presently, there are two disparate approaches to gripper construction, with correspondingly different design goals. The two types are industrial hands and omni-hands. Industrial hands are fairly simple, uni-function, one or two DOF grippers which are currently being used for such jobs as welding and assembly-type functions. Omni-hands are complex, multiple DOF hands.

Anthropomorphic hands are supplemented by sophisticated hardware and feedback control and offer many advantages; a large range of motion and the ability to pick up objects and manipulate delicate parts without causing damage to them. Maintaining a stable grasp, high costs, and complexity of control relegate this hand to the status of a research tool for the present. The complexity of the additional degrees of freedom inherent in the Omni-hand is illustrated in Figure 1.

Figure 1: Angle Definitions of Hand Geometry

Until concurrent work in decision-making, task strategy, and vision systems is developed, the potential of this hand cannot be realized. The decreasing cost of producing a functional hand with more than one degree of freedom is speeding acceptance by industry as illustrated in the following graph.

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The cost figures are based on a three fingered hand, each finger supporting three DOFs. Lower acquisition costs will allow an increase in the number of degrees of freedom employed in industrial hands. Placing the control for the hand on the arm so as to reduce the weight on the hand itself also lowers cost. The hand-object system was modelled as a rigid body system, in which a heuristic for a stable grasp is a grasp that, when altered by an external force, seeks to produce a motion or force to return the system to stability.

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Figure 2: PC-Write proves it can keep up with the big boys. The programs loaded and saved text files as quickly as Word 3.1 or WordStar 4.0 and beat them in a search-and-replace exercise. All tests were run on a 640K 8-MHz IBM AT with a 20MB hard disk using a 50K ASCII file. Times are shown in minutes:seconds.

and at $89, it's hard to turn down. But *PC-Write* is also a hard program to learn, and it isn't on speaking terms with many other word processors. Consider it if you produce documents that require complex formatting. If all you want to do is write letters, *PC-Write* could be more word processor than you need.

PC-Write features mail merge, a spelling checker, two-window editing, on-line help, and setups for over 400 printers. And it's quick: It did a search-and-replace operation twice as fast as *WordStar 4.0* (see Figure 2).

Most of *PC-Write*'s features, including the mail merge facility, are capable and efficient. It was short work to create a form letter with variable fields, then merge it with a list of names in a *dBASE III* file. The 50,000-word spelling checker, on the other hand, failed to recognize such common words as *laser* and *grey*. Equally annoying, the program loads the entire dictionary into RAM whenever you do a spelling check, soaking up 110K of memory. Still, you can fit the main *PC-Write* program files, including the dictionary, on one 360K disk and have room left over for DOS

(continues)

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files. That's a feat most high-priced word processors can't manage.

Like an eager puppy, *PC-Write* comes no matter what you call it. You can run the program with a subset of *WordStar* commands or a combination of <PgUp>, <Home>, and <Ins> keys plus your choice of function keys. Pressing a function key also brings up a *1-2-3*-style menu bar.

When it comes to formatting and printing, though, the choices aren't so simple. You have to pepper your document with an array of one- and two-letter dot commands. To make things worse, an on-screen *PC-Write* document barely resembles its printed counterpart.

Despite these drawbacks, formatting and printing with *PC-Write* are quite flexible. You can place headers and footers on the same page or alternate pages, and locate footnotes at the bottom of each page or all together at the end of a document. The program generates indexing and tables of contents; it also supports a variety of fonts and printing attributes (such as bold and underline). Though it is shareware, *PC-Write* has kept up with the times. It can be configured to take advantage of the HP LaserJet and *PostScript*-equipped printers like the Apple LaserWriter. You can even choose different color fonts for ink jet printers.

(continues)

AutoSketch™
A Resource to Draw Upon

To get any job done, you need the right tools. Ideally, they should be extensions of your talents, freeing you to do what you do best. And speed, precision, flexibility, and consistency are always top priorities, no matter what the job. If communicating with drawings is part of your job, AutoSketch should be one of your resources.

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AutoSketch runs on the IBM PC/XT/AT and compatible systems with a minimum of 512K RAM and either color or monochrome display. The standard version is yours for just $79.95. If your PC has an 8087 or 80287 math coprocessor, this version operates about three times faster. The speed-enhanced version for $99.95, requiring the coprocessor, is three times faster still.

Call 800-445-5415 for the name of the AutoSketch Dealer nearest you or more information on supported peripherals. To order direct with a credit card, call **800-772-9200, ext. 346.**

Screen 2: PC-Write's main help screen is an embarrassment of riches. It has 45 submenus—including this listing of foreign accents and symbols—but you have to know what you're looking for to pick your way through them.

Beyond the complex commands needed for formatting and printing, *PC-Write* has a few major faults. On-line help isn't context-sensitive, and the 45 help categories make it tough to find the answer you need (see Screen 2).

Document compatibility is also a problem. The program doesn't support other document formats, such as IBM's Document Content Architecture (DCA), which would help you move documents between *PC-Write* and other word processors. It does have a clipboard function that captures text from other applications into your document, but using it is an uninviting, multistep process. A do-it-yourself utility will take out high bits or add linefeeds to foreign files as needed. The program also imports and exports ASCII files.

PC-Write is distributed by Quicksoft in Seattle. For $16, the company will send you a program disk with a 17-page tutorial to get you started and a 44-page Quick Guide that can be printed out. If you pay the full $89 and register the program with Quicksoft, you also get a hardcover manual, quick reference cards, a one-year subscription to the Quicksoft newsletter, and access to the company's telephone support service.

(continues)

PC-Write is the kind of word processor that a sharp, experienced programmer would put together: fast, compact, and terse, but capable of doing anything you want if you're willing to take the time to figure it out. The program would be good for an office that can exploit its extensive document-creation functions. It's too complex for beginners and ill-suited for those who must share files, but for the right user, it's a fine program at a price that can't be beat. —*Lee Richardson*

Hotline
Telephone number data base and auto-dialer

Pros: Lists 2000 company names and phone numbers; auto-dials over PBX, public, and long-distance phone lines
Cons: Inconvenient editing features

Version 1.0
General Information, Inc.
401 Park Pl. #305
Kirkland, WA 98033
206/828-4777

List price: $39.95
Requirements: 42K, two disk drives, DOS 2.00 or later version
Not copy protected

If you're tired of letting your fingers do the walking, General Information's *Hotline* might just save you from the Ma Bell blues.

(continues)

The Desktop Publishing Conference

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"The event of the year." You heard about last year's Seybold Desktop Publishing Conference. More than 100 new products were introduced, including Ventura Publisher and Aldus PC PageMaker. Steve Jobs declared that Hewlett-Packard was "brain damaged" for selecting the DDL page description language. IBM revealed its desktop publishing strategy. Users blasted vendors for not offering support. Everyone agreed they had not seen so much enthusiasm and excitement in years.
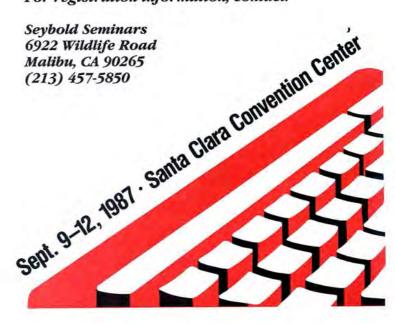
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Seybold Seminars
6922 Wildlife Road
Malibu, CA 90265
(213) 457-5850

Sept. 9–12, 1987 · Santa Clara Convention Center

At $39.95, *Hotline* is a slick RAM-resident program that combines a national directory of 2000 company phone numbers, a gargantuan personal directory, and an auto-dialer. While adding new listings to the directories is a chore, the program is a valuable helpmate for any computer user who makes more than a few calls a day.

The listings in *Hotline's* national directory include the Fortune 500 companies, government agencies, media outlets, computer companies, and airlines. Each listing consists of the company's name and telephone number and the current time in its time zone. To find a number, you type the company's name; if it isn't listed, *Hotline* can auto-dial directory assistance in over 3000 major cities here and abroad.

Hotline uses 42K to 55K of memory, depending on hardware and video requirements, and deftly avoids conflicting with other RAM-resident programs. You bring it up by pressing the <Alt>-<F10> hot key combination (which you can redefine). Program selections are made from pulldown menus or by pressing <Alt>-*function key* combinations.

As long as your modem and phone share the same line, you can pop up *Hotline* over any application and tell it to dial away; it will insert any special prefixes or pauses required. Provided the application doesn't run in graphics mode, *Hotline* will also read and dial any number on the screen. If you want, *Hotline* will log your calls, and you can also configure the function keys to speed-dial up to 30 numbers.

Before you make that first call, you must give *Hotline* your local area code and prefix. You can then specify that calls be made via inside or outside lines and over long-distance services such as MCI or Sprint; you can even charge them to a credit card.

Hotline also has a private directory with room for up to 65,534 entries. You can type in the listings directly or transfer them from ASCII files generated with applications such as *dBASE III, R:base 5000, 1-2-3, pfs:file, Multiplan,* and *SideKick.*

Correcting a phone number in *Hotline's* directories is easy, but adding, deleting, or changing an entire entry is a chore. You have to edit the listing with a word processor, transfer it back into *Hotline*, then "recompile" the entire directory.

At press time, General Information was planning an upgrade that will make editing entries simpler and expand the national directory to some 4000 listings. So if you want to reach out and touch someone without thumbing through the phone book, *Hotline* could be the right choice. —*Dusty Roady Pedersen*

(continues)

■

Amnesia
Text adventure game

Pros: *Complex, realistic story; large interactive vocabulary*
Cons: *Annoying copy protection scheme; may not work on many compatibles*

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
415/572-2787

List price: $44.95
Requirements: 128K, one disk drive, DOS versions 2.00 to 3.10
Copy protected

If you've never awakened in a strange hotel with no clothes, no money, and worst of all, no idea who you are, you should try *Amnesia*, a text adventure from Electronic Arts. In a game that Kafka would admire, your attempts to find your clothes, get your next meal, and solve the puzzle of your identity all precipitate a bewildering series of experiences. You might, for instance, marry a stranger and live out your days as an Australian sheep farmer (without, alas, regaining your memory); or you might (and almost certainly will) be mugged on the mean streets of Manhattan and executed for a crime you didn't commit.

In this frightening milieu, your rod and staff are a game booklet and a folding map of Manhattan's streets and subway lines. To try to find your worldly and mental possessions, you type in short directions for your character, like *buy a*

(continues)

FRONT ELEVATION

subway token. If you're lucky, the program will respond with a supportive statement like, 'You purchase the one-dollar fare, and in return you get a subway token to put in the slot on the turnstile.' At other times, *Amnesia* is downright taciturn. When you're in jail—a regular stopover—the program will dolefully answer your hapless cries from the keyboard by saying, 'There is no escape.' Since *Amnesia* allows you to save your game to disk, this is often a good time to go relax somewhere with a nice book—like *The Trial*.

Amnesia is an impressive program, in both heft and capacity. Its two double-sided disks hold as much text as an average book, and the program recognizes an amazingly large number of words. The game's booklet lists more than 80 verbs, such as *caress, fondle, attack, choke,* and the ever-useful *pray.* It also drops a number of clues throughout your journey, some found in a section called 'Visitor's Guide to New York City,' others in an address book with phone numbers and entries like 'Sue G.' and 'Interlude.' The desperate can turn to a list of overt hints.

A major drawback to this otherwise engrossing program is a copy protection scheme as frustrating as the game's electronic misadventures. *Amnesia* will supposedly run on a hard disk, but don't bet on it. After a number of attempts, I finally got it to work, but only from my AT's floppy drive. *Amnesia*'s 90-day warranty is no remedy for such a barrier.

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Will you enjoy *Amnesia?* That depends on what you expect from it. The adventure-style format can be more convoluted than a bad translation of Heidegger, and *Amnesia* has as many blind alleys as Manhattan and Brooklyn combined. Program author Thomas Disch's writing is serviceable, but nothing special. On the other hand, game players who cut their teeth on phrases like 'Go north' and 'There are dragons here' will find his prose a vast improvement.

If you think of yourself as a person of infinite resources, cool in the face of dar ger, you'll like *Amnesia.* Just don't get overconfident. As Bertolt Brecht once wrote, "The man who laughs has not yet been told the terrible news."
–*Robert Lafore*

Dennis Dykstra is a professor at Northern Arizona University in Flagstaff and a freelance writer and software developer. Wayne Rash is a microcomputer and office automation consultant with American Systems in Arlington, Virginia. Lee Richardson is a contract programmer and writer in Chico, California. Dusty Roady Pedersen is Product Review Editor for PC World. *Robert Lafore pioneered the computerized story genre with a series called* Interactive Fiction *and is the author of* Assembly Language Primer for the IBM PC and XT *(New American Library, New York, 1985).*

From the Hardware Shelf

PC World offers first impressions of recent hardware releases

Check out Hercules' new video standard, two distinctive 10-MHz AT clones, Toshiba's handy 3½-inch drive, and a modem that can go it alone.

Edited by Eric Knorr

Hercules InColor Card
Video display board

Pros: High-resolution, 16-color graphics; broad potential software support
Cons: Incompatible with some current software

Hercules Computer Technology
2550 9th St.
Berkeley, CA 94710
415/540-6000

List price: $499
Requirements: DOS 2.00 or later version

When nearly every graphics board manufacturer was unleashing its own EGA clone, Hercules Computer Technology was the most vocal holdout. As the creator of the first monochrome graphics standard, the upstart Berkeley firm loudly proclaimed it had something better waiting in the wings.

That "something"—the InColor Card—nearly lives up to the hype, yielding graphics on a par with those produced by 480-line boards such as Quadram's ProSync, Video 7's VEGA Deluxe, and the Video Graphics Array (VGA) built into the new IBM PS/250 and PS/260 (see "Personal Systems Revealed" in this issue). A $499 color adaptation of the Hercules Graphics Card Plus, the InColor Card uses an ordinary EGA monitor to display graphics and text at a resolution of 720 by 348 pixels—the same resolution offered by the original Hercules graphics board. That's 12 percent sharper than the EGA, but with the same 16 simultaneous colors from a palette of 64.

As a Graphics Card Plus compatible, the InColor Card also provides full RamFont support (see *From the Hardware Shelf, PCW,* February 1987). It improves on the original RamFont mode by accommodating an enhanced set of 3072 characters in 16 colors or 12,288 characters in 2 colors. You'll also find all the standard Hercules features, including a parallel printer port, a screen saver, and software utilities for printing Hercules graphics on Epson or IBM-compatible printers.

What software can take advantage of the InColor Card? In theory, you can modify any program with a Hercules driver so that it supports the board, but to get all 16 colors in graphics mode you need to patch the program with about 200 bytes' worth of machine-level programming. To spare you this chore, the company provides Setcolor and Palette, a pair of utilities for tweaking most monochrome Hercules drivers into producing color text displays.
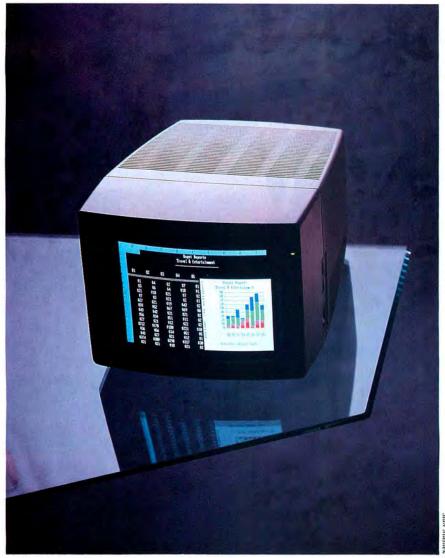
With the simple, menu-driven Setcolor, you can tag text displays with up to 4 colors from the 64-color palette. Each attribute—background, normal text, high intensity, and underlining—can have a different assigned color. Palette offers 16 simultaneous colors for dressing up text, but it's hard to use and requires a working knowledge of attribute codes. With both these programs, you can preview the results of your choices. Once you're satisfied with the colors, you save the settings to a file; later you can call them up with a batch file for application to any text display.

Obviously, most users would prefer to avoid playing with attributes altogether. To encourage acceptance of the InColor Card, Hercules has written InColor drivers for eight popular applications: *1-2-3* release 2, *Symphony, Windows, Microsoft Word 3.0, AutoCAD, Framework II, Javelin,* and BPS's *35mm Express.*

Unfortunately, Hercules neglected to do its homework on some of the drivers it released. The *Word* driver I received didn't produce color at all, cluttered the opening graphics screen with gar-

bage, and occasionally locked up the system. (Hercules has already corrected this problem and will replace free of charge any WORD-.COM driver bearing the date 5-15-86.) For low-end CAD users, a more serious issue is the purported support for *AutoCAD*. In fact, the driver works only with version 2.5 or later, and Hercules has no plans to accommodate earlier versions.

Windows, on the other hand, fares quite well. The colors produced are every bit as vibrant as

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Hercules' InColor Card adds 16 colors to the 720-by-348-pixel graphics resolution established by the Hercules Graphics Card. To support the InColor Card, programmers need only make minor alterations to the standard Hercules driver.

Stan Musilek

the EGA's, and the resolution is noticeably sharper. Herein may lie the strength of the InColor Card: With the current trend toward *Windows* as a standard graphics interface, the InColor Card offers a resolution approaching that of the new VGA while supporting—in one form or another—applications written for the original Hercules Graphics Card.

Clearly, no serious software house is willing to place all its colored eggs in one basket and support a single graphics standard. Any program that fails to support the full line of Hercules and IBM graphics hardware—or *Windows,* for that matter—will likely be left in the dust. From a programmer's point of view, adding color capabilities to an existing Hercules driver is a trivial task. If an application supported the original Hercules standard, you can bet that its next version will drive the InColor Card. —*TJ Byers*

■

Wyse PC 286 Model 2200
AT compatible

Pros: *Fast processing speed, ergonomic design*
Cons: *Expensive peripherals*
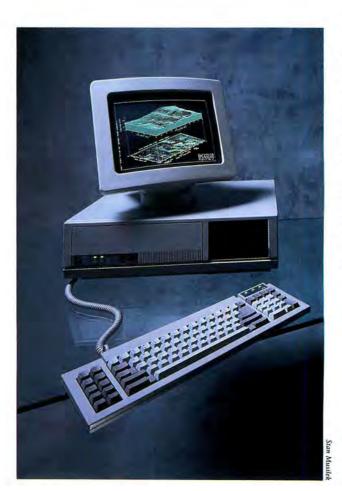
Wyse Technology
3571 N. First St.
San Jose, CA 95134
408/433-1000

List price: with 640K RAM, 1.2MB floppy drive, and keyboard $1949; with 20MB hard disk $2449; with 40MB hard disk $3149; 1MB memory expansion board $250; serial/parallel board $129; monochrome/color display adapter $299; monochrome monitor $235; color graphics board $150; color monitor $599; EGA-compatible adapter $499; enhanced color monitor $749; high-resolution, paper-white monitor and adapter $999

Style has never been a make-or-break selling point with personal computers, but let's face it—good looks never hurt. With its stream-lined gray exterior, sloping front panel, and optional paper-white monitor, the Wyse PC 286 Model 2200 combines elegant design with solid 10-MHz performance.

Compared to IBM's new Model 30 or Model 50, the PC 286's footprint seems gargantuan. Still, at 17 inches long by 21 inches wide by 6 inches tall, the machine is average in size for an AT clone, and at $1949 for the basic model, has a median price. You can always get the box out of the way by buying a floor stand from Wyse (at an exorbitant $165), but why hide such a pretty face?

(continues)

The Wyse PC 286 offers a snappy 10-MHz clock rate, a reasonably low $1949 base price, and—as an option—Wyse's legendary WY-700 display system.

Stan Musilek

On April 2, 1987 IBM and Quarterdeck announced the next generation in personal computing.

Introducing DESQview 2.0. Improving the past and ready for the future right now.

In one sweeping announcement from Miami Beach and New York City, IBM established new standards of performance for personal computers, with its new Personal System/2.™ Quarterdeck was there with IBM and simultaneously helped establish new standards for multi-tasking and multi-windowing.

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If you use two or more software programs, if you use a PC-compatible machine, if you own a new 80386 computer, if you've just bought one of the new Personal System/2 computers, or if you've tried Microsoft Windows and were disappointed but still need the power of graphics programs, DESQview 2.0 is the answer.

Consider this. InfoWorld voted DESQview's earlier version 1986 Product of the Year. SoftSector gave it the Editor's Choice Award. In PC Tech Journal's "System Builder Contest" at Comdex Fall it was voted best operating environment. And 450,000 dedicated users on four continents have voted yes with their dollars.

The new DESQview 2.0 is an order of magnitude better.

This unique software program enhances the power of your personal computer and makes it more convenient to use. It still gives your PC the power

of many PCs. It still does windows. It still multi-tasks. It still breaks the DOS 640K barrier. It still transfers data. It still dials your phone. It still gives you menus for DOS. It still remembers your keystrokes (macros). It still runs your existing programs and your new programs soon to come. In fact now you can even run Windows-, GEM-, and Topview-specific programs too. And with 386 machines and our Expanded Memory Manager it still becomes a 386 control program, but now you can run text *and* CGA graphics programs in background.

The new DESQview 2.0.

For us it's the next logical step. For you it's windows of opportunity.

SYSTEM REQUIREMENTS
▪IBM Personal Computer and 100% compatibles (with 8086, 8088, 80286 or 80386 processors) with monochrome or color display; IBM Personal System/2 ▪Memory: 640K recommended; for DESQview itself 0-145K ▪Expanded Memory (Optional): expanded memory boards compatible with the Intel AboveBoard; enhanced expanded memory boards compatible with the AST RAMpage ▪Disk: Two diskette drives or one diskette drive and a hard disk ▪Graphics Card (Optional): Hercules, IBM Color/Graphics (CGA), IBM Enhanced Graphics (EGA), IBM Personal System/2 Advanced Graphics (VGA) ▪Mouse (Optional): Mouse Systems, Microsoft and compatibles ▪Modem for Auto-Dialer (Optional): Hayes or Compatible ▪Operating System: PC-DOS 2.0-3.3; MS-DOS 2.0-3.2 ▪Software: Most PC-DOS and MS-DOS application programs; programs specific to TopView 1.1, GEM 1.1 and Microsoft Windows 1.03 ▪Media: DESQview 2.0 is available on either 5¼" or 3½" floppy diskettes

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Company: _____

Address: _____

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Telephone: _____

☐ Business use. How many PC's? _____   ☐ Computer Store Retailer

☐ Do you evaluate or recommend   ☐ VAR,VAD
   graphics software? ____Yes   consultant or developer
                      ____No

Inside the PC 286's mostly metal chassis, you'll find little Wyse labels on everything—the BIOS, the motherboard, the expansion boards, and even the hard and floppy disk drives. Don't be misled, however: Wyse is proud of designing and manufacturing its own machines, but they source components like everyone else. The BIOS is from Phoenix, and the hard and floppy drives are from Seagate and Panasonic, respectively.

Close inspection of the machine's innards reveals one full-height and two half-height storage compartments, a battery-powered clock/calendar, a socket for an 80287 coprocessor, and a 200-watt power supply. The display adapter, serial/parallel board, and hard disk controller occupy three of the eight available slots.

A switch on the machine's front panel (appropriately flagged with a lightning bolt) toggles between 6-MHz and 10-MHz clock speeds. In *PC World*'s standard benchmarks, the PC 286—equipped with a 40MB hard disk and working in turbo mode—whipped the 8-MHz IBM AT in all but two tests (see Figure 1).

As the number two terminal maker in the country, Wyse is renowned for its attractive, high-performance displays. All of its standard PC monitors—monochrome (green or amber), standard color, and enhanced color—measure 14 inches diagonally and are mounted on tilt-and-swivel pedestals. At the top of the line is the

(continues)

Two 10-MHz Clones Battle the AT

Save a 243K 1-2-3 release 2 worksheet

Recalculate a 243K 1-2-3 release 2 worksheet

Run Globe in compiled BASIC

Find all prime numbers less than 1000 in interpreted BASIC

seconds   3   6   9   12

Find all prime numbers less than 10,000 in compiled BASIC
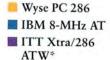
Retrieve a 243K 1-2-3 release 2 worksheet
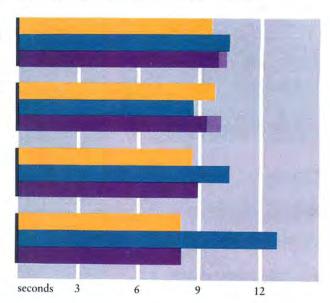
Sort a 76K 712-record dBASE III file

seconds   6   12   18   24

Run Globe in interpreted BASIC

seconds   20   40   60   80
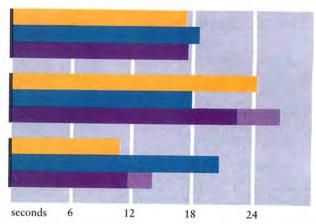
Reformat a 150K WordStar document

minutes   1   2   3   4

■ Wyse PC 286
■ IBM 8-MHz AT
■ ITT Xtra/286 ATW*
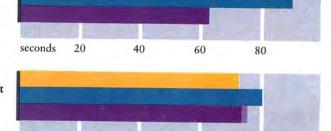
Figure 1: Not surprisingly, the ITT Xtra/286 ATW and Wyse PC 286 zoom past the IBM AT in most tests.

* Where two values are given, the first is with disk caching, the second is without it.

Get more info. Go to Ad Index.

15-inch WY-700, a $999 paper-white display system for high-end applications, which accompanied the machine reviewed here. With a hard-to-beat graphics resolution of 1280 by 800 pixels, built-in emulation of IBM's Monochrome Display Adapter and Color/Graphics Adapter (CGA), and a 16-by-32-dot character box, the WY-700's output is remarkably crisp and easy to read (see "White-Screen Fever," *PCW*, June 1987). Although any CGA or text-based program will run with the WY-700, many programs come with drivers that exploit the WY-700's high-resolution graphics, including *Ventura Publisher*, *PageMaker*, *Harvard Professional Publisher*, *AutoCAD*, and *VersaCAD*. The WY-700's utility software includes drivers for *GEM*, *Windows*, *Symphony*, and *1-2-3*.

Like most clone makers, Wyse offers a choice of either the new 101-key AT keyboard or the AT's reliable original model. Wyse's sharply angled keyboard reduces the surface area around the block of keys, so you can rest your wrists comfortably on the desk as you type. Like the AT keyboard, the PC 286's has that snappy touch. A slim telephone cord connects the keyboard to an RJ-11 phone jack on the PC 286; a standard 9-pin keyboard port is also provided.

Notwithstanding its customized BIOS, our PC 286 seemed initially devoid of technical difficulties. *VP-Planner*, *SideKick*, *TenKey*, *Flight Simulator*, *Reflex*, and *1-2-3* release 2 executed without a hitch. However, with *Word* or *WordStar*,

holding down one of the cursor keys on the numeric keypad occasionally caused the system to freeze up. Wyse replaced that machine, but the problem persisted; only when a third machine arrived did this odd glitch cease. Wyse technicians said they were unable to duplicate or explain the problem.

Fortunately, Wyse's generous warranty covers parts and labor for one year. Getting the machine repaired requires paying shipping costs to one of six Wyse authorized service centers in San Jose, Los Angeles, Dallas, Boston, New York, or Chicago. Extended service contracts are also available.

Free from the glitches of its forerunners, the PC 286 on my desk continues to draw admiring remarks from friends and co-workers. The user guide accompanying the machine is clearly laid out and copiously illustrated. Combining suave lines with computing muscle and excellent display options, the PC 286 could start a whole new PC genre—practical chic. *—Anita Amirrezvani*

ITT Xtra/286 ATW
AT-compatible

Pros: *Disk caching, ROM-based diagnostics, fast processing*
Cons: *High price, large footprint*

ITT Information Systems
2350 Qume Dr.
San Jose, CA 95131
408/945-8950

List price: with 640K, 1.2MB floppy disk drive, and multimode
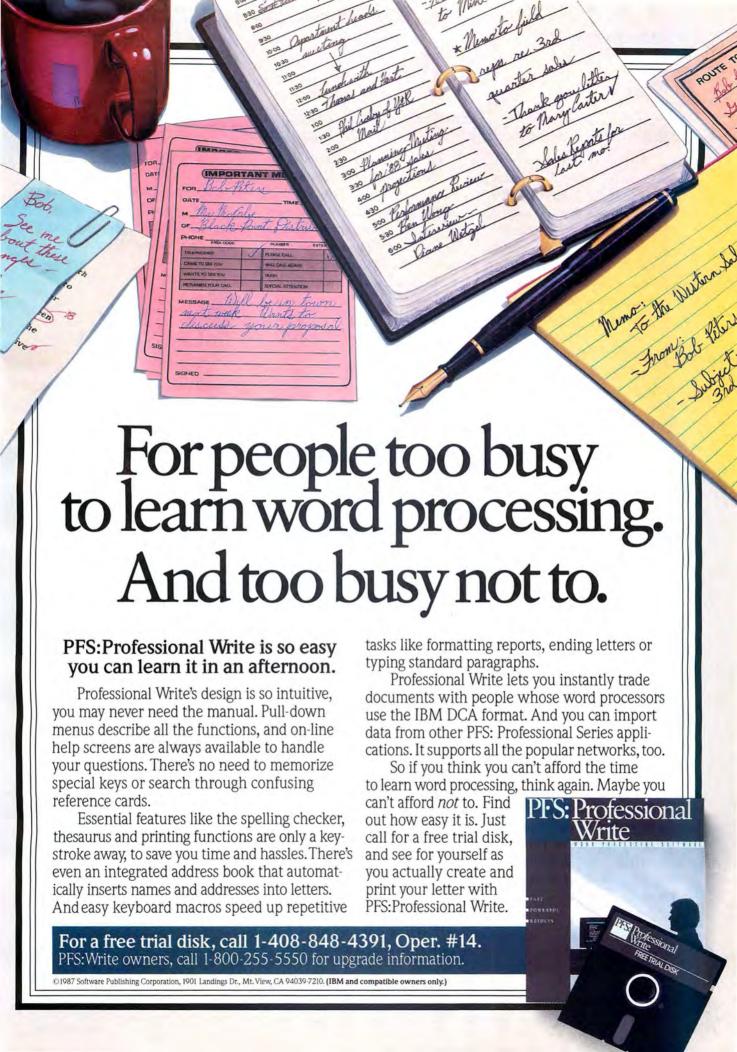
EGA board $2499; with 30MB hard disk $4299; amber monitor $189; EGA monitor $749; 60MB streaming tape backup $1900

Despite the authority a handsome exterior confers, looks don't tell the whole story. Compared to the flashy Wyse PC 286, the ITT Xtra/286 ATW (Advanced Technology Workstation) is clad in unassuming corporate grays. Fortunately for ITT, subdued appearance doesn't equal bland performance.

The Xtra/286 ATW's tempting combination of features should please the most demanding user: A switchable 6/10-MHz 80286 CPU and EGA graphics come as standard equipment. However, the $2499 base price may be a bit much for some. When you add an EGA-compatible monitor and a 30MB hard disk, you've nudged your way over the $5000 mark.

The Xtra/286 ATW's hustle well exceeds that of the 8-MHz IBM AT, and the machine's performance is comparable to the Wyse PC 286's (see Figure 1). Like IBM's new PS/2 series, the Xtra/286 ATW comes with a disk caching utility that speeds disk read/writes. When disk-intensive word processing, data management, and spreadsheet tasks are involved, the Xtra/286 even edges past the Wyse PC 286.

Unlike its popular 80286-based predecessor, the Xtra XP, the Xtra/286 ATW is a true AT compatible. With its paltry five 8-bit

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tasks like formatting reports, ending letters or typing standard paragraphs.

Professional Write lets you instantly trade documents with people whose word processors use the IBM DCA format. And you can import data from other PFS: Professional Series applications. It supports all the popular networks, too.

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PFS:Write owners, call 1-800-255-5550 for upgrade information.

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slots, the diminutive XP had one foot in the XT camp. By contrast, the Xtra/286 ATW has the full AT complement—six 8/16-bit and two 8-bit slots. In this case, expandability also means a hulking chassis that's 21 inches wide by 17 inches deep by 8 inches tall. Be sure to set this machine on a sturdy surface: The system unit and EGA monitor together weigh a whopping 70 pounds.

This gray edifice includes sockets for an 80287 math coprocessor and an additional 384K of RAM, bringing motherboard memory capacity to 1MB. As with the Wyse PC 286, the unit's 1.2MB floppy disk drive is made by Panasonic and the 30MB hard disk by Seagate. You can cram in five half-height storage devices, three of which are accessible from the front of the machine—a sensible configuration. With the great floppy-format transition well under way, you can use one bay for a 5¼-inch drive, another for a 3½-inch one, and a third for ITT's 60MB streaming tape backup.

Another versatile (and standard) device is the multimode graphics board that combines EGA, CGA, MDA, and Hercules graphics. Unlike some multimode boards, ITT's doesn't switch automatically between modes, but the DIP switches are accessible from the rear bracket. Ribbon cables run from the board to one parallel and one serial connector, which reside on a second bracket in the adjacent slot.

Two monitors are available for the Xtra/286 ATW: an amber monochrome model for $189 and an EGA-compatible display that runs $749. Each comes with a tilt-and-swivel base and nonglare screen. The EGA monitor's casing looks like that of a cheap black-and-white TV, but the display itself is high-class—perhaps a bit brighter and crisper than IBM's Enhanced Color Display.

The Xtra/286 ATW's keyboard is a gem. Its keys are springy and solid, like those on better dedicated word processors. The keyboard layout is identical to that of the original IBM AT.

When faced with a battery of software, the Xtra/286 ATW proved its mettle. *Word, Freelance, dBASE III Plus, Smartcom II, Jet, WordStar, WordPerfect,* and *1-2-3* release 2 all ran without incident. In addition, a trio of RAM-resident scalawags—*SideKick, TenKey,* and *Turbo Lightning*—behaved even when loaded together.

ITT completes the package with 128K of ROM diagnostics, which you access with a <Ctrl>-<Alt>-*key* combination. The diagnostics help menus are sensibly laid out, and the user manuals supply lucid, engaging explanations of hardware issues.

The Xtra/286 ATW's design, software, and documentation reflect considerable care, but the pricing scheme could stand some rethinking. Reportedly, the giant Taiwanese conglomerate Multitech designs and manufactures the machine; its own AT clone, with a 40MB hard disk and an EGA display, costs $1250 less than the

Xtra/286 ATW. Despite its cool facade, the Xtra/286 ATW's speed, expandability, and ease of use add up to a hot machine—if you're willing to put up the cold hard cash. —*Paul Meyers*

Toshiba ND354A
3½-inch internal disk drive

Pros: Low price, easy installation, relatively fast access time
Cons: None

Toshiba ND354A
Toshiba America, Inc.
Information Systems Division
2441 Michelle Dr.
Tustin, CA 92680
800/457-7777

List price: $150
Requirements: DOS 3.20 required for 720K format

The burgeoning acceptance of 3½-inch disks—fueled by the introduction of IBM's new Personal System/2 line—has put users in a quandary. How do you make a smooth transition from 5¼-inch disks to the new smaller media? And should you?

The answer to the second question is an emphatic yes. By now the arguments should be familiar: Nestled inside a small, hard plastic shell, the magnetic media is safer

(continues)

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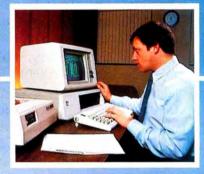
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(and more portable) than 5¼-inch floppies. And thanks to an unobtrusive write-protect switch, you'll never have to play with those sticky little tabs again.

Toshiba offers the half-height ND354A, a 3½-inch internal disk drive, for a bargain price of $150. As internal disk drives go, the ND354A is among the easiest to install. It comes with all the brackets and cables needed to connect the drive to any controller and power supply, including those of all Compaqs, the AT&T PC 6300, and—of course—the IBM PC, XT, AT, and their compatibles. The drive, however, won't fit in any of the new PS/2 series machines.

Part of the secret to the ND354A's success lies in the way the new disks are formatted. Each track contains nine sectors of 512 bytes apiece, the same track configuration used with standard 5¼-inch disks. When the 3½-inch disk is formatted with 40 tracks, it becomes a miniature version of the 5¼-inch, 360K disk—exact in every detail. Consequently, you can use the DOS DISKCOPY command to copy data from a 5¼-inch disk to its 3½-inch counterpart. A 720K disk formatted with the ND354A has the same track-to-sector ratio as the 360K version but double the number of tracks. To format a 720K disk (720K is the maximum disk capacity that the low-end IBM PS/2 Model 30

can handle), you need DOS 3.20 or 3.30 (DOS 3.10 users should check "Double Your Storage," *The Upgrade Path, PCW,* May 1987).

The ND354A's performance is on a par with the new IBM 3½-inch drives and considerably better than the conventional 5¼-inch models. Track access time is 3 milliseconds (ms), compared to the 5¼-inch drives' access time of 6ms, with an average access time of 94ms. The drive's standard 300-rpm rotation rate makes it compatible with all copy protection schemes. Power consumption is a low 1.9 watts in standby mode, 3.2 watts during read/write, and 4.5 watts when seeking.

As with the new IBM drives, you unload disks by pushing an eject button. Another nice touch is the color-coordinated faceplates and eject buttons supplied for the IBM AT and Compaq Portable, convenience items that generally run $10 extra with internal drives.

One final note: Although the ND354A can't format, write, or read disks in the new 1.44MB format used by the IBM PS/2 Model 50 and Model 60, both those systems can format 720K disks that are compatible with the Toshiba drive (and vice versa). According to Toshiba, the company will soon have a 1.44MB drive, the ND356, priced in the same low range. If you're accustomed to high-capacity, 1.2MB floppies, you may want to wait for the ND356 before making the big switch. —*TJ Byers*

Prometheus ProModem 2400
2400-bps modem

Pros: *Optional RAM buffer, unattended operation*
Cons: *Hard to program for some operations*

ProModem 2400
Prometheus Products, Inc.
4545 Cushing Pkwy.
Fremont, CA 94538
415/490-2370

List price: $499, 2K daughterboard $149, 500K of 256K-bit chips $80

Ever wish that your modem was as intelligent as it claimed to be? Even if you telecommunicate infrequently, owning a modem smart enough to collect the electronic mail (or even transfer files) without tying up your computer would keep you from wasting precious time on line. Prometheus Products' ProModem 2400 has enough brains for the job. Like the Visionary 1200XT (see *From the Hardware Shelf, PCW,* July 1987), the ProModem has its own microprocessor, RAM buffer, clock, and built-in set of extended AT commands. Together these components enable you to program the modem for a variety of unattended operations that it can execute even if your PC is in the shop.

The key to the ProModem's independence is the optional message buffer. By itself, the $499

You are now looking at the only Desktop Publishing Display that matches the 300 dots per inch performance of your laser printer.

It means that no matter how fine the print, what you see here is going to be what you get here.

It also means that if this wasn't a <u>Princeton LM-300</u> or <u>LM-301</u> monitor, you wouldn't have been able to read this ad.

Actual screen display.

Actual laser printed page.

From the Hardware Shelf

ProModem is a fairly standard 2400-bps unit, offering alternate speeds of 1200 and 300 bps; a speaker with a volume control; and an LED array that displays messages and active commands (as well as the time of day). The add-in $149 daughterboard holds a mere 2K of battery-backed static RAM, but you can build a large buffer with 512K of dynamic RAM for only $80 more. Once the buffer is installed, you can use the memory for such chores as sending and receiving messages, downloading files from on-line services, and—thanks to a serial printer port that comes with the daughterboard—creating a print buffer.

A menu-driven utility permits you to execute several of these operations with just a few commands. Aside from transferring files between the buffer and your PC, the program enables you to

send files at specific dates and times, create and edit dialing directories, and engage in asynchronous communications using a primitive TTY program. If you want to provide remote access to your PC but don't want just anyone roaming around your hard disk, an answer-back function enables you to store up to 52 passwords, each of which can be tied to a phone number. When a caller enters the password and hangs up, the ProModem calls and connects with the remote PC, providing free access to either the buffer or the local workstation.

Beyond the activities supported by the utility, programming the ProModem is no picnic. Using any telecommunications package that provides a terminal mode, accomplishing even fairly simple tasks

(continues)

The Prometheus ProModem 2400 uses an internal programming language and a 512K RAM buffer for stand-alone operation.

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Also available is an "SCSI" interface Mac Scan* for the Apple Macintosh. You can scan, edit and store a variety of Mac desktop publishing applications — MacPaint, MacWrite, Pagemaker, ReadySetGo!, Ragtime and Just Text — and print on your Apple Laser-Writer.

*New Image Technology, Inc.
10300 Greenbelt Road Seabrook, Maryland 20706

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means that you must save long strings of extended AT commands in an area of buffer memory. (Entering 03 O LOGON *3$!! = =D1!=@C30128!@OSOU to log on to The Source is few people's idea of a good time.) Compared to developing and debugging these macros, writing a *Crosstalk* script file looks easy.

Don't expect much help from the documentation. Incomplete, disorganized, and full of jargon, the manual qualifies as one of the worst pieces of technical writing to fell trees. Fortunately, installing the ProModem is a matter of connecting a serial cable and phone lines. A block of ten DIP switches on the bottom of the unit looks threatening, but only three of the switches are active (for selecting carrier detect, data terminal ready, and dumb terminal modes). Like any smart modem worth its salt, the ProModem configures itself in response to telecommunications software commands.

When tested with *PC-Talk III*, the modem captured files from MCI Mail at both 1200 and 2400 bps without a hitch. I also used it successfully when visiting several of my favorite conferences (courtesy of a popular bulletin board called The Well, which happens to support 2400 bps). The device performed equally well when used with *Crosstalk* and *Smartcom II*. However, the device wasn't as happy with *Microsoft Access,* sometimes slipping into auto-answer mode rather than performing auto-dial and auto-log-on functions.

A lesser annoyance is the ProModem's ergonomics. The device's power supply emits a high-pitched whine even when the modem is turned off. And on desks with little space to spare, the 12-inch-by-6½-inch footprint may be excessive.

The ProModem's real benefit is with turnkey applications. Branch offices, for example, could use a remote network of ProModems to set up their own electronic mail system, using batch programs to periodically plug transferred files into workstation applications. Because the modem can stand alone, it's especially appropriate in environments where PCs are at a premium. But keep in mind that you must resort to AT command programming for most specialized needs—a job for those with time on their hands. Unfortunately, the brainiest part of this modem requires the most thought to apply.
—*Ted Nace*

TJ Byers and Ted Nace are Contributing Editors for PC World. *Anita Amirrezvani is an Assistant Editor for* PC World. *Paul Meyers is an independent San Francisco video producer and freelance writer.*

The Master Plan

Eric Bender

Once past the guards, you're in Information Systems territory. The air-conditioned computer room is a corporate gridiron, extending across an entire floor of a financial services firm high above Wall Street. You're escorted past banks of mainframes and enormous blue disk drives to the network control center. Here a supervisor oversees a network of 4000 workstations. He can tell you precisely how long each of the

4000 workers is taking, right now, to type up each form.

International Business Machines' sprawling empire evolved from just such command posts—nerve centers that still regulate the flow of corporate information and typify the Big Blue heartland in this Year of the Customer. But IBM today is so diffuse and diversified that the rubric *typical customer* has lost its meaning.

Even this highly centralized financial services firm has augmented its headquarters' mainframes with hundreds of minicomputers and thousands of personal computers— IBM and otherwise—in offices across the country. And that's just one IBM customer.

As IBM continues its world championship play, the giant will exploit Personal Systems as friendly, useful pawns.

The millions of other users underscore the relentless diversity of IBM's customer base. The shop-floor controller in Akron, the kindergartener in Atlanta, the operator at a naval undersea warfare center, the West German retailer, the engineer at a Japanese telecommunications center—all have their hands on an IBM keyboard.

When IBM rolled out its Personal Systems last spring, the new machines reflected IBM's vision of desktop computing at these customer sites and the multitude of installations around the globe. For the premiere, IBM flew more than 2000 dealers to Miami for wining and dining, beamed the announcement to more than 20,000 domestic customers and employees, and launched a multimillion-dollar ad campaign targeting virtually every potential user in North America.

Yet the PS/2 unveiling doesn't figure to be the year's decisive event for IBM. Instead, 1987's most important milestone concerns the market's acceptance of a new family of small mainframes released last year. IBM is banking on the 9370 products to hold the line against DEC and a phalanx of other competitors.

This is an unusual period in IBM's history; with so many pieces now on the table, there's a genuine chance to see the shape of the PC game—and to gain a sense of what it all may mean to the players in IBM's strategic match.

Blows Against the Empire
Clearly, this is an atypical time for Big Blue. As its annual report acknowledges, "1986 was a difficult year for IBM." During those 12 months, IBM posted what, for it, were disappointing revenues of $51.3 billion. The company, usually the most profitable enterprise in the Fortune 500, fell to 2nd place at $4.8 billion. Of greater comfort to IBM was its ranking on Wall Street's tote board for manufacturing firms; the company's $90 billion book value left all comers in the blocks. Overall, IBM ranks 4th among the Fortune 500, while its closest industry competitor, DEC, placed 44th.

From his headquarters in Armonk, New York, CEO John Akers presides over 400,000 employees worldwide. Dynamic and genial, the 52-year-old

Akers climbed the traditional executive ladder from the ranks of IBM's army of well-trained, well-turned-out sales personnel. That sales force is renowned inside the industry and out—as is IBM's tightly controlled corporate culture, which breeds intense loyalty and high morale.

In the mainframe arena—where IBM has led and not looked back for 25 years—the company nailed down the top spot, thanks to an ability to

> *This is an unusual period in IBM's history; with so many pieces now on the table, there's a genuine chance to see the shape of the PC game.*

move software from one machine to another and to deliver first-class, around-the-clock technical support. Especially at the dawn of the commercial-computing era, IBM's hand-holding proved essential to companies engaged in the daunting switch to automation. Over time, IBM's unique stature has bred a curious dependency among data processing managers; even today customers are reluctant to speak ill of this supplier.

Although its surviving big-system competitors plug along, IBM locks most of the mainframe market in a stranglehold—the only inertia being the current sluggish pace of customer upgrades.

For IBM, the challenge of greatest moment comes from below. DEC has enjoyed a remarkable two-year growth spurt and is now about one-fifth IBM's size. On the face of it, that seems a trifling matter for IBM—as if a still-profitable GM were quaking in its boots at the prospect of an onslaught from Chrysler.

But it's less surprising in view of IBM's historic vulnerability in midrange systems. Unlike DEC and just about everyone else, IBM offers completely incompatible general-purpose minicomputers. Its in-

congruous lineup includes the System/36, designed for easy installation and bulletproof operation as a small multiuser machine; the System/38, optimized as a powerful data base machine; and now the 9370, the low end of the System/370 line. (And that's not counting hardware hangovers like the Series/1 mini, which these days primarily handles data communications, or the anomalous RT PC.)

IBM is now paying the price for dividing and not conquering. Although its installed base of System/3*x* machines is substantial—160,000, by the company's tally—as strategic office systems they're not selling nearly as well as IBM would like.

A Workstation Is a Workstation ...

If mainframes and minicomputers are caught in pitched but predictable battles, the PC has been IBM's soldier of fortune. The PC stood company tradition on its head; it was conceived by a semi-autonomous internal organization, built with third-party components, released with an open architecture, and sold through outside dealers. At first, IBM's core customers weren't exactly sure what to make of the beast or why they should take it seriously. IBM was of little help; the company's early estimates pegged sales at less than 250,000—for all time.

As Salomon Brothers analyst Marc Schulman observes, "IBM did the worst job of market forecasting in the history of American industry—the story of Edsel in reverse. The result is the ultimate irony: IBM, the bastion of centralized computing, legitimized the concept of end-user computing, and did so accidentally."

Former IBMer James D'Arezzo, now vice president of corporate communications at Compaq, helped select an unlikely advertising icon: Charlie Chaplin's Little Tramp. The goal, he recalls, was to "soften the image of IBM as a cold, monolithic ogre while promoting the idea that the machine was approachable and friendly." The campaign worked.

On the coattails of the Tramp, the PC rode into millions of small offices and homes and then began infiltrating larger firms. In time, the PC became big business, eventually evolving into a commodity. That development was particularly distasteful for IBM, which acted to ensure that the word *commodity* would never describe the Personal Systems line.

Down and Out in Armonk?

As IBM planned the PS/2's coming-out party, the company's disappointing overall sales reflected satiation in the mainframe market, vulnerability in minicomputers, and slumping PC demand.
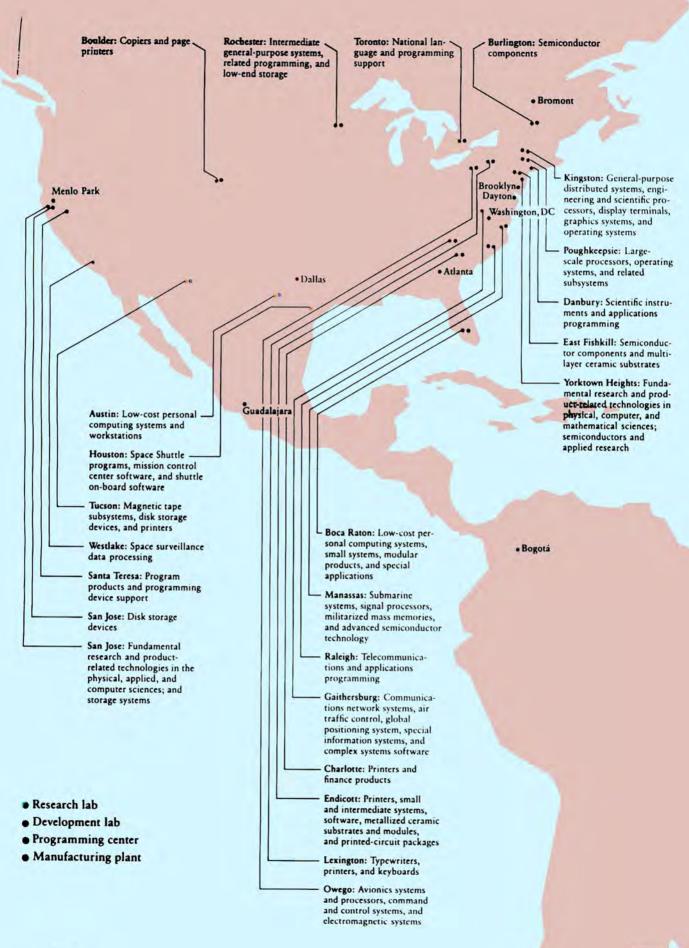
Revenues from office systems and workstations—a category that encompasses small business computers, intelligent workstations, typewriters, and such—dropped from $10.6 billion in 1985 to $9.4 billion in 1986. Outside estimates pegged PC sales at $5 billion for the same period. IBM disclosed only that "gross income from personal computer products declined slightly in 1986 when compared to a record revenue year in 1985."

Prior to the PS/2 rollout, many in the computer industry expected IBM's legendary advantages—sheer size, history, and marketing clout—to wither under an onslaught of new technology. Fundamental change *is* afoot, and some question IBM's ability to adjust. Says office systems consultant Amy Wohl of Wohl Associates, "IBM's corporate culture best understands large customers whose information strategies are
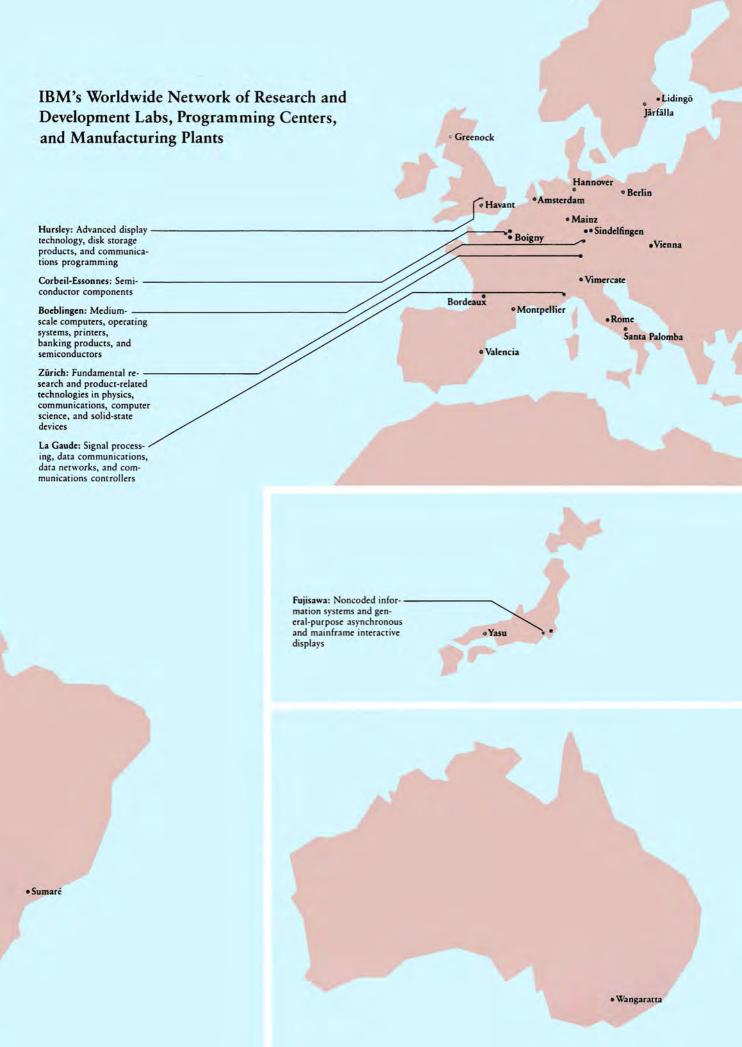
> *If mainframes and minicomputers are caught in pitched but predictable battles, the PC has been IBM's soldier of fortune.*

mainframe-driven, where every decision is based on optimizing the mainframe. I think a lot of IBM customers don't have that strategy anymore."

Partly due to the advent of the PC, "users have become both more knowledgeable and more demanding," Wohl says. "They're not willing to compromise." As Wohl sees it, while Big Blue has been hawking connectivity, users aren't yet buying. "IBM feels that customers should understand that total integration is what really matters," she says. "But if you're a

Boulder: Copiers and page printers

Rochester: Intermediate general-purpose systems, related programming, and low-end storage

Toronto: National language and programming support

Burlington: Semiconductor components

● Bromont

Menlo Park

Brooklyn●
Dayton●

Washington, DC

● Dallas

● Atlanta

Kingston: General-purpose distributed systems, engineering and scientific processors, display terminals, graphics systems, and operating systems

Poughkeepsie: Large-scale processors, operating systems, and related subsystems

Danbury: Scientific instruments and applications programming

East Fishkill: Semiconductor components and multi-layer ceramic substrates

Yorktown Heights: Fundamental research and product-related technologies in physical, computer, and mathematical sciences; semiconductors and applied research

Austin: Low-cost personal computing systems and workstations

● Guadalajara

Houston: Space Shuttle programs, mission control center software, and shuttle on-board software

Tucson: Magnetic tape subsystems, disk storage devices, and printers

Westlake: Space surveillance data processing

Santa Teresa: Program products and programming device support

San Jose: Disk storage devices

San Jose: Fundamental research and product-related technologies in the physical, applied, and computer sciences; and storage systems

Boca Raton: Low-cost personal computing systems, small systems, modular products, and special applications

● Bogotá

Manassas: Submarine systems, signal processors, militarized mass memories, and advanced semiconductor technology

Raleigh: Telecommunications and applications programming

Gaithersburg: Communications network systems, air traffic control, global positioning system, special information systems, and complex systems software

Charlotte: Printers and finance products

Endicott: Printers, small and intermediate systems, software, metallized ceramic substrates and modules, and printed-circuit packages

● Research lab
● Development lab
● Programming center
● Manufacturing plant

Lexington: Typewriters, printers, and keyboards

Owego: Avionics systems and processors, command and control systems, and electromagnetic systems

Martinez●

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Järfälla

Hannover
Amsterdam
•Berlin

° Havant
•Mainz

Hursley: Advanced display technology, disk storage products, and communications programming

• Boigny
•• Sindelfingen

•Vienna

Corbeil-Essonnes: Semiconductor components

Boeblingen: Medium-scale computers, operating systems, printers, banking products, and semiconductors

•Vimercate

Bordeaux
•Montpellier

•Rome
Santa Palomba

Zürich: Fundamental research and product-related technologies in physics, communications, computer science, and solid-state devices

•Valencia

La Gaude: Signal processing, data communications, data networks, and communications controllers

Fujisawa: Noncoded information systems and general-purpose asynchronous and mainframe interactive displays

•Yasu

•Sumaré

•Wangaratta

user department in the hinterlands, making it easy for the guys with the corporate mainframes is not a high priority."

Moreover, integration the IBM way is excruciatingly slow. Customers often face what mainframe competitor and ex-IBMer Gene Amdahl calls a Tower of Babel (see "The Well-Connected PC" in this issue). And users receive only limited help from Systems Network Architecture (SNA), IBM's diabolically complex unification theory.

Still, it's probably not wise to underestimate IBM's grip on these customers or its massive effort to advance the state of the art. "In the 1990s, when we're talking about 100-MIPS machines, the whole world will have to change drastically," says one senior IBM marketing executive. With an intuitive grasp of preventive maintenance, IBM's newest mainframes are already well on their way toward this goal.

Five Steps to Lean and Leveraged

In a bid to shake off its lethargy, IBM is taking some decisive steps.

First, the huge firm is trying to slim down bureaucracy and beef up sales and service. IBM has reshuffled 14,000 employees in the past year and will slash its headquarters' population by 7000 before year's end. By then, IBM also expects to have boosted domestic sales staffing and support staffing by 20 percent over 1985 totals.

That move seems likely to pay off, if the sales force listens to the right people—end users as well as traditional MIS clients. But as Amy Wohl cautions, "It's not clear that IBM does market research in the field or asks the right questions."

Second, Big Blue will take some obvious steps to promote its strategic systems. The company will protect its established mainframes generally and push the 9370 in particular; persevere with the System/36 and System/38 and aim for a machine that merges these two systems by the end of the year; seek a vehicle that works as an engineering/scientific workstation; and firmly establish the Personal Systems.

Third, IBM will also turn up the volume on software, seeking to boost revenue significantly with both system software and an amalgam of vertical-market SolutionPacs. In addition, Big Blue is actively

endorsing ambitious new on-line services tailored to specific industries—networks that will enable customers and suppliers to order products electronically and exploit a range of emerging services.

Bob Berland, IBM head of software products planning, emphasizes that this vision mandates connectivity not just in large corporations but in small concerns as well. "Think of a hardware store with only one PC; the manager will want to connect [electronically] with a distributor to see what's on sale," he says. These visions underline, once again, the need for a massive effort in connectivity.

Fourth, IBM will work with industry partners to explore new markets. The firm is looking for benefits from its investments in other suppliers, led by telecommunications vendor Rolm, whose digital switches represent one option for linking PCs. And Big Blue continues to pursue joint ventures in other fields, such as satellite communications and consumer information services, although its track record in such immature markets is generally poor.

Look also for IBM to step up its advances in factory automation and channel its energies into genres that are currently up for grabs, among them desktop publishing and artificial intelligence.

"IBM's making noise about attacking [the education market]," observes Jeffrey Tarter, publisher of *Soft*letter*. "They may send out a suicide squad to try, but Apple and Tandy own that market completely." IBM keeps in touch with academia largely by seeding MBA and technology programs with PCs.

Fifth, IBM will capitalize on the enormous sums it's plowed into R&D and manufacturing. Big Blue spent $5.2 billion on research, development, and engineering last year. That kind of investment yields world-class results, both in products and in pure science. Recent success stories include a 1986 Nobel Prize in physics to two IBM scientists and some stunning breakthroughs in superconductivity (see the sidebar "R&D: IBM's Trump Card").

The firm also is coming off a massive spending spree for manufacturing plants. IBM may recently have been favoring process over product; high-

powered manufacturing plants need best-selling products to keep them humming. "IBM overinvested in manufacturing technology and underinvested in product technology," Salomon Brothers' Schulman insists.

But once such plants are up, they promise to keep IBM's overhead low. "I can match anyone in manufacturing costs, either in the United States or abroad," IBM Entry Systems president William Lowe claimed last year. "I offset the low labor costs overseas through automation, in investments in my plants here."

There They Go—Again?

IBM expects its investment in Personal Systems to eventually pay off not just in personal computer sales but in sales of other machines and services— because the new workstations are designed to make those other products more accessible and more useful. Viewed from this perspective, IBM's last three years of jockeying in the PC marketplace no longer seem quite so mysterious.

During the PS/2's long gestation, Entry Systems was plucked from its entrepreneurial position, stripped of sales and marketing duties, and thrown in with IBM's Communications Products division under the Information Systems and Communications Group. And the 46-year-old Lowe, who approved the original PC when he was head of an IBM Boca Raton lab, came back to run the shop.

Aside from the key stipulation that the Personal Systems run existing software, their design began with a clean slate. Unlike PC mail-order vendors, for whom machine speed is paramount, IBM sketched a balanced design architecture. The PS/2 features sufficient horsepower and graphics to serve as an intelligent, easy-to-use workstation—just the machine to fill niches all across its empire.

Because IBM now regards graphics as the key to ease of use, every PS/2 model integrates high-resolution graphics. Because networks live and die on reliability, flawless operation proved to be the major justification for 3½-inch disk drives. And because multitasking is mandatory, the Micro Channel bus delivers it—at least a year ahead of software that will support it.

Although IBM exhibited admirable restraint in pitching new hardware standards, it did shuffle the deck in system software; OS/2 starts almost from scratch. "When we began the PC business, I don't think we had more than two or three people in software," says Edward Kfoury, Entry Systems vice president of development. Today, more than half of ESD's engineering budget is devoted to software.

DOS 3.30 will be the de facto system software standard for the foreseeable future, but OS/2 is the bona fide future. Although developed in association with Microsoft, in many ways OS/2 is quintessential IBM software, and opinions vary on its appropriateness.

"It's a joke," declares Philippe Kahn, president of Borland International. "A million-and-a-half lines of code? What are they trying to do, put 'Star Wars' on a PC?"

> *IBM may recently have been favoring process over product; high-powered manufacturing plants need best-selling products to keep them humming.*

Others, however, evince greater optimism. "While questions about OS/2 persist, a lot of things about it are fundamentally very well conceived," says Vern Raburn, chairman of Symantec. "It's a new era in operating systems."

OS/2's pending communications and data management functions aside, ease of use is the critical question for many users. "IBM has got to idiot-proof the machine, and they contend OS/2 will do it," says Tony Graffeo, senior vice president of information systems at Home Life Insurance. "I've got to see that to believe it."

R&D: IBM's Trump Card

Barbara Lee Chertok

At IBM's Thomas J. Watson Research Center, a stunning charcoal edifice chiseled into the landscape in Yorktown Heights, New York, 2400 technical staff members probe everything from voice recognition to mainframes on a chip to 4-megabit RAM to mammoth parallel processors. The project head quips that this last undertaking "might be a huge success, in which case I'll probably stop talking about it in public."

The Watson Center is the nexus of a $5 billion research and development enterprise that extends to five continents. Hundreds of other scientists work in labs scattered around the globe, and thousands of hardware and software engineers are engaged in development efforts. At last count, IBM maintained 4 research centers, 7 programming centers, 26 development facilities, and 41 manufacturing installations. In addition, 15 scientific centers are ensconced within academia in 12 countries.

When you generate $50 billion in annual revenue, taking 10 percent off the top for R&D is just good business. Today, IBM spends on research, development, and engineering nearly twice what it budgeted in 1981, the year the PC debuted. Big Blue treats expenditures for all three activities as a single entity, although each division is separately run and has a distinct mission.

Commercializing this high technology requires a similarly awesome investment. In one instance, IBM poured two-thirds of a billion dollars into a single semiconductor manufacturing plant in East Fishkill, New York.

Despite the massive outlay that fuels it, R&D at IBM has traditionally been a low-profile endeavor—although lately, IBM hasn't been above crowing about the brainpower on its payroll. Recent ads lauding superconductivity pioneers K. Alex Muller and J. Georg Bednorz of the Zurich, Switzerland, research facility contained a telling tag line: "Innovation not only makes breakthroughs possible. It makes better products for our customers possible."

That very ability to foster the leap from idea to product distinguishes IBM from other R&D powerhouses. To be sure, the research labs at Xerox and AT&T are fertile ground for new ideas. But their parent corporations have yet to develop a reliable method of translating discoveries into finished, marketable goods.

IBM is different. It supports both pure and applied research while encouraging communication among research, development, production,

sales—and the customer. But the IBM system does more than simply propagate ideas throughout the company; it regularly propels the fruits of research into product development, then into manufacturing, and finally, into the marketplace. The tough part, of course, lies in reconciling a laissez-faire approach to research with a corporate culture that takes advantage of its best minds.

At IBM, the prevailing model for research (if not development) is academia. Peer review is a regular exercise; papers are published in scientific journals and are often presented publicly. Award-winning scientists preside over IBM's research facilities, although they relinquish ownership of any inventions.

In an effort to keep the focus on research, all facilities are within easy access of academic and other research centers and aren't necessarily bound to IBM's development or manufacturing operations.

The Watson Center, a short drive along the Hudson River from New York City, maintains close ties to Columbia University. The Almaden Research Center in San Jose, California, just south of San Francisco, has similar links with Stanford and the University of California at Berkeley. IBM's Zurich facility supports a host of scientific and technical communities in Europe. A fourth center—the

Tokyo Research Laboratory, administered by IBM Japan—is likewise immersed in the scientific scene in the Far East.

Each research center offers a strong program in the basic sciences: physics, chemistry, mathematics, computer science, and, to a lesser degree, the life sciences. Staff members are free to pursue lines of inquiry that have no direct bearing on existing IBM products or applications.

In addition to the 2400 staff members in Yorktown Heights, the Almaden Research Center employs about 800 and the Zurich Research Laboratory at Ruschlikon some 200. If you can think of an area that warrants investigation, one of the centers is doubtless at work on it, from operating systems and data base machines to LANs, optical storage, natural language processing, and semiconductor fabrication techniques.

The roster of staff scientists runs the gamut of scientific disciplines and includes several Nobel laureates; recent honorees include Gerd Binnig and Heinrich Rohrer of the Zurich Research Center, winners of the 1986 Nobel Prize in physics.

Having insulated its research communities from interference, IBM

(continues)

does its best to foster communication and team spirit internally. In-house periodicals complement professional journals, and the company's R&D sites are linked to each other—and to development and production facilities—by a sophisticated network known as VNet. A PC or a terminal (perpetually on) graces every desk.

Despite the five- and ten-year vistas that are general rather than product-specific, it's possible to discern research areas to which tomorrow's personal computers will be heir—among them, miniaturization, artificial intelligence, network management, and user interfaces. On that last score, one current project seeks to discover why most people can't edit as effectively on a CRT as they can on paper.

Research and development at IBM is a well-fed, if somewhat reticent, giant. Big Blue will remain mum on future breakthroughs, and the tentacles of its research will continue to reach in virtually every direction. But it's instructive to note that IBM separates R from D and treats research as an academic discipline. Such attitudes are probably the secret of Big Blue's success.

Barbara Lee Chertok is a consultant and technology writer based in Boston.

This time, however, IBM isn't kidding, even though the company won't be any quicker at getting the product out the door. Whether software will run on a PC or a mainframe, "our highest priority in everything we're doing is ease of use," says Anthony Mondello, IBM's vice president of office systems. "That's more important than functionality. We're building prototypes, and for the first time we're bringing in real people to test them."

In the stately march of time, IBM eventually will bring huge and highly integrated networks, both private and public, together under its new Systems Application Architecture framework. When that happens, IBM expects the Personal Systems to offer the best network views. The new desktops will run PC applications and work comfortably and reliably with anything else on the network. They'll give you usable information from anywhere in the world—subject to the usual glitches and acts of God.

Who's at the Wheel?

A little closer to home, though, is IBM now positioned to create the next personal computing bandwagon?

"The key long-term strategy for positioning in this industry is the management of standards and open architectures," says Alan Hald, chairman of MicroAge Computer Stores. "IBM has been very, very successful at doing that. Some people say they've lost control. I don't believe that's true."

But beyond IBM's ability to set standards almost by fiat, and beyond its appeal as a strategic partner, what makes an IBM standard successful enough to drive the market?

Any purported IBM standard must be competitive (that is, offer a reasonable price/performance mix), although not necessarily a world beater. A PC Network, an XT 286, or a mixed metaphor like the System/36 PC doesn't qualify (see "A PC Genealogy" in this issue). The Personal Systems do.

IBM must also be serious about promoting the product—and that means more than talking a good game. If words were dollars, *TopView* would have been a strategic gold mine. The Personal Systems rollout removed any doubt about IBM's willingness to bet heavily on the new venture.

> *Although developed in association with Microsoft, in many ways OS/2 is quintessential IBM software.*

Creating momentum behind a standard is a matter of enlisting allies. Software developers quickly hopped aboard the PS/2 juggernaut, at least for DOS applications, principally because they had no reason not to. As IBM gradually released technical specifications to third-party developers, many began developing products in earnest.

Bringing its entire base of independent dealers to Miami for a PS/2 party was a similarly wise move. And because IBM's market share has dwindled, the company has shored up its relationships with dealers.

It's important to note, however, that even those who wish IBM well scarcely want it to recapture its former dominance. Dealers would like IBM to impart stability to the market and push incipient standards like 3½-inch drives, but they don't yearn for bygone days when they lived and died by a single supplier.

Naturally, IBM standards are expected to appeal to its traditional corporate base. Graffeo, who bought 400 ATs the week they were announced, is among the many playing wait-and-see with the new generation. But elsewhere, the stampede has already begun. "Two years ago, all these corporations were pure IBM shops," notes Richard Rabins, president of Alpha Software. "It took them an awfully long time to switch to compatibles. Now they'll scurry back to the IBM nest."

Does that prospect make the Personal Systems a standard for the Fortune 5 million? "I'm convinced that IBM has completely written off the small business market," maintains *Soft*letter*'s Tarter. But others disagree. "With the Personal Systems, IBM has acknowledged that personal computing, defined as stand-alone computing, is real and viable—these are not just smart boxes hung off mainframes," says Vern Raburn.

Among a host of unanswered questions, the most volatile is how much of the new architecture can be cloned—legally. In the weeks following the PS/2 announcement, most compatibles makers laid low, glowering at each other like warriors poised for the first sign of a move. Regardless of what they attempt, the cloning issue will not be resolved soon.

Of course, no standard must be sold before, or after, its time, and here the Personal Systems picture grows murky. IBM has a reputation for superb timing, but with OS/2 still a year away, its hand was, to a degree, forced. The wait for this definitive operating system may yet try users' patience.

Overall, it's doubtful IBM will recapture the driver's seat for the entire personal computer market, but it is likely to remain a driving force. And the PS/2 line seems destined to fill the workstation role that IBM requires to support its customer base. As with the fork in the operating systems path, this arrangement means ever more diverse products.

But that's hardly reason for pessimism among computer vendors and users, according to Margaret Rodenberg, marketing vice president at Entre Computer Centers: "It's no longer a world in which an IBM PC with *1-2-3* is an answer for all applications, and that's good for everybody." ◉

Eric Bender is East Coast Editor for PC World.

Buying IBM: The Mainframe Is the Message

Its recent knocks in the market notwithstanding, IBM remains the vendor of choice for managers in the Fortune 1000. When IBM talks, everyone listens—and many continue to buy.

Steve Cummings

Steve Lyons

As a market-savvy Mark Twain might quip, reports of IBM's death have been greatly exaggerated. Despite its deteriorating PC market share, IBM continues to dominate the computer business and to hold Fortune 1000 computer buyers in a veritable half nelson.

The numbers tell part of the story. According to the Gartner Group, a Stamford, Connecticut, market research firm, IBM rakes in more than 80 percent of mainframe sales and draws the largest single chunk of its income from the mainframe market. Clearly,

monster machines are what IBM values most, and their users constitute the market segment it works hardest to serve. Mainframes also shape IBM's minicomputer and PC strategy and, by extension, a major portion of the computer industry overall.

Although Dataquest, a Silicon Valley market research firm, reports that IBM lost a few notches in the minicomputer market to DEC in 1986, IBM likewise remains that segment's largest vendor (see Figure 1). Personal computer market statistics tell a similar story. PC compatibles have nibbled away at IBM's lead, while

Apple's Macintosh has attracted serious attention as a business machine. IBM's 41.8 percent of the PC market in 1986 was off from 57.6 percent in 1985–a shrinking segment of an expanding pie (see Figure 2). As if to acknowledge this erosion, IBM, which regularly topped Fortune's "Most Admired Companies" list, recently slipped in that ranking.

Just as the PC's initial success took IBM by surprise, the company was taken aback by this recent shift in fortunes–particularly in terms of PCs, where the dynamics of mass market competition scrambled IBM's best-laid plans. But these trends haven't seriously damaged IBM's standing. IBM's unsurpassed marketing muscle, its reputation for product reliability and quality service, and the ineluctable advantage that comes from being number one combine to assure its overwhelming influence in the industry. No other company is as entrenched or has attracted such a massive investment by so many firms; no

other company has comparable clout to determine purchasing and market direction.

Still, IBM radiates an aura that is difficult even for the most loyal partisans to explain. It's almost a Teflon company, its mystique barely tarnished by occasional substandard or incompatible products, premium prices, delayed deliveries, arcane connectivity strategies, and a tradition of aloofness that would sink a lesser firm.

Despite a slippage in PC market share that isn't likely to be reversed quickly, IBM's outlook is hardly bleak. Every sale of a PC compatible entrenches the worldwide IBM standard, even as IBM forges a new and slightly different one. With the Personal System/2 line, IBM has regrouped and unveiled the first family of personal computer products to occupy a strategic place in the company hierarchy. Equally important, IBM's most prized constituency remains staunchly loyal. Ray Weaver, business systems coordinator for TRW's international distribution services in Independence, Ohio, best summarizes the status quo: "We wear blue underwear."

IBM's MIS Appeal

Several months before its PS/2 announcement, IBM proclaimed 1987 The Year of the Customer–a seemingly redundant theme from a company known for its customer appeal. In kicking off the effort, IBM chairman John Akers stressed that IBM's promise to listen more carefully to its customers was not just a slogan. He reinforced that claim by beefing up the direct sales force with 5000 recruits trained to address specific industries–and pledging to redouble IBM's emphasis on service and to be more forthright about the company's plans.

What Akers did not say–and what no one in IBM is ever likely to say publicly–is that not all customers are created equal or treated equally. While IBM would obviously prefer not to write off any market segment, the PS/2 line was built to give aid and comfort to mainstay corporate accounts. With the new machines, the direct sales force will also be delivering

the spoils of the strategic relationship—lavish attention, good prices, and wining and dining.

It's a side of IBM that retail customers simply don't see. Some industry analysts claim that IBM coldly classifies its PC customers as either expendable or nonexpendable. In other words, you're fodder for some other vendor if you don't own or lease an IBM mainframe. "IBM has clearly circled the wagons around [mainframe] customers and all but abdicated the low end of the market to Tandy and the other compatibles," claims Ed Juge, Radio Shack director of market planning.

Within the Fortune 1000, IBM's wares traditionally rise to the top of official procurement lists drawn up by chief information officers, MIS executives, and micro managers. The reasons for corporate fealty to IBM—existing investments in IBM equipment, concerns about connectivity, belief in Big Blue's support and service—are neither startling nor dramatic. But taken together, these considerations have provided a compelling case for IBM and intangible comfort to managers—a situation that shows no signs of changing with the PS/2 family. Jeff Ehrlich, manager of General Electric's productivity technology department, simply calls IBM "the default decision" for micro managers.
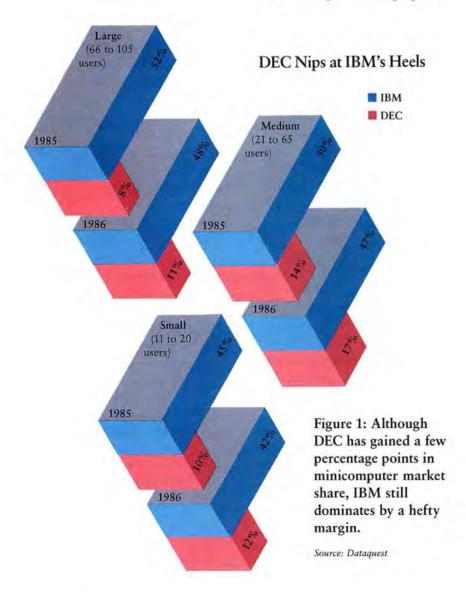
The Great Definer

Because it defines multiple computing standards, IBM can be the safest of choices. When it specifies the placement of keys on a keyboard, the number of pins on a serial port, the size of a floppy drive, or something more substantial, IBM sets the norm. Although buyers grouse about incompatibilities within IBM's world, few defect (if only because compatibles also tend to hum Big Blue's tune).

The PS/2's Micro Channel bus should test that tolerance. Is IBM's security blanket wide enough to cover the installed base of users? Or is the Micro Channel such a radical departure that users will now be forced to choose between two standards?

Vendors who churn out machines based on the older IBM standard have knocked most of the kinks from PC compatibility. The ability to run software like *1-2-3* is virtually a given, but still, the mere suggestion that a machine might balk at a popular program is anathema to managers who have purchase authority for thousands of small systems.

Compatibility can be trickier when connectivity is the goal. Managers who purchase compatibles may inadvertently stray from the IBM straight and narrow—a forgivable sin if all of IBM's technical specs aren't published. But the differences between IBM computers and compatibles may thwart plans to link PCs to one another and to minis and mainframes.

DEC Nips at IBM's Heels

■ IBM
■ DEC

Figure 1: Although DEC has gained a few percentage points in minicomputer market share, IBM still dominates by a hefty margin.

Source: Dataquest

"You have to ask yourself how painful it might be to iron out compatibility problems, and whether you'd be sacrificing the competitive advantage of sharing information," says Gary Gunnerson, manager of the information center at Gannett Company, the national media conglomerate based in Arlington, Virginia. "For us, that's why buying IBM is a better business decision than buying compatibles." At the media giant's headquarters, the Model 50 became the standard within a week of its April 2 introduction.

In particular, IBM's pledge to make OS/2 compatible with its 80286-based machines has revived compatibility concerns about IBM work-alikes. "When OS/2 rolls around you can bet it will use hidden BIOS functions, and 10 to 1 you'll find that new compatibles have problems," Gunnerson says. And Microsoft's plans to license OS/2 as an OEM product aren't apt to allay those fears.

The Critical Link
If PC or PS/2 compatibility is relatively straightforward, connectivity is an enigma. IBM mainframe shops are sticking with Big Blue from top to bottom, convinced that the definitive IBM master plan for all of corporate computing is finally around the corner (see "The Well-Connected PC" in this issue). "We've primarily purchased IBM mainframes and minis in the past, and we think IBM can provide a long-term strategy that takes all of our computers into account," says

John Muller, senior systems analyst at the Campbell Soup Company in Camden, New Jersey. "The benefits of that relationship outweigh whatever we might save in the short run by buying someone else's PCs."

> IBM *is feeding its empire, in part, on promises of connectivity, even as it complicates the picture with new machines to attach and new software to oversee the connections.*

Although the reaction of micro managers to the new machines themselves is likely to be tepid ("The Personal Systems/2 aren't breakthroughs, they're incremental advances," says GE's Ehrlich), IBM seems to be convincing its corporate accounts that the PS/2 is their ticket to connectivity. In cleaving to IBM, the argument goes, you've bought a fighting chance for harmony among connected machines.

At Campbell Soup, where PCs are tied into 3090 and 3081 mainframes and to System/3X midrange systems, the new systems will ease connectivity support headaches. "Before the Personal Systems/2, IBM had us using different standards—dedicated terminals and emulation boards—for our connections. Eventually, we'll be able to use a single box to talk with all our big computers," says Muller.

Eventually, of course, can be a long time coming. IBM is feeding its empire, in part, on promises of connectivity, even as it complicates the picture with new machines to attach and new software

to oversee the connections. Such programming tools as APPC (advanced program-to-program communications) and ECF (enhanced connectivity facilities) have been announced months ahead of their ship dates.

Customers have another protracted wait before OS/2's promise of a seamless web joining micro, mini, and mainframe becomes reality. Notes Gannett's Gunnerson, "We've been burned before waiting for IBM to deliver on connectivity, but the promise offered by OS/2 gives us enough reason to stick it out this time."

One-Stop Shopping
To be sure, other manufacturers—notably Compaq—sell machines that are as reliable, sophisticated, and well dressed as IBM's gear. The difference? Compaq doesn't sell Sierra mainframes. More to the point, no Fortune 1000 company can afford to play fast and loose with its mainframe vendor, and IBM works diligently to see that few want to.

Among those who know Big Blue best, IBM's reputation for service and support is without peer. MIS managers extol the advantages of calling on a single vendor for technical help. "Buying all our systems from one source

means we can rely more on the vendor for support," says Campbell Soup's Muller. "There's none of the finger-pointing you experience if you use one company's graphics board in another company's computer."
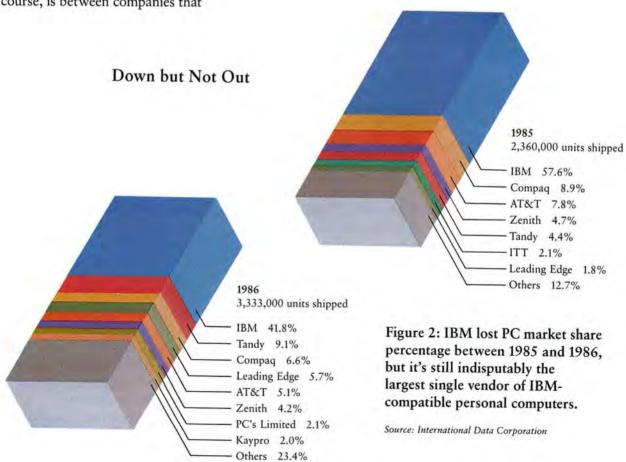
Some managers have come to regard IBM's direct sales force as guardian angels who watch over their every need. Accounts as large as Travelers Insurance benefit from a virtually full-time IBM presence. Says Joseph Brophy, Travelers' senior vice president of data processing, "IBM is extremely responsive to problems, but what really makes the difference is their preventive maintenance. Things just hum."

The dividing line here, of course, is between companies that have a mainframe and those that don't. Scratch a small to medium-size business about IBM's commitment to support, and you're apt to hear a contrary opinion. Ron Whiteside, MIS director at Alumax, a manufacturer of sheet metal products in Riverside, California, says his firm replaced its IBM minis and PCs with Tandy systems because the company found Tandy to be a more responsive vendor.

Even with some seemingly solid mainframe customers, however, IBM is prepared to play hardball. According to one information systems manager, IBM representatives indicated in subtle ways

that mainframe support personnel might be less responsive if the company were to take its major PC business elsewhere. Because smooth mainframe operations are critical, he argues, managers feel compelled to toe the line. "The day is coming when IBM won't be the only safe choice—but not in my lifetime," he laments.

Some maintain that IBM's devotion to support is overplayed. Convinced that users are increasingly comfortable with computer technology, Joe Seidler, marketing

Down but Not Out

1985
2,360,000 units shipped

- IBM   57.6%
- Compaq 8.9%
- AT&T   7.8%
- Zenith 4.7%
- Tandy   4.4%
- ITT   2.1%
- Leading Edge 1.8%
- Others   12.7%

1986
3,333,000 units shipped

- IBM   41.8%
- Tandy   9.1%
- Compaq 6.6%
- Leading Edge 5.7%
- AT&T   5.1%
- Zenith 4.2%
- PC's Limited 2.1%
- Kaypro 2.0%
- Others   23.4%

Figure 2: IBM lost PC market share percentage between 1985 and 1986, but it's still indisputably the largest single vendor of IBM-compatible personal computers.

Source: International Data Corporation

vice president of the network vendor Sytek, suggests they'll no longer flock to IBM "just because it's IBM."

But other managers say that the in-house costs of supporting PC work-alikes is the decisive argument against buying such cut-rate computers. Says Frank Hemmige, information center manager at the Quaker Oats Company of Chicago: "I just don't have enough employees to send them around with solder guns to get every odd machine up and running."

Even in regard to price, IBM is keeping its corporate customers generally contented. Although IBM's list prices remain somewhat higher than those of other PC vendors, volume purchasers often wrangle discounts that render any price differential insignificant. Consider Travelers, whose 20,000 PCs all wear the IBM logo; the company's discount is "good enough so that in many cases [the difference between buying IBM or a clone is] a wash," Brophy says.

Of course, markups don't cover just the cost of goods. IBM may be the industry's lowest-cost manufacturer, but its premium prices reflect substantial outlays for service, support, and marketing. Lacking massive purchasing power, a small business—the fastest-growing player in the PC game—can't command the discounts offered to a Metropolitan Life or a Mobil Oil. According to Doug Cayne of the Gartner Group, because small businesses are far more price-sensitive than large corporate buyers, they're more likely to look elsewhere for hardware.

■ **Cracks in the Armor**
Small business isn't IBM's only area of vulnerability. The company does not retain immutable control of corporate purse strings. When IBM has released weak—and invariably nonstrategic—products, even rocksolid customers have fled (see Figure 2). Both Quaker Oats and Gannett, for example, selected Toshiba laptops over the PC Convertible, citing the Toshiba's superior display and communications capabilities. Businesses large and small have flocked to other manufacturers for low-cost PC peripherals, such as printers and modems. And most shun IBM's application software.

Ironically, IBM's softness in minicomputers may constitute the biggest challenge to its hegemony in PCs. Doubts about how quickly IBM can orchestrate harmony among its diverse systems has induced some companies to build integrated office systems around DEC's VAX line. "In a VAX environment, people aren't as worried about having to use IBM hardware to connect, so compatibles make inroads there," notes Patricia Woo, a research analyst at the Gartner Group.

Even within IBM shops, alternatives to the PC or the PS/2 occasionally make MIS procurement lists, and some departments bend corporate buying policies with or without official sanction. An information center manager for a West Coast utility reports that his office blesses both IBM machines and an AT compatible that costs 40 percent less, and allows users to purchase other systems as their needs dictate. At Gannett, Macintoshes account for one-third of all personal computers; at Bell Research Communications, a

Piscataway, New Jersey, telephone and equipment design firm, some departments have acquired HP Vectras for financial modeling, citing their attractive price/performance ratio.

■ **The Second Stage**
Despite recent slides in corporate earnings and its hold on various markets, IBM remains imposingly profitable. The fissures in its historic customer base are relatively few, and core buyers are largely resisting third-party products that pack more glitz, often at a lower price.

Amid new hardware, software, and would-be standards, IBM faces unusually vigorous competition. At this early stage, its well-oiled outreach to its customers appears to be working. The attitude among managers with a substantial vested interest in IBM is to give the company's nascent product line—and its increasingly elaborate connectivity strategy—a chance. But even though the PS/2 systems are personal productivity platforms as well as workstations, small business may not jump on this bandwagon any time soon. Without question, the contest for users' hearts and minds—and wallets—is under way in earnest. ⬡

Steve Cummings is a freelance writer in Davis, California, who frequently covers high technology.

The Well-Connected PC

You may think of your personal computer as, well, personal. But to IBM, it's just the front line in a large corporate network.

Clare P. Fleig
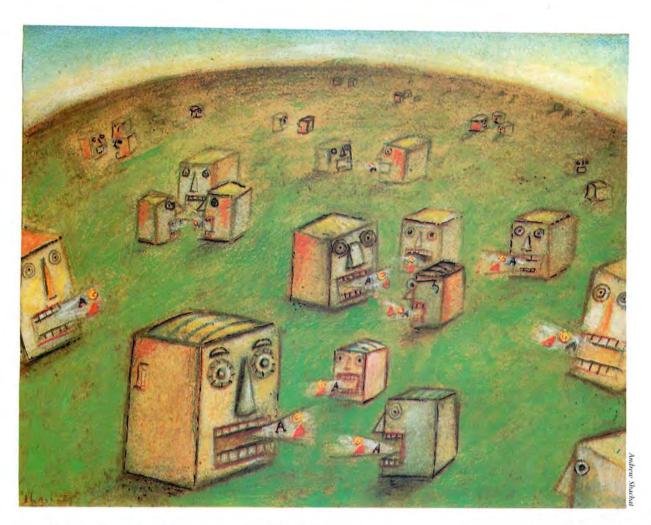
▌▌▌▌ Amid the din of this spring's Personal Systems overture, IBM has quietly changed the rules about how personal computers should be linked to each other and to larger machines. With Operating System/2 (OS/2) leading the way, a score of communications offerings promises both to streamline PC connections and to elevate PCs to junior-partner status on far-flung computer networks.

These bold strokes underscore what has been a two-year metamorphosis in the PC's strategic position: Once a stand-alone product designed and manufactured by an independent IBM business unit, the PC has become fully integrated within IBM's traditional computer and communications hierarchies.

The April announcements capped a succession of product releases that formally began with the Token-Ring local area network in October 1985; all of the products are aimed at tying together machines in large organizations. IBM next tapped the Token-Ring to link the entire family of IBM computers and connect them with Rolm digital phone systems. The company then simultaneously delegated to the PC the responsibility for managing local and corporate networks.

More dramatically, IBM looks to OS/2 Extended Edition to fuse the personal computer into Systems Network Architecture (SNA), IBM's entrenched framework for large computer networks. The Extended Edition, whose shipment date IBM has not disclosed, will bundle SNA-style communications and data management functions into OS/2. In IBM's view, this is a crucial step—no matter what is attached to a big computer network, the communications scheme must revolve around SNA (see the sidebar "Talking a Big Blue Streak").

None of these technical underpinnings is directly visible to PC users, but those in medium and large corporations can anticipate

tangible payoffs. Ultimately, users will be able to prevail upon a familiar interface to access data in seconds, whether that data exists locally, is buried deep within the corporation, or resides in a data base halfway around the globe. Of course, given the complexity of the IBM world, this happy situation is likely to evolve at a glacial pace.

Net History

IBM's networking strategy parallels its from-the-top-down data processing history: First came mainframes, then minicomputers, and finally personal computers.

The earliest hookups let the PC emulate 3270 terminals and thereby connect to IBM System/370 mainframes. Similar capabilities for 5250 terminals followed, enabling PCs to tap into IBM's System/3x family of

minicomputers. In August 1984 the PC Network gave users an IBM-sanctioned means of interconnecting PCs.

But the ultimate goal for IBM's large corporate customers was always wide area network (WAN) communications under SNA. After three years of watching IBM's PC networking products, even casual

Talking a Big Blue Streak

3270 emulation
Software and adapter boards that together enable a PC to emulate a 3270 terminal.

3270 personal computers A specialized family of PCs configured for 3270 emulation.

5250 emulation
Software and adapter boards that together enable a PC to emulate a terminal for System/3x minicomputers.

ACS Asynchronous Communications Server. Typically, a networked PC connected to several modems, offering workstations in the network access to outside networks, on-line services, and other devices.

APPC Advanced Program-to-Program Communications. An SNA-based protocol that enables mainframes, minis, and PCs to communicate as peers. (APPC includes both LU 6.2 and PU 6.2 protocols.)

Baseband A transmission scheme with only one channel.

Broadband A transmission scheme that can handle multiple channels simultaneously.

CBX Computerized branch exchange. A digital PBX voice- and data-switch network marketed by Rolm, an IBM subsidiary.

DCA Document Content Architecture. A standard defining a common format for encoding boldface, italics, margins, indents, and other attributes in documents.

DDM Distributed Data Management. A software-based method for accessing data on different machines on an SNA network.

DIA Document Interchange Architecture. A standard "envelope" for transferring DCA documents.

DISOSS Distributed Office Support System. A set of office system services available on mainframes, departmental computers, and PCs.

ECF Enhanced Connectivity Facilities. Software that links PCs with a mainframe host operating under MVS or VM. It enables users to access host data without knowing host data formats.

Ethernet A high-speed, broadband local area network developed by Xerox, Digital Equipment, and Intel in 1979.

Juniper A Rolm-made PC adapter board, digital telephone, and software that together provide voice and data communications over twisted-pair wiring in a Rolm CBX environment.

LAN Manager
System management software for the PC Network and Token-Ring local area network.

MVS Multiple Virtual Storage. A mainframe operating system.

NETBIOS Basic input and output instructions in ROM on each PC Network and Token-Ring local area network adapter board; the network interface for application software.

NetView A host-based network management system for monitoring data and voice traffic, diagnosing problems, and controlling information across systems.

NetView/PC The PC-based portion of the NetView software, which primarily handles monitoring and record-keep-

ing tasks for large computer and voice networks.

OCA Open Communications Architecture. A set of specifications for opening the SNA environment to outside vendors' products and to voice traffic.

OS/2 Operating System/2, developed jointly by IBM and Microsoft. The next-generation operating system for the AT, AT compatibles, 386-based systems, and the Personal System/2 family (excluding the Model 30). The as-yet-unreleased OS/2 Extended Edition will add a wealth of communications and data base management features closely linked to SAA and SNA.

PC local area network program Operating system software for IBM PC Networks and PC. Token-Ring local area networks.

PC Network IBM's first business-oriented PC local area network, now offered in both broadband and baseband configurations.

PROFS Professional Office System. One of IBM's two main host-based office-system environments.

Rolmphone A set of digital PBX telephone products designed and marketed by Rolm, often equipped with the Datacom module, which provides simultaneous voice and data on twisted-pair wiring.

SAA Systems Application Architecture. A new scheme for coordinating applications across IBM's micro, mini, and mainframe product lines.

SNA Systems Network Architecture. First introduced in 1974, IBM's master set of network protocols and interfaces for sharing data with IBM computers.

System/34-38 IBM's family of minicomputers, also known as midrange or departmental processors. IBM tailored the System/36, the System/34's successor, for ease of installation and use. The System/38, which is incompatible with the other two, was designed to offer particular advantages as a data base machine.

System/370 The predominant IBM mainframe line. It includes, in descending order of

power, the 309x, 308x, 4300, and 937x families.

Token-Ring local area network IBM's strategic local area network, which connects PCs to one another or (often indirectly) to larger systems. The name refers to a network scheme in which a single "permission token" passes from station to station in a loop; a station can transmit data only when it possesses the token.

Twisted pair Two insulated wires wrapped around each other, commonly used for telephones.

VM Virtual Machine, a mainframe operating system.

Wide area network A voice or data network that connects distant locations.

X.25 An international protocol for packet-switched networks, established by the CCITT (Consultative Committee on International Telephone and Telegraph).

X.400 An emerging standard for the transmission and reception of electronic mail messages, promoted by the CCITT. —C. F.

observers can clearly trace the steps the firm has taken toward that promised land.

IBM currently offers three PC local area nets: the PC Network in both twisted-pair baseband and coaxial broadband versions, and the Token-Ring, which supports various cabling options. Although all run under the same network system software and offer application software the same NETBIOS interface, the three LANs are distinguished by the technology they use and the markets they target.

The 2-megabit broadband PC Network, announced along with the PC AT, began the first phase of IBM's PC net strategy. From August 1984 to October 1985, the PC Network enjoyed modest popu-

Division had publicly committed to the Token-Ring as the primary corporate network as early as 1983, that more versatile and powerful network always loomed as the company's preferred long-term offering.

The second phase began in October 1985, when IBM officially unveiled the 4-megabit Token-Ring. The PC Network was quickly relegated to small business use, vertical applications that tapped its potential for video transmissions, and nonstrategic corporate jobs.

In no time IBM was aggressively touting Token-Ring as the corporate LAN of choice, emphasizing departmental applications—which frequently meant nothing more

tures. This proclamation accelerated the shift away from PCs and LANs as independent local systems. It underscored IBM's view of the PC as part of a vastly larger family, with the Token-Ring as one piece of a wide area network that also incorporated host mainframes, departmental systems, and Rolm digital phone systems (see Figure 1). IBM further defined this new path when it announced OS/2 and its myriad communications adjuncts.
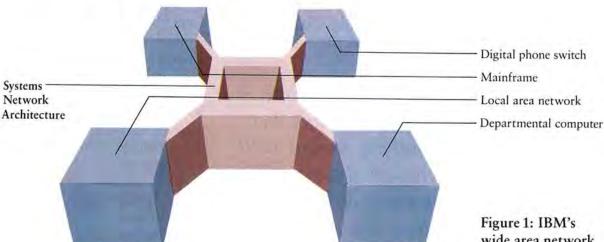
◼ Welcome to Enterprise Networking

So what will this flood of statements, standards, and software eventually provide? For IBM and its core of committed Fortune 1000 users, the goal is now *enterprise-wide* networking. IBM describes this as end-to-end control and management of communications within a corporation. Here, end-to-end can be as ambitious as linking facilities across the United States or around the world.

This goal requires five basic elements: large host-based networks, flexible network configurations, linking devices that are ignorant of SNA, peer-to-peer communications, and traffic control and management for voice and data. In the real world, these elements exist in varying degrees; peer-to-peer links are generally conspicuous by their absence.

In an enterprise-wide environment, the PC performs two crucial roles: data entry and transmission, and network management.

For data entry, choices abound. Data enters via a PC attached to a LAN, a 3270 PC, a PC using a 3270 or 5250 emulation program,

> *Users will be able to prevail upon a familiar interface to access data in seconds, whether that data exists locally, is buried deep within the corporation, or resides in a data base halfway around the globe.*

larity, particularly among corporations in dire need of PC links and intent on cleaving to IBM. The PC Network never topped the charts because it was simply too pricey and technically temperamental for many users, who opted instead for third-party LANs already on the market.

More important, the PC Network never received IBM's blessing as a strategic product. Because IBM's Communication Products

than a shared printer or hard disk. In particular, IBM's vaunted direct sales force worked vigorously to position the Token-Ring as the showpiece among IBM LANs.

A third network phase formally began in September 1986 with IBM's statement of direction on Open Communications Architec-

Major Routes Within Systems Network Architecture Environments

Systems Network Architecture

Digital phone switch

Mainframe

Local area network

Departmental computer

Figure 1: IBM's wide area network environment combines mainframes, departmental computers, local area networks, and digital phone systems—all under the umbrella of Systems Network Architecture. Personal computers may latch onto the network through any of these routes.

or a PC linked to Rolm's CBX digital telephone switch.

Two software building blocks, which have corresponding components on midrange and mainframe computers, are key to the PC's data swapping abilities: Enhanced Connectivity Facilities (ECF) software and the Advanced Program-to-Program Communications (APPC) interface (see "Peering Into the Future With LU 6.2" and "3270: IBM's Extended Family," *PCW*, June 1986).

IBM is marketing ECF as a transparent interface between the PC and a mainframe running under the MVS or VM operating system. In its current incarnation, ECF is a fast, streamlined micro-to-mainframe link that will begin to replace both the current 3270 emulation programs and third-party micro-to-mainframe packages such as DCA's IRMA board

software. ECF is thus the foundation on which 3270 emulation and file transfer software will be built.

Better still, ECF provides conversion mechanisms for sending information transparently across an entire SNA network, regardless of where the data originated. This capability will enable PC users to locate host data without knowing how the host stores it, and to receive that data in familiar form within a PC application. The necessary file conversions will be handled automatically in the background under ECF control.

APPC performs a related function by treating the PC as a peer on an SNA network, thereby enabling the PC to do much more than just take dictation from the host. Endowing PCs and minicomputers with this capability signals a dramatic shift away from SNA's original hierarchical structure. APPC, also known as LU (Logical Unit) 6.2, is at the root of IBM's plans to exploit the power of every networked machine.

Because few shops stock IBM gear exclusively, the company's long-range plans also call for the incorporation of industry-standard connections as appropriate, including Ethernet, International

> *In its current incarnation, ECF is a fast, streamlined micro-to-mainframe link that will begin to replace both the current 3270 emulation programs and third-party micro-to-mainframe packages such as DCA's IRMA board software.*

Standards Organization communications models, TCP/IP, and CCITT communications standards (including the X.25 packet-switch network interface and the X.400 electronic mail interface). Theoretically, IBM machines and third-party hardware will be able to converse as peers—assuming someone writes APPC-style software for specific non-IBM hardware.

Even as IBM works to establish a translation-free dialogue between micro and mainframe, it has assigned a key network management role to the PC. The focal point is *NetView/PC*, a network management facility released in May 1986 that serves as a touchstone for voice/data management and record collection. *NetView/PC* bridges SNA applications and non-SNA data and voice network components, supports local and remote operations, handles base network management, and performs other services.

Office Offerings

At the mere mention of connectivity, IBM executives will pepper a discussion with references to office automation (OA) software —even though OA products are applications, not communications fare. In this realm, users face yet another bewildering blizzard of protocols and product offerings.

Those engaged in PC-based word processing are apt to be familiar with one IBM office standard: Document Content Architecture (DCA), a format that often helps out when documents must be shipped between incompatible applications. (IBM plans to extend DCA to handle voice and image data as well.) In IBM-equipped environments, DCA goes hand in hand with Document Interchange Architecture (DIA), an established way to package DCA documents for transmission.

DCA, DIA, and a pile of other building blocks all help fashion IBM's two grand suites of office system software, PROFS (Professional Office System) and DISOSS

(Distributed Office Support System), each of which offers document handling, editing, forwarding, and storing services.

PROFS garnered headlines earlier this year as the system that National Security Council staffers relied on for writing and sending memos. PROFS earned the distinction of being more effective than these users wanted, storing backups of documents that they probably thought they'd never see again.
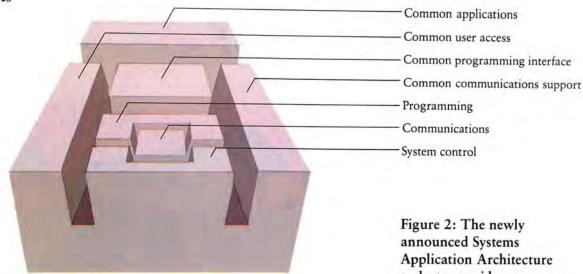
PROFS and DISOSS offer roughly similar services—PROFS on mainframes running the VM operating system, and DISOSS on mainframes running other operating systems and on departmental computers. IBM is currently forging connections between the two dissimilar offerings.

SAA Brothers

With its enormous installed base of incompatible hardware, IBM must cope with the world's largest computer-support headaches. And continuity is critical: As IBM strives to minimize customer upgrade pains, nothing in its product line ever vanishes completely. In the latest personal computer product barrage, for example, the *3270 Workstation Program* usurped the fancy 3270 emulation formerly performed by the now-moribund 3270 PC.

Developers looking to exploit the possibilities in this arcane world face seemingly endless layers of software and a confusing and conflicting mix of programming interfaces. IBM not only wants to hack through this jungle of incompatibilities—it must.

Systems Applications Architecture Components

Common applications
Common user access
Common programming interface
Common communications support
Programming
Communications
System control

Figure 2: The newly announced Systems Application Architecture seeks to provide users with a familiar environment, whether they're working on a personal computer, a minicomputer, or a mainframe. This Herculean task requires commonality among four software components: application, user access, programming interface, and communications support.

Last March IBM took a major step forward with the definition of Systems Application Architecture (SAA). SAA is SNA's counterpart in application software: a set of rules for developing common user and programmer interfaces—and common applications—across PC, midrange, and mainframe systems (see Figure 2).

In the long run, SAA promises to provide cohesive operation within any SNA network, enabling all users—whether on a PC, a terminal, or a telephone—to call any other system on the network. Additionally, SAA will supply programmers both inside and outside IBM with a consistent world for application development.

Designed as an SAA software foundation for personal computers, OS/2 will be among the first offerings to reflect this grand plan. SAA's long march toward commercial reality will truly begin when IBM releases the architecture's technical specifications to developers late this year.
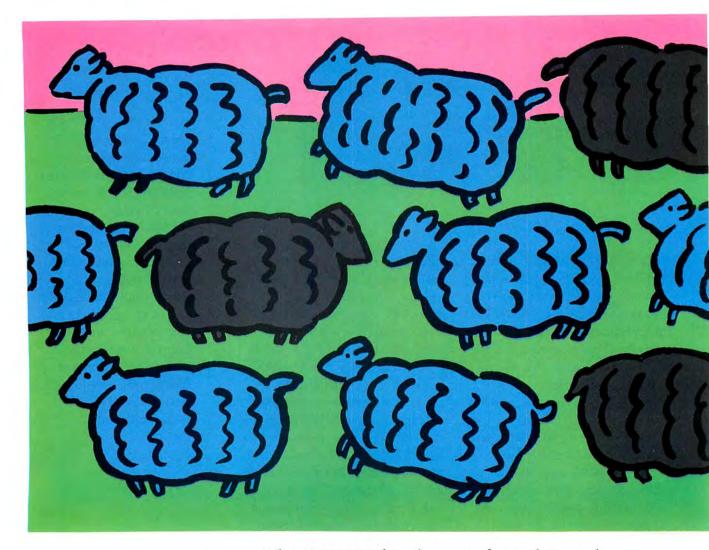
The creation of a single user interface that spans all systems, regardless of their size or architecture, has been an IBM promise for decades. We'll be well into another decade before that promise is kept and the PC becomes a full-fledged member of the IBM fold. But today, Big Blue can point to the software ground rules and the hardware architectures that will, at long last, make connectivity something more than a buzzword. ●

Clare P. Fleig, the director of systems research at International Technology Group in Los Altos, California, is a longtime IBM watcher.

A PC Genealogy

The IBM PC family has had its share of breadwinners and Willy Lomans. However, as this informal genealogy reveals, the PC's popularity has been a source not only of the family's fortunes but of its failures.

Judy Getts

IIII "The elephant can tap-
dance!" cried the masses
when IBM, longtime vendor of
gargantuan mainframe computers,
rolled out the nimble PC. Hackers
dropped their soldering irons and
programmers danced a jig, while
jaded IBM watchers pondered the
possibilities of a personal com-
puter that could access 256K of
memory and store an astounding
160K on a single floppy disk.

Largely assembled with tried-
and-true components, the PC con-
firmed that Big Blue's first priority
was providing old-fashioned relia-
bility, the kind that plays well
with small businesses and Fortune
500 firms alike. The system relied
on Intel's 8088 microprocessor
(which had previously served time
in everything from traffic control
computers to microwave ovens)
and proven floppy disk drives
(later, hard disk drives) made by
other manufacturers—even though
IBM practically invented floppy
and hard disk technology. Still, the
company could rightly claim at its
August 1981 debut that the PC
was a technological breakthrough
that could, said one IBM engineer,
"still meet a five-year maintenance
schedule."

The personal computer industry
fell back in awe—then recast itself
in IBM's image.

Big Blue Boo-Boos
Since those heady days in
the early 1980s, IBM's reputation
as a savvy, trailblazing personal
computing demigod has been
knocked around more than a
roller derby queen. IBM-bashing
has always been good clean fun
(especially for envious com-
petitors), but Big Blue has de-
served much of the ribbing. The
company followed the PC's gang-
buster success with a ragtag col-
lection of systems ranging from
the ho-hum Portable PC and mis-
begotten PCjr to the glitchy AT
and the anticlimactic PC Convert-
ible. Although some of these ma-
chines had their winning ways,
most were notable only for their
lack of distinction. Except for the
AT, none broke new ground.
Worse still, they were often over-
priced and late to market.
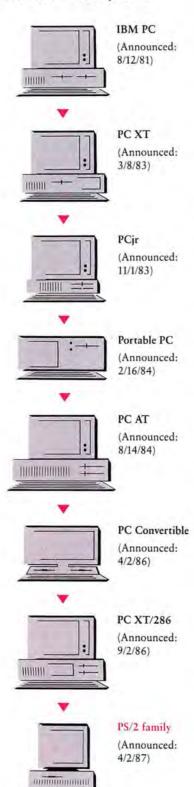
Of course, when you're the big-
gest computer company in the
world and you've got a runaway
success, you can do pretty much
as you please—for a while. The
numbers tell the tale: As late as
1983, the IBM PC owned a whop-
ping 85 percent of the MS-DOS
computer market. But IBM
couldn't keep up with user de-
mand for machines and innova-

tion. While back orders piled up,
the Compaq Portable slipped onto
the scene and lured away hungry
buyers. By 1984, over 50 compa-
nies were flooding the market
with PC and XT compatibles. By
the end of 1986, IBM found itself
surrounded by a pesky swarm of
dirt-cheap AT clones, its market
share whittled to just 48 percent.
Worse still, Big Blue was upstaged
by the Compaq Deskpro 386, the
first major desktop computer
based on Intel's 80386 micropro-
cessor (see "Compaq Deskpro
386: Dare to Be Great," PCW, Jan-
uary 1987).

Why did the elephant trade in
its tap shoes for galoshes? By some
accounts, the PC was too suc-
cessful, discouraging IBM from
taking risks with new systems.
Other observers say IBM's trou-
bles were the natural result of
marketing myopia mixed with
hubris. Given IBM's penchant for
secrecy, the real story may never
come to light. But the genesis of
the PC provides some clues.

IBM's Firstborn
IBM jumped into the per-
sonal computing fray like an en-
trepreneur with more inspiration
than money. The company as-
sembled a SWAT team of a dozen

A PC Bestiary:
The Good, the Bad,
and the Awfully Late

IBM PC
(Announced: 8/12/81)

▼

PC XT
(Announced: 3/8/83)

▼

PCjr
(Announced: 11/1/83)

▼

Portable PC
(Announced: 2/16/84)

▼

PC AT
(Announced: 8/14/84)

▼

PC Convertible
(Announced: 4/2/86)

▼

PC XT/286
(Announced: 9/2/86)

▼

PS/2 family
(Announced: 4/2/87)

engineers at the Boca Raton, Florida, facility and hammered out the PC's specifications in less than a month. The group was then christened an independent business unit and given carte blanche to get a machine out the door by August 1981.

Naturally, that meant committing heresies—using non-IBM hardware, opting for an open system architecture (and later publishing the technical specifications for third-party hardware and software vendors), and contracting with a couple of college dropouts named Bill Gates and Paul Allen to write the operating system.

By IBM standards, the risks were minor and the expense a mere blip on the balance sheet. Company strategists never expected the PC to end up on corporate desktops. They saw the machine appealing to the same crowd buying the Apple II: hackers. In fact, Big Blue prognosticators expected sales to top out at 250,000 units—a figure so meager that some of IBM's high-rolling marketers refused to handle such a puny account. The rest, as they say, is history.

IBM eventually sold over 3 million PCs, and not just on the strength of its familiar logo. The not-so-little beige box packed 64K, a 16-bit 8088 microprocessor, and a five-slot bus; it could be equipped with 544K of RAM, two 160K drives, and a sharp monochrome monitor. IBM's clever ads featuring the Little Tramp blithely balancing the books and running a factory with the PC made the message clear:

The PC was a serious machine that any business person could master. IBM seemed determined to lead the pack for some time to come.

■ The Not-So-Great Leap Forward

Even so, IBM didn't quite know what to do next with its cash cow. In the meantime, Compaq released the first portable PC (complete with a text and graphics monitor), while Corona Data Systems offered the Corona PC with an internal 10MB hard disk and 512K on the motherboard.

When the XT—the "extended" PC—was released in early 1983, experienced users could barely stifle their yawns. As one blasé industry executive said at the time, "IBM's products are always more exciting before they're released." The system offered up to 256K on the motherboard (instead of the PC's 64K), an internal 10MB hard disk, and a 130-watt power supply, for a hefty $4995—$500 more than a comparably equipped Corona PC. Although the three magic initials eventually pulled in over 2 million buyers (making the XT the second most popular member of the brood), the market's love affair with the PC was beginning to cool.

According to Michael Goulde, a senior analyst with the Yankee Group in Boston, IBM was responding "more to market opportunities than market pressures." Unfortunately, the XT was merely the first in a series of IBM machines to raise hopes, dash expectations, and keep dealers waiting. In response to overwhelming demand, IBM decided to expand production—in 1984.

Dreams of the Blue Turtle
Nonetheless, the XT was a healthy success—so much so that IBM was inspired to expand the family. At the same time, it feared that any new children would cut into PC and XT sales. The result was a textbook example of what happens when a company works at cross-purposes.

According to Will Zachmann, vice president of corporate research at International Data Corporation, the powers at ESD mistakenly assumed that the PC's stellar success was due to their own marketing prowess, the power of the IBM logo, and the memorable Little Tramp. Adds Zachmann: "The Portable PC and the PCjr proved that theory flat wrong."

Introduced in February 1984, the Portable PC was IBM's tardy and halfhearted response to the Compaq Portable. Weighing in at a back-bowing 30 pounds, the Portable included five more slots

"IBM made the mistake of assuming that the Compaq was successful merely because it was portable—not because IBM didn't have enough PCs to meet user demand," says Andrew Seybold, editor in chief of *The Seybold Outlook on Professional Computing*. "And then they crippled the Portable intentionally so it wouldn't impact PC sales."

Not surprisingly, the Portable never gained a foothold in an already crowded portable computer market. The machine limped along for 16 months before IBM quietly put it out of its misery.

And Baby Makes Two
IBM's misreading of the market was nowhere more apparent than with the PCjr, which hit the streets in January 1984. Instead of delivering a much-needed second business computer for running spreadsheets and word processors at home—a role the Compaq frequently filled—IBM aimed

lacked slots that could accommodate the burgeoning number of expansion boards for the PC. Home users put off by a price tag starting at $699 stuck with their Ataris, while serious users opted for more capable compatibles.

IBM hurried to the rescue with a multimillion-dollar ad campaign, another 128K of RAM, a second disk drive, and a redesigned keyboard modeled after the Selectric's. It even convinced Lotus Development to give away copies of *1-2-3* for the Jr to registered owners of the PC version of the program. But the public wasn't buying.

Relentlessly, IBM drove on—more promotions, contests, direct-mail campaigns, rebates, price reductions, and Christmastime fire sales—but sold only an estimated 530,000 units. In April 1985 IBM stopped production of the PCjr. Shortly thereafter the company took out newspaper ads declaring, "If you own a PCjr, you can be sure it is still a well-cared-for member of the IBM PC family." Cared for, perhaps—but permanently retired.

> *The XT was merely the first in a series of IBM machines to raise hopes, dash expectations, and keep dealers waiting.*

than the Compaq (four were "short" slots, and one didn't work) and 256K of RAM on the motherboard. The unit curiously lacked a parallel port (standard on the Compaq), didn't support hard disks, and featured an amber monitor that supported CGA graphics but couldn't produce the crisp characters of the PC's Monochrome Display.

the Jr at the massive (and slippery) home computer market. As the Chuck E. Cheese of the PC family, the Jr had 64K of RAM, a color monitor, joystick ports, game cartridges, an optional 360K disk drive, and a mushy Chiclets keyboard that interfaced with the system unit via an infrared beam.

To ensure that the Jr didn't encroach on its big brother's sales, IBM purposely gave the machine only an approximation of PC compatibility. Worse still, the box

The AT Generation: The Best and the Buggiest
As market analysts, competitors, and the computer press gleefully sharpened their barbs for the next Big Blue Blunder, IBM released the PC AT (Advanced Technology) and showed the skeptics that it still knew a thing or two about personal computers.

The big box debuted in August 1984, exactly three years after the

PC. Built around Intel's 16-bit 80286 microprocessor, the AT could dash through computing chores while the XT was still slipping on its work gloves. According to conventional (if mistaken) wisdom, the AT's minicomputer-like CPU would spur developers to new heights and make expert systems and desktop multitasking a reality. The PC family would at last have a leader worthy of the clan.

The AT's formidable eight-slot chassis took the concept of expandability to the limit. With enough lucre in hand, you could add 3MB of RAM and up to three disk drives to the unit (including a speedy 20MB hard disk drive and a 1.2MB floppy disk drive). And after years of customer complaints, IBM finally got the keyboard right, enlarging the <Enter> and <Shift> keys and relocating the backslash key, <PrtSc>, and <Esc>. IBM was so confident about its youngest offspring that it generously extended the product warranty from 90 days to a full year. As some AT users would soon discover, the extra coverage came in handy.

Getting the AT to dealers, however, was another story. As analyst Michael Goulde notes, "IBM didn't have any sense of what the future had in store when they designed the PC—but by the time the AT was introduced, they should have known better." Once again the company underestimated demand and ruefully informed dealers that shipments would be late.

Even more damaging were troubles with the AT's 20MB hard disk drive. Users discovered that good disk sectors suddenly and mysteriously went south, taking precious data with them. Fingers

were pointed at CMI, manufacturer of the drive, then DOS 3.00, and finally Western Digital, maker of the drive's controller board. As reputations left and right were being bashed (especially CMI's), IBM denied that any problem existed—but recalled the disk controllers anyway. By the time Western Digital confessed that a faulty Texas Instruments chip on the board was to blame, the public had lost faith in the AT.

As IBM's momentum dwindled, clone makers from Texas to Taiwan brought out swifter, bigger, or cheaper 80286 machines and gobbled up the market. In the next three years, IBM sold an estimated 650,000 ATs domestically—only 120,000 more units than the star-crossed Jr. The elephant's tap shoes, it seemed, were made of clay.

◼ PC II: Advanced Vaporware

The dust had barely settled on the AT fiasco when IBM decided to yank the leash on ESD. Don Estridge, the man behind the PC, was "promoted" to a corporate slot in early 1985 and replaced with William Lowe, a chain-of-command guy. At the same time, ESD was slowly but surely absorbed into the corporate sponge. With so much money on the line, says Goulde, "ESD had to play ball with the corporation."

The turning point came when IBM moved ESD from Boca Raton to a site in Montvale, New Jersey, just across the river from corporate headquarters. It was then, says Goulde, that planning for the PC line became "completely muddled."
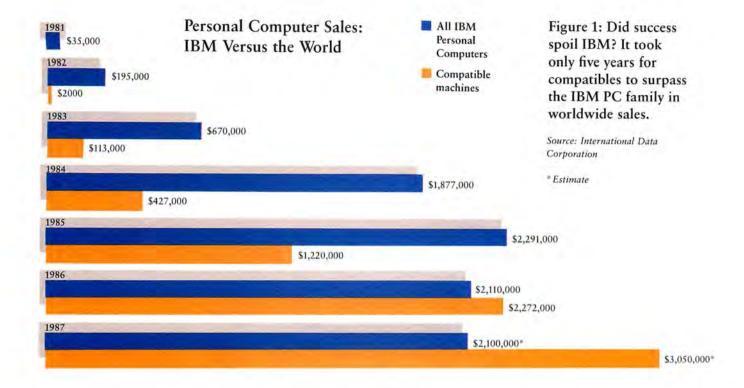
The first casualty during this uncertain period was the PC II. A scaled-down AT with an 80186 microprocessor and either two or four expansion slots, depending on who you believed, the PC II was allegedly on the verge of production throughout 1985. When the rumors reached a crescendo in July 1985, William Lowe announced that the PC II did not exist. Some industry insiders swear they saw the machine but contend that Lowe, still new to the personal computing fracas, deep-sixed the project in an effort to get a handle on ESD's market strategy.

Whatever the real story, faith in IBM continued to erode. True Blue customers increasingly turned to companies such as Compaq and PC's Limited for innovation and performance. "Up until about a year ago, there was a strong predisposition among our clients to go with the IBM PC family," says David Ferris, chairman of Ferrin Corporation, a San Francisco-based Fortune 1000 computer consultancy. "But since then, IBM has simply lost its appeal." By 1986, worldwide sales of compatible machines surpassed IBM's by more than 100,000 units; if 1987 trends continue, compatibles will outsell the PC line by nearly a million units (see Figure 1).

◼ Brave New PCs

IBM's track record since the debut of the AT has been spotty. The Enhanced AT (featuring an 8-MHz 80286 and yet another keyboard) pulled into market well behind faster peers. The PC Convertible, IBM's tardy entry in the laptop wars, is a solid, reasonably priced machine that has failed to inspire the masses. And in the

Personal Computer Sales: IBM Versus the World

Legend:
- ■ All IBM Personal Computers
- ■ Compatible machines

1981
- All IBM: $35,000

1982
- All IBM: $195,000
- Compatible: $2000

1983
- All IBM: $670,000
- Compatible: $113,000

1984
- All IBM: $1,877,000
- Compatible: $427,000

1985
- All IBM: $2,291,000
- Compatible: $1,220,000

1986
- All IBM: $2,110,000
- Compatible: $2,272,000

1987
- All IBM: $2,100,000*
- Compatible: $3,050,000*

Figure 1: Did success spoil IBM? It took only five years for compatibles to surpass the IBM PC family in worldwide sales.

Source: International Data Corporation

* Estimate

"Why did you make that?" category sits the XT/286, an expensive, incongruous hybrid that mates the AT's motherboard with the XT's chassis, which is too small to hold AT boards.

Despite IBM's miscalculations, few expect the PC family to end up on Tobacco Road. But in a business where the fastest draw often prevails, IBM continues to grope for its holster. One reason is that "IBM has lost its leadership role in technology," says Jonathan Rotenberg, head of the Boston Computer Society.

More to the point, IBM has failed to truly grasp the PC family's potential, adds Safi Qureshey, president of AST Research. "We knew that the PC's home would be in corporations and that it would have to coexist with minicomputers and mainframes." Not surprisingly, AST's synchronous communications board beat IBM's to market by a year and a half. Looking at the PC in a corporate

light has paid off: AST sold 2.5 million PC expansion boards between 1981 and 1986. Hercules, Digital Communications Associates, Tecmar, Key Tronic, and a clutch of other vendors have also built small empires on IBM's shortsightedness.

And what of the freshly minted Personal System/2 line? According to Andrew Seybold, this new family of 8086-, 80286-, and 80386-based machines signals a radical shift in IBM's mainframe mentality, a change wrought by the growing corporate stature of ESD. "IBM is finally admitting that the desktop is the future."

Well, maybe. The PS/2 line offers some nice touches—bigger hard disks, 1-megabit RAM chips, a faster bus, and superior graphics. But IBM's product announcement was strangely familiar: Most versions of the 80386-based Model 80 won't ship for at least three months, retail prices are on the high side, and worst of all, the OS/2 operating system that exploits the multitasking potential of

the 80286 and 80386 won't be on hand until the first quarter of 1988. Sound like old times?

"I see a lot of parallels here with the PCjr," says IDC's Zachmann, who gives the new line a royal raspberry. "There's nothing you can do with these computers that you can't do with an old PC, the appropriate interface card, and the appropriate software," he snaps.

This time around, as the elephant doffs its cap and slides onto the dance floor, it will be the users who are calling the tune. ◉

Judy Getts, a Contributing Editor for PC World, *writes on communications issues from Wauwatosa, Wisconsin. Unless otherwise noted, all market figures were provided by International Data Corporation in Framingham, Massachusetts.*

Looking Out for Number One
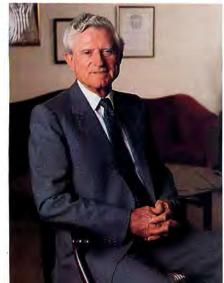
Look, over your
shoulder, that shadow
looming ominously
behind you–it's Big
Blue. And whether
you're a partner, a
competitor, or a user,
you've got to know the
rules the giant plays by.

Mike Hogan

▌▌▌▌ Nothing is designed, man-
ufactured, or sold in the
computer industry–the personal
computer segment included–
without heed to IBM's plans and
possible responses. Even compa-
nies like DEC and Apple Com-
puter–which operate independent
empires–must deal with IBM
compatibility and strategic posi-
tioning issues. As one marketing
executive puts it, "IBM *is* the
environment."
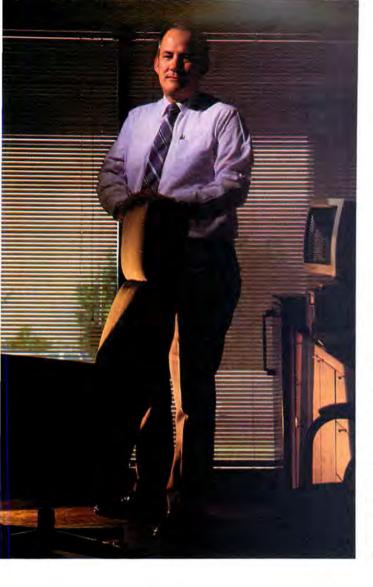
This cold reality influences ev-
erything from a product's features
to the timing of its introduction to
its price. Not that IBM is able to
control the personal computer
marketplace in quite the way it
sways the large systems sphere.
But if you don't know where you
stand with regard to IBM, you
may not be standing for long.

"The elephant is a large and
self-confident beast," observes
Alan Hald, chairman of MicroAge
Computer Stores. "You can ride
on top of an elephant as a partner,
or you can walk alongside him.
But you can't outrun an elephant,
so don't get in front of him–or
follow too closely behind."

Max Aguilera-Hellweg

Mark Forbin

August 1987

Relying on IBM's analysis of market conditions could result in lost opportunities or worse, agree former IBM employees Gene Amdahl (opposite page) and Dan Wilkie (left).

Over the years, IBM's friends and foes—its business partners and competitors—have learned the rules of the road along Elephant Walk. Many of those rules are just as useful if your primary contact with IBM is via company requisition forms. Here are a dozen principles to live (and compete) by.

Rule #1: Cutting Edge? What Cutting Edge?

Cynics often sneer that IBM's innate conservatism retards the development of new technologies. Historically, mainframe and midrange customers only received enhanced products if and when vendors were ready to supply them. In those tightly controlled markets, manufacturers have been able to drag out a product's life—and the profits that accompany longevity.

It was just such a situation that prompted Gene Amdahl, a former IBM engineer who founded Amdahl Corporation, to take on IBM in 1976 with a "plug-compatible" mainframe that provided a bit more functionality at a slightly lower price. Thus was born one of the fundamental tenets of computer sales.

A year elapsed before IBM responded to Amdahl's challenge, and by then the upstart had claimed 12 percent of the market. In 1977, IBM slashed by 30 percent the price on a product that was twice as powerful as Amdahl's. "IBM had been milking the market for all it was worth," asserts Amdahl, now chairman of the Elxsi Limited.

Some say that a similar situation prevails in the PC marketplace, an incentive for makers of inexpensive clones to enter the market and deflect price-conscious users from IBM. As one IBM component supplier (who requested anonymity) contends, "IBM will delay a new product indefinitely if it will impinge on a profitable existing product."

Thoughtful marketers like MicroAge's Hald note that pushing technology too far too fast can have deleterious side effects. A rapid rollover in technology can result in unavoidable incompatibilities, tumbling resale values, even product obsolescence. To that extent, IBM's conservatism imparts a measure of calm in a high-strung marketplace. Adds Michael Malcolm, CEO of network vendor Waterloo Microsystems, an IBM partner in Canada, "I once felt IBM was

crippling third-party technology, but now I appreciate what gets a product out the door in mass distribution. It's scary to be on the leading edge of technology—that's why IBM is so technologically conservative."

Rule #2: IBM Leaves the Pioneering to Us

A corollary to Rule #1 suggests that IBM behaves like Exxon, leaving the risks—and the early gushers—to wildcatters. "IBM waits for someone else to do the pioneering," says Gene Amdahl. "They sit back and watch the market grow. In the meantime, they find out what it takes to satisfy that market. The moment they have a product they think can take advantage of it, they move in."

It just doesn't make good dollars and cents for a company of IBM's size to venture down unblazed trails, even assuming it could mobilize with sufficient speed. IBM's preeminent industry position enables it to pursue a strategy that few others can afford: hanging back until the market embraces new technology.

IBM can develop its technology gradually or buy (and market) a product from a smaller firm. IBM's pioneering by proxy may mean that its partners have to sign over manufacturing rights as the price of doing business, as Sytek—and to a lesser extent, Intel—can attest.

Rule #3: For IBM, Nothing but the Best

IBM may stay with the crowd on features and power, but it leads the pack on product quality control and seeks nothing less than perfection from its partners. Says Waterloo's Malcolm, "They quality-assure your quality assurance department."

IBM not only looks at the product, adds Tandon Corporation president and former IBMer Dan Wilkie, it also scrutinizes the process. IBM performs quarterly reviews of its allies' business management, product quality, and materials process control and supplies voluminous feedback on product performance. For vendors, that means a sharper, more responsive manufacturing organization. For users, the IBM regimen usually translates into "a

conservative but well-implemented product"—or so says Jim Richards, CEO of Vermont Microsystems (VMI), which developed the Professional Graphics Adapter for IBM.

Rule #4: The IBM Logo Isn't Free

When IBM slaps its label on commercially available technology, prepare to pay extra for it. IBM can be as price-competitive as the next firm, as Amdahl's experience indicates—but rarely does it have to be.
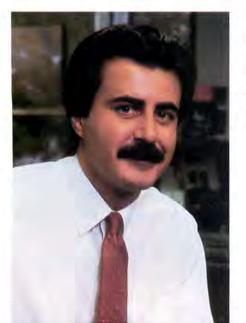
Although it's impossible to pinpoint an average premium, MicroAge's Hald reports markups of $200 to $500, depending on the market. For Fortune 2000 companies, the three little letters on the box carry greater weight than they do for small businesses more concerned about what's inside and how much it costs.

Still, VMI's Jim Richards is convinced that the status quo is about to change. "You once had to pay a premium price for the IBM name, but now, with IBM doing the lion's share of its manufacturing in-house, products will be increasingly price-competitive—and IBM's profits will be absurd."

IBM no longer owns PC industry standards, insists Compaq vice president of sales and marketing Mike Swavely.

Rule #5: IBM Wants to Hold Your Hand

Computer users the world over feel most secure when they're in IBM's arms. Even the company's staunchest competitors nod in agreement at that truism. Customer service is the acknowledged keystone of IBM's reputation; it's backed by some of the best managers in America and arguably the best sales technology anywhere.

"IBM's strength is in generating customer confidence," says Dan Crane, vice president of marketing

for Toshiba. "They deliver what they promise, and they take care of customers." That quiet assurance is difficult for IBM's competitors to match and is the IBM trait that its partners most frequently prize and praise. Poses Crane, "What better security blanket than IBM?"

Rule #6: IBM Is Not Omniscient
IBM may *control*, but it doesn't always *know*. IBM executives are fond of recalling that no one was more surprised than they at the PC's resounding success.

"We thought we'd sell 250,000 units during the product's entire lifetime," confesses Samuel M. Gianetta, vice president and western area sales manager. During the first full year alone, IBM sold four times that number.

Other misjudgments have been less salutary—the PCjr, the Portable PC, and the XT/286, to name a few (see "A PC Genealogy" in this issue). The company has both the cash and the managerial depth to weather such missteps, but its blunders have serious repercussions for manufacturers, resellers, and customers. "If IBM miscalculates demand for a product, vendors suffer," says analyst Brian Jeffery of the International Technology Group (ITG). For evidence, one need only look as far as the Teledyne unit that built the PCjr: That operation, which reportedly did $500 million worth of business with IBM, has virtually evaporated.

Rule #7: IBM Is Not a Monolith
IBM is a series of competing product divisions, a vast primordial arena where only the fittest prod-

uct teams survive. At times, however, the heartiest products aren't necessarily those the market wants.

According to one of IBM's partners, the company tends to reach an "internal, ivory-tower consensus," which evolves along with

IBM's pioneering by proxy may mean that its partners have to sign over manufacturing rights as the price of doing business.

each product's evolution. "IBM works only within the specifications of the consensus, whether or not that coincides with those of the market. You end up with a camel—a product that isn't right for any market." Only after the market has administered its licks will IBM revise the product, the partner adds.

Consider the plight of IBM partner Sytek. When IBM tapped the firm to build its broadband PC Network, revenues quickly accelerated to $91 million, with IBM scooping up 50 percent of Sytek's business. Almost as quickly, it became apparent that the PC Net simply didn't jibe with IBM's strategic plans for networks and was thus a product with a limited lifespan. The coup de grace came when IBM's Entry Systems Division was absorbed back into the corporate fold.

A market gone sour and IBM's bureaucratic reshuffle cost Sytek its contract and half of its revenues, according to marketing vice president Joe Seidler. The company is now selling an improved PC Net as its System 6000. Capitalizing on its reputation as the company that wrote IBM's NET-BIOS, Sytek has managed to build annual sales back up to $60 million.

The lesson for IBM's partners, says ITG's Jeffery, is to conduct independent market research on how a given product is faring—an activity IBM doesn't necessarily encourage. For users, the moral is that the IBM imprimatur on a

product category doesn't guarantee the investment. Says Bernie Allenstein of Torus Systems, an IBM network partner in Europe, "Ultimately, you've got to look after your own needs. Don't look back and think IBM can take you there."

Rule #8: IBM Goes Steady but Never Marries
It's axiomatic that IBM's partners ought not become dependent on the industry leviathan. Of course, it's hard not to be seduced when the biggest act in town decides to team up with you and triple your sales overnight. But trusting in IBM for your livelihood can lead to heartache.

Tandon learned that the hard way when, during one period in 1984, IBM accounted for 70 percent of its floppy disk drive business. That total was about 30 percent more than IBM prefers, according to Tandon's Dan Wilkie. Unfortunately, IBM winked at its own policy during those halcyon days, and Tandon was simply too busy to shop for other customers. When IBM took its business elsewhere, Tandon struggled for a time, but ultimately diversified into building its own systems.

"Both companies learned a very difficult lesson," recalls Wilkie. "Both enjoyed ramping up together, but coming down was catastrophic." Among disk drive makers, Seagate can echo those sentiments; CMI is no longer around to voice them. The rule of thumb: If IBM accounts for more than 25 percent of your business, worry about it; if it claims more than 50 percent, do something about it. "One of the principles [in dealing with IBM] is to take what you get but don't expect anything," says Allenstein. "You want as much business as possible, but you want that to represent as small a percentage of your total business as possible." If you're nimble (and lucky) enough, you can do as VMI did: Play for time, use IBM to "slingshot" you to a new level of manufacturing capacity, and then build an equivalent revenue stream before you're finally jilted.

sources on existing markets or redesign for the PS/2. It's a bridge computer users will eventually need to cross as well.

Rule #9: Make Hay While IBM Shines on You

In its quest for new technology to market, IBM regularly scouts around for partners, and being associated with Big Blue remains a tremendous leg up for a company—particularly if the alliance is kept in perspective.

"The cachet that IBM lends you is both tangible and intangible," explains Waterloo's Malcolm. The tangibles include access to IBM's technical staff, which means an ability to get accurate and timely answers on how IBM products work. The main intangible is that having IBM as a buddy is a sure way to win friends and influence customers. A case in point is Torus Systems. Thinking ahead, Torus entered its relationship with IBM

Rule #10: IBM Is Not Invincible

Surprise, surprise. A growing bevy of companies are going toe-to-toe with IBM and winning. Two of today's biggest triumphs belong to Apple Computer and DEC. Both have made remarkable comebacks in a scant two years.

Capitalizing on the Macintosh's enticing interface and architectural consistency—and bolstered by the company's managerial talent—Apple has made the Mac the best-selling computer in the retail channel.

DEC's resurgence is even more impressive. "In late 1984, IBM was riding high and DEC looked like a dead company," recalls Marc Schulman of Salomon Brothers. "Now DEC is viewed as *the* alternative to IBM by both [corporate] computer users and investors." The way this veteran DEC watcher figures it, DEC gained as much from the PC's huge and unanticipated success as IBM did. As the PC became a commodity item, competition from other vendors cut into IBM's overall gross margins and drained profits. Because its own personal computer bombed, DEC eluded that fate.

Ironically, the PC has pushed the entire computer industry away from IBM's philosophy of centralized, top-down processing—and legitimized DEC's strategy of distributed processing. While IBM was girding to compete with AT&T and Japan, Inc., DEC focused on peer-to-peer networking and pushed the limits of its systemwide architecture. DEC, Schulman concludes, is "harvesting" the very PCs that IBM planted and is connecting them to its high-margin VAX systems.

According to Schulman, IBM is endeavoring to overcome DEC's lead in hardware technology, PC

> ## Customer service is the acknowledged keystone of IBM's reputation; it's backed by some of the best managers in America.

You needn't be an IBM partner to be blindsided by dependence. Manufacturers of PC expansion hardware, all of whom compete in the shadow of IBM product planning decisions, are likely to be the big losers in the recent switch to the Personal System/2's Micro Channel bus, according to Mike Swavely, Compaq's vice president of marketing. While such vendors will no doubt ferret out new markets, they'll lose comfortable sources of revenue and must choose whether to bet their re-

fully intending to use the contract to build an independent base of business for *Tapestry,* its network operating system. Of course, the PC industry today is wiser and less volatile than it once was. IBM's endorsement rarely has the power anymore to elevate the lowly and humble the mighty—as it did back in 1981, when Big Blue gave its PC operating system business to Microsoft instead of Digital Research.

integration, office automation software, and networking. But Big Blue is hampered by its host-oriented networking scheme and a series of incompatible system architectures born of its penchant for splitting markets into narrow segments.

Having IBM as a buddy is a sure way to win friends and influence customers.

That's the rock. The hard place is that the one time IBM did standardize its architecture, it gave every Compaq, Epson, and Hyundai access to its user base. Accordingly, some critics are interpreting the PS/2 line as IBM's tacit admission that it can't—and won't—compete in commodity computers.

Rule #11: Hit 'em Where They Ain't

Assuming IBM won't disappear any time soon, some competitors are prudently pursuing various niche marketing strategies.

"Any time you're up against a 300-pound gorilla, you have to use guerrilla tactics," explains Bruce E. Cummings, executive vice president of Hercules Computer Technology. "What Hercules has done is to come up with products that IBM is not paying attention to [like the original Hercules board] or exploit technologies that we can do better than IBM."

Tandy also has done well by focusing on individuals, small and medium-size businesses, and schools, thereby downplaying the Fortune 1000 market where IBM is the prohibitive favorite. Simi-

larly, PC's Limited has been stunningly successful with yet another variation on the niche theme. The Austin, Texas, company aims straight for IBM's favorite customers—and hits its target by relying on mail-order sales and shunning the IBM-dominated reseller channel. In pocketing the dealer's 35 percent margin, PC's Limited president Michael Dell says his firm is able to remain competitive in both cost and price.

Rule #12: Beware the Big Chill

Often, when a competitor gains what seems like an insurmountable lead in a market that IBM covets, Big Blue alters the dynamic merely by talking about whatever it has up its sleeve. Although most companies recoil at the "vaporware" moniker, IBM frequently attempts to freeze the market—and blunt any competitor's lead—by dangling the promise of new products. Last October IBM sought to slow DEC's momentum by announcing its new 9370 midrange series—almost a full year in advance.

In a similar vein, the early announcement of the 80386-based PS/2 Model 80 will put a damper on the sales of compatibles, according to Bob Puette, general manager of Hewlett-Packard's PC business unit. "IBM will stymie the market," Puette charges. "Some products are announced for later this year, and in some cases, the announcements of the announcements won't be until later next year. The clear objective is to stop customers in their tracks."

Breaking All the Rules

Rules are made to be broken, of course, and everyone—users, partners, competitors, IBM itself—has broken a few since IBM "legitimized" the PC. But if Compaq's Mike Swavely is right, IBM can no longer predict or fully control what it helped create. According to Swavely, custody of the industry standard is now entrusted to software developers and users of the nearly 10 million PCs and work-alikes.

The April introduction of the Personal System/2 was clearly a watershed, and not just in technology. To some, the industry's dominant player is now buttressed against an onslaught of hardware vendors. For the foreseeable future, software remains fertile ground for partnership with IBM, as the company's recent alliance with Lotus underscores.

As VMI's Jim Richards sees it, IBM will enter into fewer strategic partnerships in the months and years to come. "Such alliances grew out of the entrepreneurial approach of the original Entry Systems team, and the company just wasn't that integrated," he says. "Now, it's achieved the same vertical integration it's had with minis and mainframes. As its own biggest components supplier, IBM is insulated from the industry boom and bust." And that may portend an even stronger IBM in the years ahead. ●

Mike Hogan is the News Editor for PC World.

Personal Systems Revealed

*Eric Brown, Eric Knorr, and
Charles Bermant*

With its Personal System/2 line, IBM intends to shape the fate of personal computing. The Models 30, 50, and 60 offer spectacular graphics, innovative system design, and a new floppy disk format. But will they set a new standard?

After the rapid-fire successes of the PC, the XT, and the AT, IBM seemed to drift into a malaise of the spirit. Fanfare for the PC RT, the PC Convertible, and other products fell on deaf ears. Meanwhile, Apple rebounded, Compaq outgrew its corporate knickers several times over, and hordes of upstart clone-makers swept across the land. Even the fiercest of IBM's opponents shed an occasional tear for the glory that was once Big Blue.

The tears quickly evaporated this spring when IBM announced its Personal System/2 (PS/2) line of computers. There wasn't a dog in the bunch. Certainly there were criticisms—especially regarding inflexible pricing schemes—but everybody paid attention. With one stroke IBM introduced a new bus, two new graphics standards, a new disk format, and the promise of a new multitasking operating system. Moreover, many features that previously required expansion options were tucked neatly into VLSI chips on the motherboard.

While hardly revolutionary, IBM's switch from the existing 5¼-inch floppy disk standard is praiseworthy. Despite lukewarm reactions to its 3½-inch-based PC Convertible, IBM took a gutsy step into the future by banishing the 5¼-inch floppy from the PS/2 kingdom (see the sidebar "Migration Headache").

At the same time, IBM took two steps backward into yesterday's hard disk technology. Both the Model 30 and the Model 50 have IBM-made 20MB hard disks with 80-millisecond (ms) average access times. With a 40ms 44MB hard drive, the Model 60 fares better, but it is still considerably slower than the 28ms units commonly included in AT clones. It's possible that IBM is still smarting from those first, disastrous AT controllers and will wait until production techniques are refined before pushing the disk access speed limit.

While users wait for Operating System/2 (OS/2) to unleash the hidden powers of the PS/2 line from the Model 50 on, DOS 3.30 is available at extra cost. Software is limited in the new 3½-inch format, but in PC World tests we ran 1-2-3 release 2, Microsoft Word, XyWrite III, WordStar, dBASE III Plus, and PC-Talk III with no problem. We also successfully tested a prerelease version of Micrografx Draw—running under Windows 1.03 with a PS/2 640-by-480 driver—that was designed specifically for the PS/2.

The IBM Personal System/2 Model 30

Rumors once abounded about the so-called PC II, the mythical machine that would vault IBM (and personal computing) to the next level and, incidentally, decimate the competition. The elusive product never appeared, although at various times it was reported to have a small footprint, an 80186 microprocessor, advanced graphics, and 3½-inch disk drives.

Some might say that the PC II has surfaced at last in the form of the new Personal System Model 30, the entry-level machine in the PS/2 line that serves as an XT successor. As a high-performance PC it resembles the 8086-based Compaq Deskpro and the AT&T PC 6300, offering enhanced XT power without crossing into the 80286 world.

The Model 30 uses an Intel 8086 processor running at 8 MHz and has three standard 8-bit expansion slots; parallel, serial, and mouse ports and a battery-driven clock/calendar are built in. Incredibly, IBM offers the system with only two storage options: two 3½-inch 720K floppy drives for $1695 or one floppy and one 20MB hard drive for $2295. Those seeking a different configuration must either throw away one of the factory-supplied drives or claim a precious expansion slot for a hard disk card.

Executive Summary

IBM Personal System/2 Model 30

8086-based computer

Positioned at the bottom of the PS/2 line, the Model 30 is an engineering wonder but only a middle-of-the-road performer. Even though its 8086 microprocessor runs at 8 MHz, its hard disk's average access time of 80ms cuts disk-based performance considerably. Bereft of both the Micro Channel bus and the ability to run OS/2, the machine's main selling points are its thoughtful design and relatively low price.

Expandability	*Fair*
Ergonomics	*Excellent*
Processing performance	*Good*
Disk performance	*Fair*
Overall value	*Fair*

Table 1: From volkscomputer to file server: Specs for the PS/2 machines reveal three distinct tiers.

	Model 30	Model 50	Model 60
CPU/clock speed	8086/8 MHz	80286/10 MHz	80286/10 MHz
Standard memory	640K	1MB	1MB
Maximum system memory	640K	7MB	15MB
Floppy disk capacity	720K	1.44MB	1.44MB
Hard disk options/ average access times	20MB/80ms	20MB/80ms	44MB/40ms 70MB/30ms 115MB/28ms
Maximum storage	20MB	20MB	185MB
Open expansion slots	three 8-bit standard	three 16-bit Micro Channel	seven 16-bit Micro Channel
Built-in video adapter	MCGA	VGA	VGA
Operating systems	DOS 3.30	DOS 3.30, OS/2	DOS 3.30, OS/2

As of this writing, the Model 30's RAM options appear similarly inflexible. The machine comes with 640K of RAM; according to an IBM spokesperson, the Model 30 is not designed to be expanded beyond that limit (although several companies are reportedly developing expanded memory schemes for the machine).

A monitor, of course, is extra. Four displays are available, from a $250 paper-white monochrome to a $1550 16-inch, high-resolution color unit (which requires an additional video adapter). The bottom of the line, then, carries a hefty bottom line: A system with a hard disk and a monochrome monitor lists for around $2500—about as much as the average AT compatible.

All PS/2 machines have a VLSI video graphics controller that supports all MDA, CGA, and EGA video modes built into the motherboard. However, the Model 30 features only the Multi-Color Graphics Array (MCGA), a subset of the Model 50's and Model 60's Video Graphics Array (VGA) (see Table 1). The MCGA delivers an 8-by-16-dot character box yielding text significantly sharper than that produced by the standard Monochrome Display Adapter.

The real news for videophiles is the MCGA's two new graphics modes. A low-resolution, 320-by-200-pixel mode supports 256 colors from a palette of 256,000, while in a 2-color, high-resolution mode the board produces crisp 640-by-480-pixel images. When used with IBM's paper-white monitor, the MCGA's 64 shades of gray put an end to ho-hum monochrome graphics.

I Want to Be a Clone
Regardless of the goodies built into the motherboard, the Model 30's limited expandability and configuration options are likely to disappoint buyers. After all, much of the original IBM PC's staying power comes from its ready ability to swap drives, graphics boards, and other peripherals.

Even more distressing is that the Model 30 is already half an orphan. The machine's 8086 chip and more-or-less conventional bus exclude it forever from the Personal System's biggest innovations—the multitasking Operating System/2 and the Micro Channel bus. When OS/2 finally arrives and vendors exploit the new bus, the machine will be passé. Most AT compatibles, however, won't be frozen out of advantages OS/2 may eventually bring, and their prices generally undercut the Model 30's.

The Model 30's biggest plus is its look and feel. At approximately 16 inches square by 4 inches high, it cuts a low, attractive profile. Commonsense innovations include a horizontal expansion card mount (allowing for a squatter system unit), a convenient front power switch, and piggyback AC power cords. Most of the system unit's components detach easily. For example, the hard disk drive and its controller are housed in the same removable assembly.

The computer's outer case is made of lightweight metal and is clearly built to last. The Model 30's keyboard uses the same Enhanced AT layout as the rest of the PS/2 line and all new IBM personal

computers. Surprisingly, it's even more responsive than the original PC keyboard, a satisfying combination of click and bounce. At 5 pounds, it may create lap fatigue for some people, but its sturdiness demonstrates good planning: The most durable part of the system is the one that takes the most abuse.

Those moving to the Model 30 after years on an XT will notice something missing—the constant buzz of the cooling fan. The Model 30 is so quiet you have to put your ear to the machine to make sure it's really running.

Those who pick the Model 30 as their first PC will find the machine's slim, 72-page manual unthreatening and can probably bypass it altogether. A 13-step illustrated instruction sheet makes quick setup easy, and a reference disk holds diagnostics and a configuration program for changing COM ports or adding disk drives. Anyone who's ever hooked up a stereo will find the Model 30's setup just as simple.
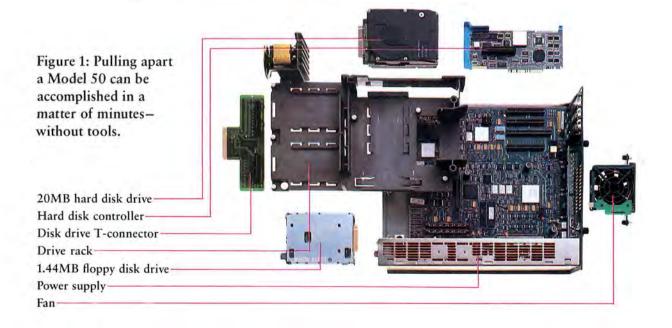
In a perfect world, this new bottom-of-the-line IBM would be a decisive step up, bringing longtime users into the present and providing computer novices with a congenial environment in which to start out. But the Model 30 is considerably less than perfect. While it incorporates some welcome innovations, it carries too many built-in confinements to qualify as the successor to the original IBM PC. Naturally, longtime XT users will notice performance improvements. But only if its storage options open up and its price falls can the Model 30 become the low-end standard. —C. B.

The IBM Personal System/2 Model 50

The Model 50 is the centerpiece of the PS/2 line. Aside from the Model 30, it's the only PS/2 machine that sits on a desktop, and at $3595 (without a monitor but with a 20MB hard disk) it's the only one that comes close to being a good deal. Whether the PS/2 line thrives outside of the Fortune 500 may well depend on the success of the Model 50.

As the least expensive route to the new world of IBM's Micro Channel bus and VGA standards, the Model 50 merits a close look. The good news about the Micro Channel is that it is intelligent enough to speedily set access priorities for as many as 16 devices; the bad news is that it won't accept boards designed for the PC or AT.

Like the MCGA, the VGA supports software that runs under previous PC graphics standards and requires that you buy one of the new IBM monitors (see the sidebar "IBM's Analog Displays") or a multiscan monitor. On a color monitor, the VGA's main advantage over the MCGA is in providing 16 simultaneous colors instead of the 2 available in the 640-by-480 mode. Aside from that, the VGA's big advantage is speedy screen refresh.

Apart from the new bus and video standards, the Model 50 settles down in familiar territory. An Intel 80286 microprocessor running at 10 MHz can draw on up to 1MB of motherboard RAM, expand-

Figure 1: Pulling apart a Model 50 can be accomplished in a matter of minutes— without tools.

20MB hard disk drive
Hard disk controller
Disk drive T-connector
Drive rack
1.44MB floppy disk drive
Power supply
Fan

Stan Musilek

able to 7MB with memory boards. (Future memory options may up that figure to 16MB.) A quiet 94-watt power supply keeps a 20MB hard disk (with a poky average access time of 80ms) and a 1.44MB, 3½-inch floppy drive humming along. A second floppy drive is optional, but the slow hard disk is not.

As with the Model 30, the motherboard includes built-in serial, parallel, and mouse ports and a battery-driven clock/calendar. With all these features built in, the Model 50's three empty expansion slots don't seem such an extreme limitation.

Cut to Fit

With the Model 50, IBM cured the obesity problem that plagued the AT. The unit weighs only 23 pounds and measures a trim 16.5 by 14.1 by 5.5 inches—a smaller footprint than the Model 30's. IBM wisely moved the on/off switch to the front of the unit, leaving just enough room for two floppy disk drives, a speaker, and a ventilation grill.

The beveled top half of the Model 50's face houses the usual disk access and power lights, but like the Model 30, it has no reset button or system lock. On the back of the unit, however, a lock keeps the system unit cover closed. Extra-long cables for the keyboard, monitor, and peripherals add yet more creature comforts to the machine.

When you remove the cover of the Model 50, you can see why IBM included a cover lock. You no longer need a screwdriver to open the cover; simply twist two large thumbscrews, slide the cover forward, and lift. In such a small package you might expect to see a crowded mass of cables, wires, and circuit boards. Instead, IBM's careful design and extensive use of VLSI chips and surface-mount technology has yielded a relatively roomy interior.

Nowhere will you find a cable, DIP switch, or ribbon connector, and the review model revealed only a few patch wires. More amazing, you can take apart the innards in less than a minute. Without recourse to a screwdriver, you can remove everything but the power supply and the system board. All the components are attached to edge connectors and are more easily removed than the average PC expansion board. In fact, the hard disk controller board is thoughtfully equipped with fingerholds. With a small plastic tool clipped next to the speaker, you can remove the pegs that hold down the drive rack—and presto, you're looking at one of the best-designed system boards on the market.

Crossing the Micro Channel

At first sight the new Micro Channel bus seems a dubious improvement. IBM provided only four slots (counting the one occupied by the hard disk controller), compared with eight on most AT compatibles. One of the slots is ½ inch longer than the others, designed for a high-resolution video board that will control IBM's Color Display 8514.

The Micro Channel is named for the 116 tiny, closely spaced pins on its expansion slot connectors. Despite the increased number of pins, the slots are smaller than the AT's, and expansion boards must be two-thirds the area of normal boards, suggesting that even smaller PS/2 models may be in the works.

But the number of slots isn't the issue—speedily handling multiple devices is. At best, the PC's bus is like an intersection complete with traffic lights. The Micro Channel is like a multilane freeway, easily managing as many as 16 devices, including the system microprocessor. While Models 50 and 60 can pass data only in 16-bit chunks (the 80386-based Model 80 has the 32-bit Micro Channel), the analogy still holds. To improve throughput, IBM included 8 Direct

Executive Summary
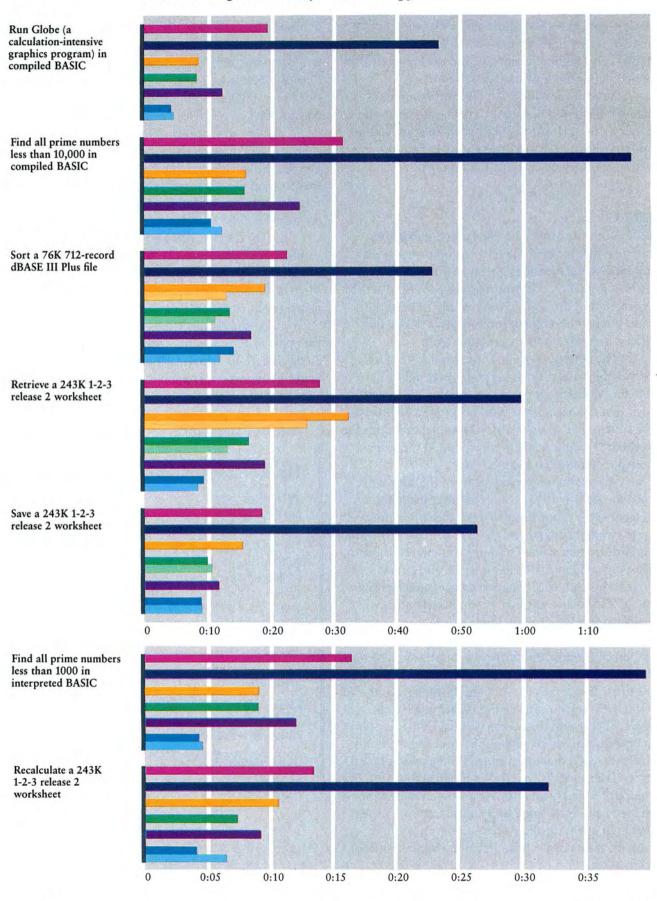
IBM Personal System/2 Model 50

80286-based computer

The Model 50 is a compact, well-designed 10-MHz 80286 computer, noteworthy for its smart Micro Channel bus and superior VGA graphics. The unit suffers from a slow hard disk but compensates with a fast bus, speedy graphics, and sophisticated disk-caching software. Other limitations include too few slots and a steep price for its class, but the Model 50 is a reasonable way to move up to the PS/2 generation.
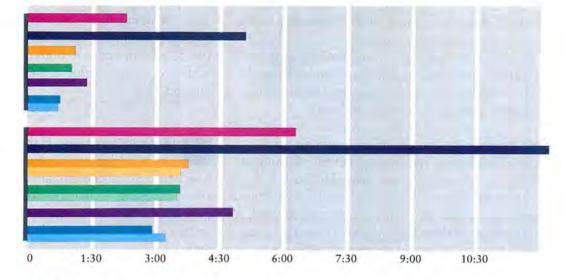
Expandability	*Fair*
Ergonomics	*Excellent*
Processing performance	*Excellent*
Disk performance	*Fair*
Overall value	*Good*

The PS/2 Against Today's Technology

Run Globe (a calculation-intensive graphics program) in compiled BASIC

Find all prime numbers less than 10,000 in compiled BASIC

Sort a 76K 712-record dBASE III Plus file

Retrieve a 243K 1-2-3 release 2 worksheet

Save a 243K 1-2-3 release 2 worksheet

0	0:10	0:20	0:30	0:40	0:50	1:00	1:10

Find all prime numbers less than 1000 in interpreted BASIC

Recalculate a 243K 1-2-3 release 2 worksheet

0	0:05	0:10	0:15	0:20	0:25	0:30	0:35

Run Globe in interpreted BASIC

Reformat a 150K WordStar document

0   1:30   3:00   4:30   6:00   7:30   9:00   10:30

- PS/2 Model 30
- XT*
- PS/2 Model 50
- PS/2 Model 50 (with disk caching)
- PS/2 Model 60
- PS/2 Model 60 (with disk caching)
- AT*
- Deskpro 386*
- Deskpro 386 (with disk caching)*

Figure 1: The PS/2 Model 30 is approximately 2 to 2½ times faster than the IBM XT, and the Model 50 is generally faster than both of them. Models 50 and 60 performed computations at the same speed; however, the Model 50's slower hard disk affected the results of disk-dependent tests. While the AT processed computations more slowly than the 50 and the 60, its disk-dependent test times often fell between the 50's and the 60's. The most expensive machine, the Deskpro 386 (a Model 40 with a Compaq Enhanced Color Graphics Board), was the fastest in all respects. Interestingly, no company's disk-caching implementation improved performance consistently. Times are shown in minutes:seconds.

CONFIG.SYS files did not contain BUFFERS commands.

* The 4.77-MHz XT, the 8-MHz AT, and the 16-MHz Deskpro 386 contained numeric coprocessors. On the XT and AT, Globe tests were run with Video 7's VEGA Deluxe Adapter.

Memory Access (DMA) channels, enabling disk drives and other devices to deal directly with memory without routing requests through the CPU. Further accelerating throughput, a DMA "burst" mode momentarily suspends bus activity to clear a path to a single device. In particular, burst mode allows the hard disk to read an entire track in one revolution, speeding data transfers. The Micro Channel also possesses some admirable smarts—at start-up its Programmable Option Select function gives each peripheral the once-over to assure that the bus will run smoothly.

Cache the Wave

The Model 50 turned in a good performance in *PC World*'s speed tests, surpassing the Compaq 286 and the IBM AT at most tasks, but it fell short of IBM's claim that it's twice as fast as the AT (see Figure 2). The surprise is that the Model 50 performs as well as it does with its sluggish hard disk.

Given the Model 50's key components—a 10-MHz 80286 chip, one wait state RAM, a quick bus, a fast hard disk controller, and disk caching software—it's hard to say exactly how much faster the Model 50 could be with a swifter hard disk. However, the Model 60's superior throughput provides a rock-solid clue, since the only significant difference is a much speedier 40ms hard disk.

Fortunately, IBM's sophisticated caching scheme compensates for the disk's laggard performance. The cache—a chunk of RAM set aside by the software—can store entire tracks for quick access. The scheme also catalogs entries, holding on to frequently accessed data and giving loiterers the bum's rush. Consequently, disk access seems faster, even though track-to-track access is still slow.

Unlike the Model 60, the Model 50 comes with only one hard disk model and no room for extra drives. Third-party vendors report they will soon offer faster, high-capacity hard disks. But space and power restrictions, as well as the peculiar problems of adapting to a new bus, may limit the capacity and performance of these internal disks. Hard disk cards and external drives may also appear, but either of these solutions would claim a precious slot.

The Model 50's support materials, like those of the Model 30, are beautifully executed. The system's reference disk holds the easily installed disk-caching software plus diagnostics, security, and configuration routines. The diagnostics program can quickly ferret out system problems. For example, without forcing us to look up error codes in the manual, it warned us that we had failed to reconnect the speaker when putting the machine back together. The password security, to prevent access to both the hard disk and the keyboard, is far superior to the old system-lock method.

■ IBM: An Expensive Habit
The Model 50 is a classic example of IBM's uneasy balance between brilliant engineering and cautious marketing. Unlike most of its AT-clone competitors, the Model 50 represents a tour de force of system design. Whereas many clone makers toss together a ragtag assortment of boards and cables, IBM has incrementally improved nearly every component.

Despite its superior design, the computer's slow hard disk, wan power supply, and lack of expandability leave us wanting more. Even the excellent built-in graphics don't justify the Model 50's price—about $1000 more than most of its competitors'. But if you're part of a big company that's already on the mainframe side of IBM's connectivity equation, the price is justifiable. There's little doubt that the Micro Channel and OS/2 will open the door to new links among IBM office systems. But if you simply want a balanced price/performance mix from a personal computer, you might want to buy a 286 or 386 clone—or wait and see how PS/2 evolves. —E. B.

Executive Summary

IBM Personal System/2 Model 60
80286-based computer

By far the most expandable of the three PS/2 models, the freestanding Model 60 opens seven free slots on its Micro Channel bus. It also has room for two full-height 5¼-inch devices and two half-height 3½-inch drives. The Model 60's 44MB hard disk is about twice as fast as the Model 50's 20MB counterpart, but with 80286 chips running at 10 MHz, the processing performance of the two machines is virtually identical. The Model 60's $5295 base price, however, is high compared with a similarly outfitted AT clone.

Expandability	*Excellent*
Ergonomics	*Excellent*
Processing performance	*Excellent*
Disk performance	*Good*
Overall value	*Good*

■ The IBM Personal System/2 Model 60
If the Model 50's good looks are the bait, then the Model 60's expansiveness is the hook. At most IBM dealerships, there's probably a path worn into the carpet between the two systems. After bemused buyers learn about the Model 50's sluggish hard disk and meager three free slots, they may well follow the trail to the majestic Model 60 across the showroom.

Unless there's an unannounced Model 70 waiting in the wings, the 10-MHz Model 60 is the definitive 80286-based PS/2 machine. Although its architecture is identical to the Model 50's, the Model 60 offers two key advantages: capacious expandability and a hard disk drive that's approximately twice as fast as the Model 50's.

As with the much-anticipated 80386-based Model 80, the Model 60's system unit is a freestanding tower buttressed by a sturdy built-in floor stand that folds up for storage. Measuring 23 inches tall by

6½ inches wide by 19 inches deep, this machine is tough to hide. A look at the Model 60's roomy interior reveals that the box would do well as a file server for a local area network (LAN).

Trading on Options

The basic $5295 Model 60 contains 1MB of RAM (the system board can hold an additional 1MB), a single 1.44MB 3½-inch disk drive, and a 44MB hard disk with a 40ms average access time. (Sometime this quarter you can add a $245 second 3½-inch floppy drive by removing a small knockout on the faceplate.) With a 30ms 70MB hard drive, the price jumps $1000. A second full-height bay stands ready for additional hard disks of either capacity, which (as add-on units) list for $1395 and $2395, respectively. A 28ms 115MB drive that sports a $3495 price tag should be shipping by the fourth quarter of this year. As with the Model 50, disk caching software is included, and you're locked into buying the machine with an IBM hard disk. If you want to use the Model 60 as a file server and beef it up with another hard disk, however, it's a cinch that third-party vendors will come to the rescue.

Concurrent with the PS/2 proclamation, IBM announced its 3363 Optical Disk Drive with 200MB cartridges. Although presently configured as an external drive, this $2950 write-once, read-many (WORM) device should fit neatly into the empty full-height drive bay at the front of the Model 60. A larger knockout on the computer's faceplate would make the WORM drive externally accessible, qualifying the Model 60 for LAN backup or corporate archiving.

The Model 60's seven free 16-bit slots also position the computer as a key element in the IBM connectivity scheme. As with the other PS/2 machines, the VGA (MCGA for the Model 30), floppy controller, parallel port, serial port, and mouse port are built into the motherboard. With the Model 60, that means room to spare, and a 207-watt power supply ensures that users can take advantage of the system's roomy interior.

With the traffic-management talents of the Micro Channel, filling the slots with interface boards—or up to 14MB worth of memory—would

Migration Headache

Although 3½-inch disks are clearly more rugged than 5¼-inch floppies and enjoy wide acceptance outside the IBM-compatible universe, switching from the larger disks poses problems. Aside from the time-consuming process of converting data, software in the new format is still limited to major brands.

IBM offers a few conversion solutions. The cheapest, the Data Migration Facility, is a one-way facility. You slap an adapter onto a parallel printer cable and ship data from a PC to a PS/2, but not vice versa. You can also buy an external 5¼-inch drive for the PS/2; however, sending PS/2 data back to the PC requires a 3½-inch drive for the PC (see *From the Hardware Shelf* in this issue). Fortunately, third-party vendors are getting into the conversion business, so better solutions are on the way.

Perhaps aware that the new drive format would be the greatest obstacle to luring buyers to the PS/2, IBM encouraged the development of 1.44MB drives. While they can read and write 720K disks, disks formatted for the higher capacity cannot be written to or read by 720K drives, such as those found in the PC Convertible or Model 30. However, you can format a disk for use in a 720K drive by typing FORMAT A:/N:9/T:80. *–E. B.*

IBM's Analog Displays

The performance of the PS/2 line's MCGA and VGA graphics depends heavily on a quartet of analog monitors introduced by IBM. Doubtless, third-party vendors will soon provide users with more choices, but IBM has a healthy head start. PC users can also enjoy these monitors by purchasing a $595 display adapter.

All the screens are etched to reduce glare, and each comes with brightness, contrast, and on/off switches. A $35 tilt-and-swivel stand is optional. The monitors support the VGA's aspect ratio of 4 to 3 and keep the display from flickering with a zippy 70-Hz vertical refresh rate (60-Hz at the VGA's 640-by-480-pixel resolution), and a 31.5-kHz horizontal scan frequency. Except for the Model 8514, all the monitors top out at 720-by-400 resolution in text mode and 640 by 480 in graphics mode. The controller produces a text-mode character matrix of 9 by 16 pixels (compared to the EGA's 8 by 14), while the 8514 can be driven to 12 by 20. Of the four monitors, the 8512 and the 8514 were not available for review.

Monochrome Display 8503. Gone for good are the green screens of old. The 12-inch Model 8503 displays text and graphics in white on black or black on white as well as in 64 shades of gray. The improved gradation level should make this $250 monitor especially suitable for displaying digitized photographs. The monitor weighs only 18.8 pounds and measures 12.63 by 12.25 by 12.3 inches.

Color Display 8512. The 8512 is a 14-by-15.5-by-14.6-inch monster that weighs 33 pounds. With its larger (14-inch) screen, text is not quite as sharp as on the other monitors, but the unit's unique stripe-pitch color display makes graphics blossom. People who frequently work with graphics will love this $595 kaleidoscope, but most users will want to move up to the 8513.

Color Display 8513. Unlike the beefier 8512, the lithesome 8513 produces more sharply defined pixels. Together with the VGA, the 8513's 12-inch screen renders color text crisp and readable, and its graphics are good enough for presentations. Weighing in at 23 pounds and measuring 12.63 by 12.25 by 12.3 inches, the 8513 should be the most popular of the new monitors, even at $685.

Color Display 8514. Carrying a price tag of $1550 (plus $1290 for the adapter), the 8514 clearly belongs in a different league, at home in the world of CAD/CAM and high-end desktop publishing. While it's downwardly compatible through the VGA and previous standards, the 8514 with the adapter can support 1024-by-768 resolution, using 256 colors from a palette of 262,144. The adapter also offers two new text modes: 85 by 38 with a character matrix of 12 by 20 pixels, and 146 by 51 with a matrix of 7 by 15. The 16-inch screen can display 51 lines, with 146 characters per line. Weighing 42 pounds and measuring 15.7 by 16.3 by 14.2 inches, the monitor will surely dominate your desk. No wonder IBM started designing computers for the floor. —*E. B.*

result in less congestion than with standard buses. IBM's connectivity options include the Multi-Protocol Adapter ($296), Dual Asynchronous Adapter ($210), and 3278/79 Emulation Adapter ($595). Memory boards with varying capacities are also available.

Big and Friendly

Though its proportions contradict IBM's new-found small-is-beautiful inclination, the Model 60 upholds the company's attentiveness to ergonomics. The system unit even comes with a heavy-duty fold-out handle so you can pretend the 52-pound plaything is really a portable.

As with the other models, thumbscrews affix cables and boards. To get inside the box, you unscrew two large screws (using the only necessary tool, a quarter) and remove the left side panel. A keylock at the top of the panel prevents gremlins from gaining access.

Although the 3½-inch drives plug into the rear of their half-height bays, an old-fashioned ribbon cable links the pair of floppy connectors to the motherboard, and another ribbon ties the hard disk controller board to its device. Instead of the usual pin connectors, however, the cables end with edge connectors, which prevent you from misaligning pins and possibly blowing a device.

The nicest touch of all is the track-mounting scheme for the hard disk drives. Two large thumbscrews, one for each drive, hold down corresponding brackets, which in turn hold the hard disk units in place. Without looking at the manual, you can pop a full-height device in or out in a matter of seconds, a revelation for PC and AT users accustomed to grappling with a writhing mass of cables and connectors.

Searching for the Competition

The Model 60's full-height drive bays and seven open slots put the machine squarely in the camp of either multiuser hosts or network file servers. However, most plain vanilla AT clones would come up only a slot or two short by comparison. And for the price of the Model 60 you'd have little trouble purchasing *two* no-name AT clones.

Yet this here-and-now comparison can't gauge the potential of the Model 60. IBM has made a sweeping gesture with the PS/2 line and packed in performance features that will remain hidden for some time to come. Only when OS/2 arrives, third-party expansion boards become available, and the Micro Channel kicks into high gear will we know if the Model 60 is a meteor or a star. —*E. K.*

PC World Contributing Editor Eric Brown, Senior Associate Editor Eric Knorr, and Associate Editor Charles Bermant collaborated on this piece.

Personal System/2 Model 30
IBM
Information Systems Group
900 King St.
Rye Brook, NY 10573
800/447-4700
List price: with 640K, two 720K floppy disk drives $1695; with 640K, 720K floppy disk drive, and 20MB hard disk $2295; DOS 3.30 $120 ($75 upgrade); 8087 math coprocessor $310

Personal System/2 Model 50
List price: with 1MB, 1.44MB floppy disk drive, and 20MB hard disk $3595; DOS 3.30 $120 ($75 upgrade); additional 1.44MB floppy disk drive $245; 80287 math coprocessor $525

Personal System/2 Model 60
List price: with 1MB, 1.44MB floppy disk drive, and 44MB hard disk $5295; with 1MB, 1.44MB floppy disk drive, and 70MB hard disk $6295; DOS 3.30 $120 ($75 upgrade); additional 1.44MB floppy disk drive $245; 80287 math coprocessor $525

Voilà! Vintage

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3¹/₂″ disks.

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Ansa ... NCP
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Pizazz 2.0 *(see what your printer is missing)* 45.
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THE WORD 3.1 *(NIV, Bible on Disk)*..... 159.
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ℝCrosstalk MK.4 1.0 .... 129.
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Quarterdeck ... NCP
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Software Publishing ... NCP
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◙PFS:Professional Write 1.0 .... 119.
◙PFS:Professional File 1.0 .... 149.
◙PFS:Professional Plan 1.0 .... 149.
◙Harvard Total Project Manager 2.0...... 349.
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PC CONNECTION®

A Streamlined LaserJet

The LaserJet Series II features an improved Canon engine, a handy new control panel, better paper handling, a sleek new design, and a vastly reduced price. Unfortunately, those eagerly awaiting a built-in page description language will have to cool their heels.

Michael Gardner
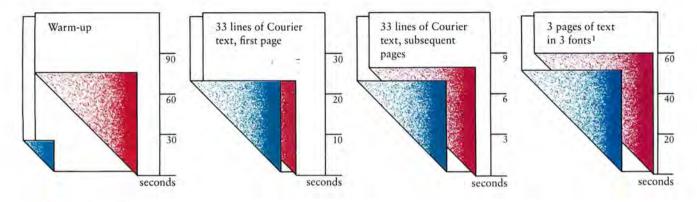
▌▌▌▌ For some companies, conquest isn't enough. Even though the Hewlett-Packard (HP) LaserJet outsells its nearest competitor, the Apple LaserWriter, by at least 6 to 1, HP hasn't rested on its laurels—partly because inexpensive LaserJet work-alikes have begun to chip away at the company's monolithic lead (see "Would-Be LaserJets," *PCW*, June 1987).

The LaserJet Series II constitutes HP's resounding response to clone makers. This formidable upgrade debuts the new Canon LBP-SX engine, which is faster and quieter than the previous LBP-CX model and produces a higher-quality image. The new Canon engine is also smaller, resulting in a printer about 3 inches shorter and 20 pounds lighter than the original LaserJet. Moreover, the svelte Series II offers improved paper handling, two font-cartridge slots instead of one, and a sensibly designed control panel that makes the printer much easier to use.

Like the LaserJet Plus, the Series II comes with only 512K of RAM, but HP has made the upgrade path much less painful. Although the company charges an outrageous $2495 to bring the LaserJet Plus up to 2MB, you can upgrade the Series II to 1.5MB for only $495. That's enough memory to accommodate a full page of 300-dpi graphics and a few soft fonts besides. (For multiuser environments, a $1995 expansion pack increases the RAM to 4.5MB.) But the best news—or the worst, if you're a competitor—is the base price for the printer itself: a mere $2495.

The only disappointment—and it's a major one—is that the Series II lacks DDL, the built-in document description language (created by Imagen Corporation) that HP promised for the new machine. Although DDL is still vaporware, it reportedly offers font-scaling and object-oriented graphics capabilities on a par with those of Adobe System's PostScript. Frustrated by delays, HP has announced that the proposed DDL board will be Imagen's product, not HP's, and that HP is helping other third-party manufacturers create boards that use "other page description languages." So hang tight, desktop publishers, PostScript for the Series II is on its way.

Warm-up	33 lines of Courier text, first page	33 lines of Courier text, subsequent pages	3 pages of text in 3 fonts[1]
90	30	9	60
60	20	6	40
30	10	3	20
seconds	seconds	seconds	seconds

▼ LaserJet Series II

▼ LaserJet Plus

Figure 1: The Series II features a faster start-up time and performs most operations about 10 percent faster than do previous LaserJet models.

[1] Includes download time
[2] 6 fonts and one 5.3-square-inch scanned image

Paper Magic

If you haven't already guessed it, Canon deserves the lion's share of credit for the Series II's improvements. Series II speed increases are mostly incremental; the half-page-per-minute edge and much faster warm-up yield significant time savings over the long haul (see Figure 1). And the LBP-SX engine delivers blacker blacks—a nice improvement over the streaks, patches, and lackluster grays produced by previous models (see Figure 2).
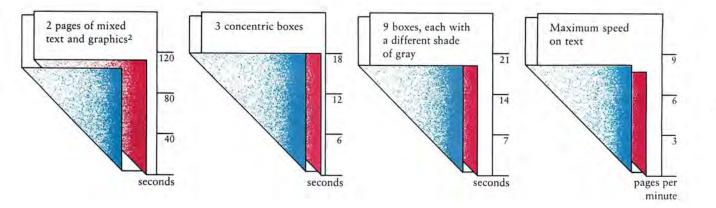
As with the previous model, the LBP-SX's replaceable electrophotographic cartridge houses the toner, developer, and photosensitive belt in one unit. (Other engines, such as the Ricoh and the Kyocera, require that you replace various elements piecemeal—often a messy procedure.) Due to a new minimum life span of 4000 rather than 3000 pages, you'll have to replace that cartridge 25 percent less often.

Error-free printing is more likely, thanks to the Series II's improved paper handling. Previous LaserJets couldn't hold more than about 30 printed sheets without threatening to spill them onto the floor, forcing you to hover nearby during long jobs. The Series II's output tray capacity is rated at 100 sheets, but it actually accepts about 180 sheets of 20-pound stock, which approximates the rated capacity of the input tray. And if you've ever had to collate a stack of LaserJet output by hand, you'll be happy to learn that the Series II ejects pages in the correct order.

Paper feeding is nearly as convenient as paper delivery. Switching from manual to automatic feed used to require a special command; now, when printing a multipage business letter, you can feed a sheet of letterhead manually and let the subsequent pages feed automatically from the tray. In addition, a new alternate paper delivery tray on the back of the machine is specially designed to receive bond exceeding the primary delivery tray's 35-pound maximum rating. Envelope feeding is also easier; a new, adjustable

| 2 pages of mixed text and graphics[2] | 3 concentric boxes | 9 boxes, each with a different shade of gray | Maximum speed on text |

Chart 1: 120, 80, 40 — seconds

Chart 2: 18, 12, 6 — seconds

Chart 3: 21, 14, 7 — seconds

Chart 4: 9, 6, 3 — pages per minute

slot atop the input tray replaces the old LaserJet's envelope feed, which was inconveniently located at the rear of the machine. Such small but significant improvements demonstrate that HP has been listening closely to users.

■ Let Your Fingers Do the Talking

Improved paper handling meshes well with another major improvement: a functional keypad and display on the printer's front panel. The previous model's arrangement was rudimentary, offering a two-character display and a few simple controls for executing a formfeed, taking the printer on and off line, and so on. When using a program that didn't fully support the LaserJet, you had to use arcane escape sequences to select fonts or the default page size.

The Series II adds a 16-character LED display and three extremely useful keys (see Figure 3). The menu key, along with the new plus and minus keys, enables you to cycle through pop-up menu se-

lections. You can toggle manual feed on and off, set the number of copies, choose the font source, set the page length, toggle the interface between serial and parallel, and perform other common tasks.

To specify a font using the new keypad, you begin by printing a list of all available hard or soft fonts using the dedicated Print Fonts key. Each font on the list has a number printed next to it. When you call up the Font Source selection with the menu key, you cycle through these numbers to select the font you need.

Keypad font selection—along with the second cartridge slot, 3 new built-in fonts, and 23 built-in symbol sets—enables you to better exploit the growing selection of HP fonts. The company now offers 23 font cartridges (with an average of 6 fonts per cartridge) and 16 software-based typefaces; as with the LaserJet Plus, you can combine up to 16 fonts on a single page. Since you can use two cartridges simultaneously and select fonts from built-in or software sources via the keypad, you can create a medley of typefaces on each page.

Executive Summary

LaserJet Series II
Laser printer

Priced $1500 below the LaserJet Plus, the diminutive LaserJet Series II is the first laser printer to employ the new Canon LBP-SX engine, which offers greater speed, denser blacks, and quieter operation than does the previous LBP-CX model. The Series II also features superior paper handling, 512K of RAM (expandable to 4MB), and a handy menu-driven control panel, but an optional controller with a built-in page description language is yet to come.

Font selection	*Good*
Bit-mapped graphics	*Excellent*
Shading	*Excellent*
Paper handling	*Excellent*
Overall value	*Excellent*

LaserJet
Series II

LaserJet
Plus
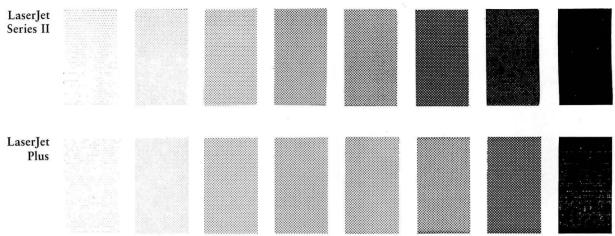
Figure 2: The LaserJet
Series II (top) prints
blacker blacks than
do previous LaserJet
models (bottom).

The real power of the LaserJet family lies in the more than 500 third-party products that support it, from soft font packages to desktop publishing programs. Our software compatibility tests covered scanned images; downloadable and cartridge fonts; object-oriented graphics; and *Ventura, PageMaker,* and *Microsoft Word* drivers. As far as we could determine, if it runs on the LaserJet, it should run on the Series II.

Hardware compatibility, however, is another issue. Products such as the JLaser Plus, which is designed to expand the LaserJet's memory (see *From the Hardware Shelf, PCW,* June 1987), are not compatible with the Series II, largely because the new Canon engine is a complete overhaul of the previous model. With the exception of PostScript-related products

such as PS Jet (a PostScript controller), hardware incompatibility shouldn't be too nettlesome since the Series II addresses most of the problems these products solved.

■ But Can It Publish?

The Series II's fairly inexpensive RAM upgrades make it much superior to its predecessors for handling full-page, high-resolution graphics. But as a serious desktop publishing tool, the machine still lags far behind the LaserWriter, for the obvious reason that (currently, at least) the Series II lacks a page description language.

The most important contribution that either DDL or PostScript will make can be summed up in one phrase: scalable fonts. HP's

cartridge-based fonts and soft fonts are bit mapped, which means that you must have a separate software or firmware description for each font size. By contrast, PostScript stores fonts as algorithms that describe the outline of each character, enabling you to change the point size of any font without having to switch soft fonts, drivers, or cartridges. PostScript also offers three-dimensional font manipulation and special graphics effects (see "PostScript: Master of the Raster," *PCW,* August 1985).

Although HP won't say so publicly, it effectively divorced itself from DDL when it dropped the DDL board. Because there's no other established page description language on the market, this move also constituted a de facto endorsement of PostScript. All the major desktop publishing packages include a PostScript driver, so

16-character LED display

Similar to LaserJet
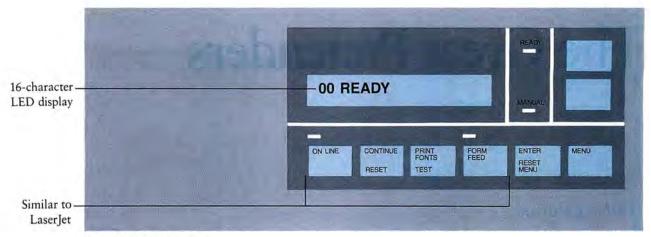
Figure 3: Using an enhanced LED display and a larger keypad, the Series II console lets you select fonts easily.

desktop publishers should greet HP's support of the language with unadulterated enthusiasm.

Nonetheless, a PostScript board won't come cheap. HP estimated that the DDL board would cost about $2500, and considering Adobe Systems' high royalties, a PostScript board will probably be even pricier. That would make a PostScript-equipped Series II about as expensive as a LaserWriter.

Still, when the PostScript board arrives, the Series II should have one significant advantage over the LaserWriter: speed. Unlike the LaserWriter, the LaserJet and LaserJet Plus use a parallel rather than a serial interface, resulting in much faster downloading—especially with high-resolution graphics. The Series II includes a video connector to link up with the proposed board, which offers even faster downloading than a parallel interface. Older LaserJets will be able to communicate with the board via an add-on connector.

With or without a page description language, the budget-priced Series II has plenty going for it. By all indications it's every bit as reliable as its predecessors: In one test, we printed 1600 consecutive pages without a hitch. The convenient new hardware controls, coupled with moderately priced RAM expansion and improved paper handling, should help HP further expand its installed base. Even after the new Canon LBP-SX engine enters wider distribution, the competition will have a tough time duplicating the Series II's features for such a low price. ●

Michael Gardner is vice president of research and development at WordTech Systems. He is a coauthor of LaserJet Unlimited *(Peachpit Press, Berkeley, California, 1986).*

The Great Pretenders

Two intriguing variations on the dBASE III Plus theme offer data base managers a choice of speed or comfort— but not both.

Richard H. Baker

Both *DBXL* and *Foxbase+* claim to be *dBASE III Plus* replacements, yet they are as different from each other as Mutt and Jeff. In *DBXL 1.1* WordTech Systems offers an inexpensive *dBASE* work-alike with an engaging interface and a hospitable programming environment that will appeal to both beginners and programmers. *Foxbase+ 1.21* is a very fast interpreter-compiler hybrid that gives *dBASE* veterans a programming environment that looks like *dBASE* but feels like Turbo Pascal. Developers can use either program to produce applications much like those gener-

ated under *dBASE III Plus,* but with *Foxbase+* the process—and the final product—is faster.

Standard Bearers

DBXL and *Foxbase+* adhere closely to the *dBASE III Plus* standard, so you won't have to change any data, command, format, or label files to use them. And with only a few exceptions, the programs' commands and sequences are identical and perform the same functions.

Moreover, *DBXL* and *Foxbase+* accept programs generated by *dBASE* without demur. For example, the disk tutorial accompanying *dBASE III Plus* includes a checkbook management application featuring linked files, an elaborate screen display, complex string manipulations, and a variety of calculations. Both programs accepted these files and ran them without error.

Alas, *DBXL* and *Foxbase+* show too well their fealty to *dBASE,* perpetuating one of its greatest failings: a report generator so clumsy it should be banned. Both programs use the *dBASE* .FRM report form file, and their mechanism for defining it is similar to that used by Ashton-Tate.

Points of Departure

DBXL and *Foxbase+* are also guilty of giving with one hand and taking with the other, as they lack some of the amenities that are finally starting to make life under *dBASE III Plus* bearable. Neither program provides a screen painter, a programmer's aid that eases the chore of creating custom menus. Nor do they offer application generators, which can produce the code necessary for creating modest menu-driven programs that contain custom data entry forms and reports.

Moreover, *Foxbase+* lacks an interface like the Assistant, *dBASE III Plus*'s handholding, menu-driven system that allows users to query and link data bases or create data entry screens and reports without writing a command file.

DBXL has a menu system, called Intro, that feels like the Assistant but doesn't look like it. On-line help is more accessible and generous than the Assistant's, but Intro won't let you have more than one data base open at a time, while *dBASE*'s Assistant allows up to ten. This limitation may actually benefit new users, since having many data bases open at once can lead to confusion.

Except for the missing screen painter and application generator, *DBXL* couldn't get much closer to

dBASE III Plus without moving in with Ashton-Tate. *DBXL* not only treats files the same way, it supports virtually all *dBASE III Plus* commands and Ashton-Tate syntax (some exceptions: SET ORDER TO, IMPORT, and EXPORT), and adds some 20 high-level commands that let developers put windows in their applications.

Although program files created with *DBXL*'s language extensions will not run under *dBASE*, *DBXL* includes a function that treats those extensions as comments.

Foxbase+'s Tools of the Trade

In addition to most of *dBASE III Plus*'s data base functions, *Foxbase+* allows one- and two-dimensional array memory variables, which can reduce the amount of code developers have to write. It also improves on *dBASE*

III Plus by giving you more flexibility in gleaning data from multiple data bases. As you traverse a customer data base, for example, you can confine the corresponding information from inventory and invoice files in a report.

Finally, *Foxbase+* allows far more procedures per command file than *dBASE III Plus:* 128 versus 32. This can lead to much faster applications, since gathering programs into a single file can reduce disk access time.

At press time, Fox Software reported that version 2.0 will let developers create custom data entry screens that verify input data—preventing, for example, an order for 2000 parts when you only wanted 20. What's the trick? Tacking on a VALID clause at the end of GET statements. Finally, *Foxbase+* will support user-defined functions (much like *Framework*'s FRED language), so if a feature you want isn't available, you can simply create it.

One of Fox's more questionable departures from *dBASE III Plus* is its decision to use a proprietary index file format to speed indexing. When the program encounters a *dBASE* .NDX index, *Foxbase+* automatically pauses and converts it; the original index files remain unchanged.

Depending on your loyalties, this feature can lead to an interesting dilemma. Once you have converted an .NDX file, you will have to rebuild it if you want to run it under *dBASE III Plus* again. That's no problem for people who permanently switch from *dBASE III Plus* to *Foxbase+*, but it's inconvenient for anyone who moves back and forth between the two.

A Better Assistant

DBXL's default prompt, XL>, may look a bit Spartan, but you can change it to display the current data base, path, active work area, or index file, as well as normal DOS attributes such as time and date.

Best of all, once you enter the command INTRO, *DBXL* takes you firmly in hand. Intro displays

Executive Summary

Foxbase+

Data base manager

With *Foxbase+*, Fox Software offers experienced *dBASE* users a fast, no-nonsense data base manager that adheres to *dBASE III Plus*'s file and command structure. Like *DBXL, Foxbase+* lacks a screen painter and application generator, and requires a lot of memory. Nor does it provide a feature like *dBASE*'s Assistant. *Foxbase+* accommodates *dBASE* data and program files but uses its own index file format. The program's built-in pseudocompiler is very fast, comparing favorably with full *dBASE* compilers.

User interface	Good
Data entry features	Good
Search/sort capabilities	Excellent
dBASE file compatibility	Good
Overall value	Good

DBXL

Data base manager

Unlike *Foxbase+*, WordTech's *DBXL* is an engaging program with a menu-oriented Intro option and generous help menus that will put beginners at ease; unfortunately, it runs no faster than *dBASE III Plus. DBXL* offers plentiful windowing capabilities, useful for data base managers and developers alike.

User interface	Excellent
Data entry features	Excellent
Search/sort capabilities	Good
dBASE file compatibility	Excellent
Overall value	Good

a bar across the top of the screen that lists choices such as Begin, Alter, Search, and so on. Select an option and you're led gently through the standard operations such as creating a data base, adding and editing records, putting them in order, and displaying selected data.

Lest you get lost, each time the cursor moves to a menu selection, a few words of explanation appear below it. As you make your choices, a tutor line at the bottom of the screen builds the complete statement (such as SORT REPORT ON MFR), which you can also issue directly at *DBXL*'s prompt, once you leave Intro's warm embrace.

Newcomers (and those with little time to peruse manuals) will particularly welcome *DBXL*'s lavish on-line help. Like *dBASE III Plus, DBXL*'s system is multitiered, but you can access it from anywhere in the program. If you can't remember the name or syntax of a certain command, press <F1>, and *DBXL* rushes to your aid, displaying a series of overlapping help screens that give the manual's definition of the command and an example of the proper syntax (see Screen 1).

Another attractive feature is *DBXL*'s windowing system, which lets you view the results of separate data base operations, such as a sorted customer list in one window and credit histories in another.

The program itself uses windows for everything from help screens to data entry. As you might expect, it's easy to use windows in applications generated

with the *DBXL* command language. This is especially useful when you want to create pop-up help screens or *1-2-3*-style command lines. Commands for the windowing system are modeled after those used in data base operations. For instance, you WUSE a window much as you would USE a data base. Counterparts such as WCLOSE and WDISPLAY are also available.

■ **Power to the Programmers**
DBXL will appeal to beginners, but it also offers programmers a comfortable working environment and comes furnished with some nice debugging features. When an error halts a program, the FIX option activates the program editor, opens the command file, and takes you straight to the suspect line. Once you have repaired the problem and saved the change, *DBXL* resumes execution of the program from the point where the error occurred, in sharp contrast with *dBASE*'s cumbersome procedures.

Another clever touch is an AUTOMEM option that eliminates some programming tasks. AUTOMEM translates data base fields into memory variables for data entry and editing, then returns the data to the data base. A PROPER() function translates entries like 'JOHN Q. PUBLIC' or 'john q. public' into the uniform 'John Q. Public', ensuring a consistency that is vital when you later retrieve data.

DBXL applications also benefit from the program's family connection with *Quicksilver*, WordTech's *dBASE* code compiler. *Quicksilver* already supports most *DBXL* features, including windows, and WordTech is working
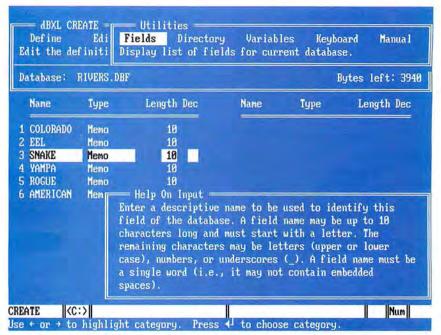
to increase the compatibility of the two programs. The current release of *Quicksilver* doesn't support AUTOMEM, for example, but the company claims a future release will.

■ The Quick Brown Foxbase+
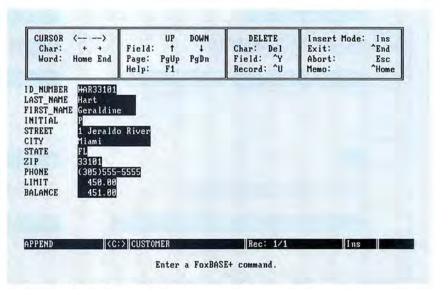
If *DBXL* pulls out an armchair for its users, *Foxbase+* laces Nikes on their feet. A pared-down program, *Foxbase+* dispenses with such niceties as an Intro (see Screen 2) and hasn't significantly bettered *dBASE III Plus*'s editing, debugging, and testing tools. But if *Foxbase+*'s programming enhancements are slim, its built-in compiler is outstanding. You can compile one or more programs in a chain, designating them with wild-card characters. Or you can issue the command to run a program, and *Foxbase+* will pause to compile source files as needed. This lends itself to quick, on-the-fly program development.

Although *Foxbase+* compiles in a single step, it doesn't produce fully executable files. Instead the package generates object files (with a .FOX extension); to run them, you must load a copy of *Foxbase+* or a run-time version. Fox offers developers either a ten-license run-time package for $300 or a royalty-free version that allows an unlimited number of applications for $500.

Both *DBXL* and *Foxbase+* install easily, but they eat up memory with a vengeance. *DBXL* requires 450K of RAM; WordTech claims the next release will trim

Screen 1: Thanks to a series of helpful prompts, creating a DBXL data base needn't intimidate novice users. And if you get stuck, you can be rescued. Here, DBXL's on-line help explains how to enter a descriptive name to identify a data base field.
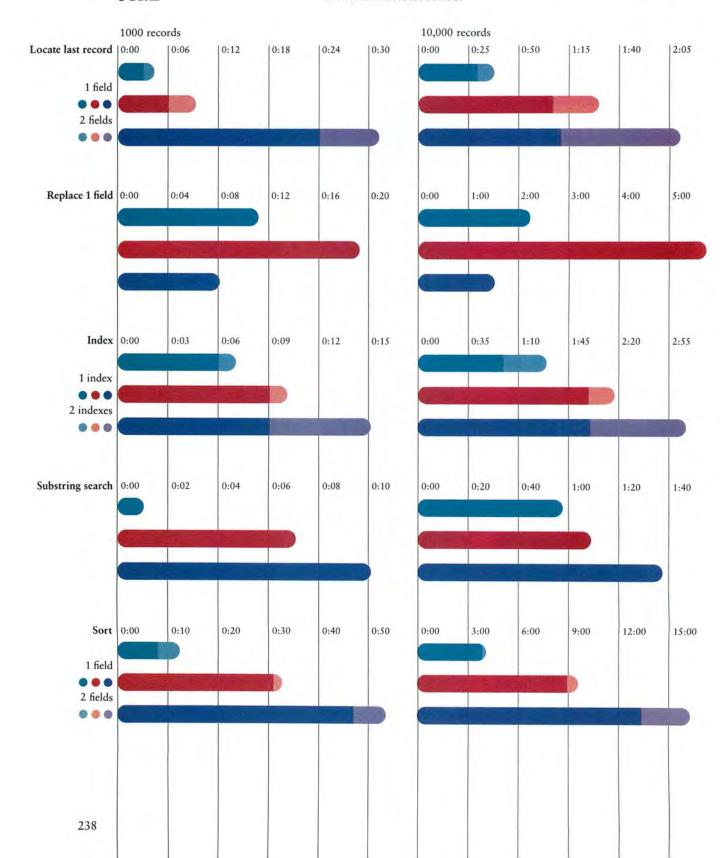
Screen 2: Only those who pay particular attention to the bottom line will recognize that this standard entry screen comes from Foxbase+, not dBASE III Plus. From the cursor movement instructions at the top to the status bar on the lower screen, the two are virtually identical, at least on screen.

The Fast Foxbase+

● Foxbase+
● dBASE III Plus
● DBXL

Figure 1: Foxbase+ easily outdistanced its competition in most tests of internal data base operations. DBXL lagged in head-to-head competition with dBASE. Tests were performed using a PC's Limited AT running at 6 MHz with 1MB of RAM and a 40MB Seagate voice-coil drive. Times shown are in minutes:seconds.

down to 410K. Though *Foxbase+* can work in as little as 374K, it prefers an elephantine 560K. Unfortunately, if your system isn't so equipped, you must run a configuration utility to match the amount of system RAM available.

The Tortoise and the Hare

Just as they differ in appearance and functionality, *DBXL* and *Foxbase+* fall into distinctly different performance classes. Word-Tech admits that *DBXL* is 10 to 15 percent slower than *dBASE III Plus* performing general operations such as indexing, sorting, locating the last record, searching for a substring, or replacing one field. *Foxbase+*, on the other hand, beats everyone to the finish line (see Figure 1).

Foxbase+ is also very speedy in executing command files. Whereas *DBXL* is an interpreter and executes code one line at a time, *Foxbase+* is a pseudocompiler that transforms the entire application into surprisingly fast intermediate code that runs in the presence of the program. In informal tests, it ran as fast or faster than the full compilers *Quicksilver* and *Clipper*.

Neither *DBXL* nor *Foxbase+* accepts network commands in its basic form, but networking is possible. Fox sells a separate multiple-user version of *Foxbase+* for $595 that runs on DOS, Xenix, and UNIX systems; there is no extra charge for additional users. WordTech, which developed a $99 network module for *Quicksilver*, plans to modify *DBXL* to accept the same module; the number of

users will be limited only by the number of workstations.

Both programs permit file and record locking to prevent one user from altering a file or record being used by someone else. The *DBXL-Quicksilver* combo handles locking automatically; *Foxbase+* leaves file access control to the programmer. Unfortunately, neither program offers a password-based security system comparable to that found in *dBASE III Plus*.

DBXL's documentation is lucid, copiously illustrated, and packed in a single paperback volume that includes a tutorial and an index. The *Foxbase+* manual, true to its intended readership, painfully lacks such refinements. Fox's manual is adequate but terse.

Should You Fight or Switch?

As contenders for the *dBASE III Plus* crown, *DBXL* and *Foxbase+* come off as scrappy fighters. Still, they're not quite ready for a title bout.

To serious data base users, *Foxbase+* offers top performance with high *dBASE* compatibility. At $395, however, it isn't exactly a bargain. It also demands a lot of memory, adds little to the *dBASE III Plus* lexicon, and produces applications that need run-time help.

At only $169, *DBXL* is a good value despite being memory-hungry and relatively slow. *DBXL* is a cheap way to spread *dBASE III Plus* power around, and it could prove especially useful as a low-cost development tool.

Both *DBXL* and *Foxbase+* have some attractive features, but they haven't really improved the data base standard. People who already own *dBASE III Plus* won't switch, and new users may decide to swallow hard and put up with

the hassles of *dBASE III Plus* to gain access to its other tools.

When clone makers started copying the PC, they offered their customers added value of some sort: extra speed, a better price, more features. Until *DBXL* and *Foxbase+* clearly demonstrate that kind of added value by bettering the *dBASE III Plus* standard, they aren't likely to escape its long shadow. ⬢

Richard H. Baker is the author of four books of dBASE techniques and applications, including Multi-User Applications in dBASE III Plus *(TAB Books, Blue Ridge Summit, Pennsylvania, 1987).*

Are You the Deskset Type?

Out of the print shop comes DeskSet, a rough-and-tumble desktop publishing package that promises rewards for those in search of true typesetting.

Richard Jantz
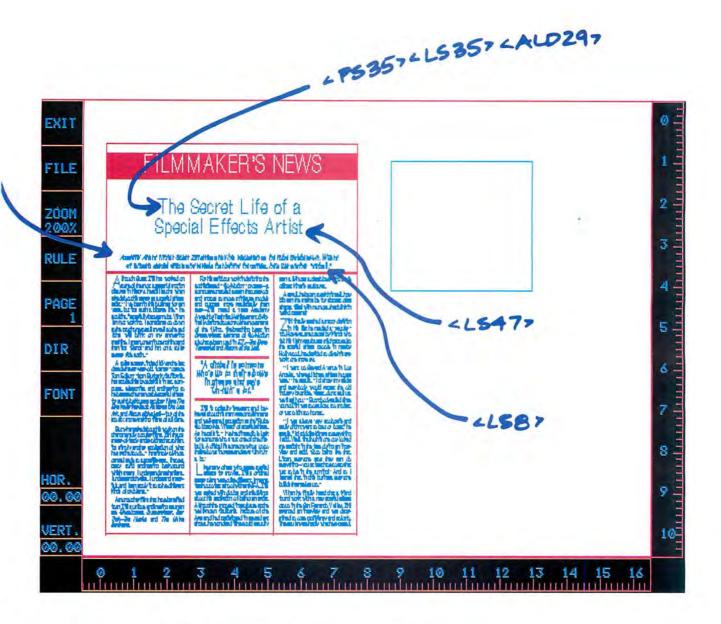
▌▌▌▌ While desktop publishing software like *Ventura Publisher* and *PageMaker* bask in the spotlight, it's easy to forget that they represent only a small portion of the publishing power available with personal computers. As popular as these icon-based, graphics-oriented programs are, they can't match the typesetting prowess of code-oriented programs that turn a PC into a front end for a commercial typesetting system.

Typesetting muscle, however, usually requires a healthy investment in software. Magna Computer Systems' *MagnaType*, for example, costs $5250 for a version that drives a laser printer and a hefty $8500 for one that powers a typesetter. Although other PC-based typesetting programs can be purchased for a few thousand dollars less, these packages are still aimed at professional typesetters and graphics shops and at those who create in-house corporate publications. Given the popularity of low-priced desktop publishing, many in the typesetting industry are beginning to see the printing on the wall.

In releasing *DeskSet,* G.O. Graphics becomes one of the first established typesetting firms to offer PC users a typesetting program for less than $1000. This hardy package mimics the rudiments of the company's $3000 *Horizon Composition System,* which controls Compugraphic typesetters. Although the basic *DeskSet* package won't control Compugraphic typesetters, it will drive laser printers or typesetters equipped with Adobe Systems' PostScript page description language. If you prefer using Compugraphic typesetters, with their enormous selection of typefaces, the optional $495 Disk Conversion Module enables you to convert *DeskSet* files into Compugraphic MCS-compatible files.

EXIT

FILE

ZOOM
200%

RULE

PAGE
1

DIR

FONT

HOR.
00.00

VERT.
00.00

FILMMAKER'S NEWS

The Secret Life of a
Special Effects Artist

<PS35> <LS35> <ALD29>

<LS47>

<LS8>

Typesetting You Can See *DeskSet* imports ASCII word processing files and translates them into typesetting files. It adeptly performs a host of professional typesetting functions, including automatic kerning; automatic hyphenation and justification with multiple exception dictionaries; multiple columnar and tabular settings; drawing of rules and boxes; and inverse video (white characters on a black background). In addition to these sophisticated features, this program enables you to manipulate text in a variety of subtle ways (see the sidebar "DeskSet's Finer Features").

DeskSet's Finer Features

DeskSet is neither a souped-up word processor nor an ersatz electronic drafting table, but a bona fide typesetting program that offers PC publishers considerable control over the way type is composed on a page. (For background information see "Typesetting Point by Point," *PCW,* July 1986.)

With *DeskSet* you can control the vertical and horizontal positioning of text. (Note that text is always manipulated by codes that consist of an opening bracket, an alphabetic identifier, a numeric quantifier, and a closing bracket.)

Vertically, the program enables you to specify line spacing and leading in points. Horizontally, you can insert characters, standard and thin spaces, and fixed entities like em and en dashes. *DeskSet* also features precision horizontal spacing with such commands as Forward Point or Back Point and Forward Unit or Back Unit. These commands enable you to add or subtract white space a point at a time or in increments of the point size in use, respectively.

Two other versatile horizontal control commands are No Flash On, which moves the printer the width of one character without printing anything, and Flash Only, which prints a character but doesn't move the "carriage," causing the next character to type over the previous one. You might, for example, use No Flash On to wrap text around a large logo, and Flash Only to create a ballot box containing a character.

DeskSet allows you to specify up to 20 tab fields, which can include *floating tabs, automatic tabs, indents* (right or left indents, or both), and *cut runarounds* (which wrap text around a rectangular area like a graphic). In conjunction with the tab commands, you can set type in columns using a series of multiple-column commands.

Kerning is the typographic technique of adjusting the spacing between specific character combinations; *DeskSet* lets you define your own kerning values or use default values. *Character compensation* reduces the number of units between each letter and is specified in 1/9-point increments. You can use kerning and character compensation in tandem, manually, or automatically to reduce character space by the aggregate amount.

Like all proficient typesetting programs, *DeskSet* adjusts letter and word spacing so that justified lines fill the line

measure and, if necessary, words are hyphenated. A *spaceband* (or word space) establishes variable space parameters between words. This refined control lets you specify the minimum, maximum, and preferred space between words in a line of text.

Hyphenation parameters control the number of consecutive hyphenated lines and the fewest allowable letters before and after a hyphen. *DeskSet* also permits the use of discretionary hyphens.

There are several ways to end a line, including *regular return* (hard return), *tab return, carriage reset, line end* (no leading added), and automatic or manual *quadding* (justification).

You can also draw horizontal or vertical rules, boxes, combs, and matrixes. With the Set Ruling Parameters command, you can establish

defaults for the weight, depth, and indention of every rule you draw. For example, <SRP600,48,6> sets parameters in which every rule, box, matrix, or grid will have a weight of 6 points (600), be 48 points deep, and start at an indent of 6 picas.

Used in combination, the commands Draw Box, Draw Rule Horizontal, and Draw Rule Vertical can effectively add rules to text and graphics. The box and rules used in the newsletter shown in Figure 2 required the commands <DBX100,680,1,45> to draw the box, <DRH150,1,45> to draw the horizontal rule, and <DRV50,458,16> and <DRV50,458,31> to draw the vertical rules. —*R. J.*

As if first-rate typesetting capabilities weren't enough, *DeskSet* also lets you mix graphics and text. You can import pictures from paint programs, .PIC files from *1-2-3* and *Symphony,* and digitized images from scanners. Using embedded codes, you can position graphics images exactly where you want them.

Finally, *DeskSet* offers a preview screen that lets you peek at an approximation of your pages before they're typeset. The preview option is *DeskSet*'s nod to bit-mapped graphics; the bulk of the program is character-based. *DeskSet*'s preview screen isn't interactive, so you can't manipulate text and graphics on screen as you can with *Ventura Publisher* or *PageMaker.* But even though you can't play with the image itself, the preview mode does enable you to zoom in for a closer look. (Like any program, of course, *DeskSet* is constrained by display resolution, so what appears on screen may not convey exactly what you'll get on hard copy.)

The preview option also makes it practical to modify an image's position on the page through trial and error. Overall, this feature serves as an excellent proofing tool and places *DeskSet* ahead of other code-oriented programs, like *ScenicWriter,* that lack this function.

Typesetting novices, however, may blanch at the program's learning curve. *DeskSet* includes a repertoire of some 80 commands; users with typesetting experience may quickly grasp the program's
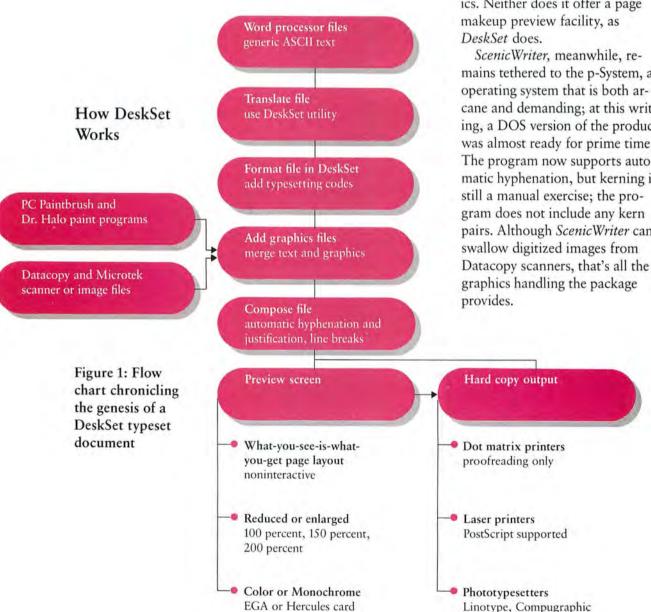
drift, while those without such experience may find themselves adrift.

Measured against two leading code-oriented PC-based typesetting packages, *DeskSet* is a happy compromise: more substantial and flexible than *ScenicWriter,* less comprehensive than *MagnaType* (see "The Scenic Route" and "MagnaType: The Personal Typographer," *PCW,* July 1986).

MagnaType's resume is simply without peer, commencing with the sheer number of its commands—130, to *DeskSet*'s 80. *MagnaType* boasts 1500 kern pair combinations, versus *DeskSet*'s 256. *MagnaType*'s hyphenation dictionary is significantly more extensive than *DeskSet*'s and even includes foreign language entries. *MagnaType* supports global formats (equivalent to style sheets) for multiple jobs and can drive a brace of typesetters. It offers win-

dowing capabilities that *DeskSet* lacks, and permits background tasks—like printing—while you're composing a file in the foreground. *MagnaType* runs on a variety of PC networks (which *DeskSet* does not), and with its $3000 *MagnaLink,* Magna Computer Systems even offers its own network.

Where graphics handling is concerned, however, the edge remains with *DeskSet.* Other than accepting input from Microtek scanners, *MagnaType* doesn't do graphics. Neither does it offer a page makeup preview facility, as *DeskSet* does.

ScenicWriter, meanwhile, remains tethered to the p-System, an operating system that is both arcane and demanding; at this writing, a DOS version of the product was almost ready for prime time. The program now supports automatic hyphenation, but kerning is still a manual exercise; the program does not include any kern pairs. Although *ScenicWriter* can swallow digitized images from Datacopy scanners, that's all the graphics handling the package provides.

How DeskSet Works

Figure 1: Flow chart chronicling the genesis of a DeskSet typeset document

Word processor files
generic ASCII text

Translate file
use DeskSet utility

Format file in DeskSet
add typesetting codes

PC Paintbrush and
Dr. Halo paint programs

Datacopy and Microtek
scanner or image files

Add graphics files
merge text and graphics

Compose file
automatic hyphenation and
justification, line breaks

Preview screen

Hard copy output

● What-you-see-is-what-
you-get page layout
noninteractive

● Dot matrix printers
proofreading only

● Reduced or enlarged
100 percent, 150 percent,
200 percent

● Laser printers
PostScript supported

● Color or Monochrome
EGA or Hercules card

● Phototypesetters
Linotype, Compugraphic

Weighing In

DeskSet runs on a PC, an XT, an AT, or a close compatible with 512K and a monochrome, color graphics, or enhanced graphics monitor. To use the program's preview option, you'll need a Hercules or EGA-compatible graphics board. Optional hardware (for the preview mode only) includes a mouse and a high-resolution graphics display; the program includes drivers for the Wyse WY-700 and the MDS Genius monitors. The preview screen mode requires that you specify your graphics board and mouse (or keyboard control) in a hardware setup file.

Although not required, a hard disk is recommended for efficient program operation. Making backup copies or installing *DeskSet* on a hard disk—the program consumes about 1MB of storage space—is duck soup, since the program is not copy protected. *DeskSet* does, however, include a hardware security lock that must be attached to the computer's parallel port for the program to run. The lock must be in place whether your printer or typesetter requires a serial or parallel connection.

Instead of a spiffy interface like that of *Ventura Publisher* or *Page-Maker*, *DeskSet*'s main menu features a menu bar that extends across the bottom of a blank screen. You use the function keys to select items from a series of such menu bars. Until you fully understand the program's organizing principles, your fingers will

```
COMPOSE File : newfilm                                        29817 05492
PS=000.0 LS=000.0  FT=0001 LL+15.00   A   TB=XX   J   HO   D=000.00  Composing
<LL47><PS40><FT006><LS40><CC2><CC0>▼
<DBX100,600,1,45><ALD50>◆
<LL46><IL1><IO><RVO><FT6><IS>F<BU4>I<BU4>L<BU4>M<BU5>M<BU4>A<BU4>K<BU4>E<BU4>
R<BU4>'<BU4>S  N<BU4>E<BU5>W<BU5>S<IS>*▼
<IX><LL46><RVX><LS0>+▼
<PS35><LS35><ALD29>The Secret Life of a**▼
Special Effects Artist<LS47>*▼
<PS12><LS14><FT7>Academy Award winner Stuart Ziff strips away his reputation
as the Rube Goldberg-Mr. Wizard**▼
of fantastic special effects and reveals that behind the camera, he's just
another "dirtball."<LS8>*▼
<DRH150,1,45>◆
<DRV50,450,16>◆
<DRV50,450,31><LS15>+▼
<AJ><LS11><TB1,2,13,J><TB2,17,13,J><TB3,32,13,J><MCO36.00,01,03>◆
<PS10><LS11><FT6><MFO><PS20>A<PS10><FT5><MFX>lthough Stuart Ziff has worked
on▼
<PS20><FT6>A<FT5><PS10>some of the most successful motion▼
pictures in history, he still laughs when▼
asked about his career as a special effects▼
artist. ''I've been in this business for ten▼
years, but it's such a bizarre life,'' he explains, "especially between jobs.
```

Screen 1: DeskSet's built-in editor mimics a word processor, with status lines and 80-column text. This file produced the typeset output shown in Figure 2.

probably get a fair bit of exercise bouncing between the various menus. *DeskSet*'s preview mode, on the other hand, greets you with a graphic interface and an array of options that you can use to select the keyboard or a mouse.

Beginning Workout

Working with *DeskSet* is akin to developing a computer program. But instead of writing, compiling, executing, and debugging code, you add typesetting codes to the desired file and let the program compose the text. You proof the results (via the screen or a printer), and then repeat the process until the document is ready for final output (see Figure 1).

You can begin using *DeskSet* with the program's built-in text editor, keying in a file from scratch. Or you may prefer to use the program's file translation function to convert formatted text or unformatted ASCII files into entities that *DeskSet* recognizes—a quick, straightforward process. The program works directly with *WordPerfect*, *WordStar*, *Multi-Mate*, *DisplayWrite*, and *PC-Write* files.

Following file translation, *DeskSet*'s editor prepares the file for typesetting. Here the screen takes on the trappings of a word processor, with 2 status lines at the top and 23 lines for text (see Screen 1). Status lines apprise you of essential typesetting information, including line length and line spacing, type size, font, and file size. You can specify these parameters plus other controls (such as

unit of measurement, character compensation, letterspacing, spaceband, and kerning) in a default file that can be modified at any time.

Using *DeskSet*'s editor, you can copy, move, delete, and store blocks of text; search for and replace text strings; insert text from other files; and create keyboard macros to automate repetitive tasks. If you're working with a large file, such as a book or manual, you'll need to break it into manageable chunks since *DeskSet*'s screen buffer holds only about 30K. You can, of course, link the separate files when it's time to generate output.

■ Embedding Codes: No Pain, No Gain

As with most typesetting programs, you format a *DeskSet* file by embedding a series of mnemonic codes in the text. The program then translates the codes into instructions that drive a printer or typesetter. Although it's not necessary to learn the entire coding scheme to produce acceptable results, mastering the program's lengthy roster of codes will afford you maximum control over the typesetting process.

Codes, which are delimited by angle brackets, consist of an alphabetic identifier followed by a numeric quantifier. G.O. Graphics has done a commendable job of keeping the codes fairly intuitive. The code <LL24>, for example, establishes a line length of 24

picas; <PS14> denotes a point size of 14; <LS15> sets line spacing at 15 points; and <FT4> selects a font—Helvetica Bold Oblique.

You can also insert codes that serve as toggles for such typesetting effects as slanted text and inverse video. Once these codes are embedded, they remain in effect until you change them. To both augment on-line help and spare you repeated trips to the manual, G.O. Graphics has tossed in a ruler/keyboard template that indicates picas, points, fonts, and other critical information.

You can write macros to remove the drudgery from coding boilerplate text. *DeskSet* supports unlimited sets of up to ten user-defined keys per set. When using the editor, you can load key sets, consisting of text strings or typesetting commands, as needed.

■ Font Flexibility

DeskSet contains three font files, providing a total of 35 fonts. Each file can contain any combination of up to 16 fonts, but you can load only one file at a time.

The program automatically accesses a 13-font default file that consists of Courier, Helvetica, and Times Roman, each in regular, italic, bold, and bold italic, as well as the Symbol font. Other files contain Palatino, Zapf Dingbats, Zapf Chancery, Bookman, Helvetica Narrow, Avant Garde, and New Century Schoolbook. If you want to customize font files, you can use a *DeskSet* utility that lets you draw from a master font library. You're free to specify any of the 35 fonts by font metrics

(character width and height) and other font attributes.

For additional flexibility, *DeskSet* offers unlimited mixing of type styles and sizes within a line. You can typeset any font in ½-point increments from 4 to 127½ points, or slant a font right or left in ¼-degree increments up to 31¾ degrees.

Although the number of fonts you can use with a PostScript-compatible laser printer or typesetter doesn't approach the Compugraphic font capacity, the fonts *DeskSet* does support should be ample for most desktop publish-

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Executive Summary

DeskSet
Desktop publishing software

If you need to add a professional touch to books, manuals, or similarly hefty tomes, *Deskset* obliges with the power of code-oriented typesetting. The program augments those capabilities with convenient integration of text and graphics and a preview screen that provides a peek at your pages before they're typeset. But page design isn't in *DeskSet*'s repertoire, and the program is decidedly not a snap to learn or use.

Typographic features	*Excellent*
Text processing	*Good*
Text/graphics integration	*Good*
Output device support	*Excellent*
Overall value	*Good*

ers. If you simply must have more, you might consider the optional module that converts *DeskSet* files for use on the ubiquitous Compugraphic typesetters.
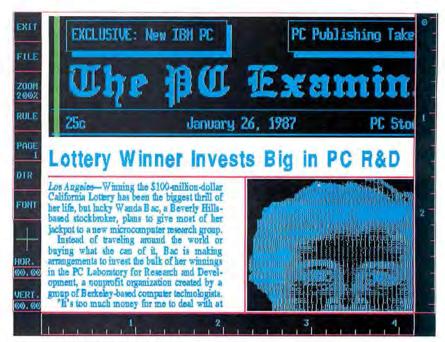
■ Swallowing Graphics Files

Graphics and text can be intermingled with *DeskSet*'s Virtual Picture command. The program imports images created with the *PC Paintbrush* and *Dr. Halo II* paint programs; uncompressed digitized images from Datacopy, Dest, or Microtek scanners; and *1-2-3* or *Symphony* .PIC files. But learning to use this finicky command flawlessly requires substantial time and effort.

To position an image in text, you designate x and y coordinates (from the left and top margins, respectively). Following standard typesetting practice, picas are used for the x coordinates and points for the y coordinates.

The digitized photograph in Screen 2 was inserted with the command <VP1,2,13,122,MCTK.300>. In this instance, the graphics scaling factor is 1 (100 percent), the graphics type is 2 (which indicates an uncompressed Microtek file), the x coordinate is 13 picas, the y coordinate is 122 points, and the file name is MCTK.300.

Fitting a graphics file into a tight or complex layout can seem an endless exercise in tinkering. The preview mode sports on-screen rulers (in inches and picas), but that's about all the help you'll get; unfortunately, *DeskSet*'s streamlined documentation might not rescue the neophyte who is grappling with a graph.

Screen 2: DeskSet's display-oriented preview screen presents a what-you-see-is-what-you-get version of a typeset file, complete with text and graphics. Although the preview screen is not interactive, you can magnify the page for proofing.

■ The Composer's Art

Once codes are embedded, invoking the Compose command prompts *DeskSet* to execute those codes. Computation proceeds apace unless an error is encountered, in which case the program halts composition, flags the error, and prompts you with what is likely to be a cryptic error message.

After *DeskSet* finishes composing a file, you can save the file and quit the edit/compose mode for the output mode. From the output menu, you can print the file on a dot matrix printer, select the preview screen for proofing, or print the file on a laser printer or typesetter. All of these options entail using *DeskSet*'s file output queue, which holds as many as 12 files.

Before sending output to a dot matrix printer, you can strip out the typesetting commands—a nice option if you simply want to proof the copy for line breaks and hyphenation. For laser printer or typeset output, *DeskSet* provides a status screen to properly connect the printer and adjust RAM to suit the print queue. Figure 2, the product of the file shown in Screen 1, was run on an Allied Linotype Linotron 100. In addition to supporting PostScript-compatible laser printers and typesetters, *DeskSet* includes an Epson driver (suitable for proofing purposes

only). G.O. Graphics has announced support for Hewlett-Packard and Xerox laser printers.

Before you dispatch final copy to a printer, however, you can take advantage of *DeskSet*'s preview screen to proof a graphic representation of your typeset file. In that case, composed files must first be run through *DeskSet*'s output mode, which converts them to preview files.

■ Sneak Previews

Armed with a preview file, you select the preview screen menu and–voilà–a graphics screen replaces the text display. Although you can use either a monochrome or color monitor, monochrome provides better resolution.

The left border of the screen is adorned with option boxes (file,

zoom, rule, page, directory, font, and exit) and *x-y* coordinates. The remainder of the screen displays the given page in portrait or landscape mode.

The preview default view–a full-page display of the file–is adequate for scrutinizing the overall design and snaring major mistakes. In this view, graphics are represented by shaded blocks. The zoom option enables you to magnify a page 100, 150, and 200 per-

Figure 2: Sample output using DeskSet to drive an Allied Linotype Linotron 100

FILMMAKER'S NEWS

The Secret Life of a Special Effects Artist

Academy Award winner Stuart Ziff strips away his reputation as the Rube Goldberg-Mr. Wizard of fantastic special effects and reveals that behind the camera, he's just another "dirtball."

Although Stuart Ziff has worked on some of the most successful motion pictures in history, he still laughs when asked about his career as a special effects artist. "I've been in this business for ten years, but it's such a bizarre life," he explains, "especially between jobs. When I'm not working, I sometimes go down to the payphone to call myself so the red lights will blink on my answering machine. I mean, one minute nothing and then it's 'Bang!' and I'm on a roller coaster ride again."

A roller coaster, indeed! Over the last decade the 37-year-old, former "garage Tom Edison" from Burbank, California, has applied his broad skills in art, computers, electronics, and engineering to help create the memorable special effects for such blockbusters as: *Star Wars, The Empire Strikes Back, Raiders of the Lost Ark,* and *Return of the Jedi*—four of the top six moneymaking films of all time.

But when asked about his work on the phenomenally popular films, Ziff shrugs matter-of-factly and explains that, to him, it's simply another application of what he's trained to do. "I'm simply plying a general trade to a specific area. I have a pretty solid engineering background which means I understand mechanisms. I understand physics, I understand materials, and I can apply it to solve different kinds of problems."

Among other films that have benefited from Ziff's unique engineering acumen are *Ghostbusters, Dragonslayer, Star Trek—The Movie,* and *The China Syndrome.*

For his assiduous work in designing the sophisticated "Go-Motion" process—a computer-controlled system that uses rods and motors to move miniature models and puppets more realistically than ever—Ziff netted a 1982 Academy Award for Technical Achievement. Originally designed to control the movements of the flying, fire-breathing beast in *Dragonslayer,* elements of Go-Motion also have been used in *E.T.—The Extra-Terrestrial* and *Return of the Jedi.*

"A dirtball is someone who's up to their elbows in grease and says 'Un-huh' a lot."

Ziff is typically irreverent and low-keyed about his many accomplishments and well-earned reputation as the "Rube Goldberg-Mr. Wizard" of special effects. As he tells it, "I've had incredible luck for someone who's just one of the dirtballs. A dirtball is someone who's up to their elbows in grease and says 'Uh-huh' a lot.'

Like many others who create special effects for movies, Ziff's original career plans were quite different. In 1976, fresh out of art school with an MFA, Ziff was racked with doubts and misgivings about his aspiration of being an artist. Although he majored in sculpture at the well-known California Institute of the Arts and had participated in several art shows, he wondered if he could actually

earn a living as a glassblower who made offbeat kinetic sculptures.

Ater all, he began to ask himself, how big can the market be for abstract glass shapes, filled with neon gas, that blink in weird patterns?

Ziff finally reached a major decision in his life: he needed a "regular" job. However, encouraged by friends who felt his flashy sculptures might appeal to the special effects people in nearby Hollywood, he decided to give his artwork one more try.

"I went up Seward Avenue in Los Angeles, where all these effects houses were," he recalls. "I'd show my slides and everybody would repeat the old industry bromide, 'Great, don't call us, we'll call you.'" But nobody called since young Ziff was too callow, too modest, or just plain too honest.

"I was always very apologetic and really didn't want to brag or boast," he recalls. "I'd add disclaimers to everything I said. Well, finally, this one guy looked me straight in the face during an interview and said, 'Stop being like that. Listen, everyone says they can do everything—you at least have to say that just to be in the running!' And so I learned that, in this business, everyone builds themselves up."

When he finally heard that a friend found work with a new special effects group in the San Fernando Valley, Ziff arranged an interview and was determined to ooze proficiency and aplomb. The results were hardly what he expected.

cent. The rule option supplies horizontal and vertical rulers, divided into inches and picas—highly useful for determining *x-y* coordinates in tandem with the Virtual Picture command.

The font option toggles two on-screen fonts: stick fonts (generic representations of type) for fast display or filled fonts for a true outline but lamentably sluggish display. *DeskSet*'s screen fonts are limited to serif and sans serif typefaces (Times Roman and Helvetica, respectively). For proofing purposes, the default typefaces substitute for any others you may be using.

Because *DeskSet*'s preview screen isn't interactive, you can't immediately edit what you see. In order to modify your copy, it's necessary to exit the preview screen and return to the edit mode. Fixing a file often means running through the edit/compose/preview cycle several times; using *DeskSet* in this fashion demands a good deal more patience than does working with an interactive program like *PageMaker*.

Overall, *DeskSet* does a credible job of approximating the final typeset page, but desktop publishers seeking instant gratification should take heed: Depending on the amount of text and graphics in your preview file, drawing the full screen can take a while. This plodding quality diminishes *DeskSet*'s appeal for deadline-intensive shops such as daily newspapers.

Stacking the DeskSet

As powerful and versatile as *DeskSet* is, it is not without its quirks; nor is it ideal for every kind of PC publishing project. Although you can use macros and user-defined keys when editing a file, for example, the program lacks style-sheet convenience for establishing headlines, text, subheads, and other repetitive formats. *DeskSet* likewise is incapable of such automatic book pagination features as running heads, footers, and footnotes or of automatic multicolumn grids.

Although the program includes a few short tutorials, *DeskSet* doesn't provide much guidance for absolute beginners. You won't find sample files that demonstrate how to use various rules, graphics, or multicolumn formats. No question about it: *DeskSet* isn't just tougher to use than *Ventura Publisher*—it's harder to learn. Proficiency at *DeskSet*'s Compugraphic-style typesetting techniques is best acquired through trial and error, or from additional technical support or training.

If you're publishing handbills, brochures, or newsletter-size periodicals in which every page requires a new design, you'll probably want a mouse-driven package like *PageMaker* to create layouts.

But if you need to typeset books, manuals, reports, or other major projects in which each page adheres to a similar style and format, *DeskSet* will enable the PC to make all the right moves for you, page after page.

A rich, code-oriented program like *DeskSet* is the antithesis of a display-oriented package where mice do the work of embedded codes. In trading ease-of-use for masterful typographic control, G.O. Graphics has come out strongly for the aesthetic of professional typesetting. ⊜

Richard Jantz, a freelance writer and editor based in Berkeley, California, is the author of Ventura Publisher for the PC *(John Wiley & Sons, New York, 1987).*

DeskSet
G.O. Graphics
18 Ray Ave.
Burlington, MA 01803-4721
800/237-5588, 617/229-8900
List price: $995, Compugraphic Disk Conversion Module $495
Requirements: 512K; two floppy drives or a hard disk; DOS 2.00 or later version; Hercules Graphics Card, IBM Color/ Graphics Adapter, IBM Enhanced Graphics Adapter, or compatible
Not copy protected
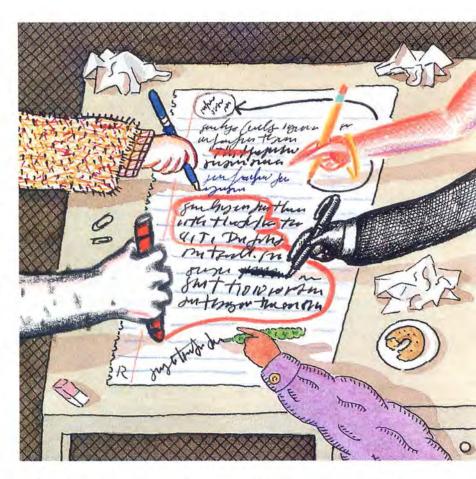
Author, Author, Author!

Can groups edit better
on the computer?
Do many hands make
write work? It depends
on the group—and
the application.

Joan Rich

█║║║ There's a black hole in
group writing projects. You
know you've found it when you're
neck deep in multiple drafts that
you can't compare side by side;
when paragraphs deleted by one
reviewer are reinstated by the
next; when long, penciled arrows
snake through pages and arrive
nowhere; when a swarm of at-
tached notes comes unstuck and
you can't tell where any of them
go. Is there any way out of this pa-
per labyrinth?

Perhaps. A new kind of soft-
ware is emerging that directly ad-
dresses the group writing process.
Variously known as group author-
ing, document management, and
editing software, these programs

work with word processing files to
help you compare drafts of a doc-
ument, automatically implement
proofreading marks, integrate re-
viewer suggestions, and maintain
an "edit trail." Since their word
processing capabilities are limited,
and formatting and text attributes
may be lost during file transfer,
group authoring programs are
best used for editing and revising
text rather than for creating pol-
ished documents.

CompareRite from JuriSoft,
Capsule Codeworks' *Red Pencil,*

and *ForComment* from Brø-
derbund Software all aim to
streamline the revision process.
CompareRite quickly and easily
highlights the differences between
drafts of a document. *Red Pencil*
attempts to translate *The Chicago
Manual of Style* proofing symbols
into software menus and com-
mands. *ForComment,* the most
ambitious product reviewed here,
provides a sophisticated system for

collecting and organizing reviewer feedback. While group authoring tools won't generate an original draft and can't typeset the final version, they can simplify the revision process for marketing plans, human resource manuals, policy statements, legal documents, and the like.

Marc Rosenthal

Comparative Thinking

CompareRite, from Juri-Soft—publisher of vertical market software for the legal profession—relies on a simple but powerful approach to one major problem in document handling: comparing two versions of the same document side by side.

Requiring 210K to operate, *CompareRite* is simple to install and use. You select the word processor used to create the document from *CompareRite*'s list of ten popular programs (or use simple ASCII files), copy the document drafts into the same directory as the program, choose a highlighting style, and run the program. *CompareRite* reads both drafts, creates a document with all the changes marked, and stores this document as a third file. The maximum size for this third, conglomerate file is 16MB; to be safe, each draft should be 8MB or less—which still leaves room for an enormous document.

In essence, what *CompareRite* does is compare the two versions, looking for additions and deletions. Given the simplicity of this concept, the program should move fast—and it does. At an average of 2 seconds per page, it can compare two eight-page drafts of a document and create a third, conglomerate draft in approximately 32 seconds.

CompareRite lets you choose the format for presenting changes. You can identify additions and deletions with attributes such as brackets, quotation marks, boldface or italics, strike-through, underlining, or combinations thereof. How many different attributes you can use on screen and in printing depends on the word processor format you select and on your printer. In any case, you should choose different sets of attributes for additions and deletions, so you can tell which is which.

All additions to a document from one draft to the next are set off by attributes and shown in full where they occur in the text. With deletions, however, you can opt to see the entire deleted passage in its original position (identified by your chosen attributes), or you can mark the beginning and end of deleted passages with a caret, pound sign, or number; *CompareRite* will then shunt all deleted text to the end of the document.

In addition, you decide how you want the program to interleave changed passages with the unrevised text. *CompareRite* offers four interleaving options: pinpoint, normal, broad, and programmer styles (see Screen 1). Pinpoint weaves in changes on nearly a word-by-word basis and is somewhat difficult to read. Most users will prefer normal or broad style; these two approaches compare passages block by block, showing

Executive Summary

CompareRite
Group writing software

Originally developed to compare drafts of legal documents, this program reads two versions and highlights the differences by producing a third, conglomerate file. You can specify output style, but lack of editing and collating features makes *CompareRite* a single-purpose offering.

Draft compare	Excellent
Cut and paste	Fair
Maintain edit trail	Fair
Printer control	Fair
Overall value	Good

Red Pencil
Group writing software

Intended for editors who suggest changes to a document but must obtain approval for them, *Red Pencil*'s one good idea—to translate proofing symbols into commands that update a document—doesn't redeem its bad execution. Grainy graphics, awkward keyboard routines, and lack of word processor support all compromise the program.

Draft compare	Poor
Cut and paste	Fair
Maintain edit trail	Poor
Printer control	Fair
Overall value	Poor

changes in context. The fourth style, a nifty tool for programmers, provides a system for comparing and debugging source code. With each style, you read the unmarked text and the deletions to reconstruct the old document, and the unmarked text and the additions to visualize the new version.

After *CompareRite* has produced a "redlined" conglomerate file, you can call up the file with your word processing program and edit it. With some minor exceptions, formats that existed in the original documents will be carried into the conglomerate file. JuriSoft recommends that you repaginate before editing files in *WordStar* and *WordPerfect*, however, and warns that original italics, boldface, and underlining may be lost in *Microsoft Word* and other program files if they're part of a changed passage. Although the program doesn't offer any communications hooks per se, you can create ASCII files for telephone transmission.

One final hitch: If you're adding or deleting a contiguous block of text more than eight pages long, the program won't mark the change in the output file. This holds true only if the text is entirely new.

CompareRite is a great example of appropriate technology. At $129.95, it performs one tedious and time-consuming task with speed and efficiency and delivers the goods with an excellent system of visual cues. If quick, accurate comparisons between drafts are a top priority, *CompareRite* may be just the package your writing (or debugging) crew needs.

■ The Wrong Road

Joan Didion says that a wrong road taken is a road mapped; *Red Pencil* from Capsule Codeworks proves her point. The program aims to capture the look and feel of traditional proofreading marks that denote text to be added, deleted, or changed. However, this close replication of manual editing methods raises a nagging question: Why shell out $199 for a single-purpose utility like *Red Pencil* when a real red pencil is less cumbersome at a fraction of the price?

The *Red Pencil* concept seems compelling at first glance. The program can mark a manuscript for eight different operations: Move, Insert, Delete, Change, Paragraph, No Paragraph, Stet, and Query. *Red Pencil* assumes that the person using the program will need to obtain approval for changes. Toward that end, a print facility produces surprisingly familiar proofing marks: *Red Pencil* can make a caret, draw a transposition line, and scrawl a delete sign across offending words. Once the marked copy has been circulated and the changes approved, the user runs an Update command on the manuscript file. *Red Pencil* then reads the editing marks as commands, changing the manuscript accordingly—establishing new paragraphs, moving blocks or words around, and so on.

That's the theory, anyway. In practice, *Red Pencil* emerges as a program with serious limitations. Although it can handle files of up to 32,000 lines—slightly over 1MB, using the default 65-character line

length–*Red Pencil* works only with *WordStar* and ASCII files. And although a mouse is not required, Capsule Codeworks strongly recommends you use one of the two the program supports. Once you begin editing, you'll understand why. Moving from the menu bar to the manuscript via a mouse is a straightforward matter of selecting the editing function you want and dropping it into the text with a click. Using a keyboard requires long, confusing keystroke combinations. You access some menu options with function keys, such as <Ctrl>-*key* combinations, and still others with cursor keys. Once you've selected a menu item and indicated its place in the text, you must press yet another key–as though you were clicking a mouse–to accept or reject the choice. A further drawback is *Red Pencil*'s limited graphics support; it works only with IBM's Color/Graphics Adapter and CGA compatibles, which produce grainy characters that are hard on the eyes (see Screen 2).

Using proofing marks as commands is a potent idea, yet here also *Red Pencil*'s execution is flawed. You activate text editing operations by choosing the Update command from the main menu and typing the drive and file names when prompted. *Red Pencil* then produces an updated file. However, if you want to see the effects of your update, you must either print the .UPD file with *Red Pencil*'s print utility or use your word processor to view it.

With its cumbersome keyboard routines, poor graphics, incomplete updating facility, and high price tag for its genre, *Red Pencil* can't be recommended. At $70

actual amounts and a column for the variance, while rows are assigned to income statement accounts.

IN THE TRENCHES

What works to enhance flexibility and power in the NewViews Analysis mode poses some hazards in day to day use. Once the system is set up", every time you modify, change, or add information, all the cross-referenced accounts will be changed accordingly -- instantly. No posting of trial balances "or cycles of review and correction" here. With NewViews, the trial balance IS the [#] "final balance. If you make an error — especially in a distributed account — error can pervade the system. Working through the necessary off-setting entries can be a convoluted process. NewViews does provide some data entry protection, however; it checks for legitimate accounts, won't allow letter entries in numerical fields, and provides for levels of password access in networked environments."

[#] "Those data protection strategies are not likely to go far enough to satisfy a responsible auditor. As noted above, there are no trial runs before posting. While" the associated sequence [#] "of numbers ticks off anyway, the automatic audit trail can be turned off in NewViews". A gap in the sequence indicates that changes were made, but [#] "there is no record of what they were. Furthermore, the audit trail

Screen 1: Shown in "normal" interleave style, CompareRite highlights additions in one color, marks deletions with a pound sign of another color, and displays common text in a third color.

```
 ^-pgs?   ^-page  ^-line  NOPARA  INSERT  CHANGE  STET    view    save    quit
 v-pgs?   v-page  v-line  PARA    DELETE  MOVE    QUERY            end
                                                                        PG 1
```

                                    nearly   so
The idea that hardware is always a year or ~~two~~ ahead of software

has been true ~~ever~~ since I stumbled into this business about 20

years ago. One example: the Macintosh had to wait about a year
                                            ed
before software ~~began to~~ appear in any quantity, even though

Apple had offered software developers considerable support well

before the machine was officially announced. And it was almost

two years after the Mac's birth before you could say that a
                                                                 M5
reasonable selection of software for most every category was on
                      M5
the market.

Screen 2: Red Pencil's CGA mode draws recognizable proofing marks but makes the text hard to read.

less, *CompareRite* is not as ambitious but more practical; for the same money as *Red Pencil*, *ForComment* offers feature-rich sophistication.

■ The Right Path

Brøderbund aims at the future with *ForComment*. Although it works with stand-alone and floppy systems, the program's complex multireviewer format, disk copying chores, and appetite for RAM make networks its optimal habitat. Brøderbund provides the necessary hooks for network operation, claiming that it has yet to find a LAN the program *won't* work on. Furthermore, *ForComment* supports ASCII and 30 popular word processing formats (including *DisplayWrite 3, Microsoft Word, MultiMate, WordPerfect,* and *pfs:write*) as well as the Lotus/Intel/Microsoft expanded memory specification.

Brøderbund started with the sensible assumption that, even in a group authoring project, one person will have primary responsibility for seeing a document through the revision process. *ForComment* is therefore divided into two "feature sets"—a full set for the author and a less powerful set for reviewers. Only the author can import a document, produce an electronic cover sheet listing reviewers and their level of access, and activate the Swap command to substitute suggested changes for original text.

Added power means added responsibility, of course, so to the author falls the chore of making a

work disk (containing the document file and reviewer's feature set) for each person who will be commenting on the text. A LAN greatly simplifies this tedious procedure.

As many as 15 people (plus the author, of course) can review a *ForComment* document, marking specific lines in the text and opening a work window to enter related comments or queries (see Screen 3). *ForComment* tags all reviewer activity with initials and a date and removes the work window, thereby controlling screen clutter. Reviewers can hide their comment windows from other reviewers or make them accessible through the dialog box.

Routines available from the Print menu allow the author to sort commentary by reviewer—a handy feature if you need to pay special attention to certain reviewers' suggestions. Furthermore, storing comments by reviewer and date also provides the "edit trail" so important in the creation of sensitive documents.

Users have access to a fair number of text editing features. From the Customize menu, you can select *ForComment*'s keyboard assignments, choose *WordStar* emulation, or exercise your preferences for cursor movements, block commands, find-and-replace operations, and so on. Since *ForComment* limits each comment to 4000 characters, you can't really produce much besides notes. And aside from some highlighting in print routines, no text formatting is available.

The program supports as many as 26 versions of a document (indexed alphabetically) and up to 15 comments associated with any one

line of text. With non-networked configurations you may find the program's disk appetite a problem. In addition to the 300K that each author's disk takes up and the 250K each reviewer's disk requires, document files in *ForComment* may grow to many times their original size. The program doesn't pack files according to actual space used but instead sets aside the maximum allotment, like a data base working with fixed-length fields. Whether you're working with a network or with stand-alone systems, Brøderbund suggests that you limit the size of your original document file to 500K or less.

Executive Summary

ForComment
Group writing software

For writing groups with a primary author, multiple reviewers, and sensitive information, *ForComment* provides the system: sophisticated collecting and collating functions in a windowed interface. Disk organization chores coupled with the program's appetite for RAM, however, make *ForComment* more appropriate for networks than stand-alone operation. Brøderbund provides the necessary network hooks.

Draft compare	*Good*
Cut and paste	*Excellent*
Maintain edit trail	*Excellent*
Printer control	*Excellent*
Overall value	*Excellent*

Group Writing With Word and WordPerfect

Some degree of group writing support is available in the newer versions of popular word processors, such as *Microsoft Word* and *WordPerfect*. While they don't offer the full roster of features supplied by a program like *ForComment*, you may already know how to use them, and they provide a great many more document *creation* functions.

One group writing tool is the "hidden text" feature found in *Microsoft Word* version 3.1. By specifying a block of text as hidden, you can control when and how *Word* displays it and whether or not it is printed in the document. This capability allows reviewers to freely enter comments in context, as in *ForComment*. However, *Word* lacks *ForComment*'s automatic date stamping and reviewer identification. Furthermore, in *Word* you have to modify documents with traditional delete/insert or cut-and-paste methods, a clumsy process compared with *ForComment*'s smooth Swap command.

WordPerfect version 4.2 adds a Create a Comment command not found in earlier versions. You can enter up to 1024 characters in a Document Comment Box, which you can then display or hide from view, although you cannot print it (except as a print of the screen).

Both *WordPerfect* and *Microsoft Word* support strike-through text, which clearly sets off deleted passages. For example, an attorney might use strike-through text to identify a contract term or condition to be voided. This feature is similar to but more limited than *CompareRite*'s capability to display and print additions and deletions in a variety of ways for text comparison.

Your current word processor may have other untapped talents for group writing. With *WordPerfect* 4.2, for example, you can number lines and reference them in footnotes or endnotes. You can also insert new ideas into a document in boldface or an alternate font to make the suggested revisions stand out from the original text.

For the person who primarily creates document drafts or who only occasionally sends a document out for review or feedback, full-featured word processors like *WordPerfect* and *Word* are probably sufficient. Where tracking changes between drafts is crucial, or when more than two or three people are involved in a writing project, consider the new genre's offerings.

WordPerfect version 4.2
WordPerfect Software
288 W. Center St.
Orem, UT 84057
801/227-4000
List price: $495
Requirements: 256K,
 DOS 2.00 or later
 version, two disk
 drives
Not copy protected

Word version 3.1
Microsoft Corp.
16011 N.E. 36th Way
Redmond, WA 98073
206/882-8080
List price: $450
Requirements: 256K,
 DOS 2.00 or later
 version, two disk
 drives
Not copy protected

Coordinating the hard copy comments and suggestions of 15 reviewers seems a potential nightmare, but it is here that Brøderbund's strength emerges. As the author, you collect the reviewer files, combining all reviewer feedback automatically into one file with a single Collate command. You can look at revisions swapped into the text of the master file or grouped together in an annotated list at the end. Once you're satisfied with the document, *ForComment*'s Export function will create a disk file in the same format you selected during document import.

At $195 for 1 author copy and up to 15 reviewer copies, *ForComment* sets the standard for price/performance in this new software category. File transfer niceties, a sensible two-tiered approach, diverse use of graphics, and the ability to produce an accurate edit trail all mark this as a product that understands its job and its users.

◼ Final Notes

A novelist sweating it out in a loft couldn't care less about group writing software. For the rest of us, these programs encourage productive work-group computing, something that LAN vendors have been seeking desperately.

Engineered with current and anticipated technology in mind, Brøderbund's *ForComment* is clearly poised to exploit the group writing-LAN connection. *CompareRite* will also likely maintain a following—particularly in the legal field—because of its clean approach to a specific task. But *Red Pencil*, with its artless adaptation to the computer's unique power, remains a weak contender.

Writing is one of the more easily defined activities done in groups. As computing systems emerge to help the group writing process, other work-group interactions await similar automation. ⬢
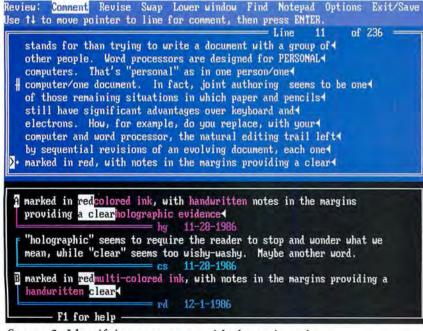
Joan Rich is a professional writer living in Oakland, California.

CompareRite
JuriSoft, Inc.
336 Harvard St.
Cambridge, MA 02139
617/864-6151
List price: $129.95
Requirements: 210K, DOS 2.00
* or later version, two disk drives*
Not copy protected

ForComment
Brøderbund Software, Inc.
17 Paul Dr.
San Rafael, CA 94903-2101
415/479-1700
List price: single-user version
* $195, LAN version for up to 16*
* users $995*
Requirements: 256K, DOS 2.00
* or later version (3.00 or later on*
* AT), two disk drives*
Not copy protected
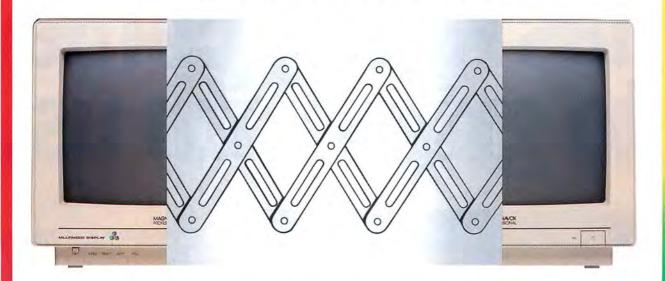
Red Pencil
Capsule Codeworks
9024 132nd Pl. SE
Renton, WA 98056
206/235-7099
List price: $195
Requirements: 128K, DOS 2.00
* or later version, two disk drives,*
* Epson- or IBM-graphics-*
* compatible printer*
Not copy protected

Screen 3: Identifying comments with the reviewer's initials and the date, ForComment organizes feedback into windows at the bottom of the screen.

Expanding your display horizons has never been easier.

The Magnavox Professional Color Display System

Multimode Color Display

Now you can own a single color display that will function with virtually *any* graphics board, in any computer now on the market, automatically. The Magnavox 8CM873 Multimode Display.

The Multimode is a new breed of color display that can adapt itself to a wide range of video signal types providing you maximum flexibility for future expansion. (The Multimode supports vertical resolution up to 580 lines [34kHz] and accepts your system's digital [TTL] or analog video outputs.)

So whether your into CGA, EGA, ATT, or PCG we're sure you'll have the same opinion of the Multimode. TNT.

Multires Display Card

The Multimode Display is only as good as the video adaptor that drives it. And we have one of the best. The 8AV480 Multires expanded function EGA Display Card for IBM PC/XT and AT computers and compatibles.

The Multires Display Card is part of a new generation of video controllers which employ customized integrated circuits to pack maximum firepower in minimum space. And with a minimum of parts producing a minimum of life-sapping heat.

The System — With the Multires Display Card and our Multimode monitor you can now get full EGA performance plus 640 × 480 (and 752 × 410) 16/64 color graphics for the price some people charge for the graphics card alone. Plus you get complete backwards compatibility with virtually all software written for the PC/XT and AT.

It's a dynamite combination.

Maximum flexibility. Single sourced.

Nobody puts it together like MAGNAVOX.

Ashton-Tate®
has finally come
to grips with us.

Because now, you can safely take advantage of all the outstanding benefits of dBXL.

Benefits that include complete compatibility with dBASE III PLUS. Both databases use the same data, index, report, and other files, and dBXL runs dBASE III PLUS programs unmodified. So you can use the two products interchangeably in the same office.

But there's a lot more to dBXL than just compatibility. Novices can access two layers of help—just by touching a function key.

S ome predicted they'd be suing us instead. After all, we publish a $169 superclone of dBASE III PLUS™ called dBXL.™ With its combination of dBASE® power, extended language features, and low price, this database represents the greatest threat ever to Ashton-Tate.

So why did they shake hands with us?

Because they wanted to get their hands on something else. Namely, some of our SQL technology.

That, plus our confidence that dBXL didn't infringe on their copyright, prompted Ashton-Tate to make this agreement with us. In return, the agreement completely protects our right to market our products. And when it was finalized in April, 1987, one clear winner emerged.

You.

There's even an INTRO command which replaces the dBASE III PLUS Assistant, and allows new users to be productive right away.

For power users, we've added even more commands and functions to the language. Like windowing. Easy access to DOS services. Automatic memory variable management. Plus an integrated "Fix" program debugging option. Add Quicksilver,™ our high-performance dBASE III PLUS compiler, and you've got an applications development package that can't be beat.

Not even by Ashton-Tate.

So take a look at dBXL.

At $169, you may want to come to grips with a copy yourself.

WORDTECH SYSTEMS

Get more info. Go to Ad index.

The Upgrade Path

Hands-on advice for upgrading PCs, compatibles, and peripherals

Installing the littlest Bernoulli, a bargain-basement modem for the Toshiba T1100 Plus, turning your PC into an XT, and a cautionary tale

Robert Luhn

A Bernoulli by Any Other Name

Ask most people what's faster than a spinning floppy and they'll probably say, "A hard disk." Not the designers at Iomega. They took the mundane 8-inch floppy disk (considered by many the modern equivalent of the punch card) beefed up its storage capacity by a factor of 30, encased it in a rock-solid cartridge, and spun it at 1800 rpm, give or take a few turns. The result, of course, was the famed Bernoulli Box, a nearly indestructible storage system built around removable 10MB and 20MB floppy disk cartridges (see "Bernoulli Box Bonanza," *The Upgrade Path*, June 1987).

Unfortunately, the original Box is almost as big as an AT. With desktop real estate in short supply, Iomega rightly sensed there might be a market for a smaller Bernoulli. Thus the Micro Bernoulli was born—a half-height internal drive built around 5¼-inch 20MB removable floppy disks. The unit that wandered onto this month's *Upgrade Path*—a single-drive system packaged by Mountain Computer, called the Mountain Micro Bernoulli Internal Drive—sells for $200 less than its desk-hogging 20MB brother.

Although the Micro Bernoulli is designed to fit in a half-height drive space in the IBM AT and the Compaq Deskpro line of computers, installation may deter less experienced users. Spiriting the drive into an AT (in our case, an Enhanced AT) involves removing the AT's front panels, slipping the drive into the full-height space under the 1.2MB floppy disk drive, inserting a disk controller board, and linking all the various components with a tangle of power and interface cables.
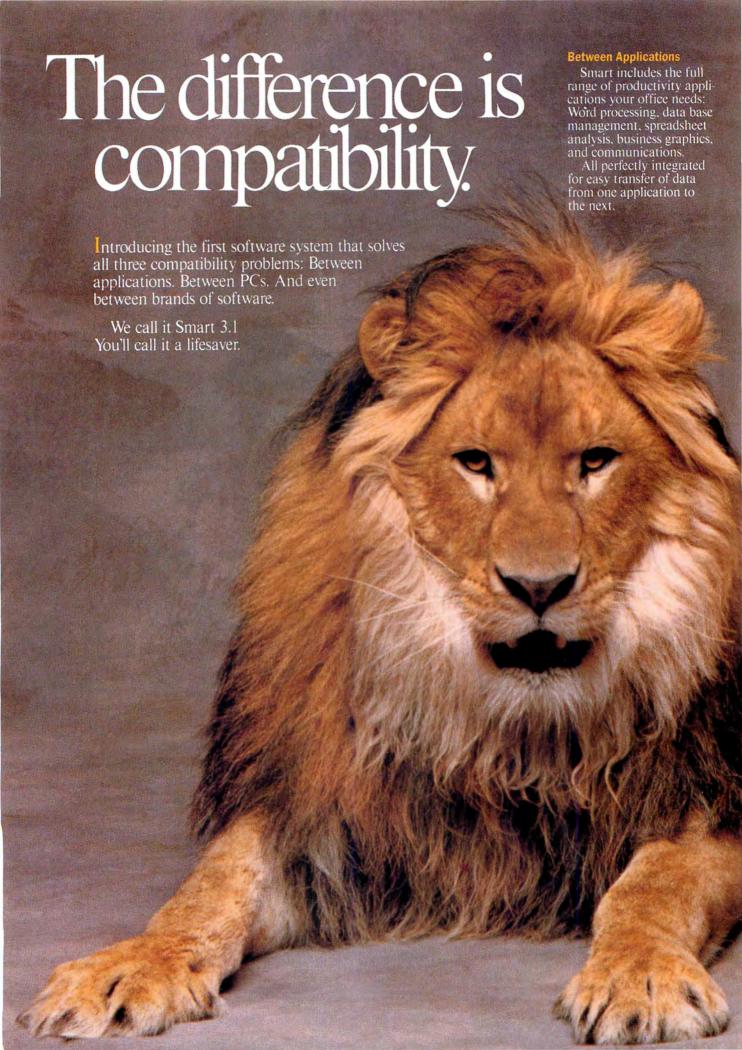
But if compact, removable storage is what you want, the Micro Bernoulli is one of the best deals around. The tools of the trade are minimal: Phillips and flat-blade screwdrivers. The lucky machine merely needs 312K of RAM and DOS 3.10 or a later version. Keep in mind that because the AT's cover obstructs the lower part of the empty drive chamber—and thus the Micro Bernoulli's drive doors—you must install the unit in the upper half of the space. As a result, the AT can accommodate only one Micro Bernoulli.

The first order of installation is configuring the Micro Bernoulli's controller board. When you lay the board on its antistatic bag, you'll notice two baby-blue switch blocks, SW1 and SW2, and a quartet of white jumpers by the board's bus connector. The board is configured by the company, but never assume that factory settings are properly implemented for your system. For example, the board that accompanied this single-drive Micro Bernoulli was configured for a dual-drive unit, and a number of seldom-used functions (such as diagnostics and parity) were enabled. Fortunately, the Mountain manual lists the proper switch and jumper settings.

Next, pull the Micro Bernoulli drive out of its wrapper, set it on top of the bag on a flat surface, and slap a plastic rail on each side. Remember to always hold the drive by its metal frame; don't touch any of the components on

(continues)

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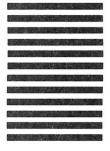
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the top of the unit. And until the drive is bolted into the AT, don't remove its foam disk protector.

Swing the drive around on its bag and screw the plastic rails onto the drive with the tapered ends pointing toward the rear of the drive. The rails can be attached to various screw holes on each side of the drive; since this unit must go into the top part of a full-height space, run the screws through the top forward holes in the guides and into the top screw holes in the drive.

Now for the AT. Turn off the computer, remove all external cables, and take off the cover. To get at the space underneath the 1.2MB floppy disk drive, remove the two outer, silver screws holding the black cover plate on. As the plate loosens, so does the beige cover just above, and the two come off together. The Micro Bernoulli's future home is now open for visitors.

To clear a path for the drive, remove the black strip of metal that holds the AT's 20MB hard disk in place. (Don't tip the AT forward or you may find the drive in your lap.) On some ATs you may have to remove other mounting clips as well. Next, pop off the floppy's power and controller cables and pull them over to the side. Then take the Micro Bernoulli's power cable and snake the connector through the drive slot at the rear of the AT to the front of the unit. Repeat the procedure with the Micro Bernoulli's gray controller cable.

Pick up the Micro Bernoulli drive, rest it just outside the opening, and attach the power and controller cables to the drive. The power connector is beveled and can fit only one way; when you're facing the front of the Micro Bernoulli, the red stripe on the controller cable should be on the left.

Pick up the drive and slide it into the upper guides in the full-height drive slot. As you push the drive in, gently pull the cables taut so they aren't wadded up between the drive and the AT's power supply. When the drive is flush with the AT's chassis, reattach the black metal bar that covered the AT's 20MB hard disk. The end of the bar will also hold the Micro Bernoulli in place. Separate the beige and black cover plates, and screw the latter back into place.

Reattach the floppy drive's power and controller cables. The skill of an origami master is now called for. With cables from floppy, hard disk, and Micro Bernoulli drives all sharing a 1-by-8-by-2-inch crawl space next to the power supply, you must fold cables artfully to achieve any semblance of order. You must also learn the art of the snake charmer in order to attach the power and controller cables to the Micro Bernoulli's adapter, which will inhabit an AT slot.

The excess controller cable can be easily folded and snaked over other expansion boards. To keep the power cables from catching on the AT's cover, thread the Micro Bernoulli's power cable *under* existing expansion boards in the AT. To minimize this unpleasant task, take the Micro Bernoulli's con-

troller board and rest it in the nearest available slot (in this case, the one next to the AT hard disk controller in slot 8). As you unroll the power cable from the Micro Bernoulli, slip the P12 power connector in the middle of the cable into a female power plug protruding from the AT's power supply. Then take the connector at the end of the cable and slide it under the AT's disk controller board. If the cable can't limbo under the board, fold the connector's "head" down and slip it through.
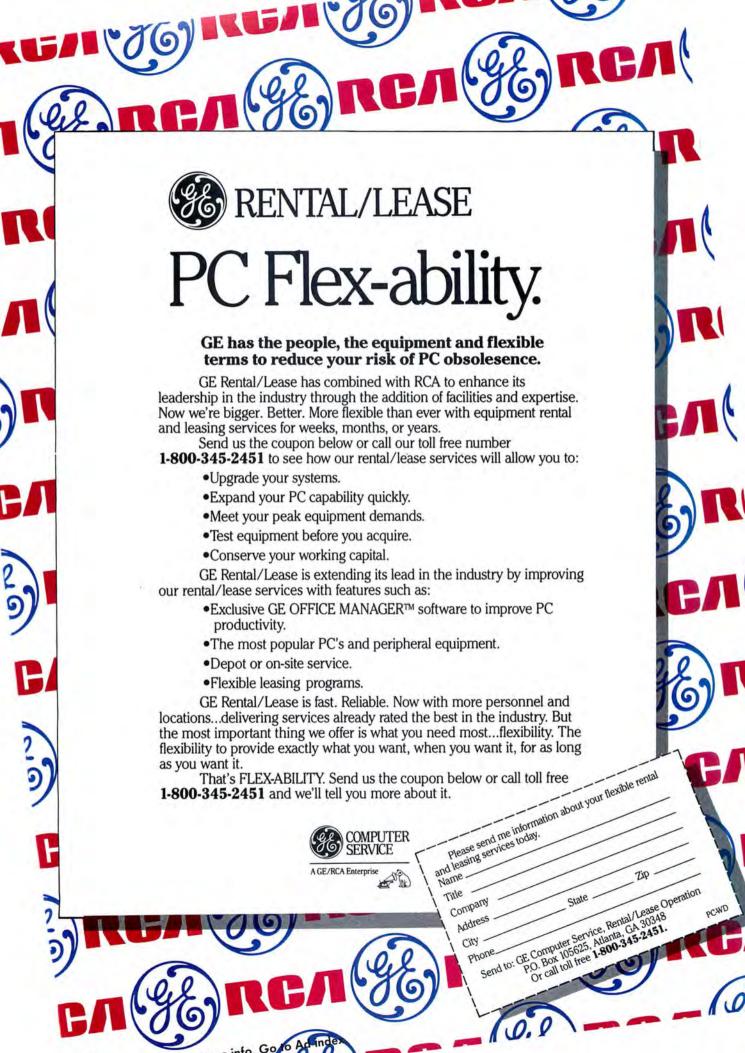
Attach the power cable to the white plastic socket near the top of the board; attach the gray controller cable to the row of pins on the board near the front of the AT. Finish the job by snapping the board into the slot, screwing down the mounting bracket, and reassembling the AT.

Getting the drive in gear is nearly identical to setting up a standard Bernoulli Box. Simply run a supplied menu-driven installation program (which modifies the AT's CONFIG.SYS file and copies over the necessary system and utility files) and format the 20MB cartridge. Then press <Ctrl>-<Alt>-<Del> to install the modified CONFIG.SYS file, and you're ready to go.

Of course, if you take a wrong turn during installation, the Micro Bernoulli probably won't work. Make sure the drive is properly connected to the AT's power supply and, more important, that the controller cable is shoved onto the

(continues)

correct set of pins on the controller board. A similar set of pins at the other end of the board is reserved for some unspecified other purpose. If the AT takes an inordinately long time to boot up and the message 'Adapter ROM: Code level 1 found in CE00:0000H' flashes on the screen, you've attached the controller cable to the wrong pins. Remember: When you take the upgrade path, you've gotta sweat the small stuff.

Micro Bernoulli Internal Drive
Mountain Computer, Inc.
360 El Pueblo Rd.
Scotts Valley, CA 95066
408/438-6650
List price: $2195

Money-Saving Modem

It's a rule in the retail world that you make your money on the little items. For years, car dealers have lured customers into the showroom with unbeatable deals on the big-ticket autos, only to fatten the dealership's kitty with sales of profitable "accessories" ranging from sunroofs to steering wheels. The computer market is typically no different.

Owners of the Toshiba T1100 Plus laptop computer can rightly claim they've got a deal. For $2000 plus change, they get a dual-floppy, 640K, 4.77/7.16-MHz 8086-based system with a sharp Supertwist liquid crystal display. But adding goodies from Toshiba

such as an internal modem can be a little pricey. The company sells an internal 300/1200-bps modem for $399, but for $60 less you can latch onto the Correspondent-T modem from Holmes Microsystems, which matches the Toshiba modem feature for feature, tosses in the extended Hayes AT command set, and includes *Mirror*, a *Crosstalk XVI*-like communications program. Holmes also markets a similarly priced internal modem for the PC Convertible.

Installing this modem-on-a-board in the T1100 Plus is as simple as popping an expansion board into the back of the PC—simpler, in fact. You just remove a plate at the back of the T1100 Plus, slide the modem in sideways, and screw the bracket into place.

Of course, don't forget *The Upgrade Path*'s Golden Rule: Thou shalt first turn off thy system and remove all external cables. In the case of the Toshiba, that may mean disconnecting the unit's power supply. First remove it from the wall outlet, then from the T1100 Plus. Expel all disks from the unit's floppy disk drives and, finally, snap the screen down into the closed position.

To get at the plate covering the T1100 Plus's slot, swivel the unit around so the back is facing you. Remove the two Phillips screws holding the metal slot cover just above the raised plastic letters *EXP*. Save the cover—you may need it later.

At this point, unpack the Correspondent and lay it on top of its antistatic bag. You'll notice that one end of the board has a shiny metal bracket, which holds the

phone and line connectors and the modem's on/off switch. The other end, which goes headfirst into the T1100 Plus chassis, has a black connector.

Unless you have an unusual application, leave the factory DIP switch settings untouched. All the switches in the single block next to the mounting bracket should be in the off position. (If you must set a switch, make sure you use an unbreakable point, such as a ballpoint pen tip.) Note that the manual erroneously refers to switches A through D; the DIP switch block actually contains switches 1 through 6, but the last two aren't connected.

Finally, make sure the modem's power switch on the mounting bracket is in the off position. This prevents the modem from draining the T1100 Plus's battery when the system is not in use.

To grease the wheels of installation, the slot in the T1100 Plus is lined with plastic guides that keep the modem board on track as you slide it in. With the components facing up, maneuver the board into the opening and place the edges of the board on top of the plastic runners. Angle the board slightly up, push it in ½ inch, level it off, and push the board in gently until the connector snaps into place and the mounting bracket is flush with the backplane. Screw the bracket down and reconnect any external cables.

To test the modem, connect it to the phone line, turn the modem on, and then switch on the T1100

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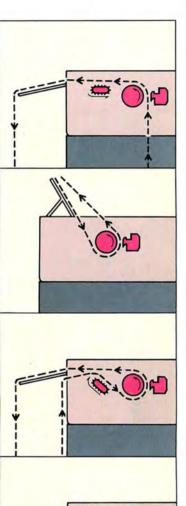
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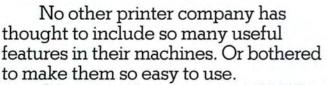
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ERROR
PAPER OUT

HOST   HOST   HOST   HOST
INT   DRAFT 10   6
CART 1 HD   12   8
CART 2 LQ   17   3
              PROP   4

ADJUST

ON LINE

NEXT OPTION
LINE FEED

PREVIOUS OPTION
FORM FEED

MENU SELECT
INSERT SHEET

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—PC Magazine

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P2400C		18- or 24-pin serial dot matrix. Color and black and white.	24-pin 18-pir Draft 360cps 250cp Correspondence 180cps Letter quality 120cps 125cp
ALQ200		18- or 24-pin serial dot matrix. Color and black and white.	24-pin 18-pir Draft 240cps 200cp Correspondence 120cps Letter quality 80cps 100cp
ALQ300		18- or 24-pin serial dot matrix. Color and black and white.	24-pin 18-pir Draft 240cps 200cp Correspondence 120cps Letter quality 80cps 100cp

TERFACE	PAPER FEED	BUFFER	EMULATIONS	SIZE	SPECIAL FEATURES
ntronics allel and 232C serial ts standard.	Push/pull tractor, bottom and rear feed, automatic single sheet loading standard. Single bin sheet feeder optional.	4KB standard, expandable to 260KB.	Epson FX and MX Series	Width: 24.4" Depth: 16.5" Height: 5.5" Weight: 33 lbs. Carriage width: 16.5" 136 columns at 10 pitch. 272 columns at 20 pitch.	Two font cartridge slots. Automatic copy feature. Quiet, below 55dBA operation. Excellent multi-part forms capability. 1-year warranty.
ntronics allel and 232C serial ts standard.	Push/pull tractor, bottom and rear feed, automatic single sheet loading standard. Single bin sheet feeder optional.	4KB standard, expandable to 260KB.	Epson FX and MX Series, DEC.	Width: 24.4" Depth: 16.5" Height: 5.5" Weight: 37.9 lbs. Carriage width: 16.5" 136 columns at 10 pitch. 272 columns at 20 pitch.	Two font cartridge slots. Automatic copy feature. Quiet, below 55dBA operation. Excellent multi-part forms capability. 1-year warranty.
ntronics allel and 232C serial ts standard.	Push/pull tractor, bottom and rear feed, single sheet automatic paper loading standard. Single and dual bin sheet feeder optional.	4KB standard, socketed for easy expansion to 260KB.	Epson LQ, FX, JX, EX and MX Series.	Width: 25.4" Depth: 17.7" Height: 7.09" Weight: 43.7 lbs. Carriage width: 16.5" 136 columns at 10 pitch. 272 columns at 20 pitch.	Two font cartridge slots. Snap in/out print head. Special printing features selected via menu, control panel or software. Quiet, below 55dBA operation. 1-year warranty.
ntronics allel port ndard, 232C serial t optional.	Fan-fold bottom and rear feed, single sheet automatic paper loading standard. Bi-directional tractor, single and dual bin feeder optional.	7KB standard, expandable via plug-in buffer cartridge to 71KB.	Epson LQ, FX, JX, EX and MX Series.	Width: 18.5" Depth: 15.8" Height: 5.6" Weight: 30.9 lbs. Carriage width: 11.5" 80 columns at 10 pitch. 160 columns at 20 pitch.	One font cartridge slot. Snap in/out print head. Special printing features selected via menu, control panel or software. Quiet, below 55dBA operation. 1-year warranty.
ntronics allel port ndard, 232C serial t optional.	Fan-fold bottom and rear feed, single sheet automatic paper loading standard. Bi-directional tractor, single and dual bin feeder optional.	7KB standard, expandable via plug-in buffer cartridge to 71KB.	Epson LQ, FX, JX, EX and MX Series.	Width: 24.1" Depth: 15.8" Height: 5.6" Weight: 37.5 lbs. Carriage width: 16.5" 136 columns at 10 pitch. 272 columns at 20 pitch.	One font cartridge slot. Snap in/out print head. Special printing features selected via menu, control panel or software. Quiet, below 55dBA operation. 1-year warranty.

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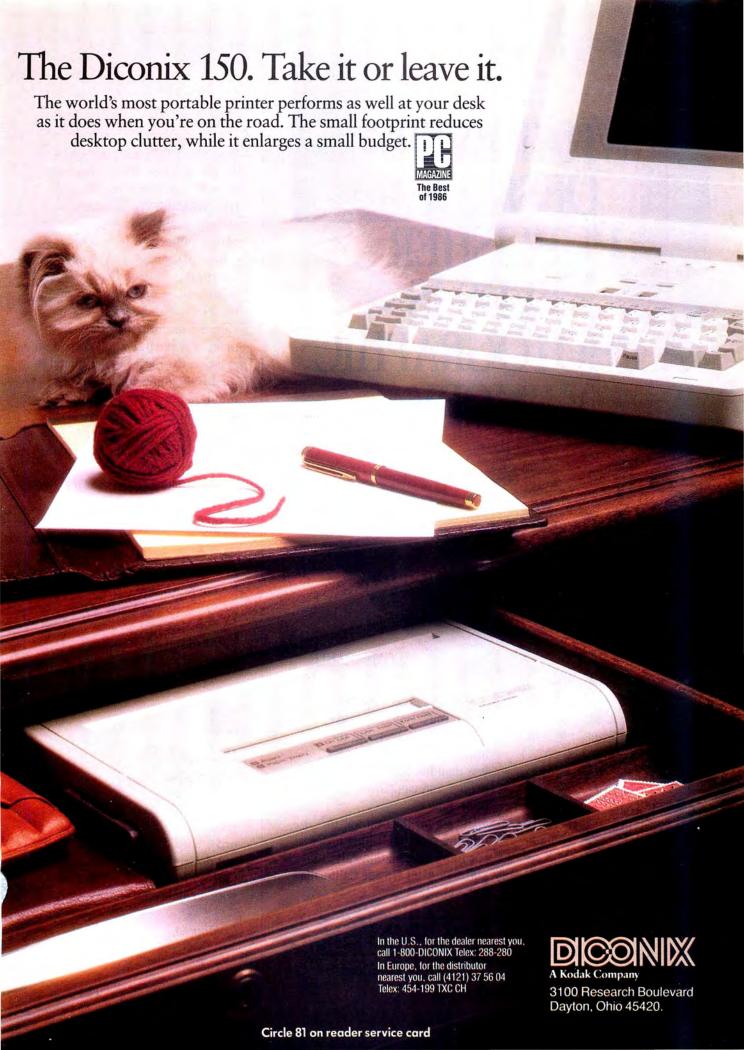
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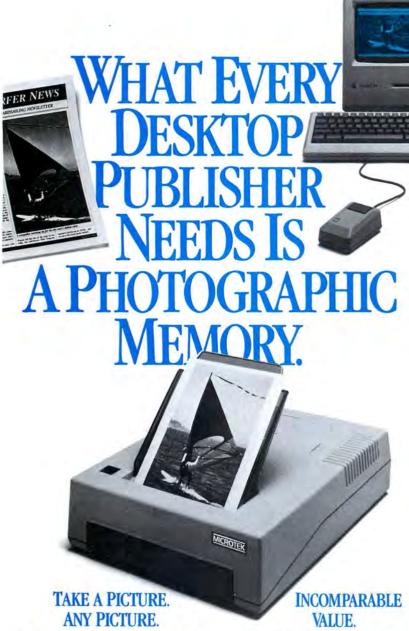
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Correspondent-T
Holmes Microsystems, Inc.
870 East 9400 South #103
Sandy, UT 84070
800/443-3034
List price: $339

PC to XT– The First Step

If you use a classic PC and can't resist buying a dirt-cheap mail-order hard disk or hard disk card, put down that checkbook. The journey from PC to XT begins with a single chip—namely, a BIOS

ROM chip nestled securely on the PC's motherboard. In vintage PCs, this humble slice of silicon can deal with only monochrome and color displays and unintelligent devices such as floppy disk drives. It can't recognize a hard disk drive.

If your PC dates back to the early eighties, chances are it relies on one of these silicon oldsters. When IBM released the 10MB XT in 1983, it naturally rectified this oversight. If you leave the floppy disk drive door open and turn on or restart the XT, routines in the revised BIOS ROM search out and discover the ROM chips on the XT's hard disk controller. These ROM chips take over and boot the system from the hard disk.

Installing a new BIOS ROM chip (available from IBM dealers for only $32.72) takes a little pluck. But before you start digging around, confirm the age of the current BIOS ROM in your system. Place a copy of the DOS Supplemental Programs disk in drive A:, type **DEBUG**, and press < Enter > . When DEBUG's hyphen prompt appears, type **D FFFF:5 L8** and press < Enter > . The ROM date will appear on the right side of the screen. If the date is earlier than 10/27/82, it's time for a new ROM chip. Type **Q** to quit DEBUG.

IBM provides a tweezerlike chip puller with its BIOS ROM upgrade kit for the PC, but you'll also need

(continues)

Get more info. Go to Ad index.

small Phillips and flat-blade screwdrivers (to remove the PC's cover and expansion boards) and a pair of needle-nose pliers for straightening errant chip pins.

As in all things upgrade, turn the PC off, remove all external cords, take off the PC's hood, and ground yourself properly before you touch any component. The doddering BIOS ROM chip is parked in the U33 socket, just to the left of drive A:. Although the IBM manual directs you to clear some work space by removing all installed expansion boards, you can get to the chip by simply pulling out the disk controller (usually in slot 5) and the board next to it. You don't need to remove the disk controller cable; just lay the board (component side up) on the PC's power supply.

Once you've found the U33 socket, take the supplied chip puller and slip it around both ends of the chip. Be careful not to hook the socket base, and place the grippers between the chip and the socket. To remove the chip, gently rock the chip puller left and right until the chip slips out.

Ground yourself again, remove the new ROM chip from its antistatic box, and set it lightly in the socket, with every pin in its appointed hole and with the notch on the end of the chip facing the rear of the system unit. If all the

pins are straight, place a finger at each end of the chip and gently press straight down. Once the chip is about halfway in, press more firmly until the chip is seated in the socket. Remember to maintain even pressure on both sides of the chip—it's easy to push one row of pins into the socket before the other side. (If the pins are slightly bowed, follow the steps outlined in "CPU Sidekick" in the June edition of *The Upgrade Path*.)

Plug the disk controller and any other boards back into their slots, and you're ready to roll. Depending on what you do next, you may need to change switch settings on the PC's motherboard. If you add a hard disk card to your system and leave the floppy disk drives in place, you won't have to fiddle with the switches. If you replace drive B: with a hard disk, you will have to flip switch 7 in the SW1 block into the off position to indicate the presence of only one floppy disk drive.

Keep in mind that a new BIOS ROM also opens your PC to the Enhanced Graphics Adapter (EGA) and allows original PCs with a 64K motherboard to access 640K of standard memory instead of 544K. To use an EGA video setup, you pop the appropriate adapter board into a free slot and set SW1 switches 5 and 6 to the on position. To take advantage of a full 640K of RAM, you will need to set SW2 switches 1, 3, and 4 on, and the rest off.

(continues)

ROM BIOS Kit
IBM Personal Computer Sales
  and Service
P.O. Box 1328-W
Boca Raton, FL 33432
List price: $32.72

Cautionary Tales

"2 Boards in 1 Slot!" shouts the manual. The Radix Bus Extender Card for the Compaq Portable is a revelation. Or a revolution, depending on what you read. The board is simply two bus connectors plastered onto a board that plugs into a slot in the Compaq, thus giving you two slots for the price of one. It's produced either by Radix Associates (as the manual states) or by the Underground Guerrilla Forces of the Office Revolution (the name stamped on the board). Both organizations share the same Houston address and phone number. Either way, the board does the job, although Compaq users may wonder why the designers bothered creating this silicon Hydra.

For starters, a single 13-inch board can't provide the equivalent of two long slots. The connector closest to the outside world can accommodate six ⅛-inch short boards, while the other connector is limited to the very small universe of four ⅞-inch boards. Boards dropped into the smaller

(continues)

connector must have their brackets removed or they won't fit.

Keep in mind that because short boards ride piggyback on the Bus Extender, they're raised 1½ inches above the motherboard. This limits the Bus Extender's expansion options even further, since externally mounted parallel and serial ports will likely be obstructed by the Compaq's shell. As a result, the only suitable occupants will be short memory and clock/calendar boards and the occasional video or mouse board with a low-slung connector.

Since the Bus Extender can't accommodate hard disk cards and other watt eaters, the board shouldn't pose a threat to the Compaq's power supply. But as Compaq's Gary Stimac points out, the stability of this piggyback arrangement in a transportable computer is questionable, especially when you consider that the board lacks a mounting bracket.

At $79.95, the Bus Extender isn't likely to win many converts. If your Compaq is cramped for slots, consolidate your options and buy a multifunction board that includes all the memory, clock/calendar functions, and ports you need.

Please forward submissions and queries to The Upgrade Path, PC World, *501 Second St., San Francisco, CA 94107 or electronically to MCI Mail PCWORLD/179-3813, CompuServe 74055,412, or The Source STE908. Articles submitted by mail should be accompanied by a self-addressed, stamped envelope and an ASCII file of the item.* ◓

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Designed for easy operation, the ACER 910 has LED indicators, keyboard connector, power on/off switch and reset button all located within reach on the front panel. For total system security, on the front panel, you'll also find a keylock which simultaneously locks powerswitch, keyboard, reset button and cabinet cover.

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ACER 910B CPU 80286, 6/10MHz, switchable. Socket for 80287 math coprocessor, RAM 512KB, expandable to 1MB. 1FDD, 1.2MB. Microsoft® MS-DOS® 3.2.
ACER 910E As 910B plus 1WDD, 40MB, 28ms.

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Info-01

Consumer Watch

Advice and information for the computer consumer

This month: Hard disk drive buying tips and technical jargon demystified; plus letters from readers about mail-order delays, transcontinental trading, and an unsolicited upgrade

Anita Amirrezvani

A Hard Choice

Technobabble permeates the PC industry. Hard disk vendors do their share, throwing around terms such as *average access time, data transfer rate,* and *mean time between failures* with little concern for the uninitiated. Advertisements tout product performance without offering hard evidence, and product specification sheets are often perplexing and incomplete. The plethora of hard disk drives on the market just adds to the confusion, making it difficult to sort good products from bad.

This quick tour will show you what's important when purchasing a hard disk drive, either separately or with a PC (see "A Hard Disk Drive Buyer's Checklist"). Whether you buy retail or through the mail, be prepared to ferret out the facts about what the drive does and who backs it. Because the last thing you need is a hard disk that annihilates your data, reliability—not price—is key. No other PC component has as much potential for creating havoc. Unless you're an incurable risk taker, stick to established hard disk manufacturers: Core International, Plus Development, Seagate, and Tandon, to name a few. Find out what products have a good track record by reading reviews in computer publications and consumer guides. Then, armed with knowledge about which features are important, you'll be able to recognize the best values in reliable drives.

Sizing it up. Don't be fooled by ads pushing "unformatted" hard disk capacity; formatted capacity is what counts. As a guideline for deciding how many megabytes (MB) of storage you need, note that a formatted 10MB hard disk holds roughly 6000 double-spaced pages of text. Naturally, capacity and price go hand in hand. An internal 20MB Seagate drive from a mail-order house can cost as little as $369; the equivalent 40MB drive will run at least $600.

Up and running. Adding a hard disk to your system can be as simple as plugging in a cable or two (if you buy an external drive) or complicated enough to require experienced help. With the advent of Plus Development's Hardcard and hard disk cards from other vendors, installation can mean merely popping a board into a slot. But convenience has a price. At press time, the 20MB Hardcard was selling for $680 at Computerland; an internal 20MB hard disk that takes the place of a floppy drive can cost $300 less. Keep in mind that installing the internal drive may mean pulling out an existing floppy drive, using special mounting brackets, and wrestling with a handful of cables.

Consider your skill level and patience quotient before you buy—especially if you plan to purchase through a remote mail-order firm. Make sure the price of the hard drive includes all necessary parts—disk controller, manual, cables for the controller and power supply, mounting brackets, shock mounting—plus any disk organizing software, such as *Xtree*.

How fast is fast? A hard disk's speed is typically measured by its average access time—the time in milliseconds (ms) required for the drive's read/write head to travel from one track to another. Generally, the lower the average access time, the faster the drive—and the

(continues)

more it costs. Drives with a slower average access time usually rely on a stepper motor, an older technology in which a motor turns a wheel, which then pulls a metal band to position the disk head over a given track. Drives with an average access time of 40ms or less tend to employ voice-coil technology, a far more accurate and reliable technique in which a coil locates a track magnetically. Although voice-coil drives are more expensive, their speed and dependability justify the premium.

The average access times for the hard disks accompanying the XT, the AT, and Compaq's 80386-based Model 40 are 65ms, 40ms, and 35ms, respectively. Russ Walter, author of *The Secret Guide to Computers,* advises potential PC buyers to make sure the computer's hard disk speed corresponds to the appropriate figure. "Recently, a mail-order firm was offering a 386 clone with a 65ms hard disk," says Walter. "With a drive that slow, having a fast microprocessor doesn't do much good."

The controller's the thing. The speed of a hard drive also depends on its controller board. "A controller is like a garden hose—the bigger the hose, the more water you can get through it," says John Simonds, director of marketing for Core International in Boca Raton, Florida. "Similarly, the faster the controller, the more data you can get to the [microprocessor] bus." The transfer rate of an XT's hard

(continues)

A Hard Disk Drive Buyer's Checklist

When you shop for a drive, use this checklist to help you decide which product to buy. The product of choice should fit your budget, match your needs—and get the most votes.

_____	Cost
_____	Formatted capacity of drive (megabytes)
____ yes ____ no	Drive compatible with system
____ yes ____ no	Controller included
____ yes ____ no	Cables included
____ yes ____ no	Mounting kit with brackets included (if needed)
____ yes ____ no	Installation manual included
____ yes ____ no	Software included
____ yes ____ no	Automatic head parking
____ yes ____ no	Drive uses voice-coil technology
____ yes ____ no	Toll-free technical support

Warranty

_____	Period (months)
____ yes ____ no	Parts and labor
____ yes ____ no	Drive replacement
____ yes ____ no	Shipping costs paid by company
____ yes ____ no	Guaranteed turnaround time for repairs
_____	Length of turnaround time

PC, XT, or compatible	AT or compatible	
____ (5/second)	____ (10/second)	Standard transfer rate (in megabits)
____ (85ms)	____ (40ms)	Average access time[1]
____ (10 watts)[2]	n/a	Start-up power required
____ (10 g's)	____ (10 g's)	Operating shock rating[3]
____ (30 g's)	____ (30 g's)	Nonoperating shock rating[3, 4]
____ (15,000)	____ (15,000)	Mean time between failures (in hours)[3]
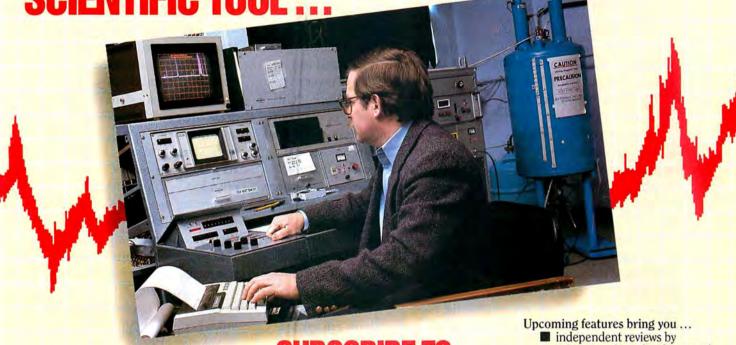
[1] Suggested maximum
[2] Beyond 10 watts, consider upgrading.
[3] Suggested minimum
[4] Nonoperating shock ratings for portables should start at 60 g's.

disk controller is 5 megabits per second—a reasonable rate given the speed of that computer's 8088 microprocessor. "On a 286- or a 386-based machine [both faster than the XT's microprocessor], you should accept nothing less than a data transfer rate of 10 megabits per second. Otherwise you penalize the processor and slow down the system," notes Simonds.

Powering up. Every hard disk drive is rated for start-up and operating power requirements. Because an internal drive always requires more power when you turn on the PC, ask what the drive's start-up rate is to determine whether your system's power supply is up to supporting a new family member. "If a drive requires more than 10 watts, consider upgrading your power supply," advises Hank Chesbrough, manager of product marketing at Plus Development in Milpitas, California.

Power supplies for the PC, XT, and AT are rated at 63.5, 130, and 190 watts, respectively. If you have an older machine loaded with gadgets—say an internal modem, a turbo board, and an expanded memory board—the system's power supply may not be able to feed another hungry mouth. Note that power supply ratings for compatible computers vary widely. The power supplies in older Compaq Portables can't take on much of an additional load; similarly, the machines in Epson's Equity line are equipped with modest

power supplies. Fortunately, upgrading a desktop computer's power supply is easy and can cost less than $100 (see "Power to the PC" in *The Upgrade Path, PCW,* May 1987). Another option: For about $100 more than an internal drive, you can buy an external drive that comes with its own power source from manufacturers such as Western Digital, Sysgen, and IDEAssociates.

Shock treatment. If you plan to add a hard disk to a portable or desktop computer that gets moved a lot, ask the drive vendor about the hard disk's operating and nonoperating shock ratings. Expressed in g's (units of gravitational force), the ratings indicate how much force a drive can safely withstand both while the disk is spinning and when the drive is off and the read/write heads are "parked." The 10MB hard disk mounted in the IBM PC XT can endure 20 g's of nonoperating shock; the 20MB Hardcard, which is designed to handle abuse, can absorb an astounding 100 g's.

A drive's shock rating becomes critical when you buy it through the mail. If the rating is low, it's especially important to find out how the drive will be packed for transit. Ideally, the vendor will cushion the drive with shock-resistant foam and bag it in anti-static material. For added data security, look for a drive whose mounting kit includes more than just a pair of screws to paste the drive to the PC's chassis. A separate mounting bracket will protect the drive from rattling around in the PC—and, not incidentally, will reduce noise.

When a hard disk is in use, one good thwack can send read/write heads crashing into the disk, damaging it and destroying data. To avoid such a calamity, look for drives that automatically park and lock their read/write heads when the system is turned off. At the very least, the vendor should supply a head-parking utility.

Pooping out. When comparing drive reliability, scrutinize published mean-time-between-failures (MTBF) ratings. This laboratory test measures the number of hours it takes, on average, for a product to fail. "Use it like an estimated miles-per-gallon figure," says Plus Development's Chesbrough. "Individual cars never get the advertised mileage under everyday conditions. But a car that has a 30-mpg rating will do better than one with 20 mpg. The MTBF figures are very relevant when you compare products." Although no minimum industry standard exists, "I wouldn't buy anything below 15,000 hours," says Carter O'Brien, marketing director for Seagate in Scotts Valley, California.

Are you covered? Manufacturers' warranties on hard disks usually range from six months to one year. Qubié, a distributor in Camarillo, California, offers one of the best: a 30-day money-back guarantee, including shipping costs for returning the drive; a

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one-year parts-and-labor warranty; 48-hour turnaround on repairs; and Federal Express shipping on repairs made under warranty. Equally impressive, Core International provides a three-year parts-and-labor warranty and sends out a brand-new drive if problems arise. Under some disk drive warranties, you may have to accept a repaired or refurbished product instead of a new one. One *PC World* reader who returned a faulty hard disk received yet another malfunctioning drive complete with someone else's files. Should difficulties arise, make a pitch for a new drive—it's worth hollering for. Before buying, find out who provides the warranty—the manufacturer or the dealer. If the manufacturer is responsible, ask whether the dealer will provide warranty service if the manufacturer goes out of business. Get all promises in writing. If the warranty is offered by a dealer or distributor, make sure the outfit has staying power; you may not be covered by the manufacturer if the dealership goes down the tubes. Carter O'Brien explains his company's warranty policy as follows: "Seagate provides a one-year warranty to its distributors; those distributors (or their clients) pass on their own warranties to consumers." In short, the length of a warranty on a Seagate drive varies by dealer, and if the dealer goes out of business, the consumer is out of luck.

In such cases, drives can be returned to Seagate for repair on a fixed-fee basis. Remember to question your salesperson about such fine points; a good warranty is your best protection.

Shop Talk

Update
PC Network, one of the biggest mail-order companies in the industry, filed for protection from creditors under Chapter 11 of the bankruptcy code on May 18, 1987. At press time, the company's doors—and phone lines— were still open for orders and customer service.

Steve Dukker, PC Network's president, explains: "We had substantial debts before filing Chapter 11, which hamstrung us. We couldn't buy products fast enough to satisfy customer demand. When we filed for bankruptcy we were able to discontinue servicing the older loans, liberating an enormous amount of cash to turn products around." According to Dukker, PC Network plans to stay in business.

Dukker says PC Network has sent notices to all consumers it considers creditors. If you think the company owes you money but haven't received a notice, call the U.S. Bankruptcy Court in Chicago at 312/435-6868 to obtain a proof of claim form. At press time, the deadline for filing a claim had not been set, so check before filing. If you've paid for merchandise by credit card, contact the credit card

issuer and try to get the charges removed from your account to avoid going through the courts.

Hanging In There
On August 2, 1986, I sent a prepaid order of $4300 to Arlington Computer Products [now in Downers Grove, Illinois] for two IBM PCs, two IBM monochrome monitors with adapters, and two Novell network boards. I received all the items except the network boards, and in September I called the company to check on their status. I was advised that the boards had been back-ordered and were shipped via UPS on September 9. On September 19 I called again, only to be told that the boards were shipped on September 18. By October I still hadn't received the products. A letter sent to Arlington via certified mail and two subsequent letters sent by my attorney failed to generate any response.

A. N. Williamson
Jackson, Mississippi

Arlington Computer Products responds: On April 15, 1987, I received the information regarding Mr. Williamson from your publication. Mr. Williamson received a $1300 refund check [for the network boards] on April 19.

Lucky Larry Shelton
Customer Service

(continues)

Nobody's Home

In March 1986, I spent $2350 on computer products—a 10MB Syquest removable hard disk, a 30MB Tulin hard disk drive, two cables, and five Syquest 10MB disk cartridges—from Express Systems in Schaumburg, Illinois. When I returned to France, I discovered that only two of the 10MB disk cartridges worked. After getting a return authorization number from the company, I sent back the cartridges by air freight on June 14, 1986. Six months and four letters later (two of the letters were sent by registered mail), the company still hasn't bothered to send me my new merchandise, let alone answer my letters.

Lars E. Sellegaard
Mougins, France

Editor's note: Mr. Sellegaard is not alone in his pleas for a response. In March, PC World *contacted Express Systems representative Sandy Vlaisavich, who agreed to look into the matter. Subsequent phone calls during regular business hours were answered by Express Systems' answering service. Eventually, Ms. Vlaisavich called back to say that Express Systems had "closed its doors," and that the company had filed suit against one of its hard drive suppliers, LaPine Technology in Milpitas, California. Wilson Cochran, vice president of operations for LaPine, says the company does not comment on lawsuits. LaPine can be reached at 408/262-7077.*

PC Plaudits

Although users often complain about service, they seldom offer compliments, so here's one for the record. Last winter, I purchased Video Seven's VEGA Deluxe EGA board. When Video Seven began advertising new features for the product, I sent a note to the company asking if the older board would perform the same tricks. Instead of just mailing out a form letter, the company sent me an updated ROM BIOS chip via UPS. Video Seven paid for both the new hardware and the shipping costs.

Les McCarter
Honolulu, Hawaii

Got a gripe? Want to set the record straight? Write Consumer Watch, PC World, *501 Second St., San Francisco, CA 94107, or use MCI Mail PCWORLD/ 179-3813, CompuServe 74055,412, or The Source STE908. Include your name, city, state, and daytime telephone number with all correspondence. Letters may be edited for length and style. Due to volume, not all letters can be acknowledged.* ◓

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Sourcebooks

Further explorations into personal computer technology

This month: A modest magnate's story, tutorials on Dow Jones News/Retrieval, case studies on cost-justifying technology, and everything you need to know about bulletin boards

Michael Harper and Marlene Nesary

Wang's Tao

Lessons: An Autobiography
Dr. An Wang, with Eugene Linden
Addison-Wesley, Reading, Massachusetts, 1986
248 pages
$17.95 hardcover

Don't trust IBM! is one of the more dramatic lessons to be gleaned from Dr. An Wang's autobiography, although the founder of Wang Laboratories is too polite to state it outright.

In 1956 Dr. Wang, then 36 years old, sold IBM the patent for a magnetic core memory he had developed at Harvard University. The Byzantine negotiations (described in detail in *Lessons*) were a valuable introduction to "IBM's no-holds-barred style." But they didn't altogether prepare him for what happened in the early 1970s when he began competing with IBM in the word processing market.
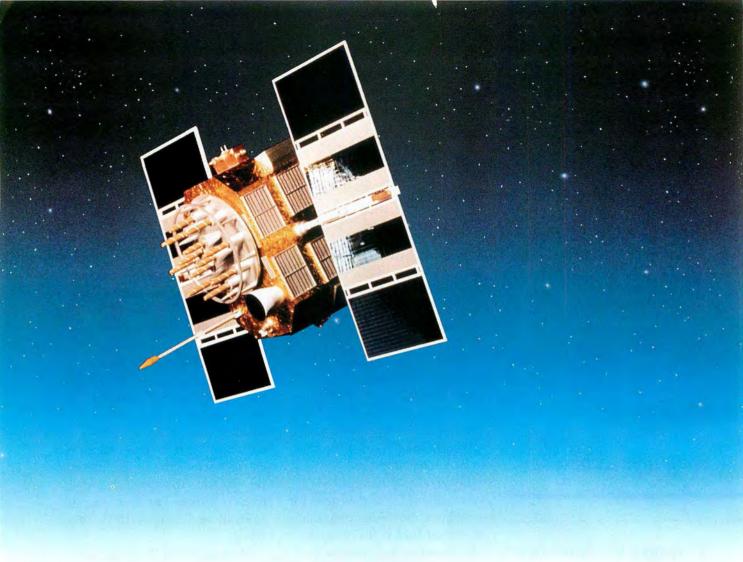
The move into word processing was a life-or-death gamble for Wang Laboratories. Even though calculators were responsible for 70 percent of his company's $27 million in annual revenue, Dr. Wang decided to pull out of that market in 1970. Wang could see that the new integrated circuit technology would cut profits dangerously thin for a calculator company that didn't make its own semiconductor chips. So he turned to more

sophisticated machines to protect his profit. By 1972 Wang's future was riding on the 1200 word processor, an "automatic typewriter with limited editing functions." But the 1200 had an IBM-related problem.

The 1200 used an IBM Selectric as a terminal, and the Selectric carriage jumped around so much during printing that 80 percent of Wang's customers canceled their contracts. In 1973 Wang Labs posted its first loss. Despite troubleshooting efforts, the carriage continued to twitch, and IBM refused to supply Wang with the Selectric's specifications. Only when IBM servicepeople were called in to look at the Selectric did Wang learn the bitter truth: A carriage-stabilizing spring fitted to the machines IBM produced for its own markets had been omitted from all the Selectrics IBM sold to Wang.

No wonder Dr. Wang takes such satisfaction in his successes against the blue giant! By 1978 Wang Laboratories dominated the word processing market, which IBM had virtually owned seven years earlier. And last year Wang beat out IBM for a $480 million contract to supply MIS equipment to U.S. Air Force bases around the world.

As an immigrant who turned his one-man business into a Fortune 500 company with 30,000 employees and almost $3 billion in sales, Wang has ample cause for self-congratulation. Yet for all his bold moves in the market, *Lessons*

(continues)

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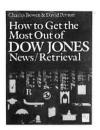
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shows Wang to be an unassuming man, more than ready to acknowledge the role that good luck—and a "righteous, affectionate" upbringing—played in his success.

Even when confronted with jolting setbacks, Wang has remained imperturbable. In 1968, for example, he paid more than $7 million in Wang Laboratories stock to acquire a company whose major asset was the expertise of its people. Many of these experts promptly cashed in their newly valuable shares and left. In a masterpiece of understatement, Dr. Wang allows that he found this unexpected defection "irritating at the time."

But Wang's emotional reserve gives way when he discusses Japan. Wang has never forgotten his years as a university student in Shanghai, when Japanese troops occupied China. Nor, it seems, has he forgiven. Regarding Japan as a more formidable competitor than IBM, he concludes that the country "learned little from their experiences in World War II—instead of tempering their imperial ambitions, they are merely pursuing their goal in the economic arena rather than the military one." Though a grim and perhaps biased prophecy, it is a sobering one for American industry, coming as it does from a man whose success in business proves that he has usually been right.

Taking Stock by Wire

How to Get the Most Out of Dow Jones News/Retrieval
Charles Bowen and David Peyton
Bantam, New York, 1986
345 pages
$19.95 softcover

A few years ago, the typical on-line subscriber was a computer pioneer, someone who could hack a path through the thicket of bps rates, parity bits, and protocols, to reach uncharted regions of the electronic universe.

These days things are easier. With the PC and the Hayes Smartmodem setting the hardware standards, and with powerful, well-documented communications programs, you can fill the screen with information instead of junk.

The hard part comes later—when you're already connected and want to hop around the system. Powerful information services are usually complex: It's easy to get lost in the labyrinth of Dow Jones News/Retrieval, for instance, which consists of nearly 40 individual data bases. And finding your way through the maze without a guide can be an expensive business when you're paying for every minute of connect time.

Charles Bowen and David Peyton claim that many News/Retrieval subscribers are so deterred by the system's complexity that

they tap only a fraction of its potential. *How to Get the Most Out of Dow Jones News/Retrieval* is invaluable for that kind of user as well as for the newcomer. Bowen and Peyton don't waste much time talking about computers and peripherals—although a complete beginner will learn what's needed, in general terms, to access the system. The book is strictly a guide to data bases—what's available and how to zoom in on the desired information once you're connected.

The authors devote 7 of their 16 chapters to "on-line tours," a tutorial technique developed for their previous books about CompuServe and The Source. If you're a prospective News/Retrieval subscriber, be sure to read the tour chapters for an overview of service functions.

The book also includes a tutorial on Fidelity, the on-line discount brokerage service available to News/Retrieval subscribers, Comp-U-Store's shopping service, Cineman's movie reviews, MCI Mail, and the *Official Airline Guide*. At the heart of the book, on-line tours are supplemented with in-depth, off-line discussions.

Some chapters may hold surprises even for experienced users, who can learn from these scenarios how to exploit interrelationships among separate data bases and then solve sophisticated problems with multilayered analyses. The authors don't presume to tell you how to manage your investments, but they do show you how to use a range of resources to

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What's more, depending on the software and video card you use, the 410 can display up to 132 columns by 44 lines of text, giving you increased spreadsheet capability. Amdek even offers an optional tilt/swivel stand that allows you to select a viewing angle that's most comfortable for you.

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keep tabs on individual companies and whole industries. The tutorials on performing text searches of the *Wall Street Journal* and the *Washington Post* are particularly valuable.

Bowen and Peyton are experienced journalists, adept at cutting through complexity and making the vast resources of News/Retrieval seem simple and workable. In their eagerness to reassure the timid reader, they sometimes sound like overly hearty cruise directors cajoling reluctant passengers into a game of deck quoits. But their writing is clear, focused, and logically organized. The book concludes with a handy reference guide and an excellent index. It is highly recommended.

Measuring Hidden Benefits

The Information Edge
N. Dean Meyer and Mary E.
Boone
McGraw-Hill, New York, 1987
333 pages
$24.95 hardcover

Need to justify the cost of new equipment to a skeptical superior? Easy enough when the purchases help with routine, repetitive tasks

such as typing, accounting, payroll, and record keeping, because time saved by computers here translates directly into the dollars and cents spent on clerks who require salaries, benefits, and management.

But what about equipment for managers and professionals, whose work is more unstructured? At issue here is not simple timesaving *efficiency* but the more abstract and qualitative concept of *effectiveness*. Potentially, a manager or professional could earn a year's salary in 5 minutes—if that's all the time it took to come up with a brilliant idea. The stopwatch approach is at best misleading and at worst useless, since there's no guarantee that time saved means anything more than getting to the health club a few minutes earlier.

Measuring effectiveness is the problem that N. Dean Meyer and Mary E. Boone tackle in *The Information Edge,* a book based on interviews with hundreds of people in nearly as many organizations in North America and Europe. They believe that effectiveness *can* be measured, although not always with "hard dollar" precision.

The value-added benefits of office automation (OA) are, to some degree, intangible. Meyer and Boone acknowledge that this quality makes measurement difficult—but not impossible. OA can make an organization "more adaptable in times of change" or may build a "more highly motivated, creative and collaborative" work environment. In these instances, the authors argue, measuring the benefits of OA merely requires a

"greater degree of estimation and judgment."

Meyer and Boone are too sensible to fool themselves into thinking there's a magic formula that covers all cases. "There's no single correct way to measure value-added benefits," they assert. They proceed on a case-by-case basis, documenting OA benefits in terms of real-life examples.

Roughly half the book is devoted to analysis of more than 60 such cases. One of the most dramatic (and persuasive) examples involves a medium-size chemical company where a spreadsheet program helped a chemical engineer improve quality control. The result: a $25,000 modification of the production process and $20 million in additional annual profits.

The authors cite examples of value-added benefits in selling, marketing, operations, personnel and product management, finance, and negotiations. Separate sections discuss executive use of communications and computing tools, ways to find high-payoff applications in your own organization, and methods for measuring potential benefits.

The Information Edge isn't exactly light reading. In fact, it would make great supplemental material for an MBA candidate. But it is clearly and intelligently written and includes extensive notes, three indexes, and a scholarly discussion of the methodology behind what the authors believe is the first serious attempt to evaluate OA intangibles quantitatively.

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The Network Nation

Essential Guide to Bulletin Board Systems
Patrick R. Dewey
Meckler Publishing Corp.
Westport, Connecticut
1987
$19.95 softcover

Patrick Dewey, author of the *Essential Guide to Bulletin Board Systems*, tells of an enterprising Canadian author who sold 7000 copies of his novel by offering the first chapter on bulletin boards as a free teaser and then charging $4.50 for the rest of the book. It's not surprising that so much interest in bulletin board systems (BBSs) currently exists: Interactive, on-line data bases can be powerful tools.

BBSs have long enticed the computer hobbyist to join their on-line communities. And "electronic singles bars" have proved so popular that three software packages on the market are tailor-made for setting up matchmaker bulletin boards.

Educational institutions, other nonprofit organizations, and companies large and small are setting up their own BBSs. A bulletin board can shuttle electronic mail and information between headquarters and field staff. The more

modest read-only board can serve as a newsletter or catalog for customers. Many software companies use a BBS to monitor user feedback and to provide product fixes between versions.

A librarian, the aptly named Dewey set up a BBS at the Chicago Public Library, where well over 30,000 calls have been logged to date. When he began the project, little BBS software was available commercially, so he acquired expertise the hard way. But Dewey has continued to refine and expand the library BBS (a copy of his grant proposal, budget and all, is included in an appendix to his book), and he has a thorough knowledge of what's out there in the "network nation." Did you know, for example, that the sheriff of Maricopa County, Arizona, operates a BBS as "a forum for the interaction of police and public"?

Besides teasing the reader with a rich sampling of BBS applications, the *Essential Guide to Bulletin Board Systems* aims to teach the basics of setting up and operating a BBS. Dewey gives descriptions and specifications of available modems and devotes a substantial chapter to brief but incisive reviews of bulletin board software, including several packages for PCs and compatibles.

Although generally comprehensive and well informed, the *Essential Guide* shows evidence of sloppy editing. This flaw is just mildly annoying when we are told for example, that "one popular

modem, the Hayes Smartmodem, is close to being a standard" only four sentences after reading, "In fact, the Hayes Smartmodem has become a standard." But the lack of vigilance permits more serious misinformation to slip through, as when two different terminal programs from Microstuf—*Crosstalk* for 8-bit computers and *Crosstalk XVI* for the PC—are apparently collapsed into one "popular CP/M program which supports Xmodem for the IBM PC, but will work on almost any CP/M computer."

Dewey's extensive practical wisdom helps you forgive the sloppy editing, however. He discusses problems and risks involved in running a board (for example, the nature of your liability if someone posts illegally obtained credit card numbers on your BBS) and suggests ways of dealing with obscenity and other unwelcome messages from the electronic underworld. The pros and cons of "censorship, preregistration, security levels, frequent sysop monitoring, and obscenity filters" are deftly outlined.

As one might expect from a librarian, Dewey provides a wealth of information, including an annotated bibliography, a full list of vendors' addresses and phone numbers, and the numbers of the bulletin boards mentioned in the book. For someone thinking about setting up a bulletin board for business or as a hobby, the *Essential Guide* is a good place to begin, and most people won't need to go any further. —*M. H.*

(continues)

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Few data base gurus are as clear about what they know as Miriam Liskin. Her new book, *Advanced dBASE III Plus: Programming and Techniques*, demonstrates why her expertise is so respected and why her writing sells. Using a case-study scheme, she simulates real-world application development by taking you step by step from system design through automation, debugging, and fine-tuning. Her book assumes that you're familiar with *dBASE* and can print reports, build an index, design labels, and perform other such basic tasks. Sample programs include routines for using *dBASE III Plus*'s new error-trapping, multiuser, and LAN features; these are printed in the $21.95 book and are available for $10 extra on disk—a real bargain for the serious user. Osborne/McGraw-Hill, Berkeley, California, 1987; 885 pages, softcover.

■■■■■

Has your learning curve on *Auto-CAD* flattened like a prairie horizon? Maybe you can produce line work faster with *AutoCAD* than without but lack the time or nerve to really take advantage of *Auto-CAD*'s open architecture. The *AutoCAD Productivity Book* by A. Ted Schaefer and James L. Brittain can move you along with tutorials on custom digitizer templates, screen menus, macros, DOS interaction, and AutoLISP routines. Even if you've already customized your CAD package, the extensive (100-plus pages) li-

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brary of macros and LISP programs should enhance your productivity at least $39.95 worth. For $49.95 extra, all the printed routines can be had on disk. Ventana Press, Piedmont, California, 1986; 314 pages, softcover.

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Ashton-Tate is leaving no stone unturned in marketing its new flat file manager. *RapidFile: Business Applications*, written by Leo Brodie and published by Ashton-Tate Publishing Group, follows closely on the heels of the program itself. The first thing you encounter in the book is a table of 101 applications: everything from apartment management to legal billing to equipment inventory. For each application, the table lists relevant chapters. The chapters themselves are organized into tasks—keeping track of people, printing forms and labels, expediting data entry, and so on—and give specific techniques for handling the tasks with *RapidFile*. Aimed at novice users who've at least read the *RapidFile* manual, this application guide sells for $19.95. Ashton-Tate Publishing Group, Torrance, California; 240 pages, softcover.

■ ■ ■ ■ ■

No corn from the Cobb Group. Douglas Cobb, grand master of spreadsheets, is determined to provide the most useful compendium of *1-2-3* information available. Written in conjunction with Steven S. Cobb and Gena Berg Cobb, *Douglas Cobb's 1-2-3 Handbook: The Complete Guide for Power Users* offers full information on HAL as well as other advanced add-ons such as *Freelance, SQZ*, and *Sideways*. In addition, release 2.01's new commands and functions are integrated throughout the book. If you're a power user already and want to match wits and tips with the best, or if you simply aspire to be an efficient user of *1-2-3*, this thick, moderately priced ($22.95) tome will feed your need. The Cobb Group/Bantam Books, New York City, 1986; 700 pages, softcover.

■ ■ ■ ■ ■

"Welcome to the Network Nation," proclaims the introduction of *National Directory of Bulletin Board Systems: 1986/87*. His jaunty writing sprinkled with examples, Rice Manning demystifies and legitimizes BBSs in two quick pages and then gets to the meat of the book: listings of domestic and foreign bulletin board systems and their locations, hours of operation, and bps rates. Corporations, churches, computer clubs, magazines, government agencies, public interest organizations, and private individuals endowed with money and time all operate bulletin board systems. If you want an up-to-date listing of these systems (or of the many software packages available to help you start one), this yearly directory of BBSs is a great buy at $19.95. Meckler Publishing Corporation, Westport, Connecticut, 1987; 40 pages, softcover. –M. N.

Michael Harper teaches English at Scripps College in Claremont, California. Marlene Nesary is an Assistant Editor for PC World. ●

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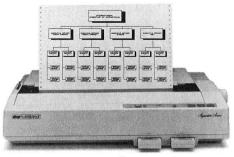
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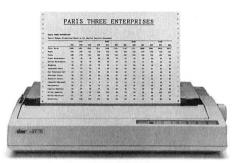
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Listen to the sound of a silent ECHO, get a taste of the DOS pipe utility, see why some 1-2-3 graph legends display but don't print, use BASIC to sniff out the day of the week, and change from DOS to Pick almost without touching the keyboard.

Karl Koessel

ECHO Lost

Q. I teach computer literacy courses at a technical college. In my WordStar class, the students correct text files as a practical exercise. To simplify copying text files to students' data disks, I created a pair of batch files that use ECHO commands to display instructions. The problem is, text following the fourth ECHO command [see Listing 1] does not appear. Can you explain why?

    James E. Henry
    Camden, South Carolina

A. DOS 2.00 and later versions use the less-than and greater-than symbols to redirect standard input and output, respectively. Standard input comes from the keyboard, while standard output goes to the screen. Using the redirection function, a program can draw its keystrokes (input) from a file; it can also send its screen output to a file or a device (such as a printer). This capability can be quite useful (see "Pick a Partition" at the end of this column). However, it prevents you from using the redirection symbols in file names or as text in ECHO and REM commands. The vertical bar (¦), or "pipe" symbol, is subject to the same restrictions. (See the next item, "Alphabetical Directory," as well as "Piping of Standard Input and Output" and "DOS Filters" in your IBM DOS manual. They're in different chapters, depending on your version of DOS.)

    An ECHO command puts text on the screen. Note, however, that the line that fails to appear contains a greater-than symbol. The '> prompt' at the end of that line instructs DOS to place in a file what it would normally display on the screen (all text following the

ECHO command, excluding the '> prompt'). The name of that file is the word that follows the greater-than symbol. In your case, a file called PROMPT was created on the disk in the default drive; take a look at that disk. To prevent DOS from interpreting redirection (or pipe) symbols, enclose them in double quotation marks. In other words, end that ECHO command with *at the "A>" prompt,* and the line will appear on your screen.

Alphabetical Directory

Q. I want to alphabetize my hard disk's directories by file name or creation date so that I can find files easily. Can you help?

    Robin Fieldman
    Des Moines, Iowa

A. By piping a directory listing through the DOS SORT filter, you can sort your directories without purchasing a disk management utility that presents sorted directories (see "Lord of the Files," *PCW,* July 1987) or some utility that rewrites a directory in sorted order (which would be corrupted as soon as you saved a new file).

    I will assume that FIND.EXE, MORE.COM, and SORT.EXE (from your DOS disk) are in a subdirectory called \DOS and that \DOS is included in the PATH command of your AUTOEXEC-.BAT file. I will also assume that the current directory is the one you want to sort. Just type **DIR ¦**

(continues)

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for what

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D E L U X E V E G

E L U X E V E G A D

X E V E G A D E L U X E V E

D E L U X E V E G A D E L U X E V E G A

see VGA it really is.

SORT and press < Enter > to display the directory sorted by file name. Type DIR ¦ SORT /+24 to display the directory sorted by creation date (which begins at the 24th column of a directory listing).

If the list scrolls off the top of the display, pipe SORT's output through the MORE filter; for example, DIR ¦ SORT /+24 ¦ MORE. To print the sorted listing or save it in an ASCII file, redirect the output to the printer (PRN) or into a file, as in the commands DIR ¦ SORT > PRN and DIR ¦ SORT > DIRFILE. If DIRFILE already exists and you want to append SORT's output to that file rather than overwrite it, use two greater-than symbols, as in DIR ¦ SORT >> DIRFILE.

If you'd like to see only subdirectories listed, pipe DIR's output through the FIND filter with the command DIR ¦ FIND " < DIR > ". You can, of course, pipe FIND's output through the MORE filter or redirect the output to the printer or into a file.

Now You See It ...

Q. I've run across an annoying problem with 1-2-3's PrintGraph utility. Although Lotus brags about support for up to six ranges per graph, when there are more than four ranges, the first, fifth, *and sixth legends are either truncated or not printed at all. I have tried adjusting the full-page and half-page settings, but to no avail.*

It should be noted that each legend is visible on screen during the worksheet session. However, PrintGraph adjusts the legends' positions and cuts off their left and right ends.

Is there some command sequence I might have overlooked or an inexpensive add-on to solve this problem? Should I look at other business graphics packages that allow more control?

Louisa P. Jones
Gloucester, Virginia

A. The *1-2-3* manual qualifies the utility's support for six graph legends by explaining that legends should be kept as short as possible because their print display is limited. It states further that with five legends PrintGraph supports a maximum of 21 characters (total, not per legend). With six, it supports even fewer.

Not very comforting, is it? But then, PrintGraph is not the most capable business graphics program on the block. If legends weren't the problem, it would probably lack some other feature you'd want. Take a look at Micrografx's *Windows Draw* and *Windows Graph*. Both programs do much more than PrintGraph. For instance, you can place the legends anywhere on the page and even stack them instead of spreading them horizontally. *Windows Draw* is more suitable for enhancing existing graphs because it imports .PIC files. *Windows Graph*, the most recent addition to the Micrografx product line, is better for creating graphs because it swallows worksheet values whole, enabling you to create your graph from the ground up.

Windows Draw
Micrografx
1820 N. Greenville Ave.
Richardson, TX 75081
214/234-1769
List price: $299
Requirements: 320K, graphics adapter, DOS 2.00 or later version (512K, color monitor, and hard disk recommended)

```
echo off
echo ***************************************************
echo *                                                 *
echo * Place TARGET disk in drive B:. At the A> prompt *
echo * type DUP oldfilename newfilename and hit ENTER. *
echo * Two filenames are required - same or different. *
echo *                                                 *
echo ***************************************************
```

Listing 1: This batch file does not display the fourth ECHO command because of the > symbol. To fix that line, place A> between double quotation marks.

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and hard disk recommended)*

A Day in the Life

*Q. I run a medical accounting
and billing program written in
BASIC. I can easily obtain the current date using BASIC's reserved
DATE$ variable. But I also want
to determine the day of the week
to use in printed reports. Is the
day accessible from BASIC, or is a
special algorithm needed to compute it?*

*William C. Claridge
Redmond, Oregon*

A. The day of the week is not a
BASIC function—you need a routine to derive it from DATE$.
DAY.BAS (Listing 2) is a BASIC
program that uses a subroutine
to determine the day of the week
for any date from 1-1-1980 to
12-31-2099, a limitation imposed
by the DOS function call SET
DATE. (BASIC's DATE$ function,
which actually calls DOS's SET
DATE function, verifies that the
entry in question is a valid date.)

Although a BASIC algorithm
could find the day of the week,
this program calls, in line 430, an
assembly language routine that
uses the DOS function call 2A,
GET DATE (see remark line 130).

```
10 'DAY.BAS finds the day of the week for dates 1-1-1980 to 12-31-2099
20 DEFINT A-Z :DIM DAY$(6),ARRAY(8)    'Define integer variables & arrays
30 WIDTH 80 :CLS                       'Set up screen, array of day names
40 DATA Sun,Mon,Tues,Wednes,Thurs,Fri,Satur
50 FOR I=0 TO 6
60    READ DAY$(I)
70 NEXT
80 DATA 55,89,E5,B4,2A,CD,21,30,E4,8B,76,06,89,04,5D,CA,02,00
90 ' The data above is the machine code (to be CALLed by BASIC) for
100 '   the following day-of-the-week assembly-language subroutine:
110 ' 55         PUSH   BP           ;save BASIC's BP register
120 ' 89 E5      MOV    BP,SP        ;put stack pointer in BP
130 ' B4 2A      MOV    AH,2A        ;set DOS GET DATE function
140 ' CD 21      INT    21           ;do DOS call, puts day in AL
150 ' 30 E4      XOR    AH,AH        ;zero high byte of AX
160 ' 8B 76 06   MOV    SI,[BP+06]   ;put DAYNUM pointer in SI
170 ' 89 04      MOV    [SI],AX      ;put AX (day) into DAYNUM
180 ' 5D         POP    BP           ;restore BASIC's BP register
190 ' CA 02 00   RETF   0002         ;return to BASIC
200 FOR I=0 TO 8                     'Put the machine code into an array
210    READ LOW$,HIGH$
220    ARRAY(I)=VAL("&h"+HIGH$+LOW$)
230 NEXT
240 SYSDATE$=DATE$                                'Save system date
250 ON ERROR GOTO 370                             'Trap errors

260 'The main loop: request input, process it, display result, & repeat
270 DATE$=SYSDATE$                        'Restore saved date
280 INPUT ;"Enter date (mm-dd-yyyy) or Q to quit: ",ENTRY$
290 COL=POS(0) :LOCATE ,1 :PRINT SPACE$(38); :LOCATE ,COL 'Erase prompt
300 IF ENTRY$="" THEN GOTO 330 'If just <Enter>, use today's date
310 IF (ASC(LEFT$(ENTRY$,1)) AND &HDF)=81 THEN GOTO 350 'If Q, go quit
320 DATE$=ENTRY$ 'DATE$ function generates error if ENTRY$ isn't a date
330 GOSUB 430                             'Call day-of-the-week subroutine
340 LOCATE ,39 :PRINT DATE$;" is a "DAY$(DAYNUM)"day." :GOTO 270

350 LOCATE ,38 :PRINT SPACE$(42); :END 'Erase input and quit

360 'Error trap handles invalid entry; other errors halt program
370 IF ERR=5 AND ERL=320 THEN GOTO 390 'If invalid entry, skip a line
380 BEEP :PRINT :PRINT "Error" :END     'Other errors end program
390 PRINT " is an invalid date." :LOCATE ,11    'Invalid entry messages
400 PRINT "Please enter a date between 1-1-1980 and 12-31-2099."
410 PRINT :RESUME 270                    'Try again

420 'Subroutine calls DOS GET DATE function & puts day (0-6) in DAYNUM
430 DAYROUTINE=VARPTR(ARRAY(0)) :CALL DAYROUTINE(DAYNUM)'Always use...
440 RETURN                               '...VARPTR before issuing CALL
```

Listing 2: DAY.BAS is a BASIC program that uses
DOS function call 2A to determine the day of the
week for dates from 1-1-1980 to 12-31-2099.

That DOS call returns the day of
the week as a number from 0 to 6
(0 = Sunday) in register AL. The
assembly language routine then
places that number in the BASIC
program's DAYNUM variable,
which is used as an index (in line
340) to a string array holding the
names of the days of the week.

If your needs change and you
want a program that can deliver
the day of the week for any Gregorian date, check out *Some
Common BASIC Programs, IBM
Personal Computer Edition* (Osborne/McGraw-Hill, Berkeley,
California, 1982). This collection
of 76 programs includes one that
can tell you whether 2-29-2100 is
a valid date or calculate the day of
the week on which you were born.

(continues)

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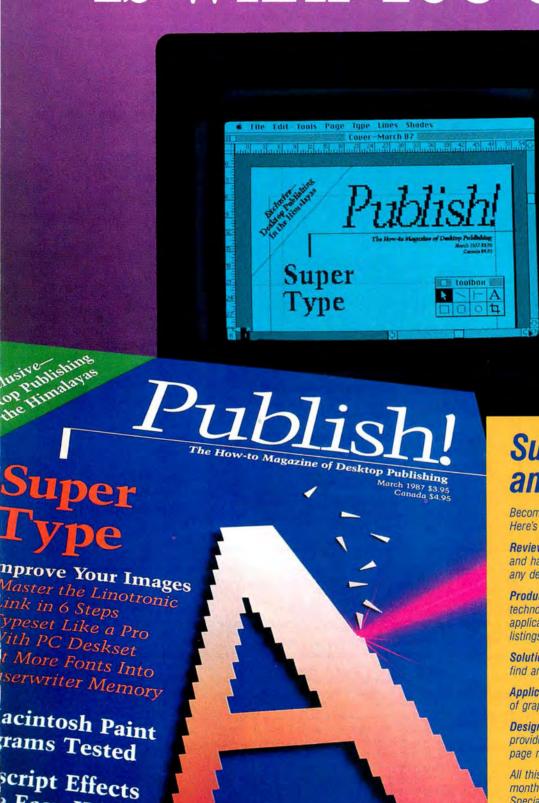
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Pick a Partition

Q. *How can I automate the process of changing a hard disk's active partition? I have written a data base program for historical research that runs under the Pick operating system. The program enables the user to collect data on the portable Radio Shack Model 100 and then transfer the information to a larger computer, using the same menu and commands on both machines. Pick is far more suitable for data base and multi-user applications than is MS-DOS; my Pick program will run on an XT as well as on minis and mainframes.*

I would like the user to be able to switch easily between the MS-DOS and Pick partitions of an XT or AT—that is, without confronting the terrifying choices presented by MS-DOS's FDISK.COM (a wrong choice could "remove" a partition and render its files inaccessible). Pick makes changing partitions easy by allowing any sequence of commands, along with their required responses, to be placed in a "procedure." A similar solution in MS-DOS would require a memory-resident keyboard macro program such as ProKey, which means extra expense as well as possible conflict with other memory-resident utilities.

Is it possible to use an assembly language program to switch to another partition? Can Pascal handle the task? Whatever the language, the program must work under MS-DOS 2.00 through 3.20 and avoid catastrophic results if it finds something unexpected on a non-IBM machine.

David L. Clark
Malibu, California

A. It's possible to write a program to change the active partition. But FDISK is already written; you just need to automate feeding it the requisite keystrokes and automate restarting the PC.

As you know, FDISK requires that you type a 2 and a carriage return to bring up the Change partition menu. Then, entering the number of the Pick partition (I'll assume it's partition 2) and another carriage return makes the Pick partition active. Finally, one <Esc> brings back FDISK's main menu, and a second <Esc> ends FDISK and makes the DOS prompt reappear. Let's build a file containing those six keystrokes.

I will assume that in the MS-DOS partition you have a directory called \DOS that contains ATTRIB.COM and FDISK.COM (from the DOS disk) and DEBUG-.COM (from the DOS Supplemental Programs disk). Change to that directory (**CD \DOS < Enter >**) and bring up DEBUG (**DEBUG < Enter >**). DEBUG's hyphen prompt appears; type **F 100 L6 02 0D 02 0D 1B 1B < Enter >** , which fills (F) memory from offset 100 (DEBUG's default starting point for files) for a length of six bytes (L6) with the six values listed (the keystrokes that you need to send to

FDISK). The hyphen prompt reappears; type **R CX < Enter >** to display and change the value of register CX, which is the number of bytes we want in the keystroke file. 'CX 0000' and the colon prompt appear; type **6 < Enter >** . The hyphen prompt reappears; type **N FDKEYS < Enter >** (to name the file) and **W** to write (save) it on the disk.

Now check your work by typing **L < Enter >** to load the file we just saved and **D 100 L6 < Enter >** to display six bytes, beginning with offset 100. If the six bytes are not correct, repeat the steps in the previous paragraph, beginning with the F command.

Since you're still in DEBUG, let's create a program that will restart the PC as if <Ctrl>-<Alt>-<Del> had been pressed. Type **A 100 < Enter >** to invoke DEBUG's simple assembler. A string of hexadecimal numbers (they vary from machine to machine) appears, followed by ':0000'. Carefully type the following, pressing **< Enter >** at the end of each line:

```
MOV DX,40
MOV DS,DX
MOV BX,72
MOV WORD PTR [BX],1234
JMP FFFF:0
```

Press **< Enter >** again, and the hyphen prompt reappears; type **U 100 L11 < Enter >** to "unassemble" 11 bytes beginning at offset 100 so you can check your work. If you have made a mistake, type A 100

(continues)

The Help Screen

<Enter> and start over. Once you get it right, type **R CX < Enter >** . At the colon prompt, type **11 < Enter >** (this file's size), **N WARMBOOT.COM < Enter >** to name the file, and **W < Enter >** to write it on the disk. Type **Q < Enter >** to quit DEBUG and return to DOS.

To prevent FDKEYS from being altered inadvertently, type the DOS command **ATTRIB +R FDKEYS < Enter >** , making it a read-only file.

Now we'll put it all together. Type the following, pressing **< Enter >** at the end of each line:
COPY CON PICK.BAT
C:
CD \DOS
FDISK < FDKEYS
WARMBOOT

Now press **< Ctrl > -Z**, then **< Enter >** to mark the end of the file and save PICK.BAT to disk. The less-than symbol tells DOS (2.00 and later versions) to feed the keystrokes in FDKEYS to FDISK. You can, of course, move PICK.BAT to another directory or give it another name.

Do you have any questions concerning the IBM PC or compatibles? Send them to The Help Screen, PC World, *501 Second St., San Francisco, CA 94107, or electronically to MCI Mail* PC WORLD/179-3813, *Compu-Serve 74055,412, or The Source STE908.* ◉

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Edited by Mike Cushman

Word Envelopes With Style
Thanks to *Microsoft Word* version 3.*x*'s "hidden-text" feature, you can employ a style sheet to address an envelope using address information contained in a letter. You simply create a style sheet that hides every paragraph except the recipient's address (the "inside address") and the return address (if included in the letter).

To create the envelope style sheet, start *Word*, type **< Esc > GTL** (Gallery Transfer Load), and select the style sheet you use for letters (for example, SEMI.STY). Press **< CursorDown >** to highlight the first Paragraph style whose text you need to hide. Type **FC** to bring up the Format Character menu, and enter **< Shift > - < Tab > Y < Enter >** to set 'hidden' to Yes. Repeat this sequence for each Paragraph style except address paragraphs.

Next, use the cursor keys to highlight the Paragraph style for the return address. Type **FP** (Format Paragraph) and then **L** to set 'alignment' flush left. **< Tab >** to 'space after', and type **10 < Enter >**. Next, highlight the inside address's Paragraph style, type **FPL** again, then **< Tab >** to 'left indent', and type **5 < Enter >**. Now highlight the Division style and press **FM** (Format Division Margins). Type **0 < Tab > 0 < Tab > 0 < Tab > 0 < Tab > 4 < Enter >** to set the top, bottom, left, and right margins to 0 inches and the page length to 4 inches. Type **TS** (Transfer Save), and name the style sheet **ENVELOPE.STY**.

To print an envelope from a letter on the screen, just replace the letter style sheet with the envelope style sheet by issuing the command <Esc> Format Style Sheet and entering the file name ENVELOPE.STY.

The text of the letter will disappear, and addresses will line up for a perfect envelope. For letterhead and printed envelopes, simply ignore the return address instructions and set the envelope to begin where the address should be.

One caveat: This technique will not work if portions of the letter have been formatted directly from the keyboard or the Format menu, because that formatting takes precedence over style sheets.
James Mittenthal
Boston, Massachusetts

Another Perfect Envelope
Terry Boss's envelope macro [✳.✳, *PCW*, March 1987] seems longer than the one I use with *WordPerfect* version 4.1 [see Listing 1].

I place the cursor at the beginning of the recipient's name in the inside address and type <Alt>-E. Essentially, the macro makes a temporary page out of the address, then changes the margins and prints the "page."
Robin Perry
Waterford, Connecticut

Quick Tempo on Insert and Delete
I've found a quick and easy way to insert and delete rows in *Symphony* spreadsheets. To insert a row, simply switch to the DOC environment, place the cursor at the beginning of the line, and press <Enter>; a new line will be inserted above the cursor.

(continues)

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```
<Ctrl>-<Enter>
<F2><Enter><Enter><F2>
<Ctrl>-<Enter>
<PgUp>
<Shift>-<F8>340<Enter>75<Enter>
<Shift>-<F7>2
```

Listing 1: ALTE.MAC, a WordPerfect envelope
macro—short and sweet

To delete a row, place the cursor
at the beginning of an empty row
and press <Del>; the row the
cursor is on will be deleted.
Patrick Kerr
Capo Beach, California

SUBSTitute RESTORE and BACKUP

As the software support person
for several different companies, I
send and receive a lot of disks that
were created by a variety of users
with BACKUP.

The greatest problem my users
and I face is that with BACKUP
the full path names are not visible
in the backed-up file. RESTORE
knows where to put the files from
the header, but without using
TYPE to display each file's header,
the user has no idea whether re-
storing a file will destroy an exist-
ing directory or replace an existing
file. To compound the problem,
users often add files from many di-
rectories to the backup disk with
the /A option.

Since I don't have a spare ma-
chine to check out their directory
structures and don't want to de-
stroy mine, I developed the follow-
ing procedure using the SUBST

command (from DOS 3.10 or a
later version).

At the root directory I enter:
MD C:\UsrEnvir
SUBST E:/D >NUL
SUBST E: C:\UsrEnvir
RESTORE A: E:*.*/S

The first command creates
UsrEnvir, a temporary directory.
The second deletes the substitu-
tion assignment, if any, for logical
drive E:. The third assigns the
drive letter E to C:\UsrEnvir. The
fourth restores the backup files
from drive A: to E:.

Because the SUBST command
enables me to use E:\ as a virtual
root directory, I can restore what-
ever a user has sent me without
destroying my own directory
structure.

Likewise, whenever I send a
disk to a user, the files are backed
up with:
SUBST E: C:\UsrEnvir
BACKUP E:*.* A:/S

Users are instructed that what-
ever I send them is always backed
up from logical drive E:'s virtual

(continues)

✱•✱

```
echo off
cls
echo --------------------------------------
echo Loading Turbo Lightning into memory
echo Press "<Shift>-<F8>" to invoke menu
echo --------------------------------------
cd c:\lightn
light
echo.
echo.
echo --------------------------------------
echo Loading SideKick into memory
echo Press "<Ctrl>-<Alt>" to activate
echo --------------------------------------
cd c:\sk
sk
cd \
```

Listing 2: LSK.BAT loads Turbo Lightning and then SideKick. All Turbo Lightning and SideKick programs should be in the subdirectories C:\LIGHTN and C:\SK, respectively.

root directory. They then apply all the steps outlined earlier except the MD command and restore the files to any directory they want.

Jorge G. Chiesa
Buenos Aires, Argentina

Lightning With a SideKick

SideKick and *Turbo Lightning* are two superb utility programs. However, to get the two to coexist peacefully you must load *Turbo Lightning* before *SideKick*. Listing 2, LSK.BAT, is a batch file that loads the programs properly.

As LSK.BAT shows, for the help feature on either program to work you must change to that program's directory before loading it. In fact, unlike with programs such as *Microsoft Word*, it is fruitless to try to circumvent this limitation by including the programs' sub-directories in the PATH command.

Roman Budek and Richard Budek
Des Plaines, Illinois

Listings by the Batch

When I was writing a lot of *dBASE III* program files, I needed a quick and easy way to print listings and other ASCII files. I wanted each file listing to begin at the top of a new page, preceded by the file name and a comment to identify it. So I developed LIST-.BAT [see Listing 3] and its "batch subroutine" PRINTIT.BAT [see Listing 4].

To use LIST.BAT, type LIST *filename.ext comment* at the DOS prompt (for example, LIST B:*.BAT Sikes Print Utilities 7-15-87 9:15). The file name can be preceded with a drive specifier and/or a path and can use the wild-card characters * and ?. The comment is a text string; it can contain up to seven embedded blanks but must not include the vertical bar (¦), less-than symbol

(continues)

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•

```
echo off
cls
if !==!%1 goto noname
if not exist %1 goto nofile
echo Check that Top of Form is properly set and printer is on line.^G
pause
for %%f in (%1) do command /c printit %%f %2
cls
echo Printing Completed
goto done
:noname
echo Use the syntax^G
echo LIST filename.ext comment
echo.
echo The file name and extension may include global characters.
echo The comment can have up to eight words.
goto done
:nofile
echo %1 not found^G
:done
```

Listing 3: LIST.BAT prints ASCII files. The file's
name and a comment precede each printout. Each
of the three ˆGs represents Control G, the beep.

```
echo off
cls
echo Printing %1
rem Print the comment in parameters 2 through 9
if not !==!%2 echo %2 %3 %4 %5 %6 %7 %8 %9 > prn
rem Linefeed
echo ^K > prn
rem Print the file name
echo %1 > prn
rem Linefeed
echo ^K > prn
rem Print the file
type %1 > prn
rem Formfeed
echo ^L > prn
```

Listing 4: PRINTIT.BAT is called as a subroutine
batch file by LIST.BAT. Each of the two ˆKs and
the ˆL represent Control K (linefeed) and Control L
(formfeed), respectively.

(<), greater-than symbol (>),
equal sign, semicolon, or comma.
The comment is printed before the
file name at the top of each listing.

A few tips: Because LIST uses
COMMAND.COM to call
PRINTIT as a subroutine batch
file, be sure that COMMAND
.COM is in the current directory
or accessible via the current
PATH. Do not type the carets (∧)
in either listing; hold down the
<Ctrl> key and press the next let-
ter (G, K, or L) shown in the list-
ing. Also, don't be surprised by
the strange appearance of file list-
ings with control characters (such
as PRINTIT.BAT itself).

Ed Sikes
Charlotte, North Carolina

(continues)

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```
;*******************************************************************
;                       BRIGHT for the IBM PC
;
; Memory resident program that, when <Ctrl>-B is pressed in text mode,
; will change the attribute of all the characters on the screen, making
; them more visible.
;*******************************************************************

kb_data         equ    60h             ;keyboard data port
kb_ctrl         equ    61h             ;keyboard control port
eoi             equ    20h             ;8259 end-of-interrupt value
int_ctrl_port   equ    20h             ;8259 interrupt command register
b_key           equ    48              ;scan code for 'B' key
ctrl_key        equ    4               ;shift code for Ctrl key

screen          segment at 0B800h      ;segment pointer to screen memory
screen          ends

code            segment
                assume    cs:code
                org    100h            ;origin for COM file
start:          jmp    initialize      ;go to initialization code

new_attr        db     5               ;new character attribute
rev_vid_bit     db     64              ;reverse video attribute bit
old_int_9       dw     2 dup (?)       ;old interrupt 9 vector

;*******************************************************************
;
; Main routine - this code gets control every time a key is pressed or
; released.  If <Ctrl>-B was pressed, the code to brighten the screen is
; executed.  If not, control is transferred to the BIOS keyboard interru
; routine.
;*******************************************************************

bright    proc near
          sti                          ;enable interrupts
          push ax                      ;save AX register
          in   al,kb_data              ;get scan code from keyboard
          cmp  al,b_key                ;was the 'B' key pressed?
          jne  exit                    ;no, so exit to BIOS routine
          mov  ah,2                    ;get state of shift keys
          int  16h
          test al,ctrl_key             ;is the Ctrl key depressed?
          jne  bright1                 ;yes, so continue

;Exit here to normal BIOS keyboard interrupt handler.

exit:     pop  ax
          jmp  dword ptr old_int_9 ;goto BIOS keyboard handler

; <Ctrl>-B was pressed.  Reset the keyboard and issue an end-of-interrup
; to the 8259 chip to enable hardware interrupts.

bright1:  in   al,kb_ctrl              ;get current control port value
          mov  ah,al                   ;save it in AH
          or   al,80h                  ;set bit 7
          out  kb_ctrl,al              ;send reset value
          mov  al,ah                   ;restore original value in AL
          out  kb_ctrl,al              ;send it out to enable keyboard
          cli                          ;suspend interrupts
          mov  al,eoi                  ;get EOI value in AL
          out  int_ctrl_port,al    ;send EOI to 8259
          sti                          ;enable interrupts

; Get the current video mode to see if it's an 80-column color text
; mode (2 or 3).  If it is, proceed.  Otherwise, return to the
; interrupted program.

          push bx                      ;save BX register
          mov  ah,15                   ;get video mode and display page
          int  10h
          cmp  al,2                    ;video mode 2?
          je   bright2                 ;yes, so continue
          cmp  al,3                    ;mode 3?
          je   bright2                 ;yes, so proceed
done:     pop  bx                      ;restore AX and BX
          pop  ax
          iret                         ;return to interrupted program

; If control gets this far, then the screen is to be brightened.  This
; is done by simply 'OR'ing each attribute (except reverse video) with
; new_attr.

bright2:  push cx                      ;save CX and DS registers
          push ds
          mov  bl,bh                   ;get page number in BL
          xor  bh,bh                   ;byte value to word in BX

          (continues)
```

Listing 5: BRIGHT.ASM is a memory-resident
assembly language program that enables users
with color boards and monochrome monitors to
see muted color shades in monochrome.

Brighten Mono-Graphics Text
When I first purchased a PC, my desire for graphics capability and lack of finances forced me to combine a color graphics adapter with a monochrome monitor. This combination has generally worked well, but some of the darker colors were too dim to be visible on the screen. This led me to write BRIGHT.COM, a memory-resident program that lightens the color of the "invisible" characters on the display.

BRIGHT.ASM [Listing 5] can be assembled, linked, and converted into a .COM file. Or you can load BASIC, type in the lines shown in BRIGHT.BAS [Listing 6], and run the program to create BRIGHT.COM.

The resident code takes up only 110 bytes of memory. I install it using my system's AUTOEXEC-.BAT file. <Ctrl>-B invokes the program.

The assembly language source code logic should be relatively easy to follow. However, two constants deserve special mention: new_attr determines how much to change the color, and rev_vid_bit determines which colors to change.

As a last note, the program as written works only in 80-column text mode (modes 2 and 3). In any other mode, it does nothing.

James Graham-Eagle
Newark, Delaware

(continues)

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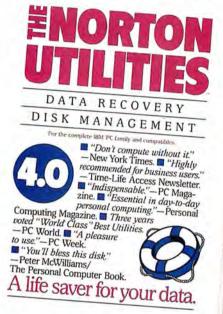
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```
                mov     ax,1000h          ;length of one video page
                mul     bx                ;page * 1000h = offset of page
                mov     ax,bx             ;move offset into bx
                inc     bx                ;point to attribute byte
                mov     ax,screen         ;point DS to screen segment
                mov     ds,ax
                assume  ds:screen
                mov     al,new_attr       ;get new attribute into AL
                mov     ah,rev_vid_bit    ;get reverse video bit into AH
                mov     cx,2000           ;2000 characters per page
bright3:        test    [bx],ah           ;is the character in reverse video?
                jnz     bright4           ;yes, do nothing
                or      [bx],al           ;change the character attribute
bright4:        inc     bx                ;point to attribute of next character
                inc     bx
                loop    bright3           ;do for 2000 characters
                pop     ds                ;restore DS and CX
                pop     cx
                jmp     done              ;return to application
bright          endp

;**********************************************************************
;
; INITIALIZATION code saves the old interrupt 9 vector and replaces it
; with one pointing to the code to be left behind in memory.
;**********************************************************************

initialize:
                mov     ah,35h            ;get current interrupt 9 vector
                mov     al,9
                int     21h
                mov     old_int_9,bx      ;save vector offset
                mov     old_int_9[2],es   ;save vector offset
                mov     ah,25h            ;set new vector
                mov     al,9
                lea     dx,bright         ;point it to BRIGHT procedure
                int     21h

;Exit using INT 27h, leaving BRIGHT in memory.

                mov     dx,offset initialize   ;point DX to INITIALIZE
                int     27h                    ;terminate, but leave code
                                               ; up to INITIALIZE in memory
code            ends
                end     start             ;execution begins at START
```

Listing 5: (continued)

```
10 DEFINT A-Z : 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) SUM=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$(LN);" :"
180 PRINT "Check your work." : BEEP : END
190 CLS : LOCATE 3,1 : PRINT "X-Maker II" : RESTORE : READ F$
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
1000 DATA "bright.com"
1010 DATA 1,EB,6C,90,05,40,00,00,00,00,FB,50,E4,60,3C,30,75,-1,2D
1020 DATA 2,08,B4,02,CD,16,A8,04,75,06,58,2E,FF,2E,05,01,E4,-1,D4
1030 DATA 3,61,8A,E0,0C,80,E6,61,8A,C4,E6,61,FA,B0,20,E6,20,-1,12
1040 DATA 4,FB,53,B4,0F,CD,10,3C,02,74,07,3C,03,74,03,5B,58,-1,EB
1050 DATA 5,CF,51,1E,8A,DF,32,FF,B8,00,10,F7,E3,8B,C3,43,B8,-1,2A
1060 DATA 6,00,B8,8E,D8,2E,A0,03,01,2E,8A,26,04,01,B9,D0,07,-1,BD
1070 DATA 7,84,27,75,02,08,07,43,43,E2,F6,1F,59,EB,D0,B4,35,-1,D5
1080 DATA 8,B0,09,CD,21,2E,89,1E,05,01,2E,8C,06,07,01,B4,25,-1,10
1090 DATA 9,B0,09,8D,16,09,01,CD,21,BA,6E,01,CD,27,-1,79,-1
```

Listing 6: BRIGHT.BAS is a BASIC program that creates BRIGHT.COM.

(continues)

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.

These Softstrips contain *.*'s
August program listings.
They can be read by Cauzin's
Softstrip System Reader.

FMTPATCH Correction
Due to a production error,
FMTPATCH in June's *.* is miss-
ing a blank line and therefore does
not work properly. Additionally,
the author has another correction
that causes the PC to beep after
drive A: has completed formatting
a disk, as well as after drive B: is
done. To make these changes to
FMTPATCH, insert the following
lines between the lines DW 0000
and N MFORMAT.COM:

(blank line)
A 02B0
NOP
NOP
NOP
(blank line)

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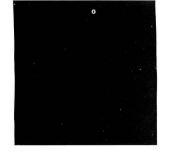
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999

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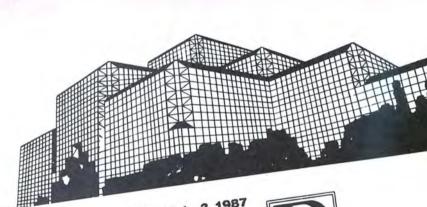
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- **Add-In Text Editors for 1-2-3**
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