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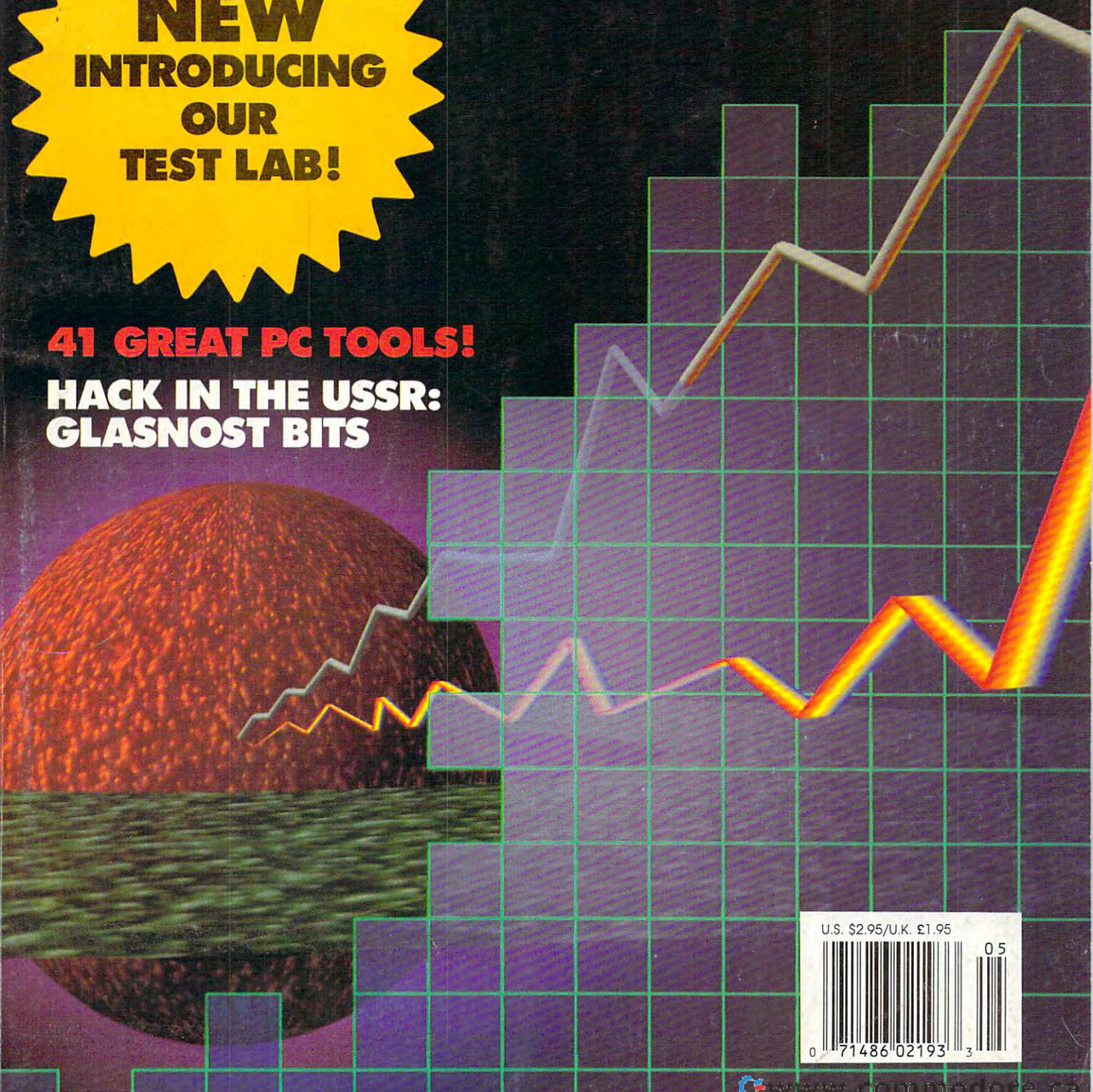

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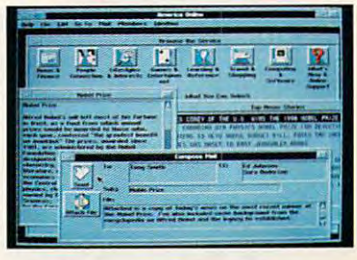

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COMPUTE

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This issue of *COMPUTE* has some exciting changes. Here's a road map to what's new inside.

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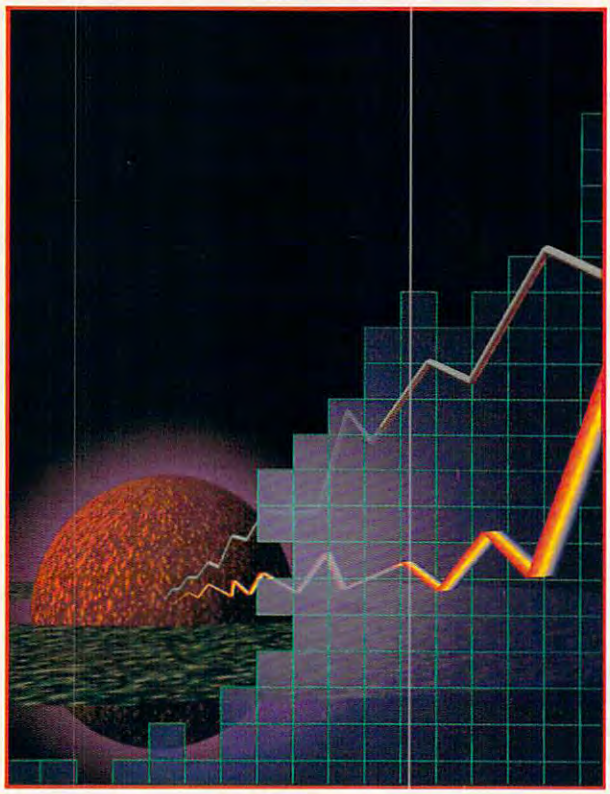
State of Computing: Europe 20
JACK SCHOFIELD
From his home in the U.K., Jack Schofield takes a hard look at home computing in Europe, especially in the U.K., Germany, and France. Unlike the United States, which, despite its diversity, still has one predominant language and culture, Europe has a computing community which is complex, with its host of languages and differing cultural attitudes. IBM, Apple, Commodore, and Atari are the big players, with PC compatibles making great gains in the last few years.



ON THE COVER

Artist Doug Struthers created this issue's cover with a Silicon Graphics Personal Iris workstation. This machine's powerful geometry engine is fueled by a MIPS RISC chip, 32MB of RAM, and a 1.2 gigabyte disk drive. Doug used his own software to model the image, which is based on spline surfaces, not more commonly used polygons. The finished image is 4000 pixels high by 4000 pixels wide and four bytes deep.

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Computing in the Other Europe 30
KRISTEN STERNBERG
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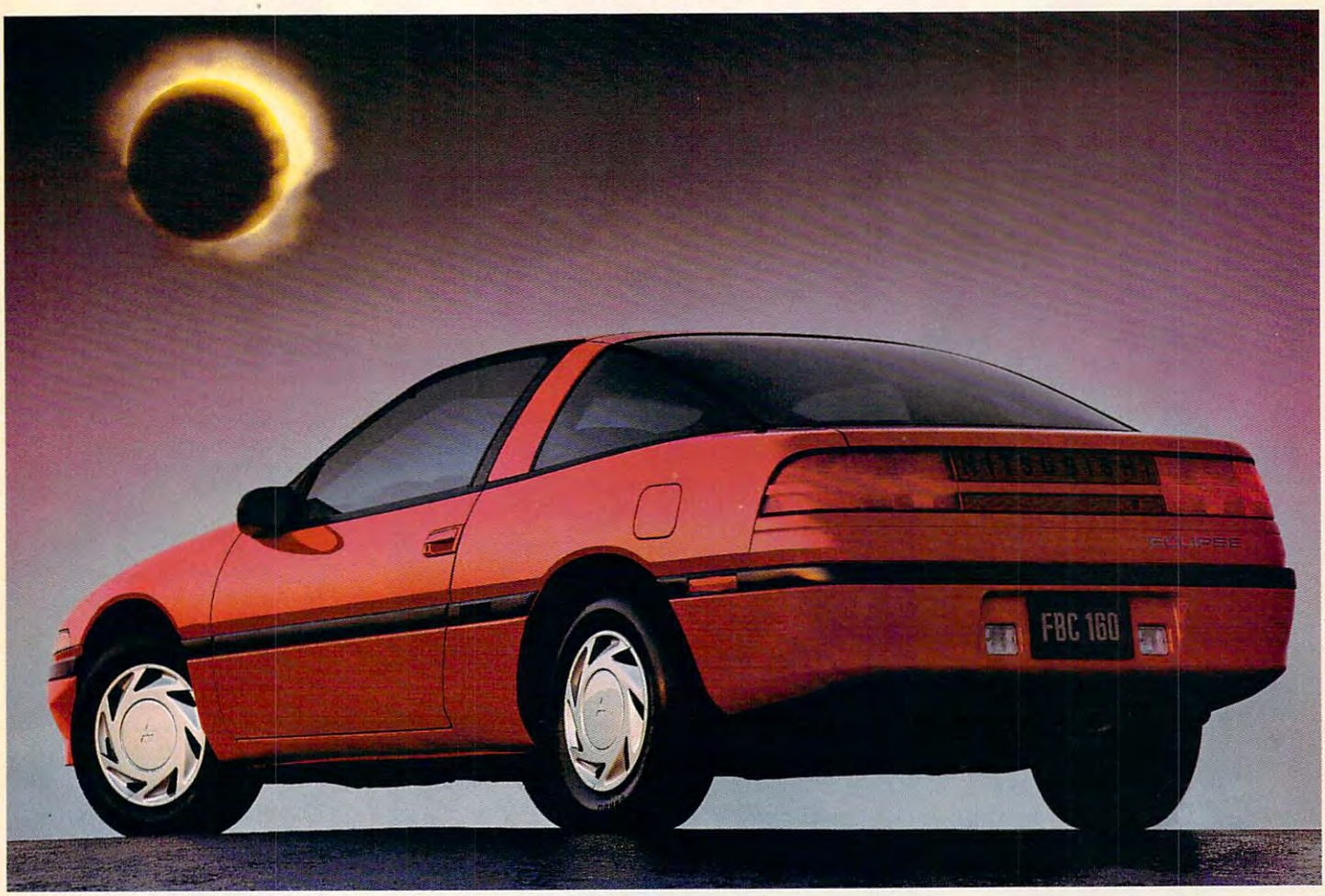

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Michael S. Hedgepeth
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21 January 1991

Ed Bates
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Dear Ed:

Well, we're finally settled in.

The kids are registered in school. We've unpacked everything but the pictures. And I'm in my new digs.

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I love it. That is, when I can get to it. Barbara's putting all her recipes on computer. And John's at the age where it seems like there's a term paper due every week.

Well, gotta run. You're not the only one with deadlines to meet.

Give my best to everyone in the department. Tell Pete he still owes me a beer. You collect it for me.

Can't wait for you and Ann to come visit.

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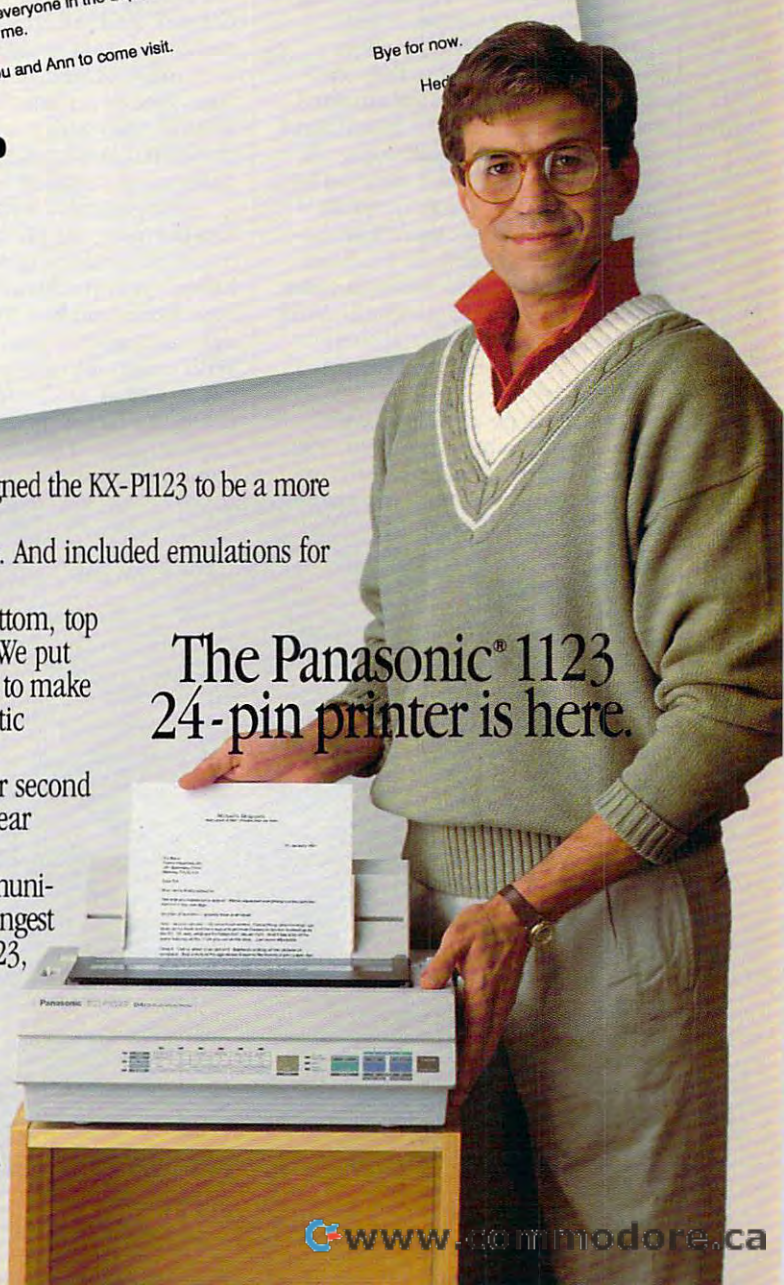

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EDITORIAL LICENSE

PETER SCISCO

This issue of *COMPUTE* brings with it some exciting changes. Over the last several months, the editors have worked diligently to refine the focus of the magazine and to define *COMPUTE* as a total resource for computing at home. From what many of you have said, in letters and in phone calls, we're on the right track.

Your feedback is doubly encouraging because it endorses a vision shared by the *COMPUTE* editors. From its inception more than ten years ago, *COMPUTE* has attracted an active audience that was willing to experiment with personal computer technology even when it required long hours of work to reap the rewards. A lot has changed since then. The software applications and the hardware platforms we use now are so complex and sophisticated that (and this is the central paradox of personal computing) they make computers easier to use for all of us.

Access to power. That's what computing at home is all about. The power to make the right decision when you go to buy that new laptop. The power to make the most of your favorite software program. The power to influence the decisions your company makes—whether you're the president or the rookie. The power to help your children realize their potential. The power of electronic entertainment, a world of wonder only imagined a decade ago.

Access to power. That's what *COMPUTE* is all about, too. And this month, we want to share that access with you. Our new Test Lab section gives you the information you need when shopping for new equipment, spelled out in language that's easy to understand, designed for easy access.

Our expanded Tech Support section (formerly the PC section) solves the tough technical questions that can hamper your productivity. This month, find out how to choose the right hard disk for your computer. With insight into graphical computing, as well as hardware and software strategies, Tech Support is sure to become a valuable resource in your home and office.

Last, but certainly not least, we have expanded our Reviews section to include as many software and hardware reviews as possible. Whether it's a laser printer or the latest flight simulator, you'll find it in these pages.

COMPUTE will continue to be the essential guide for the PC activist. It will continue to provide an avenue for the exploration and implementation of computer technology at home. Our readers will continue to be the forward-looking advocates they have always been, exponents of the computing lifestyle. And as more and more people adopt computer technology, *COMPUTE* and its readers will be there to share and encourage their excitement and discoveries.

This month, *COMPUTE* launches itself on a journey of discovery across the Atlantic, where we explore the world of personal computing as it exists in Europe—and beyond. It's rank fallacy, of course, to talk of Europe as one big nation of computer users. The platforms that are hottest in the United Kingdom may be eschewed in Germany or France. The software admired in France may be coolly dismissed across the Channel. Business software must adhere to differing governmental regulations. Cultural attitudes toward violence, arcade halls, and narrative many times flavor discussions of entertainment software.

The burgeoning number of PCs moving into European homes is slowly growing to critical mass. And as the community grows, so does the opportunity for shared ideas and perspectives.

The idea of home computer users linked globally through networks and software applications is but a glimmer of a random thought, and a long way from replacing television broadcasts and telephone calls.

But the idea persists. And it's worth considering how a different culture might influence the design and use of home computers, suggesting a perspective we may never gain from our own explorations. ⊡

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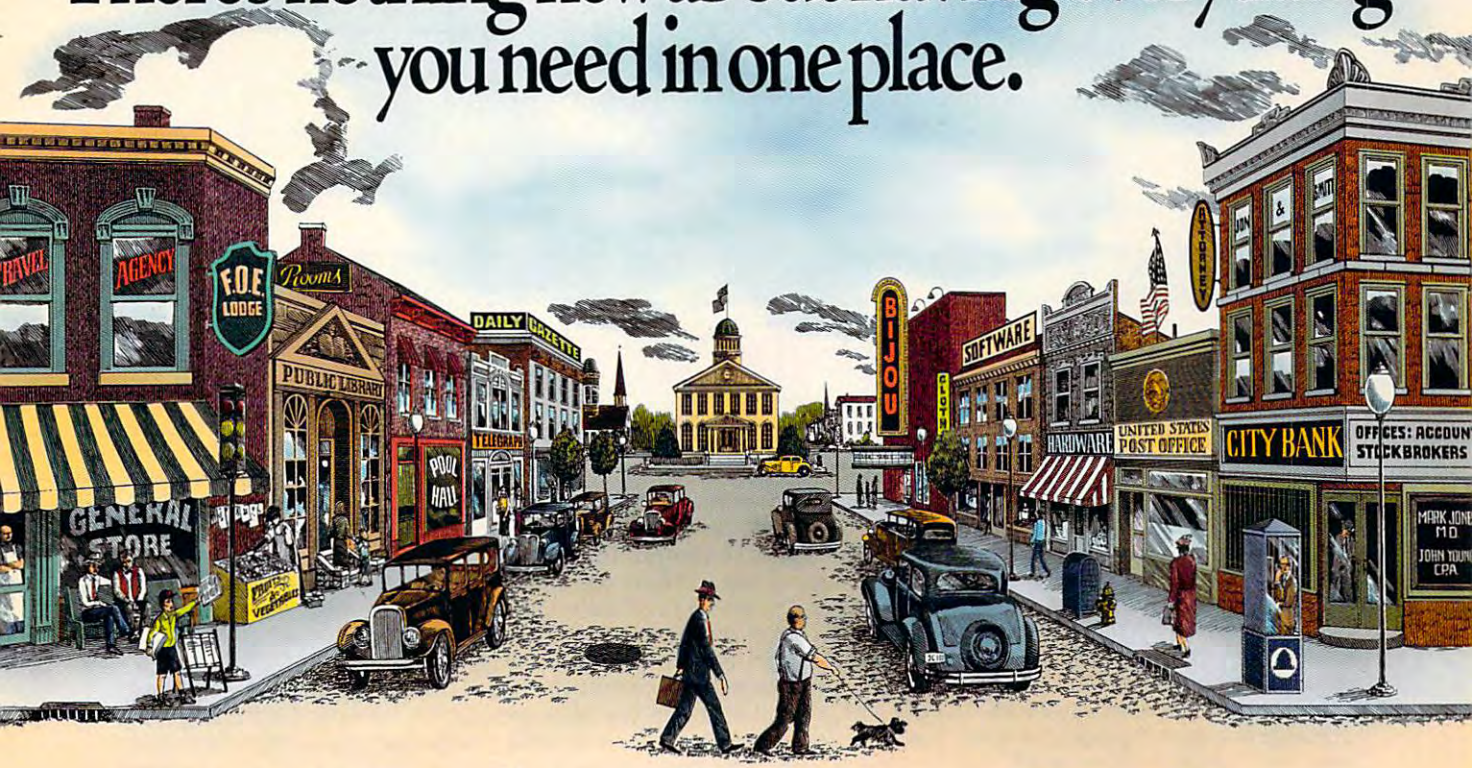

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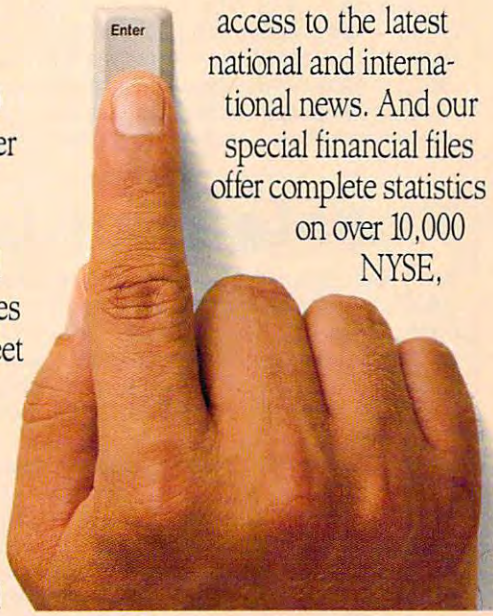

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NEWS & NOTES

At the Movies

IBM continues to build its multimedia arsenal by enhancing existing graphics-presentation software. IBM's Audio Visual Connection (AVC) now provides touchscreen capabilities that ease authoring and viewing multimedia presentations. AVC 1.03 also includes a new video-out option that allows users to send draft or finished presentations to a videocassette recorder or television monitor. The company's M-Control Program, which enables full-motion video presentations using the M-Motion Video Adapter/A, now supports *Microsoft Windows* 3.0 and improves the speed of performance when run with the OS/2 Presentation Manager.

Storyboard Live!, IBM's animation, motion video, and enhanced presentation software, now lets users create onscreen presentations that incorporate drawing, painting, animation, motion video, music, and voice. Users can also play back *Storyboard Live!* audio and video without additional hardware, allowing them to distribute presentations on disks for viewing by individuals with standard computer hardware. New background templates and automatic frame-sequencing capabilities enable users to quickly and easily create presentations. *The Video Editor,* formerly part of an add-on program from Krepec Publishing, has now also been fully integrated into *Storyboard Live!*. This allows users to capture video sequences for a presentation with a video-capture board and any video source, such as a VCR, laser disc, or video camera, and then play back the sequences from the computer's hard drive. Tagged Image File Format (TIFF), Picture Exchange Files (PCX), Windows Bitmap files (BMP), and Graphic Image Files (GIF), in addiiton to IBM Linkway, OS/2, and Audio Visual Connection files, are also now supported.

The Backfire Heard 'Round the World

Ashton-Tate might not own *dBase!* In a legal decision that could have major implications for the entire database market and for the software industry as a whole, a federal judge in Los Angeles ruled that Ashton-Tate's original copyright for *dBase III Plus* was invalid. The ruling came in a look-and-feel suit brought by Ashton-Tate against Fox Software, in which Ashton-Tate claimed that Fox had infringed on Ashton-Tate's *dBase III Plus* copyright. The judge dismissed Ashton-Tate's current lawsuit against Fox Software "with prejudice," precluding Ashton-Tate from refiling a new suit in the same court.

Judge Terrence Hatter ruled that *dBase III Plus* is a "derivative work" from JPL/DIS, a mainframe database language originally developed at the Jet Propulsion Laboratories in Pasadena, California. The decision is also expected to affect *dBase IV,* which is primarily derived from *dBase III Plus.* This decision is expected to strengthen the *dBase* aftermarket for *dBase*-compatible databases and follow-on products by encouraging independent implementations of the *dBase* language.

There are currently ten vendors marketing *dBase* language compilers and interpreters. Four of these vendors—Ashton-Tate, WordTech, Fox, and Nantucket—hold over 90 percent of the *dBase*-compatible market. Coupled with Nantucket's recent moves to eschew the *dBase* market and reposition its compiler, the decision may cause a significant reshuffling among the *dBase* market leaders. Competitors in the database area that are not specifically *dBase*-compatible include *Paradox* and *R:BASE.* Both can import *dBase* files, however.

Russian Lotus

Computer users in the Soviet Union won't have to do without their *Lotus 1-2-3.* Lotus is now shipping a fully translated Russian version of *1-2-3* in the U.S.S.R. Esther Dyson, a U.S. expert on the Soviet computer industry, said, "Until now, word processing and databases had a higher share of the software applications market in the Soviet Union than spreadsheets. As the economy loosens up and the need for financial analysis grows, the demand for spreadsheets will increase significantly."

In related news, Lotus has also made several moves regarding its market activities in the Soviet Union. Lotus has appointed VNIPI StatInform as its first Soviet distributor. In addition, the Leningrad International Management Institute has been named the first Lotus Authorized Training Center in the U.S.S.R. Lotus also will open a Soviet sales office in the first quarter of 1991. It will be managed by Jane Kitson, who was recently appointed business development manager for the U.S.S.R.

"The Soviet market represents both a significant opportunity and a challenge for Lotus," said Steve Crummey, senior vice president of Lotus's International Business Group. "Currently there are an estimated 300,000 PC users in the Soviet Union. As the price of PCs in the U.S.S.R. drops and their availability increases, the number of users is expected to grow significantly. At the same time, the country's economy is in upheaval, and conducting business under these conditions is difficult, especially for a foreign company. VNIPI StatInform's existing infrastructure will assist us in making this transition easier.' ▷

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Senior Hacker

An 82-year-old retired Navy captain who was aboard the U.S.S. *Yorktown* when it was sunk during the Battle of Midway has been named Senior Adult Student of the Year. Vane M. Bennett was selected from more than 100 nominations as part of Salute to Older Adults Day, when adult schools all over California honored their oldest students. Bennett is involved in an avid study of databases, spreadsheets, and hard disk management at Grossmont Adult School in La Mesa, California.

Bennett says he's "hooked on computers" and his goal is to become computer literate so he "can take advantage of all the things computers can do." His teachers at the Foothills Center near San Diego describe him as "incredibly energetic" and "committed to the pure joy of learning." His fellow students, all younger, often seek him out for advice and answers to their questions.

Most adult school classes for older adults are tuition-free. Many have outreach programs that send teachers and aides to senior centers and convalescent homes.

Enabling the Disabled

"Computer technology is providing solutions that help many of the estimated 43 million Americans with disabilities to lead more independent lives," said James G. Parkel, IBM director of corporate support and community programs. To help enable the disabled, IBM is making available $4.5 million in computer systems to federally funded disabilities support centers being established nationwide. Under the program, dubbed the IBM Disabilities Assistance Network, personal computers and software will be loaned at no charge to the agencies and nonprofit organizations designated by the states and U.S. territories to operate the centers.

"This program builds on the partnerships IBM has established with state agencies and nonprofit organizations that work with people who have disabilities," Parkel said. The computers will be available to centers receiving federal grants to help them assess needs, coordinate resources, and answer telephone inquiries. The equipment also will be used to provide demonstrations of computer-technology solutions that assist people with disabilities.

Through the program, centers will be eligible for IBM Personal System/2 models, peripherals, software, and databases that assist people with disabilities. IBM products designed to assist people with hearing, vision, speech, and other disabilities will also be available to the centers. The loan program will be managed by the company's National Support Center for Persons with Disabilities, located in Atlanta.

Demanding Lower Wages

Computer consultants are celebrating a new labor bill which exempts hourly computer employees from receiving time-and-a-half for overtime as a major victory. Normally, people aren't too happy about lower wages, but National Association of Computer Consultant Businesses (NACCB) president Bill Campbell says most computer professionals will actually make more money as a result of the new law.

"Typically, employers have been reluctant to pay the steep overtime costs, averaging $75 per hour," Campbell said. "Many of them would simply stipulate that employees could not exceed 40 hours each week on a project, even if it required more time."

Now, the association reasons, computer employees will at least be given the opportunity to work additional hours for their regular hourly pay. The landmark change occurred after more than four years of lobbying efforts by the NACCB. For more information, contact Lynee Leaf, NACCB Publicity Chair, Northern California Chapter, (415) 835-1004.

Faster Laptops?

IBM's *next* laptops might run faster than anything we've seen today. IBM researchers have unveiled some new transistors that could revolutionize personal computers—especially laptops—by speeding them up dramatically. The transistors are built out of a promising new computer-chip material called "silicon-on-insulator," and they reportedly run three times faster than their comparable pure-silicon counterparts.

The new transistors are the Complementary Metal Oxide Semiconductor (or CMOS) type of electronic devices, a mainstay of computer chips that power laptop and personal computers. IBM research staff member Dr. Ghavam Shahidi said the new silicon-on-insulator material could someday speed operation and decrease errors in computer circuits.

Inoculate Your Computer Now!

VirusCure might be just what the doctor ordered for your PC. According to its maker, the program can actually cure your computer of a broad spectrum of known virus infections.

From International Microcomputer Software (1938 Fourth Street, San Rafael, California 94901), *VirusCure* scans disks and memory and identifies all files infected with known viruses. It then removes the viruses from all infected files and repairs infected programs where possible. *VirusCure* also identifies any boot-sector or partition-table virus that may be present. If a virus is discovered, *VirusCure* will open a window in the center of the screen, listing the name of the infected program and the name of the virus. The company claims that most COM files and up to 80 percent of EXE files can be successfully repaired by *VirusCure*. *VirusCure* also works on a network.

The new version, developed in association with McAfee Associates, can detect more viruses (over 230). It retails for $89.95. ▷

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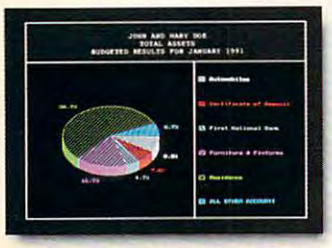

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Software That Throws a Fit

Mannequin is a program for computer-aided design (CAD) and graphics-design users who need to fit their designs to the human form. The program actually implements the human fit into the design process by creating moving, fully dimensional human likenesses on the screen. These likenesses can see, walk, bend, and grasp objects in a quantifiable, ergonomic manner. Ken Goodman, vice president and general manager of *Mannequin* publisher Humancad, said the program "can dramatically improve the appeal of thousands of products by allowing designers to meet individual customers' needs by matching product designs to different human body types."

The program uses extensive ergonomic data to allow users to combine specific likenesses of men, women, and children of different sizes, shapes, and nationalities into a design. It can be integrated with most popular CAD and graphics software packages, such as *AutoCAD, Generic CADD, Corel Draw, Micrografx Designer, Harvard Graphics,* and *Aldus Pagemaker,* to provide the user with a variety of design options. According to Goodman, the program can assist companies in improving overall customer satisfaction by providing more comfortable, higher-quality, better-designed products and environments, from entire buildings to automobiles, home and office furniture, hand tools, and kitchen appliances.

Mannequin draws human figures from ten world populations, including North and South America, Europe, and the Far East. The package also draws five different body sizes, from extra small to extra large. Specific body parts, such as arms, legs, or heads, can be drawn to different scales as well. In addition to drawing human physiological characteristics, *Mannequin* offers animation capabilities, allowing the program to evaluate range of motion, vision (including peripheral vision), and distance judgment. The program retails for $699, and all customers who register the program immediately also receive a free copy of Humancad's extensive ergonomic database, including 44 world populations of male, female, children, disabled, and military figures. For more information contact Humancad, 1800 Walt Whitman Road, Melville, New York 11747.

NCR and AT & T: No Peace in Our Time

NCR chairman of the board and chief executive officer C. E. Exley Jr. has placed himself and his company in a defensive position against a takeover attempt by AT & T. In a public letter addressed to AT & T chairman of the board Robert E. Allen, Exley said: "NCR's Board of Directors has been and remains unswervingly committed to protecting the vital interests of NCR's shareholders, customers, employees, and other important stakeholders. We believe that all of our shareholders and other stockholders are best served by continuing to build NCR's enormous inherent value as an independent company."

The NCR board has rejected a $90 stock-for-stock merger offer from AT & T, and, in his letter, Exley called the offer "grossly inadequate and unfair." NCR went on to let AT & T know it would consider an offer of "not less than $125 per share." Such an offer has not been forthcoming, so NCR broke off negotiations, and a bit of name-calling and breast-beating by both parties ensued. In his letter, Exley referred to AT & T's offer as "a desperate attempt to salvage AT & T's disastrous foray into the computer business." Should AT & T continue alleged hostile attempts to take over NCR, NCR "will use every means at [its] disposal to protect [its] shareholders and other stakeholders."

NCR then filed a lawsuit against AT & T, alleging that its tender offer filings were "false, manipulative, and misleading" and in violation of the Securities Exchange Act of 1934 and the rules and regulations of the Securities & Exchange Commission.

So AT & T has attempted to take over NCR with what NCR refers to as an unfair offer. Now NCR stands ready to go to legal war to protect its interests.

Finally! An IBM Laptop!

Yes, it's true. According to recent reports, IBM's long-awaited laptop computer is finally about ready to ship. At this writing, IBM executives have reported the new PC will be more fully loaded than any of the other so-called notebook class of laptops currently on the market. Reports indicate the machine will have a 386SX microprocessor, a 60MB hard drive, and a slanted full-size keyboard. Reports indicate the new IBM notebook computer will weigh 7 to 7½ pounds and will come equipped with 2MB of RAM (expandable to 18MB). The suggested retail price is expected to be $5,000–$5,500.

RISC-y Business

Portability and RISC-based computing don't usually go hand in hand. Now TriGem may have solved the problem with the introduction of a battery-powered RISC-based laptop PC. The company claims it's an industry first.

The new laptop workstation weighs only 8.5 pounds and comes equipped with 8MB of RAM, a 100MB hard disk, and a 13-inch monochrome screen capable of 1152 × 900 pixels of resolution. The 4-pound battery provides 2–6 hours of continuous usage. The new laptop's SPARC architecture (or *SPARCitecture,* as it's called at *COMPUTE*) was developed by Sun Microsystems. It can execute about 15.8 million instructions per second (MIPS), compared to about 5–6 MIPS for computers based on Intel's 386 chip running at the same speed. The laptop can also emulate CISC processors and run DOS software at the same speed as a 286 PC, and it's also capable, according to the company, of running Macintosh software faster than a Macintosh SE. The price is expected to run between $7,000 and $12,000. More information about this machine can be obtained by writing to Neale-May & Partners, 4920 El Camino, Los Altos, California 94022. ▷

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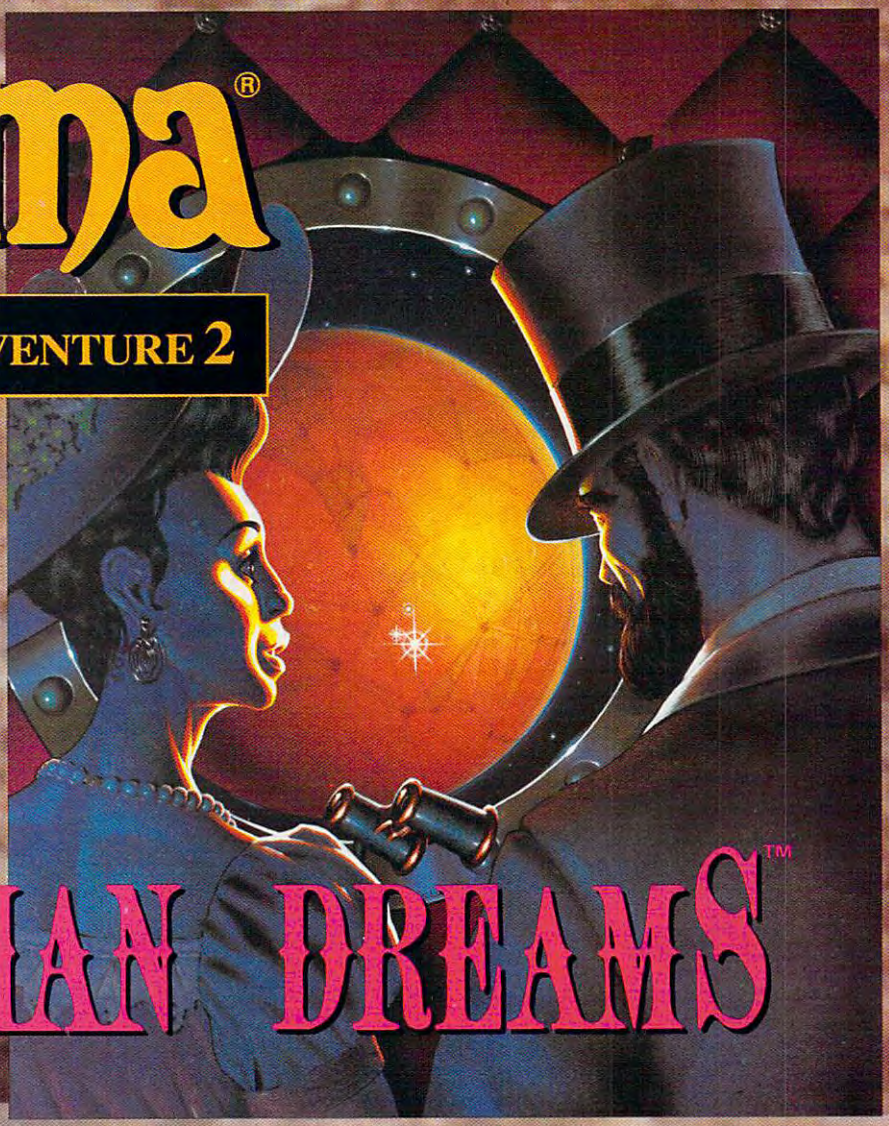

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To Catch a Thief

It's getting harder to catch a thief these days. According to a report by the National Academy of Sciences' National Research Council, "The modern thief can steal more with a computer than with a gun." The statement may set the tone for how computers and the precious data they contain are viewed in the 1990s.

In its report, the council also encourages Congress to form an Information Security Foundation to serve as a center for computer-system security research, as many corporations are just beginning to understand how vulnerable they are to theft or destruction of vital corporate information.

Twice the Football

A special promotion from Data East combines the fun of a fast-action computerized football simulation with the pleasure of real-life football in a single bundle. Data East's new football bundle combines its *ABC Monday Night Football* software with ABC Sports' 20th anniversary videotape, *Monday Night Madness*.

ABC Monday Night Football delivers the same action-packed excitement as the original version, plus much more. The program is an upgrade that delivers improved graphics and sound, offering players 256-color VGA graphics and Ad Lib sound board support. Additionally, players can take advantage of the game's improved use of artificial intelligence. And with improved broadcast-style statistics, players can keep track of the scoring drive, including downs, yardage statistics, losses, and pass completions for more accurate gameplay.

The *Monday Night Madness* VHS tape highlights some of the most memorable moments in NFL history. The video is a collection of the heroes and villains, including such legends as the Juice, the Fridge, and Broadway Joe, who have made "ABC Monday Night Football" one of the highest-rated television shows ever.

A Three-Way *1-2-3*

Lotus Development's new Network Edition of its popular *1-2-3* release 3.1 is specifically designed for Local Area Networks (LANs) running under DOS or *Windows* 3.0. The new Network Edition, which simplifies the task of installing and running the popular spreadsheet on LANs, is available in three editions: Standard, Server, and Node.

The Standard edition is intended for use in a stand-alone or networked environment, including full documentation, software, and a single-user license. The Server edition is licensed for shared use from a central network file server and includes complete network administration software and documentation, product software and documentation, and a single-user license. The Node edition provides an additional license for network use and contains complete documentation and software.

Each of the new editions provides the ability to share *1-2-3* data and program files, as well as network resources, such as printers and fonts. Server and Node editions of *1-2-3* release 3.1 are available at a retail price of $795 and $495, respectively. The Server edition includes 5¼-inch and 3½-inch disk media in the same package.

Hazardous Waste Fine for Seagate

Computers can actually help save our environment by cutting down on waste (think of the paper and energy saved every day by electronic mail). But some computer manufacturers have actually been found to be contributing to the possible deterioration of our environment by their manufacturing processes.

According to a published report, one such company, Seagate Technology, was recently fined $850,000 for an environmental violation involving hazardous waste. According to the report, Seagate allegedly gave more than 500,000 gallons of copper sulfate solution from its disk-drive plant in Fremont, California, to Stapleton Technologies in Long Beach, California, for disposal during a period from mid 1987 to late 1988. The fine has been referred to as one of the largest environmental penalties in the history of California's Santa Clara County.

Quest for Merger

Two of the country's biggest consumer software companies, Sierra On-Line and Brøderbund, announced in March their intentions to merge their operations into a single company. The proposed merger is a means of broadening their respective product lines and gaining clout on retail shelves.

Under the terms of the agreement, Sierra, which had about 3.6 million shares outstanding at the time of the announcement, will issue 4.1 million new shares of common stock in exchange for all outstanding shares of Brøderbund. Sierra-Brøderbund will become a wholly owned subsidiary of Sierra. The transaction is subject to approval by both companies' shareholders and other contingencies. Susan Lee-Merrow, director of marketing at Brøderbund, expects the deal to become final sometime in mid to late April.

Ken Williams, Sierra's current CEO, will be chairman, president, and CEO of the consolidated company. Doug Carlston, Brøderbund's chairman and CEO, will be president of Sierra-Brøderbund. Williams said that the combination of the two firms will have "the financial and technological resources to compete effectively on a global basis." The only anticipated change, from the consumer's point of view, is wider software availability. ⊡

—PETER SCISCO

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FEEDBACK

LETTERS FROM OUR READERS

Where Are They Now?

Does anyone remember *Papermate?* It was the first truly powerful word processor for the Commodore 8032. It was written almost entirely in BASIC, so it could be revised readily for special uses. It was the ideal first word processor, and I have adapted it to the PC. I'd like to give it away to my school, along with the source listing (it's compiled with *Microsoft QuickBASIC*). The question is whether Michael Riley, the author of the original *Papermate,* would permit it. Can you get me an answer to this question, or alternately, can you put me in touch with Mr. Riley?

ALFRED D'ATTORE
DOVER, DE

If your program "looks and feels" like the original, you'll probably need to get permission from the copyright holder before distributing it. Check the initial screen of the program for a copyright notice. Even if Michael Riley is the author, the copyright might be in someone else's name. We aren't aware of the whereabouts of Mr. Riley, but we hope that someone reading this will help us track him down.

Brickbat Roundup

After I saw the new *COMPUTE,* my feelings about it were affirmed. I must say that I really enjoyed the magazine as it was because it provided various articles for various computers. Now the magazine seems to be concentrating on the IBM PC, with little or no attention given to the Amiga or the Apple II. There are other publications designed for the IBM, and there are few that provide general information about many kinds of computers. I wonder what happened to the well-rounded magazine.

CECILIA MCKINLEY
LOWER LAKE, CA

Get with the Program

I like the new *COMPUTE.* If I remember correctly, *COMPUTE* used to have programs. That was how I became interested in BASIC and computers. If possible, could you put a small, useful program in once in a while to tempt your programmers? Keep up the great job!

RICK WIKOFF
FPO SAN FRANCISCO, CA

Check out Tom Campbell's "Programming Power" column. Each installment will provide a short, useful program that illustrates how to program the PC with BASIC and other languages.

Dark VICtory

This fall we purchased an AT clone for our family. We especially appreciate the educational programs we've purchased, but we'd also like to have more recreational games. Several years ago we owned a Commodore VIC-20 and a large collection of games for it. However, the VIC-20 finally died, and the repair shop lost it, leaving us with all these games and no computer to play them on. Is it possible to have these game cartridges transferred to 3½-inch disks and play them on the AT? If so, which company do I contact, and what would be the cost?

WILLIAM H. VICKERS
BARBOURVILLE, KY

There is no way to play VIC-20 games on an AT. Even if you could somehow transfer the code on the ROM chips in the cartridges to a PC disk, the two computers use utterly different central processing units. The VIC's 6502 code would be gibberish to the AT's 80286. It seems to us that you have two options: Sell or donate the games to someone with a VIC-20 or advertise to purchase one of these units from someone else. There must be someone in your area with a VIC collecting dust in a closet.

Born to Upgrade

I have an IBM XT clone with a hard drive and a 5¼-inch drive. I plan to add a 3½-inch drive. I have DOS 3.3, the BIOS, and space available to upgrade my system. My question is what kind of 3½-inch drive I should get—720K or 1.44MB. I notice that some of the new software is using high-density disks. My worry is that if I get a high-density drive, I won't be able to use any of the current popular software on 720K disks. Are they compatible?

Yes, with the exception of some early 720K drives, 720K and 1.44MB disk drives are completely compatible. You will have to use a slightly different format command to format 720K disks on a 1.44MB drive, but other than that the capacity of the disk should be of no concern to you. Not only are they compatible, but the price difference between the drives is almost negligible—often only $10 or $20 by mail order.

What ought to be of concern to you is that some BIOSs are completely unable to cope with the 1.44MB drive itself. To make sure that your BIOS is compatible, read your documentation or call your computer's manufacturer.

Border Skirmish

My new VGA monitor has a black border around the color screen. How can I eliminate this black border?

ADAIR D. WILSON
OCEAN SPRINGS, MS

All VGA screens have a border around them. There are three solutions to the problem. You could write a program that makes a BIOS call that results in a thin border of a color other than the background color. This doesn't eliminate most of the border, though.

You could change the palette so that the border is some color other than black, but then everywhere something black appears on the screen, it would be changed to this new color.

Finally, you can usually adjust the size of the picture using the knobs on the back of the monitor. If

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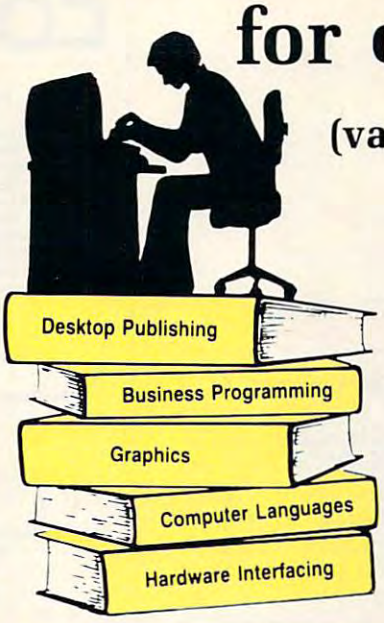

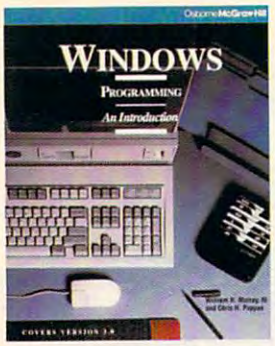

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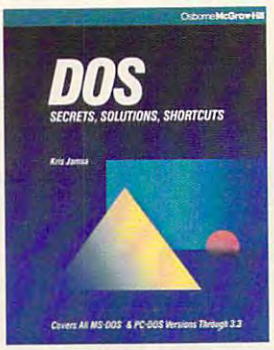

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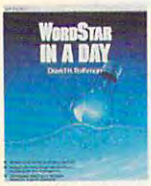

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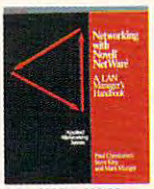

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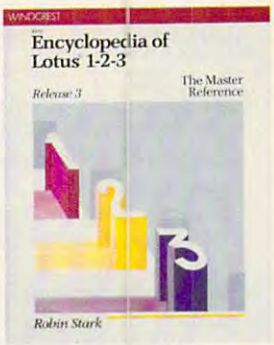

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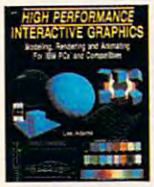

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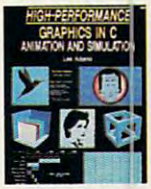

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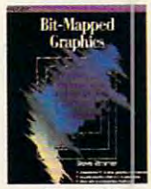

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FEEDBACK

you can adjust the vertical and horizontal spread on the screen so the image is large enough, you can make the border essentially disappear.

Where It's AT

I have decided to buy a computer with an 80286 microprocessor, but the market is flooded with them. Is there any difference between a generic computer and a brand name? Are you just paying extra for the name? Also, I see that there are different types of BIOSs around. What is a BIOS, and which is the best one? Phoenix and AMI seem to be the most popular.

ADAM JULIUS
BELLMORE, NY

You sound as if you have made up your mind, and we hate to throw in another source of confusion, but you ought to consider a 386 or 386SX machine. These computers have come down in price to the point that they rival their 286 cousins, and they are faster and much more capable.

There isn't much difference between one AT compatible and another. If there were significant differences, the word compatible *would lose all its meaning. A compatible that wasn't compatible would never find a place in the market and would soon die of neglect. The price differences you see among computers are based in part upon the value of a brand name, but the value goes beyond a recognizable nameplate. A brand-name manufacturer (like Compaq, Dell, Tandy, or AST) is unlikely to disappear overnight, so you will have a service department to back you up. The woods are full of fly-by-night PC companies offering incredible deals but little assurance of stability or longevity.*

A BIOS (Basic Input/Output System) chip is the ROM at the very heart of a computer. It provides the primitive routines that allow a computer to operate. Both AMI and Phoenix have been around for a long time and offer good quality BIOS chips. You're right to be concerned about the BIOS. Early PC clones offered BIOS chips with a low level of compatibility, resulting in computers that wouldn't run some PC software. This is a problem of the past, however.

Watch out for mail-order PCs that seem to offer an unbelievably low price. These computers may be shipped without RAM, video card, disk drives, keyboard, or ports. You would be left with a motherboard in a steel case and a long shopping list of extras to buy. Another concern is computers that have no expansion slots. They aren't expandable or user-configurable, so you lose out on many of the things that make a PC valuable to a user.

Once you have decided on the equipment that you need (say, a VGA card, a multisync monitor, a 120MB hard drive, a 1.2MB 5¼-inch and a 1.44MB 3½-inch floppy drive), you need to decide what brand you should specify, and in the case of the hard drive, you need to decide on a format. All of this can be incredibly perplexing.

Although it may end up costing more, a beginner is usually best off buying a brand-name computer from a hometown dealer. Dealers will offer advice over the telephone, stand behind repairs and enhancements, and go the extra mile to be sure you are satisfied with your machine.

Readers whose letters appear in "Feedback" will receive a free COMPUTE's PC clock radio while supplies last. Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to COMPUTE's Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that we cannot provide personal replies to technical questions. ⊡

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STATE OF COMPUTING:

Europe

Americans tend to think of Europe as one place, and a lot of Europeans are trying to make that idea a reality. But it isn't. Where Britain and the U.S. are said to be divided by a common language, Europeans are divided by more than a dozen. Imagine if all of Apple's software and manuals were written in French, while all of Compaq's were in German and Tandy's were in Portuguese. Suppose Microsoft wrote everything in Dutch, while Lotus only dealt in Italian. Western Europe is like that, only worse. It isn't going to get easier as Hungarian, Polish, and other languages come into the fold.

And it isn't just language. The Sinclair ZX-81 and Spectrum micros—sold in the U.S. by Timex—were a huge success in France. The reason was simple: Sinclair made the effort to produce a special version with an AZERTY keyboard and the Secam television standard, which are different from the U.K.'s QWERTY and PAL. Some countries, such as Belgium and Switzerland, have more than one language and more than one standard keyboard.

Compatibility on the Menu

If you write a program with pull-down menus, it's a mistake to leave just enough room for the English words: Swap them for German equivalents, and they all spill over the edge. Text isn't the only problem. Just try fitting Italian lire into the columns allowed by a business program written for Deutsche marks.

There's only one computer language that unites Europe. The key words include *zap!, pow!,* and—for those with long memories—*kaboom!* Everyone can recognize a fire button. American TV series and Hollywood movies may be painfully dubbed into a dozen European languages, but there aren't too many words in the average computer game. Anyone can learn the cockpit layout for *F-19 Stealth Fighter,* and *RoboCop* doesn't need translating at all. Only Germany is a problem: Swastikas are verboten, and because violence is considered obscene, sales of war games may be limited to sex shops.

It wasn't supposed to be like this. Most European countries had great hopes for their native computer industries. Most supported national champions—Bull and Thomson in France, Siemens and Nixdorf in Germany, ICL in the U.K., Olivetti in Italy, Norsk Data in Norway, Philips in the Netherlands, and so on. But they found it hard to compete with transnationals like IBM and Digital Equipment. Now they're under new pressure from the Japanese. ▷

JACK SCHOFIELD

JANICE R. FARY

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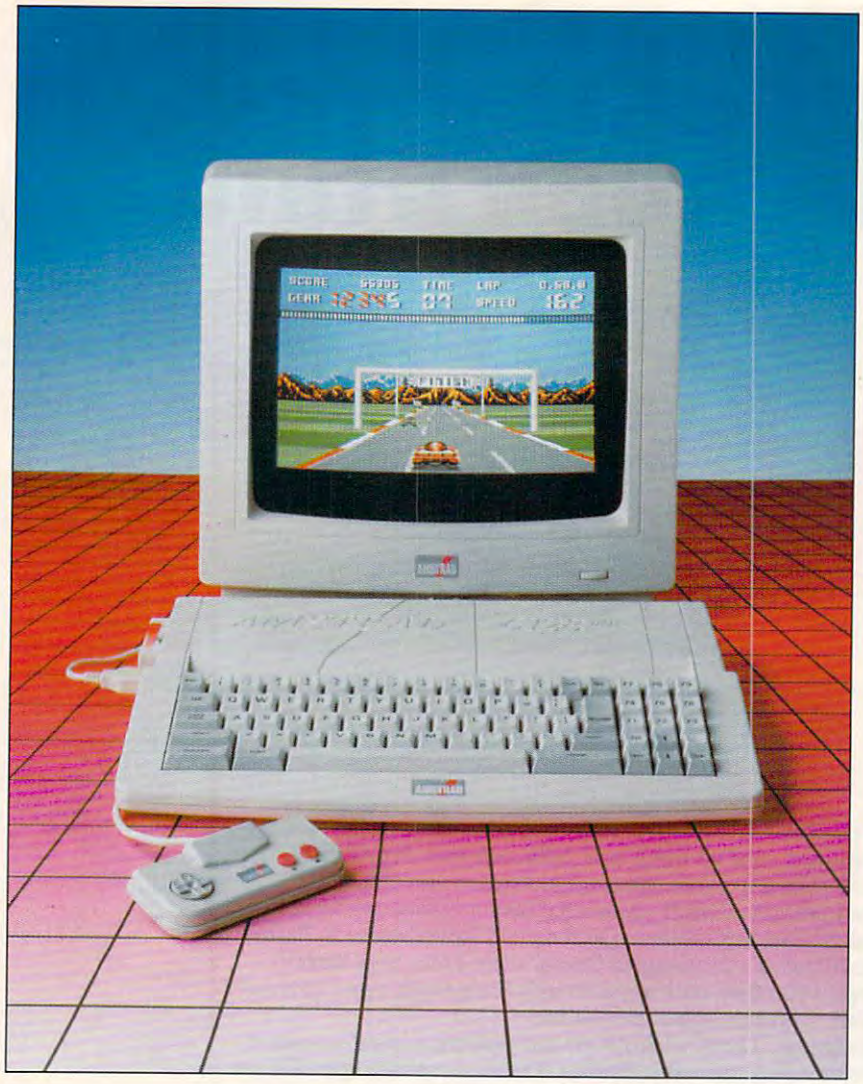


No Hits and Two Outs

The microcomputer offered a second chance, but this time Europe did even worse. Acorn, ACT, Dai, Dragon, Oric, Matra, Thomson, and many more proved unable to compete with IBM, Apple, Commodore, and Atari. Strength in one country was still not enough to sustain an international market. Only Amstrad, from the U.K., managed to build a large European business. Its turnover from sales of the CPC series of machines, PCW word processors, and PC clones is about $1 billion annually. Amstrad is bigger than Commodore or Atari, its main rivals.

Americans are often surprised at the European strength of Commodore and Atari. Both do the majority of their business in Europe. It isn't hard to explain. Europeans generally don't have high disposable incomes. Both Atari and Commodore offered cheap machines, whereas Apple and IBM demanded very high prices. For example, an Apple II with two drives cost over $5,000, and my first IBM PC XT with a printer was over $10,000 in 1983. Commodore was considered local: It had factories in Germany and, briefly, in Corby, a former steel town in England.

Hundreds of small software houses had started writing for cheap micros such as the Sinclair Spectrum. They responded to sales of the Commodore 64, Atari ST, and later the Commodore Amiga by supplying the market with games for these U.S. machines. Software availability drove hardware sales and vice versa. Once such a virtuous circle was established, it was hard for rivals to break in. Not even the 500-pound gorilla named Nintendo has managed to crack the market.

The Battle of the Byte

Today, Western Europe has three dominant 8-bit home computer formats and three 16-bit ones. The 8-bit formats are the Sinclair Spectrum, Amstrad CPC, and Commodore 64. The 16-bit formats are the Atari ST, Commodore Amiga, and the DOS-based PC. There are local variations—for example, the Apple Macintosh is very popular in France, and some places have a smattering of MSX. But on the whole the generalization holds true.

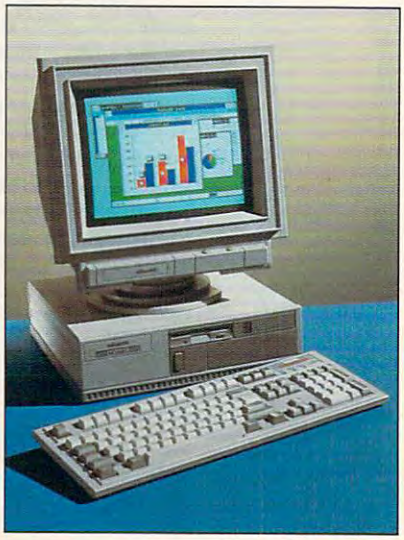
The Sinclair Spectrum is still popular in the U.K. and Spain, but it's in decline. Amstrad (Alan Michael Sugar TRADing) took over the Sinclair computer operation in 1986, improving the Spectrum's design and repackaging the machine in a bigger box. This extended its life, but the boom days are over. However, the Spectrum has become a sort of standard in the Soviet Union, where there are dozens of unofficial Spectrum clones. One of them, the Hobbit, may even be exported.

It was the success of the Amstrad CPC—which, like the Spectrum, is a Z80-based home micro—that forced Sir Clive Sinclair to sell out. The CPC is still doing well in much of Europe, especially in France. Indeed, Amstrad has just launched an upgraded series of CPC Plus models and added a games console. All of the cases have been changed to make them look just like the Atari ST and Amiga. Nevertheless, CPC sales have also been falling as the market moves gradually from 8-bit to 16-bit machines.

The 64 Still in Front

The exception that proves this rule is the Commodore 64. It was a huge hit when it came out, yet Commodore (U.K.) claims it sold more C64s last year than in any previous year. It's also very strong in Germany, Austria, and Italy.

Perhaps this isn't such a surprise. Every year there are new kids on the block lusting after their first home micro. And most of the machines that used to compete with the C64—the Acorn Electron, Alice, Dai, Oric, Lynx, Enterprise, Video Genie, VIC-20, Commodore 16, Plus/4, and a dozen or so Japanese MSX machines—have faded away. ▷



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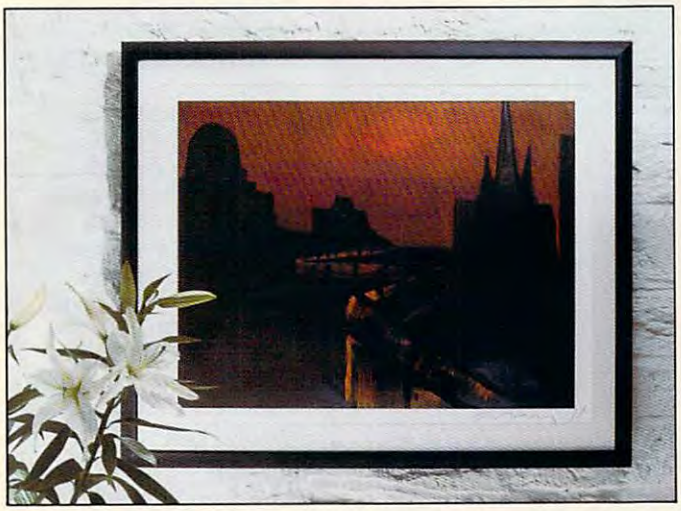

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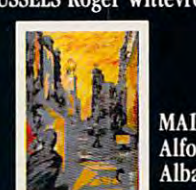

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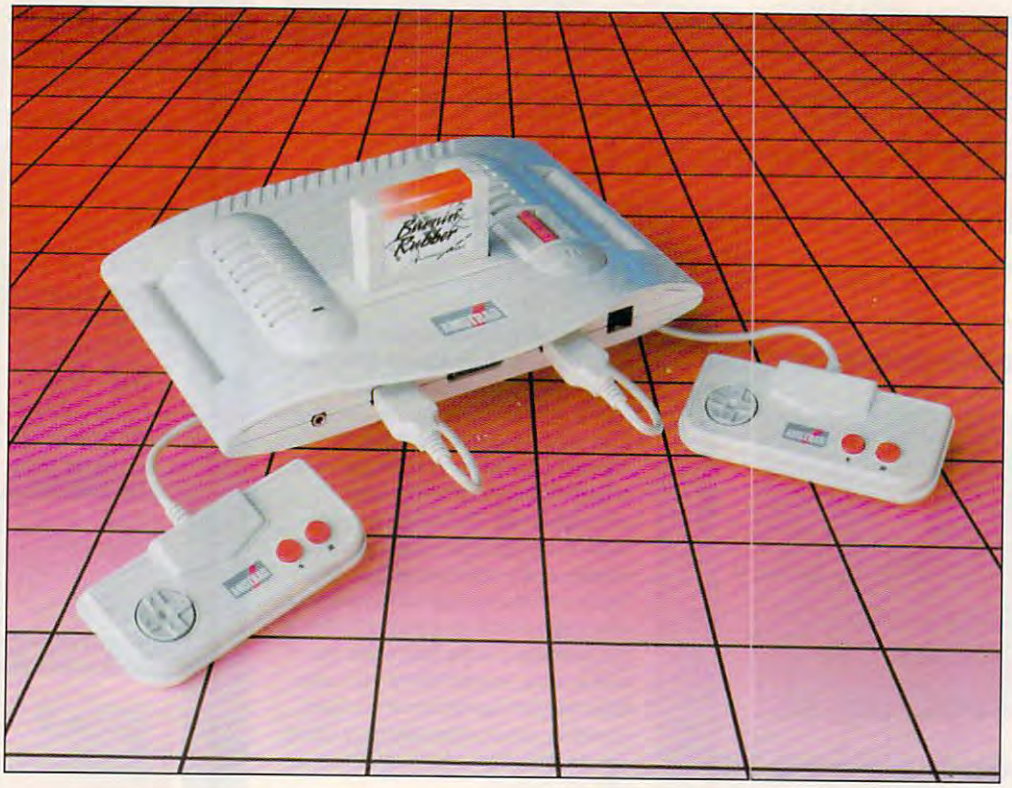

Though much more sophisticated than their 8-bit competition, 16-bit micros had a tough time becoming established in Europe. Initially they were too expensive. In fact, the Atari ST, Commodore Amiga, and Apple Macintosh were all introduced as serious business machines. Several firms provided multiuser operating systems—BOS, Mirage, OS/9—which let you attach a couple of dumb terminals to an Atari ST and use it like a minicomputer.

In Germany, the Atari ST did manage to grab away from the Apple Macintosh a slice of the business and home/education markets. This is why most top ST software—*Calamus, Signum II, GFA Basic, Pro-24,* and so forth—is German in origin. But sales of STs and Amigas didn't take off in the rest of Europe until the prices were slashed and the machines retargeted at the home/games market.

Amiga Makes New Friends

Today, the Atari ST and Commodore Amiga dominate the three biggest leisure markets: Germany, France, and the U.K. In Germany, the Amiga seems to be ahead as a games machine, while in France the ST has long had the edge. In the U.K., the ST became dominant, but last year the Amiga 500 caught up and has now overtaken it. Overall, European sales are still comparable with those of the old 8-bit machines, but the value of those sales is much higher.

In particular, the ST and Amiga have received strong support from software houses because game prices are much higher. The bulk of the Spectrum market is for low-cost games that cost $6 on tape cassette. ST and Amiga games usually sell for about $40–$50 each. PC game prices are even higher, but sales are much lower. Naturally, most effort goes into high-priced 16-bit games, and 8-bit owners have to settle for conversions that appear later (or never).

However, the ST and Amiga hegemony is now under attack from both ends of the spectrum. Japanese games consoles are competing for the games market, while the PC compatible is at last being accepted for home use. Instead of buying one machine for home office and pleasure, the consumer is being tempted to buy two: a PC and a games console.

Little Consolation

In general, Europe has not been a very good market for consoles. People have bought computers partly for educational reasons, and that has meant something with a keyboard and built-in BASIC. But as parents have learned, home micros are used mostly for playing games. As this has become more acceptable, consoles have become acceptable, too.

Another factor is that Nintendo was so involved with supplying the U.S. market that it didn't have much time to bother with Europe. This allowed Sega to become established with the Master and, more recently, Megadrive consoles. Now Nintendo is targeting Europe, and the computer manufacturers are fighting back. Atari, Amstrad, and Commodore have all produced console versions of their 8-bit micros (though the C64 Game System does not seem to be sold outside the U.K.). With the arrival of hand-held games machines such as the Lynx and Nintendo Game Boy, Europe may be about to go console crazy.

European software houses are not bucking the trend. In the early days, even the best programmers wrote only for the most popular local machines. Many a flower was born to blush unseen except on the obscure Acorn BBC B.

Toward the end of the 1980s, when cross-European software marketing deals became popular, programmers started to write for the most popular European micros. Nowadays they are aware of the worldwide market, including the PC. And what they want most of all is a big hit on the Nintendo format, because sales in the U.S. and Japan have been demonstrated to generate huge profits.

The PC Moves Home in Europe

In the past, PCs were seen purely as business machines, unsuitable for home or educational use. Now they have a wide distribution through department stores and chains, which makes them acceptable to consumers.

The arrival of EGA and especially VGA graphics has brought screen displays that stand comparison with those of STs and Amigas in the shops. Also, there is a ready supply of PC games, though the vast majority are high-priced U.S. imports.

The movement was started by Amstrad with the launch of its 512K 8086-based PC-1512 in 1986. At a U.K. price of £399 plus tax, it was dramatically less expensive than any other brand-name PC on the market. Corporate buyers sniffed at its CGA graphics, lack of flexibility, and unsophisticated appearance—they preferred the new Compaq Deskpro 386—but home users snapped it up by the hundreds of thousands.

The PC-1512, built for Amstrad in South Korea, was a success all across Europe. In Germany, however, it was sold by its distributor, Schneider, under its own name. This turned out to have unfortunate conse-

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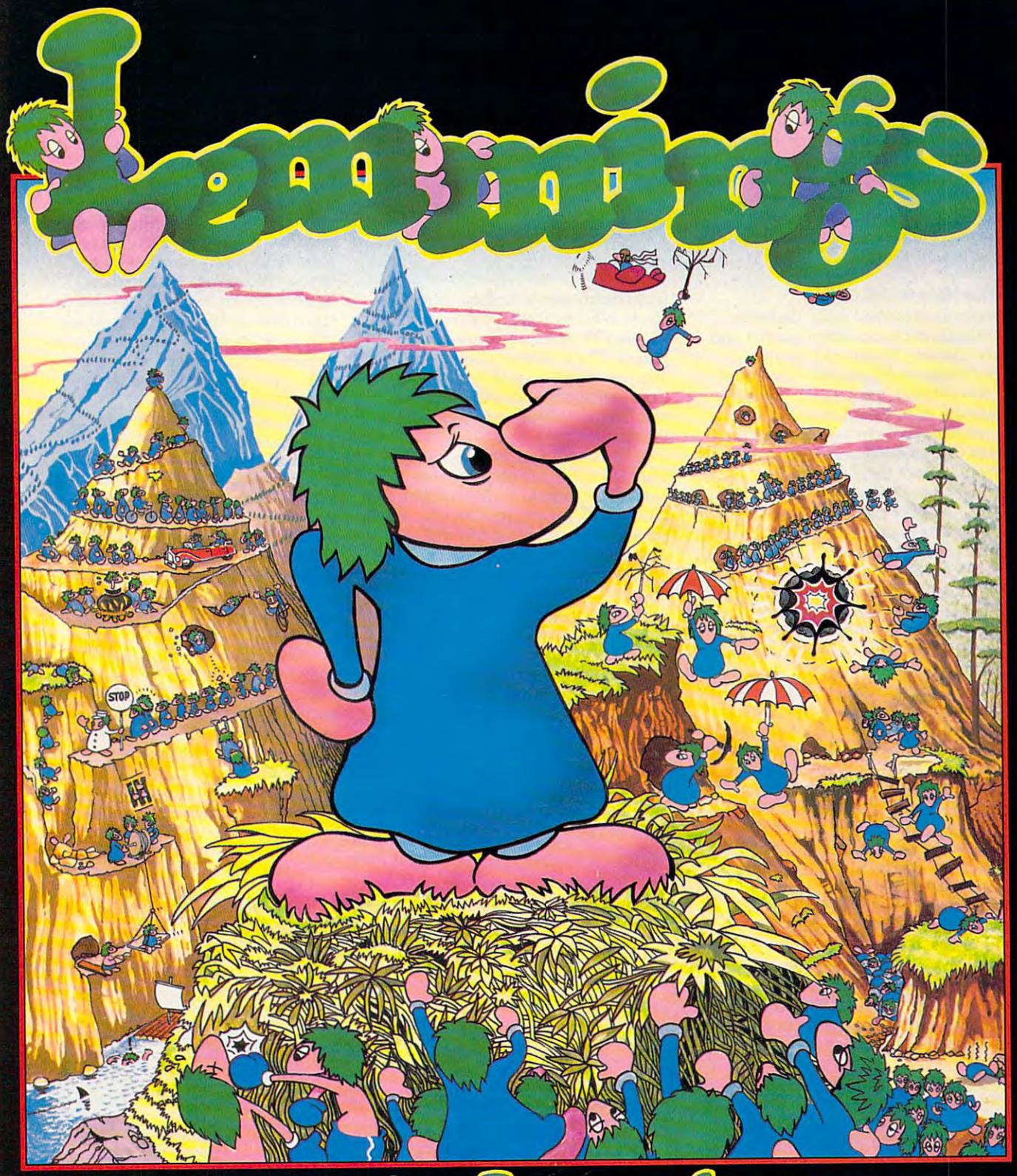

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quences. Amstrad started to buy up its European distributors, but its relationship with Schneider went sour. Schneider reacted by designing and building its own line of machines. It succeeded in capitalizing on its brand awareness in Germany and then expanding into other countries. Amstrad has remained the leading European brand for home (not business) PC buyers, but retaining its position has been a struggle.

The Hole in the Dike

Once Amstrad had made the breakthrough, of course, others poured into the market. Olivetti and Philips—both huge multinationals—produced lines of smart, low-cost PCs for sale through chain stores. Both Commodore and Atari produced comprehensive lines of desktop PCs (or brought them in from Far East firms such as Mitac) for sale through the same outlets. And of course, the Japanese and Taiwanese manufacturers competed under their own names, too.

Even IBM made an attempt at the home-user PC market, offering huge discounts to chain stores willing to take huge volumes of its PS/2 Model 30. But this was not a success, and IBM has since returned to its traditional business market. In the U.K., for example, the PS/1 is being sold without its modem under the slogan *Five minutes and you're in business.* If that's not bizarre enough, it's even being pushed at sophisticated corporate buyers, such as merchant banks.

The growth of the PC industry is a threat to Commodore and Atari, too. Most of the PC-clone vendors have only a tiny slice of the market. However, there are so many of them, surveys show the most popular brand in Europe is now Other. Only one company pushes the ST, and only one pushes the Amiga, but hundreds compete in the PC market. This is driving performance up and prices down. The pressure must tell.

Portents of Change

Another threat to the ST and Amiga hegemony is the appearance of the notebook-sized portable PC. There are many people who would like a computer at home but who don't want a desktop PC dominating their living room or study—and they don't want an ST or Amiga interfering with family TV viewing. Notebook PCs are a tempting solution. These now have good-quality built-in LCD (Liquid Crystal Display) screens. And when you've finished using one, you can just fold it up and put it in a drawer.

Consumers are happy to buy notebook PCs from firms such as Toshiba, Sharp, NEC, and Philips. They may already own a Toshiba color TV set, an NEC or Sharp VCR, and a Philips CD player; these are leading brands. The consumer electronics giants now want to use their marketing clout and access to distribution channels to dominate this new sector of the PC market.

WESTERN EUROPEAN PC MARKET ESTIMATES

1989	1990	1991
21,831	26,891	31,678

END USER REVENUES IN MILLIONS OF DOLLARS

At the moment, Europe is the place to be if you're not European. Most of the large U.S. firms—IBM, DEC, Hewlett-Packard, Compaq, Apple—have had European factories for a long time. Now the Japanese are getting ready for the arrival of the Single European Market at the start of 1993 by opening plants in European Community countries. Many of them already manufacture printers, TV sets, or VCRs here; PCs will follow. Last year, for example, Toshiba started building notebook PCs in Germany.

One European country might have been too small a market to bother with. But the pan-European market represents a third of the world's computer sales and can't be ignored.

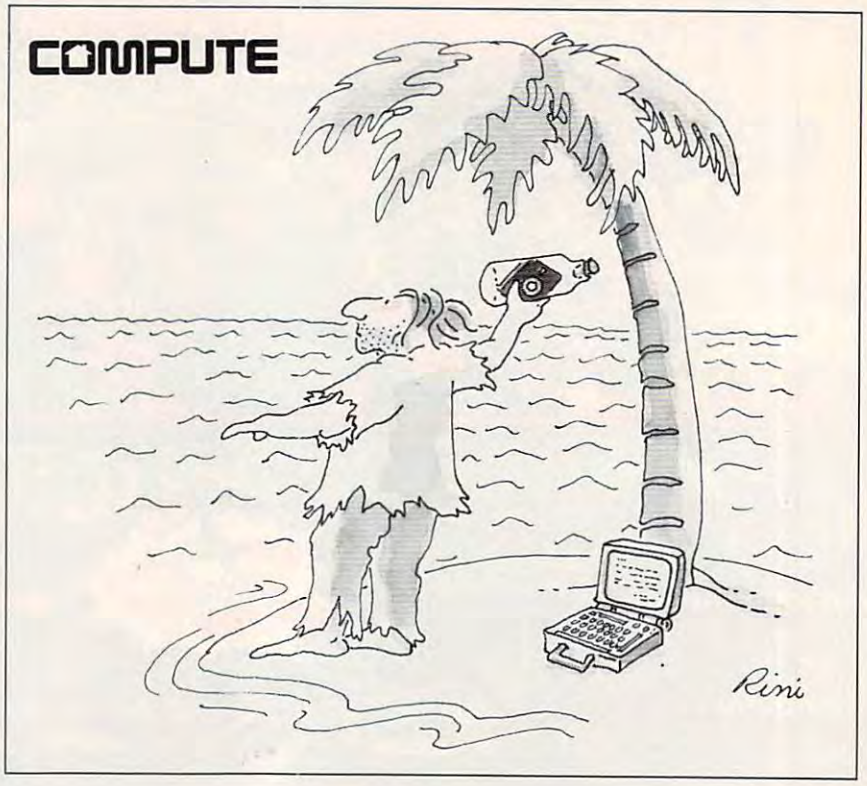
Japanese Invade Europe

Sadly, Europe is not such a good place to be if you *are* European. Many of the local suppliers are under strain. Last year Philips (the Netherlands), Olivetti (Italy), and Groupe Bull (France) all announced they were laying off thousands of staff. Nixdorf (Germany) hit the skids and was taken over by Siemens, which formed Siemens-Nixdorf Informationsystems. Both Apricot and ICL—the largest U.K.-owned PC and mainframe suppliers, respectively—were taken over by Japanese firms. Many of Europe's survivors depend on Japanese technology, being resellers of Fujitsu, NEC, or Hitachi mainframes and supercomputers.

All this activity ought to make the European market more homogeneous and standardized. No doubt it will. But alas, there is no chance of all Europeans using the same keyboards, the same character sets, the same TV standard, or the same currency—let alone the same language. The 12-member European Community is a permanent struggle, and a United States of Europe is far from being practical.

But it is a noble ideal. And if it helps limit rapid-fire infantry attacks, tank maneuvers, bombing raids, and nuclear explosions to the computer screen—and keep them out of real life—few of us will ask for more. ⊡

Jack Schofield is the computer editor of the *Guardian,* a London-based newspaper.



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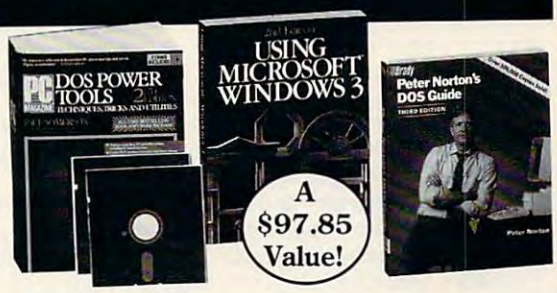

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SHAREPAK

RICHARD C. LEINECKER

Squeeze more power out of your PC. The *Windows* graphical environment takes full advantage of extra memory and modern microprocessors—and that translates into greater computing power. This month's *SharePak* brings you two programs that run under *Windows* and two programs that run under MS-DOS but have a lot of *Windows*-like features.

Our *SharePak* is a terrific value. We download and screen hundreds of programs each month. That saves you time you'd have to spend looking through programs to find what you want, as well as the cost of connect time that you'd be charged.

There's also a money-back guarantee: If you buy one of our *SharePak* disks and aren't satisfied, just return it for a refund. You can also call us for technical support if you have trouble using the programs on the disk.

Click! Filer Version 1.1

Developed for *Microsoft Windows* 3.0, *Click! Filer* gives you the combined features of *Program Manager* and *File Manager.* You also get hooks to most of the popular archive utilities so you can easily compress and decompress files.

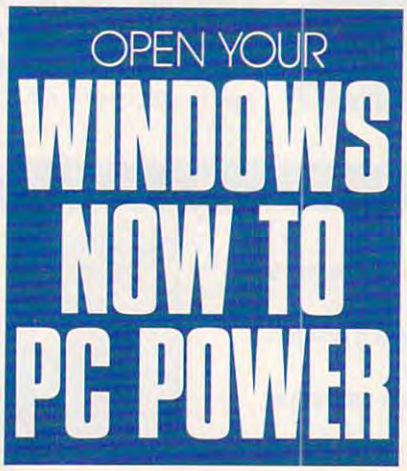
When the program runs, you see a source file list and a destination file list. Buttons below the lists offer all of the disk options you'll need. You can copy, move, rename, delete, edit, and run files. Making and deleting directories is as easy as pushing a button, too. Using the lists makes disk navigation easy—just click the mouse, and you're in another directory or drive. And to make things even easier, you can change the file mask so only the files you want to see will show.

You can tag multiple files for easy multiple copying or deleting. This feature can really come in handy when you're cleaning up your hard drive. Especially handy is the ability to copy entire subdirectories and the embedded subdirectories.

Using this program with *Windows* will simplify those clumsy and awkward disk operations and make *Windows* a friendlier environment.

PBIcon Version 1.1

Making your own icons for *Windows* applications can be fun. *PBIcon* lets you capture virtually anything on the screen to use as an icon. You can capture graphics that are part of the *Windows* environment, part of other programs, or portions of pictures that you create with *PaintBrush.*



Using the program is easy. Just run the program, capture an image, paste it into the *PBIcon* work area, and then save your new icon to disk. And you can cut a larger image than what's required for an icon and use the scroll bars to position the exact area you're going to use.

Customizing *Windows* lets you feel more at home in what can be an intimidating environment. And that translates into better productivity. Besides having fun, you might gain benefits you hadn't expected.

PCBUDGET

If you're like most people, you'd like to be better about budgeting your money. *PCBUDGET,* written for MS-DOS, does just that with its pull-down menus, windows with slider bars, and online help. Thus, besides being very useful and functional, the program is attractive and easy to use with its great *Windows*-like interface.

Your finances are probably complicated like those of most other Americans these days. But *PCBUDGET* handles those complications, factoring in income, expenses, liabilities, assets, credit cards, and multiple bank accounts. And it keeps track of tax-related items so that doing your tax return is easier and you won't miss anything.

There are tons of features. You can create a mailing list, start a list of payment reminders, do loan amortizations, search your budget file for items, print checks, and view data in graph format.

If you're serious about your budget, this program will help. It's a great tool for the fiscally minded person who wants to get ahead.

Résumé Professional Version 1.6

If you've ever looked for a job, you know how hard it is to write a good résumé. This program, written for MS-DOS, gives you everything you need to create the best résumé possible, even if you've never written one before.

Dialog boxes tell you what information to enter and how to place things in the final version. All the important areas are covered: educational background, work experience, objectives, references, and personal information. Then you can save your résumé to disk to work on it or update it later.

Pull-down menus, dialog boxes, alerts, a file selector, and edit windows make you think you're in a new environment that's similar to *Microsoft Windows.* You can open two windows. One lets you do a final edit, and the other lets you create a cover letter. You can cut and paste text between the windows and print your creations to disk.

If you think you'll ever write a résumé, this program is for you. With it, you might well have an edge over your competition when you apply for that next important position. ⊡

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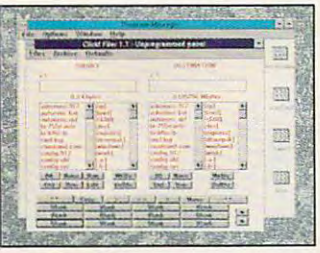
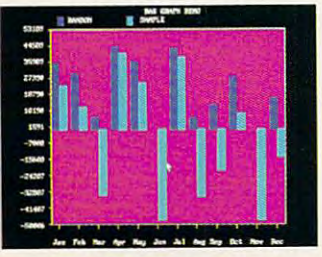


***Click! Filer* Version 1.1**

***PBIcon* Version 1.1**



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COMPUTING IN THE OTHER EUROPE

KRISTEN STERNBERG

Even as the bitter wind cut through our winter coats and boots, we were glowing with excitement at the prospect of spending three weeks in the Soviet Union. The cramped seating and bumpy flight made all 22 of us—17 high school students and five teachers—happy to disembark from the Aeroflot plane that had brought us to Moscow from Finland.

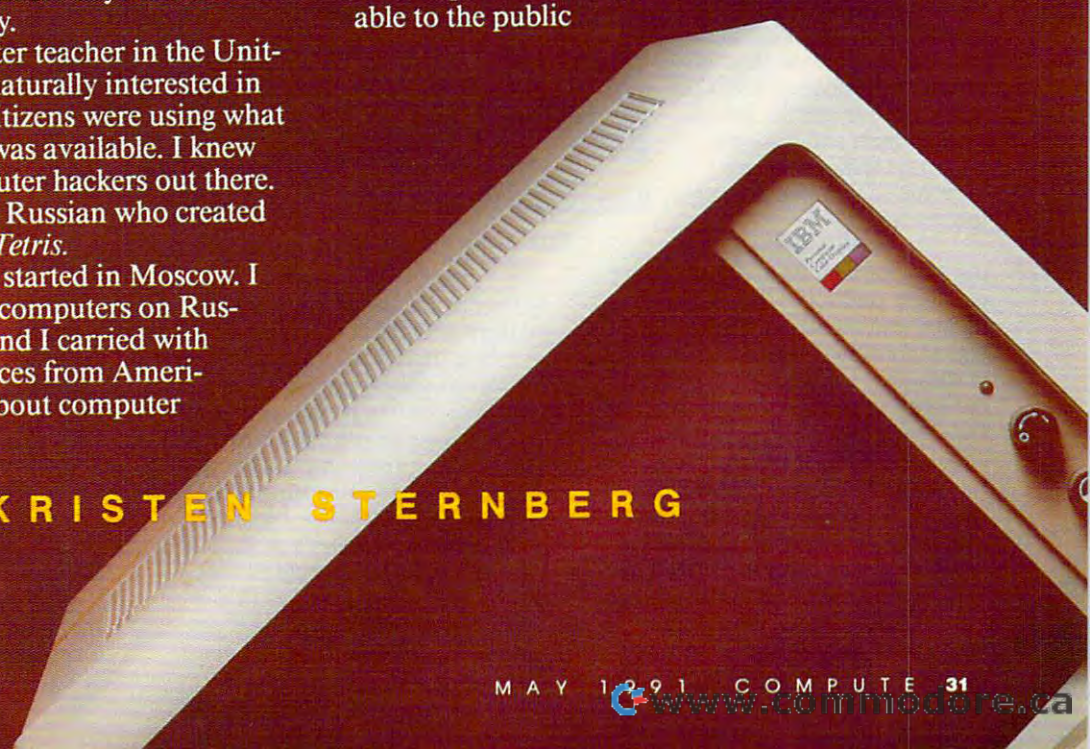
The state of technology in the Soviet Union forces the people to rely on their own resources. Because even electronic calculators are unheard of, shopkeepers ring up purchases with an abacus instead of a cash register. Business people can fax information, but there are only 16 international telephone lines out of the Soviet Union, so a message can wait for days to be sent out of the country.

As a computer teacher in the United States, I was naturally interested in how the Soviet citizens were using what new technology was available. I knew there were computer hackers out there. After all, it was a Russian who created the challenge of *Tetris*.

My mission started in Moscow. I had seen ads for computers on Russian television, and I carried with me some references from American magazines about computer conventions in Russia. I quizzed everyone I met who could speak English, but no one could give me any information about computer conventions. No one could direct me to a computer store, a software store, or even a magazine store. There just weren't any. No one I talked to had ever even used a computer. I drew a complete blank in Moscow.

My sleuthing days appeared to be numbered. The people I spoke to were interested in computers, they believed computers could be useful, and their kids were up to date on all the titles of the latest games. Yet they could not buy computers for their homes or their schools.

I was later told that there were no computer stores available to the public



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in Russia. Only used computers were to be found, and these were all sold or traded privately, not in stores. There was also a very long waiting list for them. New computers had to be brought in, one at a time, from outside the country, which meant they had to pass through the numerous and thorough customs officials.

Moving useful technology through customs is almost impossible. In the rare event that a computer becomes available for sale, the price is outrageous. It can cost a Russian family four times as much as a car, or up to about 40,000 rubles. This sum may not seem large when you translate it into dollars (40,000 rubles is a little less than $700), but a Soviet citizen might earn less than 100 rubles (about $18) per month.

At that rate you'd have to save every single penny for well over three years for a computer. And the computer might be a used computer, not even new or up to date.

The second leg of my trip was Estonia. I immediately noticed differences when I crossed from Russia into Estonia. Most obvious was the presence of stores—food stores, clothing stores, handicrafts stores, and pharmacies. It was apparent that the Estonians enjoyed more comforts and choices than the Russians.

Our group was participating in an academic exchange with a high school in Tallinn, the capital city. As a part of the exchange, the previous autumn we had arranged for the school to have an Apple IIe computer and printer. We also provided it with some indispensable tool software: word processing, database, greeting card/sign making, and various logic and skill-building programs. I was eager to see how the computer was being used and what kinds of problems the Estonian teachers and students had come across. I wasn't even sure if they had been able to set it up.

My fears about their having the computer up and running were put to rest the minute I walked into the school. Some of the high school students who specialized in computer studies were waiting in the lobby to take me to their Apple and show me everything they had done with it. Many of them were very experienced in BASIC and machine language programming by this time, and they had also taught themselves to use all of the software. Some of the students had even reprogrammed the word processor so that the menus were shown in Estonian. They treasured the computer and kept a careful watch over it, locking it behind several doors each time they were finished using it. The computer was heavily used—and not only during school hours.

The American students reported that their Estonian friends spent many Friday nights and Saturdays using the computer in the school. They were astounded that the Estonians would voluntarily spend Saturday at school. But to the Estonians it was a privilege to be there with the computer.

Russian Orthodox Church, Tallinn, Estonia

Time-sharing at School No. 21, Tallinn, Estonia

In another part of the school, during regular class times, many students were busy writing programs to simulate a password-protection scheme. The BASIC programming language they used was an interesting mixture of English and Estonian. I tried to help debug one student's program, but the only command I could recognize was STOP. I was amazed to find a third-generation computer still in use: This Bulgarian minicomputer dated from the 1960s, and its technology was passé long before that in America. It supported a total of five terminals, was hard-wired to run only BASIC, and—believe it or not—allowed only 64K of RAM.

In addition to their computer classes at school, many students traveled after school every day to a nearby university to work on an IBM system. There they would wait in long lines for a turn to work at one of the terminals.

However serious they were, the students managed to find time to play computer games. What did they spend their free time playing? Do you remember *Sea Fox, Star Blazer, Super Puckman, Sneakers,* or *Spy's Demise?* Although we may think of these games as old-fashioned, they were new to the Estonians.

I discovered a second Apple computer in Estonia. I also found an old IBM PC. This machine was in a doctor's office and was used for research. The doctor had taught herself to use the computer without any help other than a manual (which was printed in English). Her greatest need was for blank disks on which to store her information.

The majority of computer enthusiasts in the school were boys, but some girls were also interested, and everybody shares the computer equally. So far, the students monopolize the computer, but the interest on the part of teachers is growing.

Times are definitely changing in the Soviet Union. Some major universities are becoming computerized, and students are allowed more access to the computers for their research. Online information services are beginning to spring up in major cities. A new line of microcomputers is scheduled for release throughout the U.S.S.R. When and if these micros are made available to homes, businesses, and schools, we'll begin to see a lot more activity in the computer world.

After three weeks of travel in Russia and Estonia, my strongest impressions were of the changing political situation throughout the Soviet Union, the food shortages, the lack of choices available to the population, and the incredible warmth and caring of the people. Russia is caught between an old world and a new one. Traditions remain while technology languishes. Even where the equipment is available—as in the case of the doctor trying to do research—the accessories can't be found. ⊡

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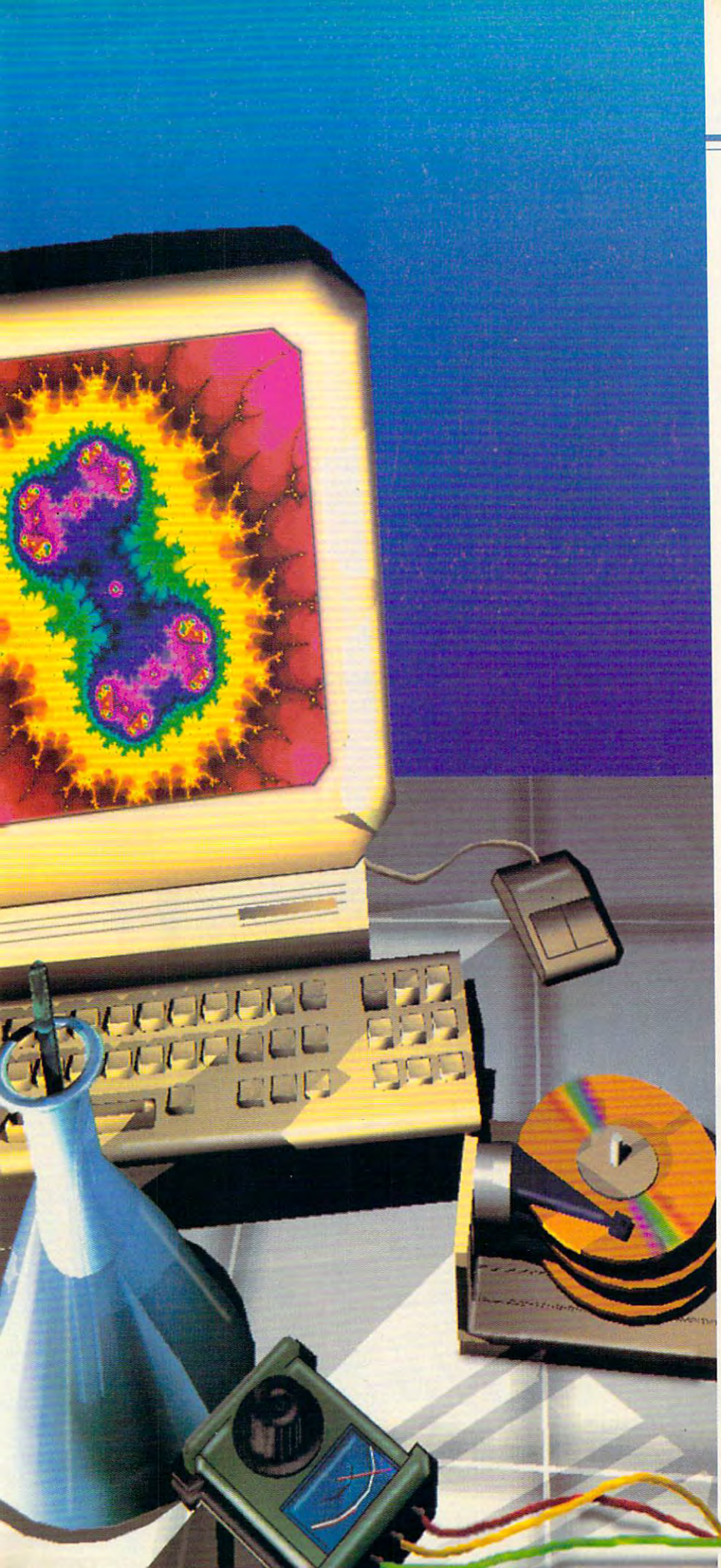

DIDIER CREMIEUX

TEST LAB

WELCOME

Each month *COMPUTE*'s Test Lab will focus on a specific kind of hardware and offer you the information you need to guide your understanding of the technology and to make informed buying decisions. Our comprehensive system benchmarks are accompanied by in-depth explanations of the tests and the technology. Attractive graphics clarify differences in features and performance. You also get the expert product reviews that PC activists have come to expect from *COMPUTE*. This month, Test Lab examines three desktop computers and four laptops—seven capable computers representing a range of technologies and prices and suitable for a wide range of computer users.

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LASER PAL 286

I shamefully admit that my first impression of this small-footprint system was less than favorable. I never thought a machine this small could ever compete with the 386SX I use every day at work.

Surprised that I had the system up and running in less than ten minutes, I decided to keep an open mind. (I recommend that amateurs follow the instructions in the Quick Start Guide or watch the installation videotape provided before they hook up any cables.)

As I found out and as the name implies, the Pal is user-friendly. The 40MB hard drive formatted with DOS 4.01 comes installed with *GeoWorks Ensemble* and *Prodigy*. A few nonessential but appreciated extras include a 2400-baud Hayes-compatible modem, a high-resolution VGA monitor with a tilt-swivel stand, and a 15-pin game port.

Additional hardware includes dual disk drives, 1MB of memory, a parallel port, a Microsoft-compatible mouse, and an enhanced keyboard with 102 keys—firm but not stiff.

LASER COMPUTER
800 N. Church St.
Lake Zurich, IL 60047
(708) 540-8086

CPU Type: 80286; CPU Speed: 12 MHz

Conventional Memory: 640K; Extended Memory: 384K

Ports: 2 serial, 1 parallel, 1 mouse, 1 game

Drives: 5¼-inch 1.2MB floppy, 3½-inch 1.44MB floppy, 42MB hard

Video Modes: text, CGA, EGA, VGA

List Price: $1,995.00

Street Price: $1,416.58*

*Test Lab street prices are an average of prices advertised in computer magazines and national newspapers during February 1991.

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That adds up to a lot of punch for a computer that measures no more than 14 inches square and 5 inches high.

You can easily expand the Pal's memory to four megabytes if the one megabyte of installed RAM isn't enough. The hardware reference guide discusses the type of RAM you should purchase, and it gives complete instructions on where and how to install the RAM modules.

There's no math coprocessor, but one can easily be installed in the available socket. Installation instructions are in the hardware reference. The four AA alkaline batteries are easily accessible when it's time to replace them. Of the four horizontally placed card slots, two are open for simple installation of any additional cards.

The system runs at either 8 or 12 MHz, and you can set the speed easily with the turbo button. The current speed appears in an LCD display located on the front of the system above the turbo key. The reset button and the keyboard lock key are also easily accessible on the front of the system.

Hardware isn't the only surprise included with the Pal. A free month's service is offered for *Prodigy,* a well-known online service. The *Prodigy* software, a hardware reference book, an MS-DOS manual, and a *GeoWorks Ensemble* manual are also included.

If the Pal has an Achilles heel, it's the cooling system. The cooling vents are located on the top rear of the CPU box. If you place the monitor on top of the unit and cover the cooling vents, you risk overheating the system. Since the monitor's base is almost as large as the computer, it would be easy for this to go unnoticed.

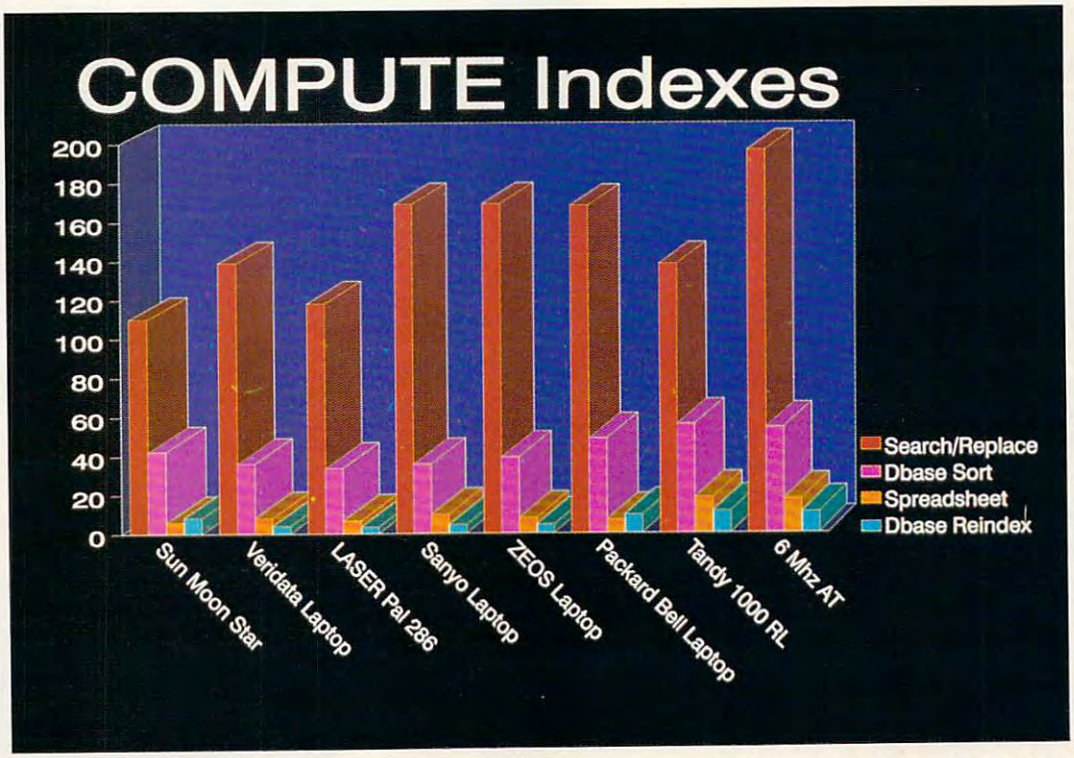
It's true that a single computer can't be all things to all people, but if if you're looking for a reliable and full-featured system, the LASER Pal 286 can fill the bill. As a matter of fact, I keep hinting to my superiors that I'd like to keep the Pal for all the hard work I do around here, but I don't think they're getting the message.

JOYCE SIDES

COMPUTE Application Indexes

Since the Test Lab section is designed to give you the best information about how systems will perform when you take them home or to your office, we performed a set of tests involving commonly used applications.

The timings indicate how long it took a particular computer to reindex a database, sort a database, perform a search and replace in a word processor, and recalculate a spreadsheet.



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PACKARD BELL PB286NB NOTEBOOK

Compact design, crisp display, and performance options make Packard Bell's PB286NB a solid contender in the notebook arena, although the list price isn't as competitive as the marketplace demands.

The PB286NB is a capable road warrior, as I found out while taking it on several cross-country jaunts. The unit's size and weight made it practically unnoticeable during transport. I found it quite easy to set up and use during plane rides, without breaking the tray tables or crowding the passengers around me.

The PB286NB stretches its ni-cad battery life with a series of power-down options that you can define during setup. Automatic power-saving functions help to extend the reach of the system whenever you're running it from the battery and include a slower rate of DRAM refresh, shutdown of the floppy drive if it isn't in use, and a slowdown of the CPU (from the standard selectable 12- or 6-MHz clock speed to 0.125 MHz) when processing activity is absent.

You can disable or add to these power-saving functions during setup. At this point, you can set the screen backlight and LCD screen power to shut off when not in use, disable ports, and set the hard disk to shut down after a predetermined period of inactivity. I found that setting the power-saving functions to their maximum efficiencies did not adversely affect my work with the system.

If the PB286NB can be singled out for praise, it must be for its sharp LCD display. The VGA-compatible resolution of 640 × 480 maps 16-color ap-

PACKARD BELL
9425 Canoga Ave.
Chatsworth, CA 91311
(818) 773-4400

CPU Type: 80286; CPU Speed: 12 MHz
Conventional Memory: 640K; Extended Memory: 384K
Ports: 1 serial, 1 parallel, 1 VGA, 1 keyboard/keypad, 1 floppy drive, 1 mouse
Drives: 3½-inch 1.44MB floppy, 21MB hard
Video Modes: text, CGA, EGA, VGA
Screen Type: LCD with CCFT backlight
List Price: $3,995.00
Street Price: $2,008.79

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THE ONLY EXECUTIVE TOOLS MORE COLORFUL THAN THE GSX-140.

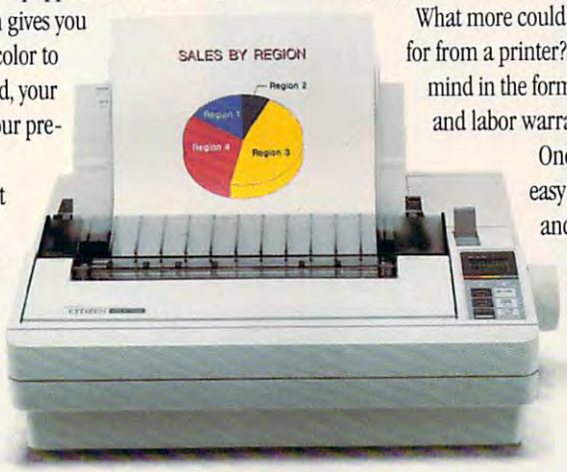
PC MAGAZINE EDITORS' CHOICE November 13, 1990 GSX-140

The GSX-140 is the ultimate executive business tool for office and home. PC Magazine has awarded it their Editor's Choice for best 24-wire printer.

Like its wide carriage cousin the new GSX-145, the print quality rivals that of any printer in its class and its six resident fonts give you more flexibility to design your output.

And, like all our new printers, it's equipped with our exclusive Color On Command™ feature which gives you the capability of installing dynamic color to make your spread sheets easier to read, your graphics easier to understand, and your presentations simply brilliant.

Speaking of ease of use, it doesn't take a MIS manager to operate the GSX-140 printer. That's because the Command-Vue™ control panel prompts you with plain English directions on its LCD panel. The "Quick" menu gives you instant access to the printer settings most often changed. It remembers your four favorite software programs and sets them up just the way you like them, every time you use them.



Blending 192 cps, logic seeking, bidirectional printing and high speed paper feed, the GSX-140's high throughput design quietly cranks out page after page far faster than any of the competition.

What more could a busy executive ask for from a printer? How about peace of mind in the form of a 24-month parts and labor warranty.

Once you've tried the new GSX-140, it'll be easy to see how it makes your reports brighter and life easier. For the dealer near you, just call 1-800-441-2345, ext. 34 in Calif., 1-800-556-1234 ext. 34 outside Calif.

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CITIZEN™

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plications to 16 shades of gray. A 256-color video mode will map to 32 shades of gray, giving you a clear view of even your most advanced graphics applications.

Expandability must also play a role in a well-designed mobile system. Packard Bell has built into the PB286NB the capabilities for attaching external options like a mouse, a keypad, an external keyboard, an external monitor, and an external floppy drive. The traditional parallel and serial ports and the usual external bus connector (for connecting an external chassis that can hold two AT-class interface cards) round out the expansion options.

All of the ports are concealed behind hinged television-style doors that pop open at the press of a finger. Although I like the look and operation of this design, I have reservations about its stability. Small hinges and quick-release doors don't hold up on the road too well. Sliding covers made of high-quality plastics and possessing fewer parts tend to hold up much better.

The field of notebook computers is full of competitively priced machines that will let you take your office on the road without sacrificing your ability to perform. The PB286NB notebook is no exception. It brings all the performance most mobile workers will need to a compact system. Its comparatively high list price ($3,995) will discourage the casual traveler. If you're interested in this system, however, you should know that the actual selling price is closer to $1,800. That price is much more in line with current market trends and may attract mobile computer users who need a topnotch display for their applications.

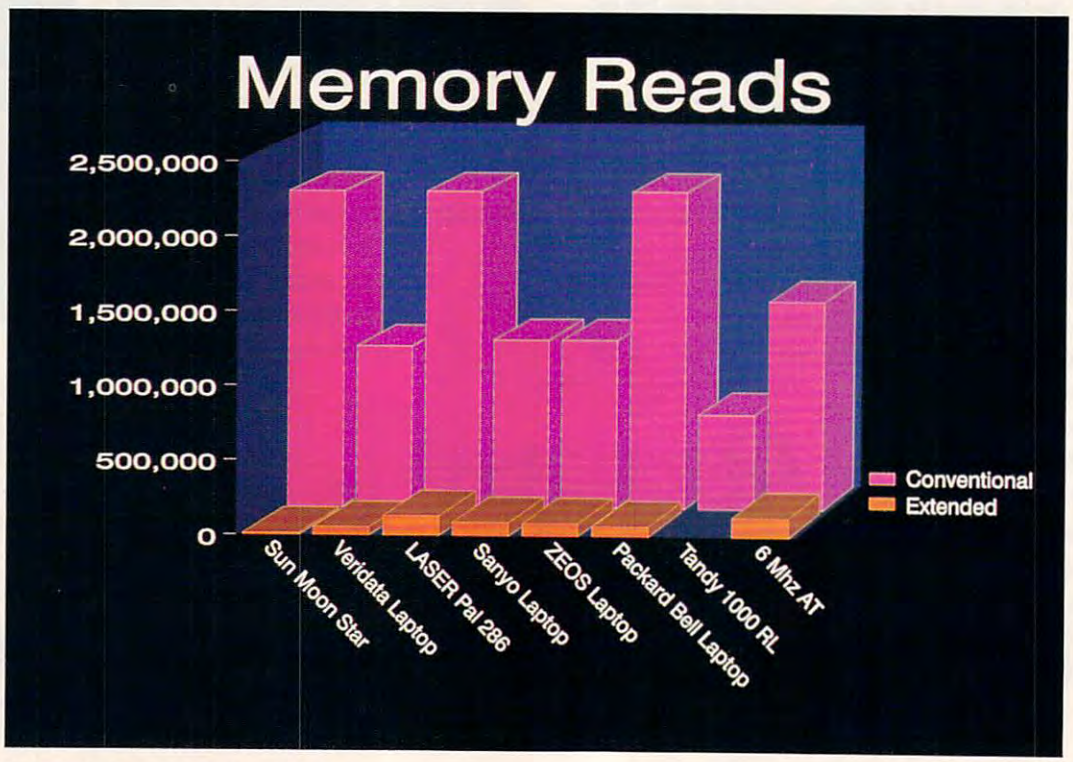
PETER SCISCO

If the PC286NB can be singled out for praise, it must be for its sharp LCD display.

Memory Tests

The memory tests performed by COMPUTE's *BenchMark* program count the number of memory reads the microprocessor can make in a second. The resulting indication of memory speed, along with computer speed and processor type, determines how well a system performs in real life.

These tests may not yield results directly proportional to the speed of a computer or the processor type. Other factors such as memory speed, bus size, and DRAM refresh affect overall performance.



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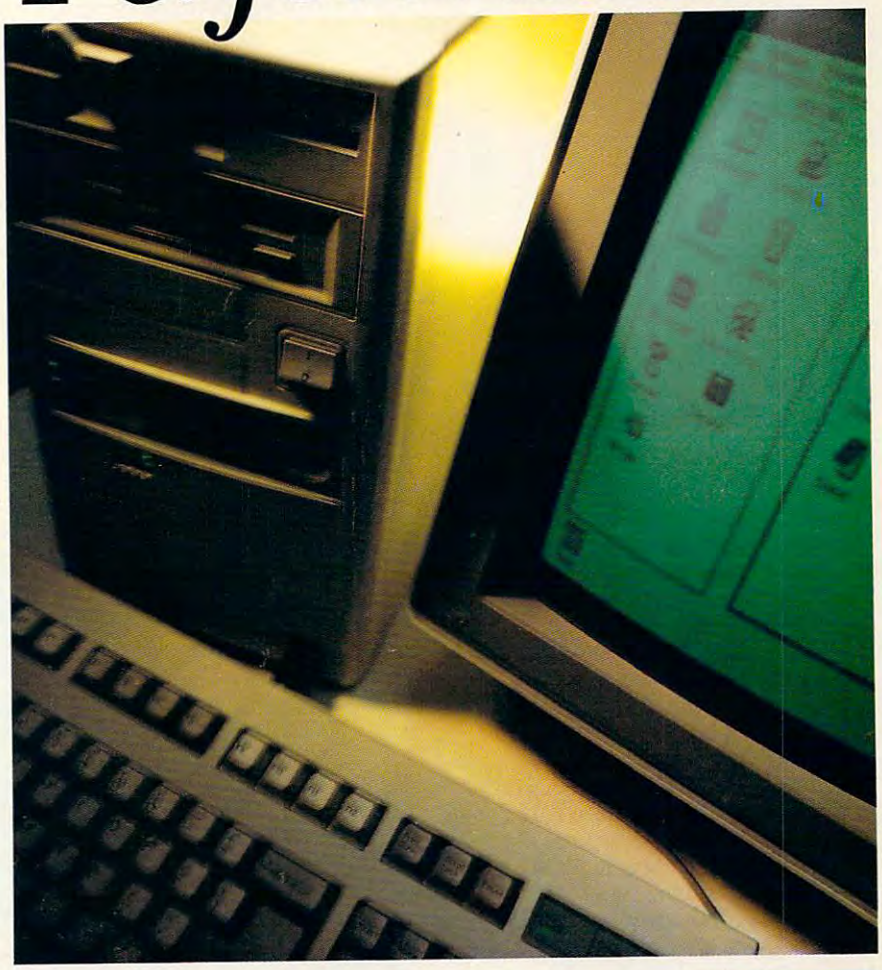

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SANYO MBC-17NB PERSONAL COMPUTER

It's tiny, it's fast, and it comes with *Windows* and *Works* installed on its 20MB hard drive. The backlit screen is bright and clear. What's not to like about the 80286-based Sanyo MBC-17NB notebook computer? (An 80386-based 18NB is slated and will probably be released by the time you see this.)

The list of attractive features is long, including a keyboard that is remarkably comfortable to the fingers and an eight-gray-scale screen that provides a clear, sharp image as long as the "grays" displayed are black and white (more about this later). As shipped, the 17NB is equipped with 1MB of RAM. An optional modem and memory expansion to 5MB are available. The computer and its power supply/recharger fit comfortably in an average-sized briefcase, leaving enough room for a couple of magazines and a legal pad. (Note to inventors: The industry desperately needs a portable computer power source that can fit in a shirt pocket.)

Two important issues for assessing notebook computers are the quality of the screen and the feel of the keyboard. Perfect gray-scale representation might simply be too much to ask of a flat-screen monitor at this stage in the development of display technology. This screen is touted as an eight-gray-scale display, but unless an image contrasts dramatically with the rest of the screen, it fades into the background.

The keyboard is fast and responsive, though the awkward lower-left placement of the Function key (which, for example, turns the up- and down-arrow keys into page-up and -down keys respectively) makes it an easy target for the left hand while typing, resulting in some strange typos until you become accustomed to it. ▷

SANYO BUSINESS SYSTEMS
51 Joseph St.
Moonachie, NJ 07074
(800) 524-0048

CPU Type: 80286; CPU Speed: 12.5 MHz
Conventional Memory: 640K; Extended Memory: 384K
Ports: 1 serial, 1 parallel, 1 video
Drives: 3½-inch 1.44MB floppy, 21MB hard
Video Modes: text, CGA, EGA, VGA
Screen Type: ST backlit LCD
List Price: $2,999.00
Street Price: $1,999.95

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The batteries last a couple of hours—enough for most purposes—and they are compact enough that you could carry a couple of charged-up spares in an overcoat pocket. At a desk, you can use the charger as a power supply, which leads me to one complaint about this machine that would be easy to fix. The power supply/battery charger unit has a three-foot power cord, but the cable from the charger to the computer is only about 18 inches long, which means that the power supply has to sit on the same surface as the computer when it's in use. Sanyo should have provided a long cord to the computer, allowing the transformer to sit on the floor, out of the way.

The low-battery light gives you a little warning when the battery pack is breathing its last, but don't think you have enough time to do one more recalculation on your spreadsheet. You'd be well advised to save your work immediately, or you'll have an unpleasant surprise.

You might want to know that Sanyo makes the ZEOS and Commodore notebook computers, which are virtually identical to the Sanyo. Whichever you choose, you'll be getting a handy, well-designed computer.

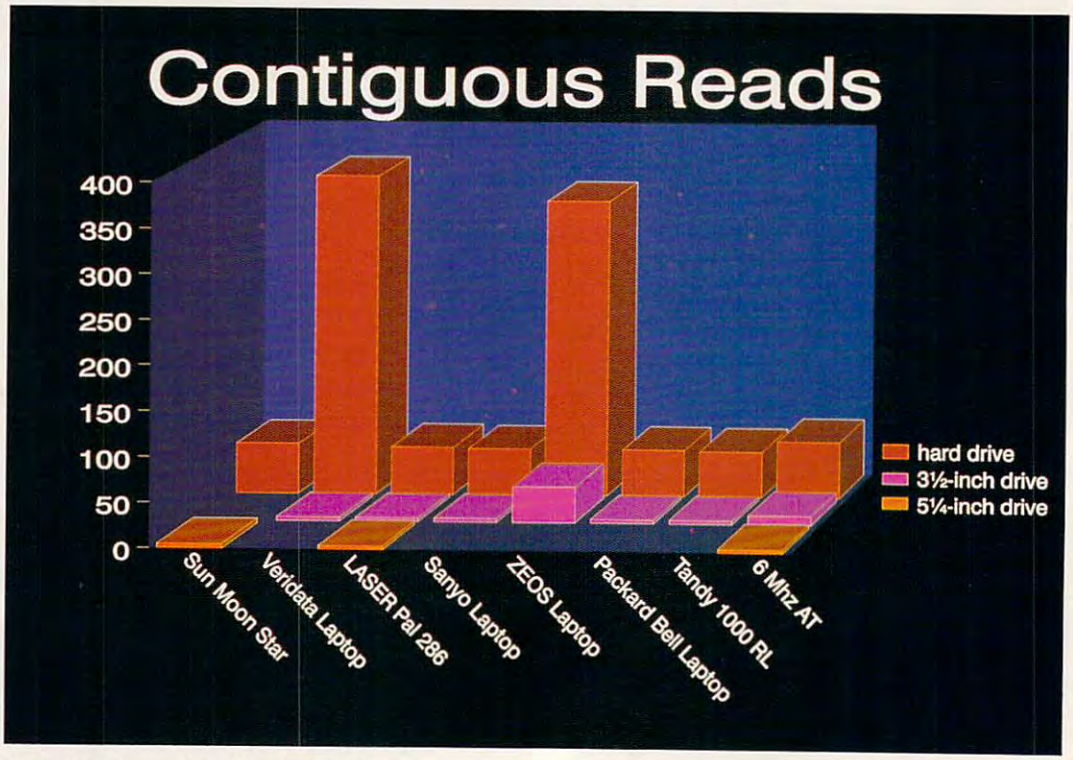
ROBERT BIXBY

Storage Media Device Tests: Contiguous Read, Fragmented Read, Contiguous Write, Fragmented Write

Regardless of the speed and computing power of a computer, the storage devices are often a bottleneck. COMPUTE's *BenchMark* program performs four different tests that can help rate the speed of a drive.

Our tests read and write sectors to the drive with a timer running. That way we know how many sectors have been accessed in a second. The more sectors read or written, the better the performance and the faster your applications will run.

Not only have we read and written whole blocks of information from the disk with our contiguous read and write tests, but we've also developed a test that addresses the disk in a fragmented order that's closer to real-life drive performance conditions. Seek time, interleave factor, and other statistics are condensed into four easy-to-understand numbers.



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SUN MOON STAR 386SX

Ease of setup, a small footprint, and opportunities for expansion make the Sun Moon Star 386SX a system you should consider, especially if you're new to computing.

The Sun Moon Star is quite easy to set up. You'll find all the usual manuals and setup guides, but you also get an extremely helpful VHS videotape that walks you through the entire installation process.

The unit I reviewed came with 1MB of RAM, with room for up to 8MB on the motherboard. The system allows a flexible RAM configuration; you can populate with 256K chips, 1MB chips, or a combination of both. You can thus upgrade cost effectively and without using up one of your slots.

This computer has five slots: three 16-bit AT slots and two 8-bit XT slots. The AT-bus FDD/HDD controller card can handle up to two hard disks and two floppy drives, saving you money, because you don't have to buy an additional controller card. And it frees a slot for later expansion.

A fast (28ms), formatted 44MB hard disk comes with the unit, with DOS installed. In just a few minutes, I had the computer up and running.

You get a crisp, clear picture on the Sun Moon Star analog RGB monitor. The 256-color VGA graphics are very impressive, offering photographic-quality displays. I was disappointed that it wasn't possible to plug the monitor's power cord into the back of the computer. The setup video in-

SUN MOON STAR
1941 Ringwood Ave.
San Jose, CA 95131
(800) 545-4786

CPU Type: 386SX; CPU Speed: 16 MHz
Conventional Memory: 640K; Expanded Memory: 384K
Ports: 2 serial (mouse attaches to serial port), 1 parallel, 1 game
Drives: 5¼-inch 1.2MB floppy, 43MB hard
Video Modes: text, CGA, EGA, VGA
List Price: $2,195
Street Price: $1,799

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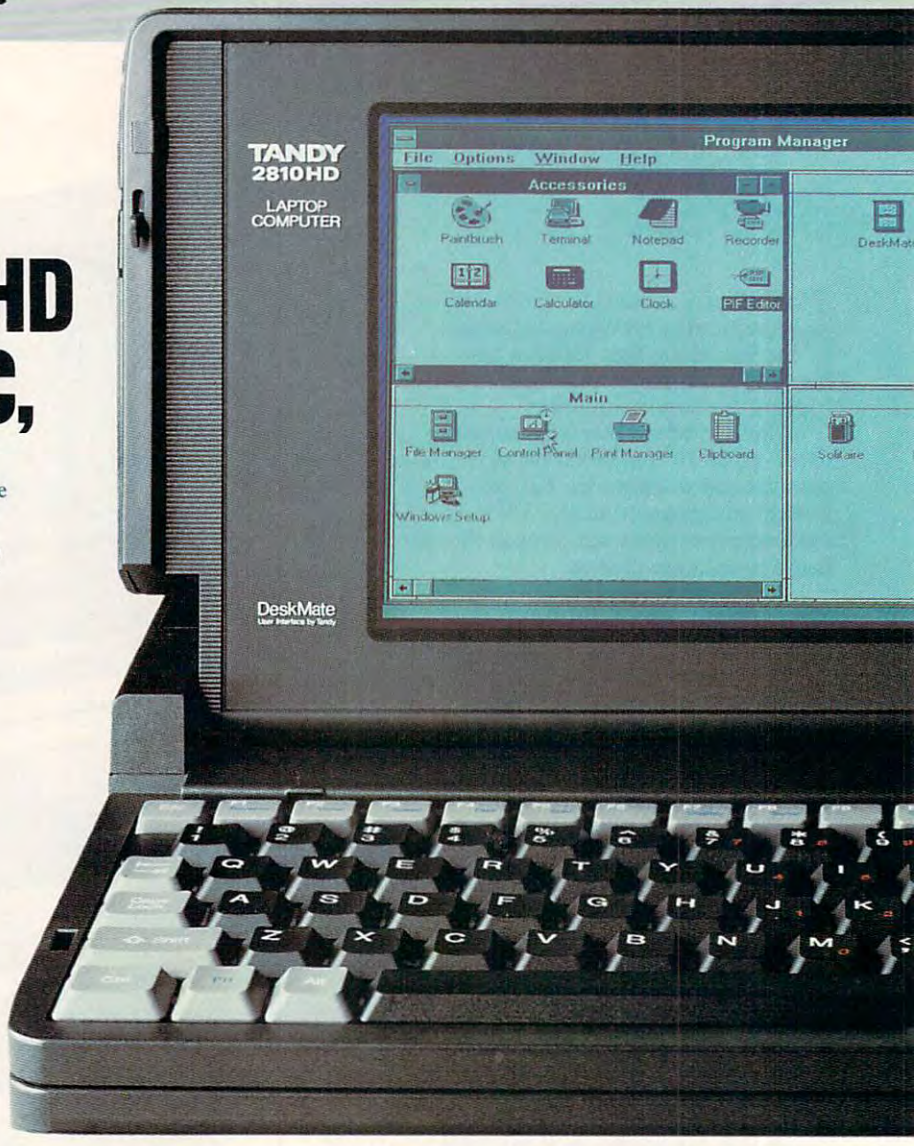

286 Power
The 80C286 microprocessor runs at 16 MHz for speed-intensive applications like Microsoft® Windows.

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Brilliant clarity with 640 × 480 graphics and a sharp 16/32-gray scale.

Built-In Hard Drive
20 megabytes of internal storage for rapid access, plus a 3.5" 1.44MB floppy drive.

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The latest version of MS-DOS (4.01) comes already installed on the built-in hard drive.

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The DeskMate Graphical User Interface with ten applications is installed on the hard drive for instant-on ease of use.

Resume Mode
Lets you shut off and come back right where you left off—also shuts down automatically to save battery life.

External Support
Attach a 101-key keyboard, a VGA color monitor, a printer, an external floppy drive and more.

1MB Memory
Expandable to five megabytes.

DESKTOP PERFORMANCE IN A 6.7-lb. PORTABLE

Continuing our tradition of innovation, the Tandy 2810 HD is a lightweight laptop for heavy use—at the office, at home, or on the road. With extremely durable construction, it's built for travel—but it can also support a full-size keyboard and monitor for true desktop power. AT® compatibility, stunning VGA graphics and DeskMate® productivity software. Only at Radio Shack. Again.

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structs you to plug it into the rear power connector, but it just doesn't fit.

This system comes with some useful software. *CheckIt* is a full-fledged PC diagnostic package that will check your system for software and hardware problems. *GEM/3 Desktop* is an interactive user interface that allows you to run programs by pointing and clicking on icons. *Draw Plus* is a full-featured paint program. As you can see, there's plenty included to get you started.

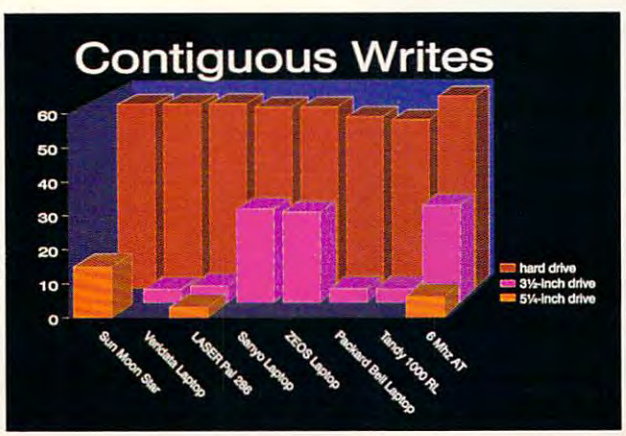
I found no major design flaws in the Sun Moon Star, although there are a few things that I don't like. First, the keyboard doesn't have that springy, metallic click I've come to expect with most PC keyboards. I found the mouse too small for my liking and awkward to hold.

The system allows a flexible RAM configuration; you can populate with 256K chips, 1MB chips, or a combination of both. You can thus upgrade cost effectively.

On the plus side, I found the Sun Moon Star an attractive computer. It's only 15 inches wide by 16 inches deep and about 7 inches tall. You won't lose any desktop space with this little computer. It operates very quietly and appears to be shielded very well, too. Nearly every computer brought into my house interferes with my television, but the Sun Moon Star doesn't.

Sun Moon Star offers an attractive three-year warranty, including six months of on-site service and six months of carry-in service. According to the company, there are more than 800 service centers nationwide.

TROY TUCKER



Advertorial

Face to Face With

Graphical User Interfaces

Power users are turning to graphical user interfaces (GUIs) for the ease of use they provide. But what about those of us ***without*** 386 VGA systems? Fortunately, there are GUIs designed to make computing easier on 8088, 8086 and 80286-based systems, and one of the most important decisions you'll make is choosing which GUI to work with.

Can We Talk?

First, you'll want to choose a GUI that "speaks" your language—English, plain and simple. That way you won't have to learn how to communicate with your computer before you start to use it—you'll already be on speaking terms.

Easy Operation

Second, your GUI should have neat, organized displays that present your options clearly and concisely. Easy-to-follow graphics make it simple for you to see exactly where you are in a program. Handy pull-down menus keep your options tucked away and out of sight until you call for them. And pop-up dialog boxes guide you through tasks, making sure that your computer does what *you* want it to.

Something in Common

GUIs provide a uniform operating environment, which alleviates the frustration and confusion of switching from one task to the next. Programs based on the same GUI have the same look and feel to them, making each new application easier to learn. Of course, you'll also want to choose a GUI supported by many of the leading software publishers. That way you'll be sure to find readily available software for home, school or business.

Those Little Extras

Another feature to look for in a GUI is a help function that's *context sensitive*—one that's able to "sense" which task you're currently running and provide help for that specific task.

For true convenience, your GUI should operate with just the point and click of a mouse cursor controller. The mouse makes it quick and easy for you to select your choices from menus and dialog boxes, taking the mazework out of getting around the many computing options your GUI offers.

Fortunately, there ***is*** *just such a user-friendly GUI: Tandy's DeskMate® Graphical User Interface. It's affordable, too—the proven format of DeskMate gives you instant convenience without having to upgrade your system memory beyond 384K. And it's available from over 7000 Radio Shack stores across the country. So take a scroll through DeskMate and discover for yourself just how easy computing can be.*

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TANDY 1000 RL/HD

Tandy's sleek 1000 RL has an interface especially designed to appeal to new computer users and hardware that reflects some sound but conservative and controversial design and manufacture decisions.

Tandy's decision to use an 8086 processor, rather than the 286 or even 386SX, places some limitations on the machine's performance. RL/HD owners will have some difficulty using high-end spreadsheets and databases and playing some of the more sophisticated entertainment software. The RL's video refresh is fast enough for most games, however; and at between 9 and 10 MHz, the machine is as fast as an AT, still the workhorse of the computer industry.

This is a household computer, not a terrific machine for handling complex work from the office. You're not going to be running *Windows* on the RL. With its kernel in ROM, Tandy's *DeskMate* flies on the RL, obviating for many users the need for any other environment than MS-DOS.

The machine reviewed here is the hard disk version, which is the one I recommend. The hard disk is fast and comes loaded with system and applications software, making setup almost foolproof. Tandy has offered a special deal, including a mouse, which is essential to new users' enjoyment and control of their systems. New users should also be persuaded to purchase color systems, and it's hoped that Tandy will add a VGA option to the RL line.

Several ports—for a printer, joysticks, an earphone, a microphone, a

RADIO SHACK
A Division of Tandy
700 One Tandy Center
Fort Worth, TX 76102
(817) 878-4969

CPU Type: 8086; CPU Speed: 10 MHz

Conventional Memory: 512K; Expanded/Extended Memory: None

Ports: 1 serial, 1 parallel, 1 mouse, 1 game

Drives: 3½-inch 720K floppy, 21MB hard

Video Modes: text, CGA, Tandy 16-color

List Price: $999.90 with hard drive, $599.95 without hard drive

Street Price: $794.00 with hard drive, $499.00 without hard drive

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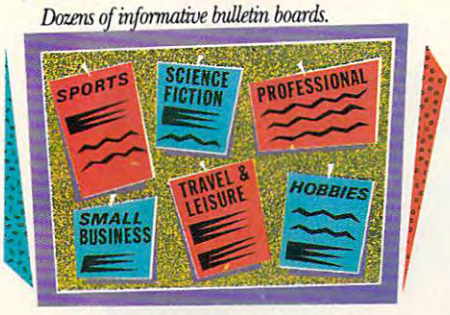

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3. At the U#=prompt, enter XTX99497,GENIE then press RETURN.
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mouse, and serial peripherals—are built right in. Tandy's volume control is a feature that other manufacturers should emulate. Some RL owners, as they grow in capability and ambition, will find the lack of expansion slots (there's only one) daunting. A solution—an add-on expansion box for the RL and at least one more slot in the next generation of RLs—will help the machine grow along with its users.

The decision to include only 512K of RAM, while probably price-based, needs to be corrected. For better or worse, today's software designers are assuming a megabyte of RAM as standard. At the very least, the motherboard should be socketed for a meg. Understand me: I get 90 percent of my work done in less than 512K on my 386. The 1000 RL will do the very same. You can run most word processors, some spreadsheets, and many other packages just fine.

Despite these caveats, I think the RL is a fine system, especially for users who are new to computing. It's a system that will work beautifully for 90 percent of household use. With Home Organizer, the *DeskMate* enhancement, users might actually computerize whole aspects of household operation.

I think Tandy has taken a large step in the right direction with the 1000 RL/HD. But the walk is not yet finished. As an introductory and functional computer system with some special features and enhancements designed to put new users at ease, the 1000 RL is a sound, safe purchase for people who are curious about using a computer in the home.

KEITH FERRELL

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There are two radio-emission classifications for computing devices or electronic digital devices: Class A and Class B.

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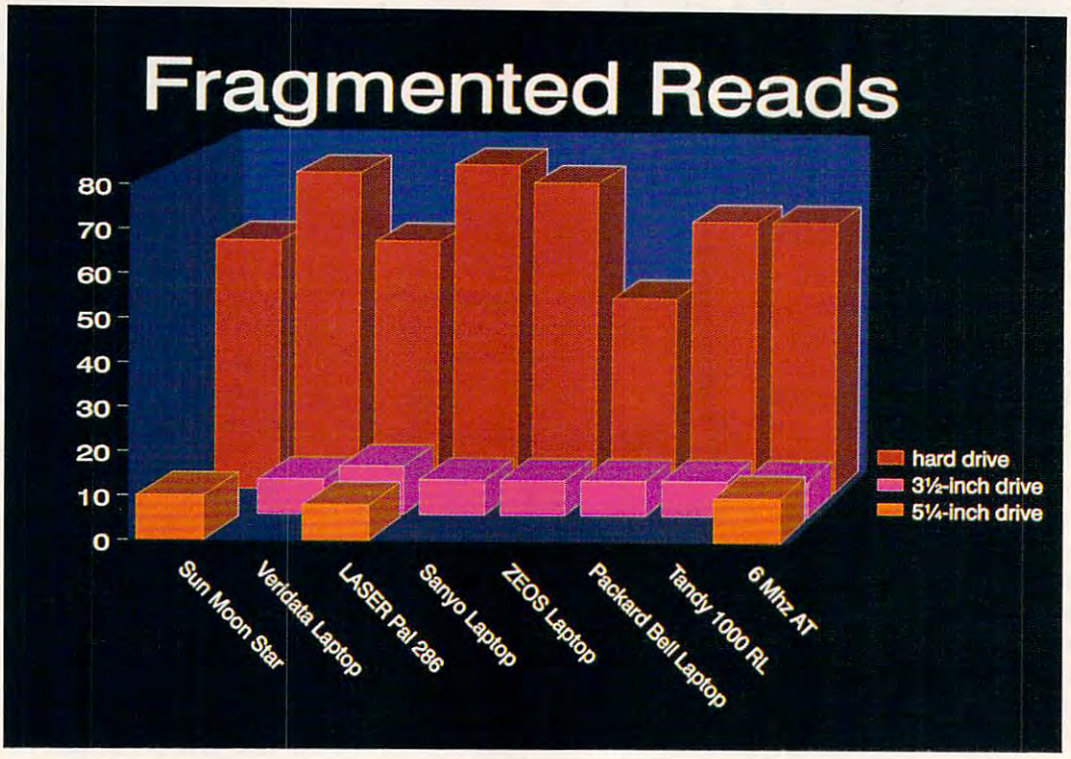

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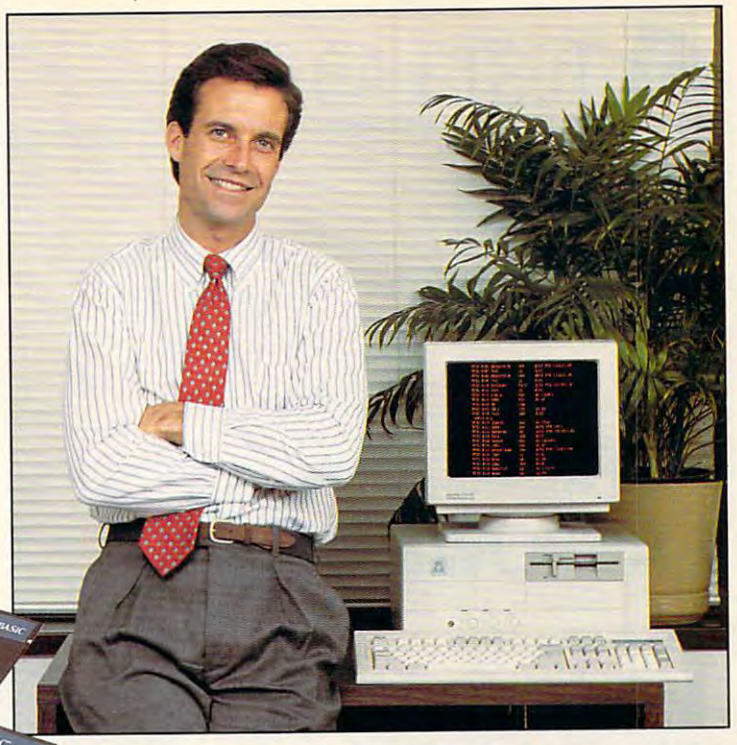

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The LapPower's boxy case contains a system of moderate power. The 12-MHz 80286 processor is rapidly heading toward obsolescence in the desktop world, but it's only now becoming the low-end standard in the laptop world. Unless you find yourself using *Windows* a lot, though, or playing games in your spare time, you'll find the Veridata's performance acceptable. The system ran *GeoWorks, WordPerfect,* and *QModem* with no perceptible loss of performance compared to my desktop system.

The VGA graphics are a welcome change from the blocky CGA displays found on older laptops. Hard and floppy disk drive performance are on a par with the performance of similar drives in a 286 desktop unit. Only the keypadless keyboard and LCD screen serve to remind you that you're using a laptop system.

Even these minor limitations can be remedied, though. The computer has an external VGA port, which pro-

VERIDATA
11901 Goldring Rd.
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(818) 303-0613

CPU Type: 80286; CPU Speed: 12 MHz
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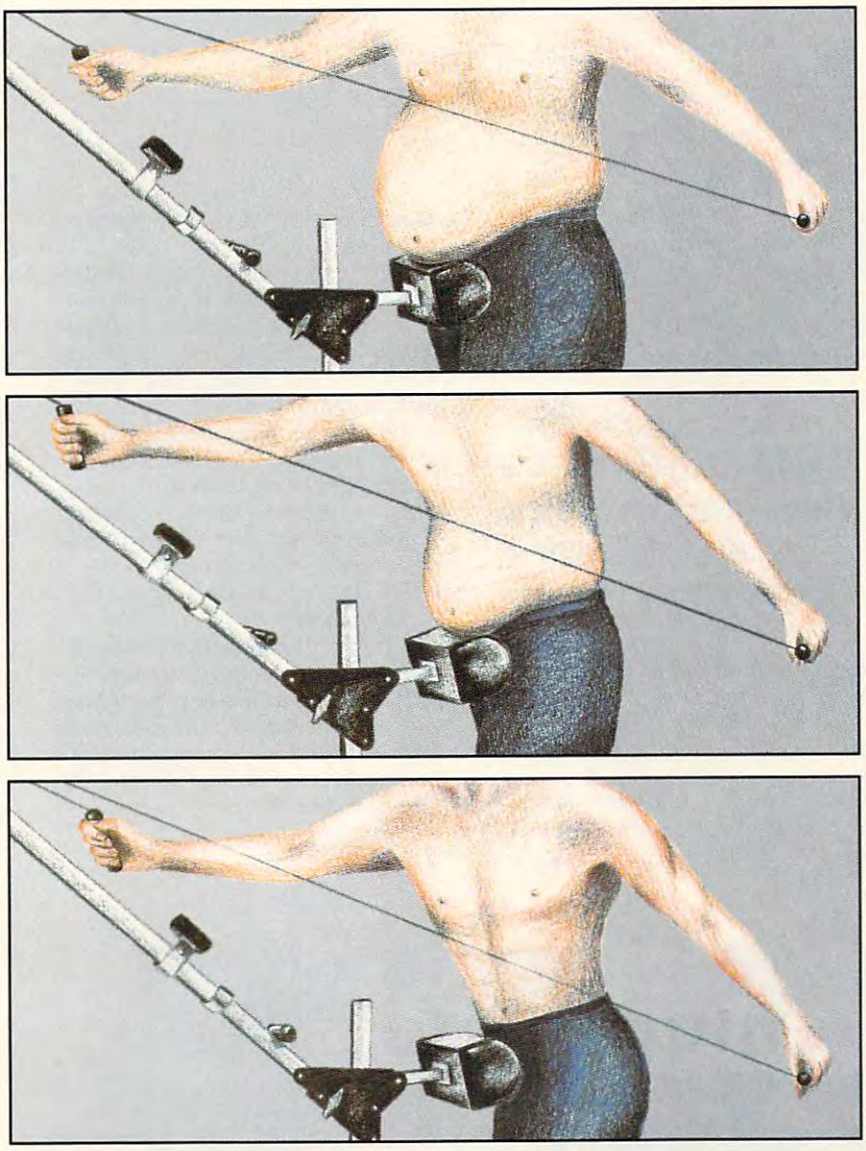

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vided a clear and speedy color display on my Mitsubishi Diamondscan color monitor. Veridata offers an optional strap-on numeric keypad that attaches to the right side of the laptop's detachable keyboard. You can also attach any standard PC keyboard that uses the PS/2 style connector, an option you may want to consider if you don't like soft, mushy keyboards. The LapPower's keyboard is quiet but has a very short throw and doesn't provide much tactile feedback.

The 16-gray-scale LCD display is crisp but suffers from severe smearing and ghosting. Brightness and contrast are adjustable but not enough to eliminate the ghosting. While the LCD display is OK for use on the road, you'll want to keep a VGA monitor in the office.

There's an expansion connector on the back of the LapPower for an optional expansion box that accepts industry-standard cards. You'll also find a port for an external 5¼-inch disk drive, and an internal 2400-baud modem can be added by your dealer. Attach the card box, full-size keyboard, disk drive, monitor, and serial mouse to the laptop and close the LCD display; and you'll never know you're using a laptop.

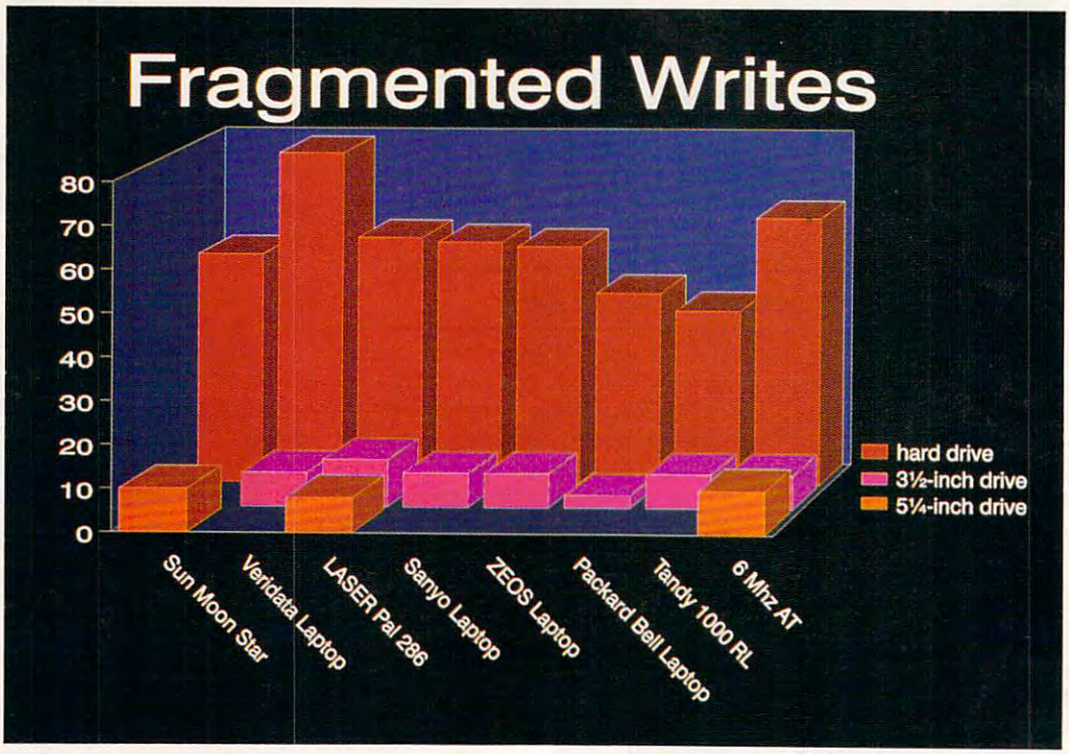
The computer has an external VGA port, which provided a clear and speedy color display on my monitor.

The system has a battery life of about two hours with the LCD and hard drive in constant use. The included PowerCon utility will shut down the hard drive and backlit LCD and toggle the microprocessor into a standby mode after a user-defined period of inactivity.

Other than the less-than-satisfactory LCD display, the only real problem with the LapPower is poor documentation. The LapPower 286/40 is sold by companies other than Veridata, so the program includes a generic 179-page book called the *Laptop Operation Manual* that's inadequate as a tutorial or reference guide and includes no information on customer support or even how to contact Veridata. You'll need to depend on the dealer from whom you purchase the unit for support.

If you're looking for a laptop PC that can also serve as an all-purpose desktop machine, the LapPower may be the machine for you. If you're looking for a machine to use specifically on the road, though, you can probably find a smaller and lighter unit at a comparable price.

DENNY ATKIN



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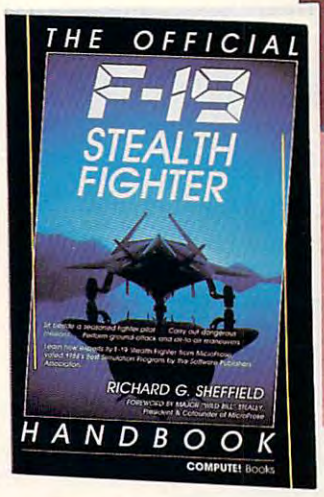

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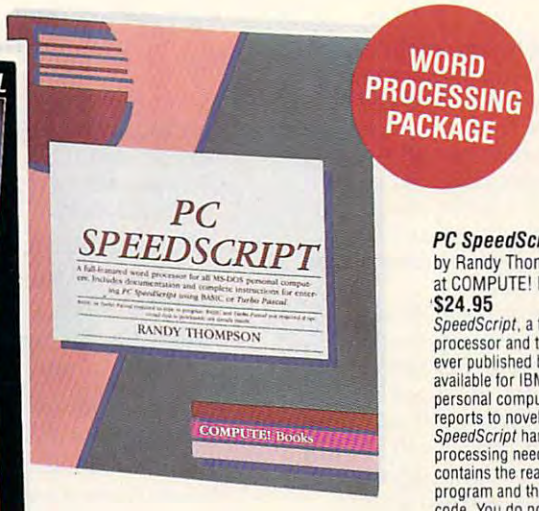

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ZEOS NOTEBOOK 286

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The Zeos Notebook 286 is one of the first of a new generation of no-compromise laptops. For $1,995, you get a 7-pound notebook-sized computer with a 12-MHz 80286 processor, 1MB of RAM (expandable to 5MB), a backlit VGA screen with 32 shades of gray, a fast 20MB hard drive, and a 1.44MB 3½-inch floppy drive.

Besides being a genuine bargain, the Zeos Notebook 286 is also intelligently designed. Because a backlit screen, hard drive, and 286 processor can quickly drain a laptop battery, Zeos has built in several power-saving features. You can switch the processor speed from 12 MHz to 6.5 MHz, reduce screen brightness by half, and have the computer shut off power to the hard drive and LCD screen when they're not being used.

Using the power-saving features, you can extend the standard two-hour battery life to nearly three hours. When the battery has only about 3–6 minutes of power left, the low-battery light blinks slowly—giving you ample time to back up your files. With 1–3 minutes left, the light blinks faster.

The battery charger is exceptionally fast and versatile. When the computer is switched off, recharging the battery takes only about an hour. Even more impressive, you can recharge the battery in about two hours while you continue to use the laptop.

Before you buy any laptop, you should spend as much time as you can

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530 5th Ave.
St. Paul, MN 55112
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CPU Type: 80286; CPU Speed: 12 MHz
Conventional Memory: 640K; Extended Memory: 384K
Ports: 1 serial, 1 parallel, 1 video
Drives: 3½-inch 1.44MB floppy, 21MB hard
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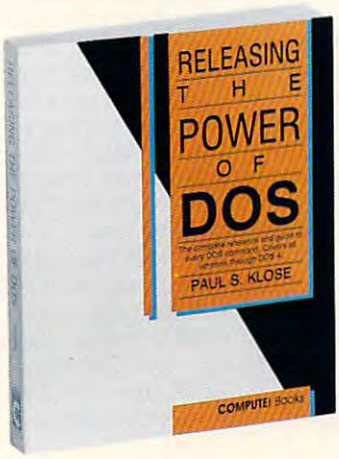

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trying out the keyboard. The Notebook 286's keyboard has 82 full-size keys, 12 function keys, and an embedded numeric keypad—all with a full key travel. The keys have a firm feel (not too mushy), and they're extremely quiet (you won't disturb others on a plane). On the downside, I miss the audible click of the keys, the Enter and right Shift keys are smaller than usual, and you have to use a special Fn key to access the embedded PgUp, PgDn, Home, and End keys.

While the Zeos Notebook 286 is, indeed, a great little laptop, you would actually be better off buying another machine. For just $300 more, you can buy the same machine from Zeos with a 16-MHx 80386SX processor. The Notebook 386SX adds a math coprocessor option and includes a black-and-white screen instead of the Notebook 286's blue-and-white screen. With either machine, you'll have enough power to run *Windows* 3.0. Zeos has proven that good things do come in small packages.

DAVID ENGLISH

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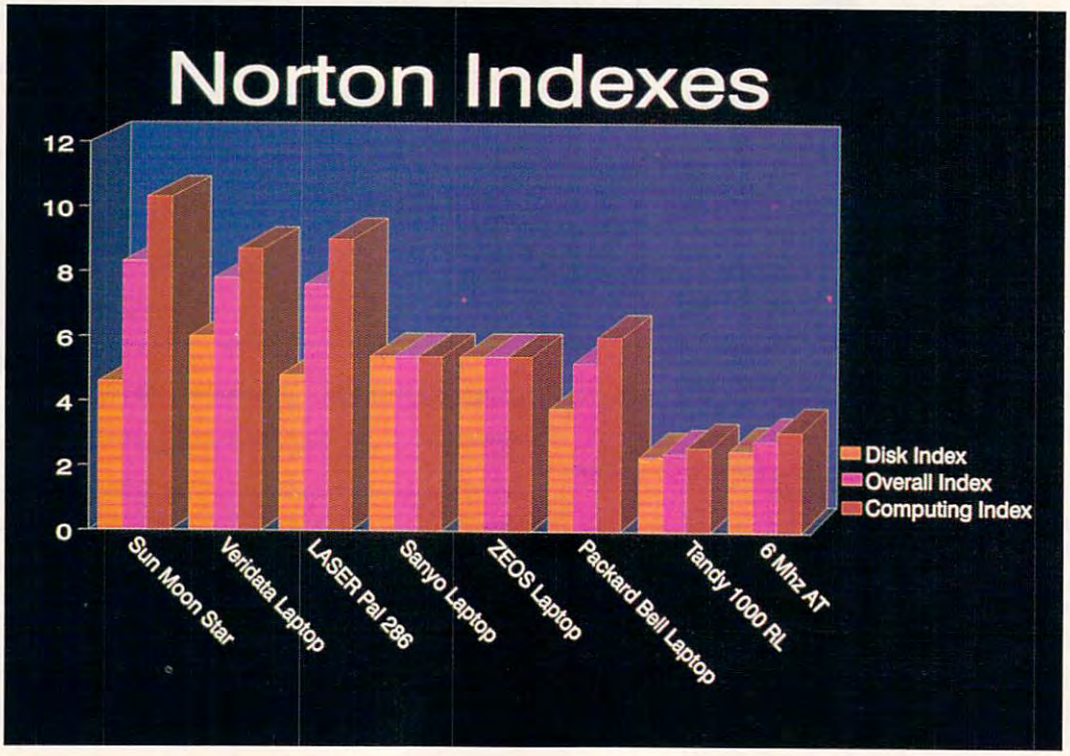

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- ☐ Other _____
- ☐ I don't own a computer.

Which video display system(s) do you use?

- ☐ Monochrome
- ☐ Hercules
- ☐ CGA
- ☐ EGA
- ☐ MCGA or VGA
- ☐ Tandy

Which peripherals do you own or use with your computer?

- ☐ 5¼-inch disk drive
- ☐ 3½-inch disk drive
- ☐ Hard disk
- ☐ Dot-matrix printer
- ☐ Letter-quality printer
- ☐ Laser printer
- ☐ PostScript printer
- ☐ Modem
- ☐ Mouse
- ☐ Joystick
- ☐ MIDI device
- ☐ Sound card
- ☐ CD-ROM

How much memory does your computer have?

- ☐ 128K
- ☐ 256K
- ☐ 384K
- ☐ 512K
- ☐ 640K
- ☐ Expanded memory _____
- ☐ Extended memory _____

Which language do you prefer for programming?

- ☐ BASIC
- ☐ Assembly language
- ☐ Pascal
- ☐ C
- ☐ Other _____
- ☐ I don't program.

Which version of DOS do you use? (Check one.)

- ☐ 4.0 or higher
- ☐ 3.0 or higher
- ☐ 2.0 or higher
- ☐ 1.0 or higher

Do you use *Microsoft Windows?*

- ☐ Yes
- ☐ No

Which columns do you like the most?

- ☐ Editorial License
- ☐ News & Notes
- ☐ Feedback
- ☐ *Sharepak* Disk
- ☐ Tips & Tools
- ☐ Programming Power
- ☐ On Disk
- ☐ Disk Update
- ☐ Point & Click
- ☐ Hardware Clinic
- ☐ IntroDOS
- ☐ Online
- ☐ Arts & Letters
- ☐ WorkPlace
- ☐ PathWays
- ☐ GamePlay

Which of the following computer-related topics do you like to read about?

- ☐ New computer technologies
- ☐ New hardware
- ☐ How to upgrade your PC
- ☐ Word processing
- ☐ Spreadsheets
- ☐ Databases
- ☐ Telecommunications
- ☐ Integrated software
- ☐ Games and entertainment
- ☐ Money management
- ☐ Disk management and MS-DOS
- ☐ Programming
- ☐ Education
- ☐ Desktop publishing
- ☐ Graphics (paint, draw, or CAD)

Where do you use your PC?

- ☐ Home
- ☐ Work
- ☐ School

Where did you get this copy of *COMPUTE?*

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- ☐ Newsstand

What topic(s) would you like to see covered regularly in a column?

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Additional comments:

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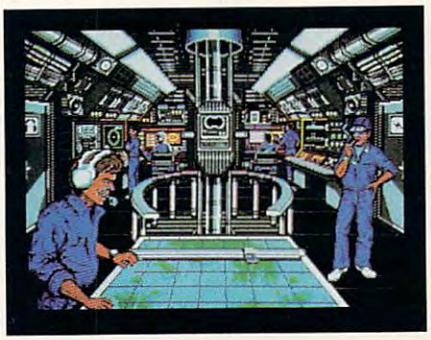

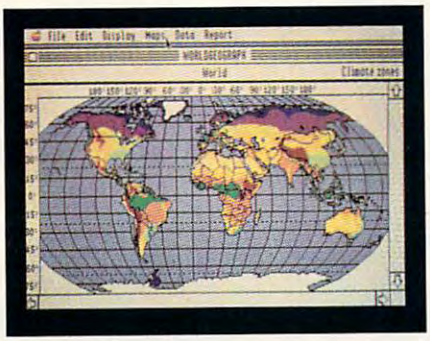

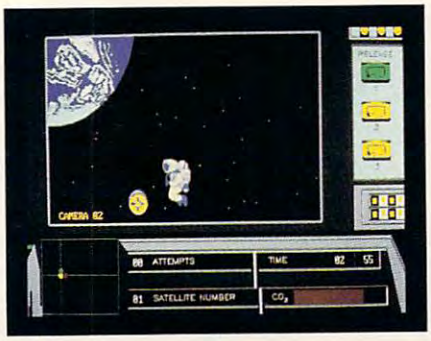

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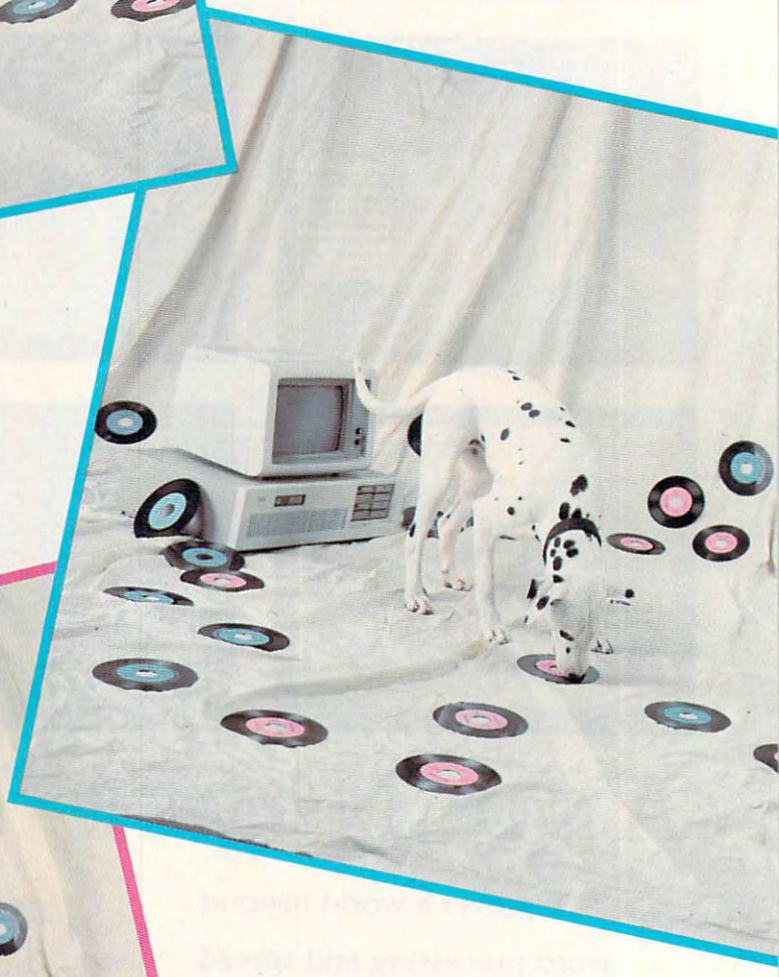

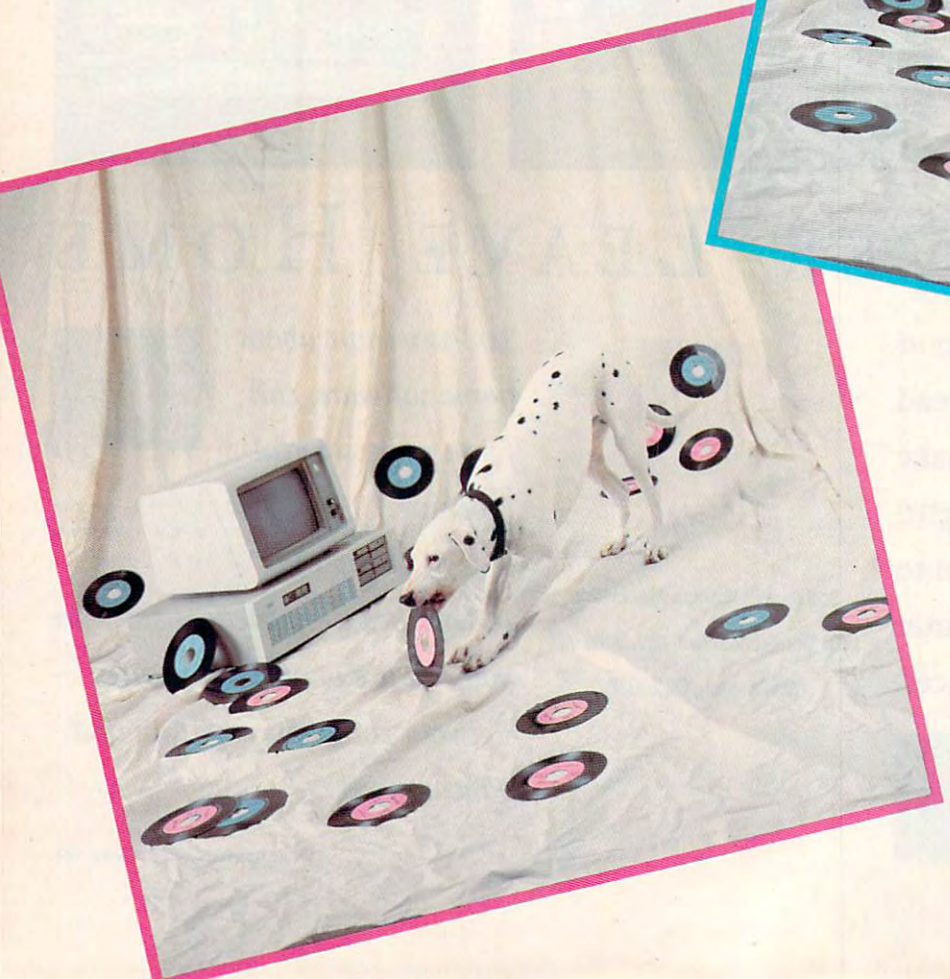

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HOW TO CHOOSE A HARD DISK

CHOOSING A HARD DISK CAN BE TRICKY. HERE'S EXPERT ADVICE.

Buying a hard disk is confusing nowadays. How big? What brand? How about RLL? There's a lot to worry about. Here's how to kick the tires and read the EPA mileage sticker when you're shopping for a drive (or a PC with a drive).

Your hard disk subsystem consists of two pieces: the hard disk itself and the hard disk controller board. The controller is usually a circuit board in your PC, although some newer computers put the controller's electronics right on the main PC circuit board, the motherboard.

A few years ago, you wouldn't worry about buying a controller; you'd just use the one that came standard with your machine (in the case of an AT-type system) or buy a disk/controller combination all at once (in the case of an XT-type system). Since you have a variety of choices in drives and controllers, you've got to make sure that they can talk to each other.

Making these choices may seem a bit daunting, but read on—hard drives aren't tough to understand. And having a grasp of the terms found here will allow you to pick the right drive for your system. Here's a quick look at your options.

Drive options. You must choose size, seek time (which affects speed), band stepper or voice coil, and the drive's self-parking capability.

Controller options. Here you choose XT, AT, or PS/2; the interleave factor (which affects speed); whether or not to get an on-board cache; and the drive's sector translation.

Matching drive and controller. There are several items that must match on the drive and controller, including the interface (ST506, SCSI, ESDI, or IDE) and encoding scheme (MFM or RLL). ▷

MARK MINASI

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What Size Is Best?

Many computers these days are advertised as coming with 40MB drives, but assess your needs carefully before jumping at such a package. The sad truth is that virtually every program you buy will demand a few megabytes of your disk's space, and you'll soon be looking for more room.

For example, the popular *Micrografx Designer* drawing program gobbles up five megabytes in a basic configuration (it can take much more), *Windows* 3.0 takes up about seven megabytes without a swap file, and even old *Lotus* 2.1 requires a couple of megs.

That doesn't even consider the real biggies, like OS/2 (more than 30MB when its *Extended Edition* is loaded). Downloadable fonts can suck up space in no time. And greater use of graphics strains the disk further. For example, a nongraphic computer screen can be stored in just 4K; a graphical screen can take up a megabyte. Your 40 megabytes of space will disappear in no time.

Economics seems to favor 80MB or larger drives. The typical 42MB drive (the Seagate ST251-1 is the most common) runs about $300.00 discounted, or about $7.50 per megabyte. In contrast, Maxtor's 80MB drive is now selling for as low as $410.00, or $5.13 per megabyte. Further, the Maxtor is a voice-coil drive, which is preferable to the 251-1's band-stepper design. (Fear not, explanations of voice coil and band stepper are coming up soon.)

And when shopping for really big drives, watch out for an old scam, reporting "unformatted" drive capacity. Drives must give up as much as 30 percent of their capacity for system overhead. For example, a 20MB drive may actually have 26MB of capacity, but the extra 6MB is required for system overhead.

Every drive has this meaningless "unformatted" capacity that looks impressive but is of no value to the buyer. Look out for unscrupulous dealers who report the larger, useless unformatted capacity in their magazine ads. (By the way, *format* in this article means *low-level*—not the familiar DOS—*format;* it's something generally handled by your dealer.)

Seeking the Fastest Drive

Part of what makes a drive subsystem fast is how fast a drive can move its read/write head over the data you want—that is, how long it takes to find the data. The average time to find an area on disk is called the *seek time,* and it's measured in milliseconds (ms, thousandths of seconds). The lower the number, the better.

Hard Drive Interfaces

Interface	Transfer Rate	Encoding Method
ST506	250K–750K/second	MFM or RLL
SCSI	1MB–3MB/second	RLL
ESDI	1MB–3MB/second	RLL
IDE	1MB/second	ARLL

Don't buy a drive with a seek time larger than 28 ms. The best on the market are in the 10–12 ms range—you'll know from the price tag which those are.

Band Steppers and Voice Coils

A lot of what makes a drive fast or slow is whether it moves its read/write head with a band stepper or a voice coil.

Cheaper drives move the head to and fro over the disk surface with a combination of flexible metal bands and a stepper motor, hence the name *band stepper.* They rely on a mechanical approach to find data, an approach that isn't reliable in the long term, as the mechanical parts do not display consistent behavior over time; telling a new drive head to move 1/1000 inch may yield different actual movement than making the same request of an older drive.

The alternative is a voice coil. Named after the voice-coil circuit used in telephone electronics, this is a coil with a cylindrical rod at its middle. When the coil is energized, the rod moves in or out of the coil, depending on how much energy is used. The rod is connected to the heads, so energizing the coil moves the heads in or out. Meanwhile, as the heads are moving, they're reading address information from the drive; that way, the head knows whether it's found the desired data or not.

Which is better? The voice coil, for three reasons. First, and most important, the voice coil is a constantly self-adjusting system; the mechanical parts may change with time, but the head will always find the data. The stepper acts on the unrealistic idea that its mechanicals will never change as time goes on. Second, the voice coil parks its head automatically when the drive is shut down, thus protecting the disk. Most steppers require you to run a head-parking program of some kind. Third, voice coils are generally faster than band steppers.

You'll find that most 80MB and larger drives are voice coil, so buying large drives will pay off in reliability and speed as well as capacity.

Get in Control

If your computer already has a controller, you needn't worry about picking a new one. Or should you? Superpowerful controllers now appearing on the market can squeeze the last ounce of performance out of a drive.

First, make sure your PC can use the controller! Your controller must be made to work with your computer. Vendors sell XT-type controllers, also called *8-bit controllers,* and AT-style controllers, also called *16-bit controllers.* An XT controller can work in an AT system (albeit slowly), but an AT controller generally won't work in an XT system. There are some PS/2 microchannel controllers, but the market for them isn't large, as all the PS/2 microchannel computers come standard with a fairly fast controller.

Next, make sure it's a speedy controller. We've seen that an important determinant of a drive's speed is its seek time. Controllers also contribute to the speed of your disk subsystem with their interleave factor.

The seek time refers to how long it takes to find the data on disk. The interleave factor tells how quickly the disk subsystem can read the data, once it's been found. Interleave factors look like 1:6, 1:3, 1:1, and the like. A lower second number is better, so 1:1 is the best. Controllers that feature 1:1 interleave used to be very expensive—$400 or more for AT systems—but now they're about $120, only about $20 more than the more common and slower 1:2 controllers.

If you're buying an AT system (286, 386SX, or 386) today, insist on 1:1. Buyers of XT systems will find 1:3 controllers their best bargain; there aren't any 1:1 XT controllers, and the 1:2 controllers are a bit expensive. All microchannel PS/2 systems come standard with 1:1 controllers.

Maintaining Cache Flow

Most 1:1 controllers include a speed-enhancing feature called *on-board cache.* A cache is necessary because hard disks retrieve data thousands of times more slowly than your computer's RAM. Every time the computer needs to read the hard disk, it must twiddle its thumbs, waiting (and waiting and waiting . . .) for a device that seems, in terms of CPU speeds, positively geological in time scale.

It would be nice just to copy the whole hard disk to the much-faster RAM, but that's impractical. Buying even enough RAM to accommodate a

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❑ **Names and Dates (1619,1620)** - An address book, calendar system, and mailing list combination. (2 disks) 512K

❑ **ZPAY 3 (1610, 1611)** - A simple-to-use, full-featured payroll package. HD

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❑ **Total Recall (1245)** - This program helps you quickly memorize words and information on any subject.

❑ **Algebrax (1233)** - A great program that teaches algebra. CGA, DOS 3.0

❑ **Pre-Calculus (1218)** - Excellent pre-calc tutor. Reviews algebra and trig.

❑ **Play n' Learn (1236)** - A collection of learning games for children. CGA

❑ **KinderMath (1262)** - An excellent math tutor for children. Three levels of difficulty. Very entertaining. CGA

❑ **WordWhiz (1252)** - A challenging word game that tests your vocabulary.

❑ **Word Gallery (1256)** - Teaches kids to link written words with objects. CGA

❑ **Our United States (1255)** - Test your knowledge of United States trivia.

❑ **Animated Shapes (1264)** - Teaches shapes and colors to pre-schoolers using animated graphics. 640K, EGA

UTILITIES

❑ **Auto Menu (1409)** - A professional hard disk menu system. Run any of your programs from a customized menu. HD

❑ **ViruScan (1440)** - Make sure your computer is virus-free with this valuable utility. Highly recommended!

❑ **Tree View (1418)** - A superior DOS command shell with pull-down menus.

❑ **Telix (1422)** - The best telecommunications program available. HD

SPREADSHEET

❑ **On Side (1506)** - Prints your spreadsheets (or any file) sideways.

❑ **As-Easy-As (1805)** - A fantastic Lotus 1-2-3 compatible spreadsheet.

❑ **Lotus Learning Sys. (1810,1811)** A complete package that makes it easy to learn Lotus 1-2-3. (2 disks) HD

MS WINDOWS 3.0

These programs require Windows 3.0.

❑ **Almanac (1470)** - An excellent calendar/information utility.

❑ **Icon Library (1481)** - Customize your Windows operating environment with this collection of over 300 icons.

❑ **Wallpaper (1484)** - A collection of wallpaper to decorate your Windows.

❑ **Active Life (1472)** - A powerful system for managing your active business and personal life.

❑ **Icondraw (1478)** - Create your own icons to use with Windows.

❑ **Command Post (1474)** - Allows you to create custom menus that can execute applications automatically.

❑ **Metz Desktop Applications (1485)** - Create menus and easily access files and directories.

❑ **Screen Peace (1486)** - A FANTASTIC screen saver with many beautiful and interesting variations.

❑ **Change Cursor Utility (1487)** - Allows you to design your own arrow and hourglass cursors to use with Windows.

HOME & FAMILY

❑ **Family Tree Journal (1122, 1123)** - Presents your genealogical information in book form. (2 disks) HD

❑ **Home Inventory (1105)** - Keeps track of all your personal property.

❑ **Personal Budget Tools (1108)** - Provides a simple way to plan for annual, semi-annual, and quarterly expenses.

❑ **Edna's Cookbook (1118,1119)** - An electronic cookbook with several great recipes - add your own! (2 disks)

❑ **Will Kit (1343)** - Create your own will valid in all 50 states.

❑ **C.A.R.S. (1126)** - Keeps a complete record of your auto expenses.

❑ **Cash Control (1127)** - Manage your bank accounts the fast and easy way with this great program. 320K

❑ **Topp's Grocery Program (1136)** - Helps you prepare grocery lists, manage coupons, and track savings. HD

WORD PROCESSING

❑ **WP 5.0/5.1 Clip Art (1875,1876)** - A large collection of clip art to add spice to your WP documents. (2 disks)

❑ **PC Write 3.03 (1851-1853)** - A very popular full-featured word processor. (3 disks) HD, 512K

❑ **WP 5.1 Learning System (1865-1867)** - Be a more proficient WP user. (3 disks) HD, 512K

❑ **Readability Plus (1340)** - A computerized writing style analyzer.

❑ **Grab Plus/Laser Label (1883, 1884)** Takes addresses from a word processor and sends them to the printer. HD

APPLICATIONS

❑ **Trip Planner (1331)** - A computerized road map. Computes best route. Very popular!

❑ **Melody Maker (1918)** - A fun and easy-to-use program for new or experienced music students. Comes with several songs.

❑ **PC Beat (1909)** - Turns your computer into a drum machine. A lot of fun!

❑ **Calendar Mate (1344)** - A full-featured program designed to create personalized calendars.

❑ **Lotto! (1313)** - Win the lottery with the help of your computer!

❑ **By the Numbers (1342)** - Provides you with a complete numerological interpretation. HD, 340K

❑ **Bowl 101 (1346)** - A user-friendly bowling league management program.

❑ **The Electric Almanac (1341)** - A source for lots of useful information.

GRAPHICS

❑ **PrintShop Graphics (1503)** - A large collection of PrintShop clip art.

❑ **Picture Label (1501)** - An excellent label printing program that uses PrintMaster or PrintShop graphics.

❑ **Banner Maker (1502)** - Prints banners in various sizes, styles, and fonts.

❑ **Dazzle (1530)** - An amazing randomized color pattern generator. Performance art for the eyes! EGA or VGA

GAMES

❑ **Double Blocks (1970)** - A TERRIFIC Tetris clone for 1 or 2 players. Records top scores. You will love this!!

❑ **Video Poker/Ultima 21 (1945)** - The BEST poker and blackjack games!

❑ **Miramar Flight Simulator (1967)** - You are in control of all the speed and fire-power an F-18 has to offer! (will not work with Tandys) CGA

❑ **Pharaoh's Tomb (1974)** - Face monsters and traps as you explore the pyramid. Your goal is to survive.

❑ **Bass Tour (1925)** - Fish in your choice of lakes. Try to win the trophy.

❑ **ZZT (1921)** - Test your problem solving ability and your arcade skills as you battle your way through 43 rooms.

❑ **Field General (1931)** - Experience the excitement of a pro football game from a coach's point of view. CGA, HD

❑ **Insanity (1936)** - Find your way out of this maze before going insane! CGA

❑ **The Monuments of Mars! (1920)** - Many tough levels filled with puzzles, traps and creatures. 350K, CGA

VGA GAMES

❑ **Shooting Gallery (1990)** - Seven variations of a shooting range on your computer screen. VGA, mouse

❑ **VGA Sharks (1992)** - Recover lost treasure in shark infested waters in this action arcade game. VGA

❑ **Beyond Tetris/Joust (1997)** - Beyond is like Tetris with a twist. Joust is a VGA rendition of the classic. VGA

❑ **VGA Jigsaw (1993)** - Uses beautiful pictures to create puzzles for you to put back together. VGA

EGA GAMES

❑ **The Last Half of Darkness (1962)** - Scary graphics and mysterious puzzles to challenge your mind. EGA, HD

❑ **Dark Ages (1964)** - A brilliant arcade/adventure game with superb graphics and animation. 400K, EGA, 286 or faster machine.

❑ **Poker Slot (1989)** - Plays just like the video poker machines you see in casinos. Great graphics! EGA, mouse

❑ **Commander Keen (1986)** - One of the best games we have ever seen. Exceptional play and graphics. EGA

❑ **Snarf (1987)** - Travel through various mazes while you pick up treasures and avoid the Snarfs. EGA

IMPORTANT

CGA = Requires Color Computer
EGA = Requires min. EGA adapter
HD = Requires Hard Drive
512K = Requires 512K RAM
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20MB disk would be prohibitively expensive.

Computer designers have noticed, however, that most of us seem to return to the same areas on the disk over and over again. Even though your hard disk is 20MB in size, you may do 90 percent of your work in just 2MB or so. That's where a cache comes in.

A cache is a TSR (memory-resident) program that sets aside some of your PC's memory as a temporary holding area. It then monitors your disk usage. Every time DOS goes to read a file, the cache transparently copies that file's contents to its holding area in memory. Then, if DOS needs to reread that file later, the cache supplies the file to DOS, fooling DOS into thinking that the information came from the disk drive.

The benefit? The file reread occurs by transferring information from memory to memory, rather than from disk to memory, yielding much faster apparent disk performance. If you have expanded or extended memory that you aren't using, putting in a cache program is an ideal way to speed up your disk subsystem.

PC Tools, Mace, and *The Norton Utilities* all include cache programs, or you may want to pick up a copy of Multisoft's *PC-Kwik* (call Multisoft at 503-644-5644). If you've got the memory for one, a 512K cache will speed up apparent disk speed quite a bit. Now that computer memory is so much cheaper, you may want to spend some cash on memory so you can spend that memory on cache (sorry—couldn't resist).

Thus far, I've explained caches as add-on software. But some hard disk–controller designers have gone a bit farther and actually have implemented small hardware caches right on the controller. The caches tend to be 8K–32K in size.

It sounds like a good idea, but it often isn't. The problem is that a cache that tiny doesn't do much. An 8K cache makes a disk look really fast to the kind of small speed-test programs that computer magazines run when writing reviews, but they don't help much for real-world applications.

Further, built-in caches can confuse many disk-tester programs like *SpinRite, Disk Technician,* and the like. The cache makes them think the system is a good bit faster than it actually is. The bottom line is this: If your controller has an on-board cache, fine. But make sure you can disable the caching so you can reliably run a disk-maintenance program in the future.

Sector Translation

The last thing to look out for when shopping for a controller is sector translation. When hard disks first became popular in the PC world around 1983, they used a disk-encoding method called *MFM* (Modified Frequency Modulation, discussed in the next section).

This slowly is being replaced by RLL (Run Length Limited). RLL makes it easier to build large-capacity drives, and it, too, is discussed in the next section.

In 1986, when RLL first appeared on the PC scene, some PC programs had trouble talking to RLL-type disk subsystems because they looked different from the MFM-type disk subsystems that the programs had been designed to expect.

That's not a problem with today's software, but at the time, the makers of RLL disk controllers decided to solve the problem with sector translation.

Sector translation makes a newer RLL disk subsystem look like an older MFM disk subsystem. Most translating controllers give you the option to disable translation and "come clean" about their RLL-ness.

Why disable translation? Again, because of *SpinRite* and the crowd. Disk-fixer and -maintenance programs are greatly hampered in what they can do for your disk if the controller is translating. Make sure you've got the option to disable translation. You'll also see translation on some of the 300MB and larger drives, as well as on many IDE drives, discussed in the next section.

Interface Basics

Up to now, you've seen the characteristics that a drive or a controller can have; these characteristics can be mixed and matched in just about any way. But the drive and controller have to agree on how to communicate; that's determined by their interface type and encoding scheme.

How does the controller talk to the drive? Originally (before 1983), you'd buy a controller and a drive from the same company, so you wouldn't worry about the interface. Nowadays, it's likely that you'll want to buy a controller from one vendor, like Western Digital or Data Technology, and a drive from another vendor, like Seagate, Maxtor, or Mitsubishi. This implies that both the drive and controller must support some common standard interface.

Originally, the now-defunct Shugart Technologies used something it called the ST 506/412 interface, or as it's more commonly known, ST506. Most PC drives use ST506 to this day. It can support a maximum data-transfer rate of 7.5 million bits per second (Mbps). That doesn't sound slow, but it is, and that's one reason why it's slowly fading from the scene. The other reason is that it's noise prone.

Real muscle drives these days are using a replacement interface called *ESDI* (Enhanced Small Device Interface). ESDI, like all other interfaces after the ST506, reduces noise and boosts speed and reliability by putting part of the controller right on the drive. ESDI could theoretically support 24 Mbps. The ESDI interface has another useful feature; the drive can describe itself to the controller, which makes drive setup easier.

Another interface that high-end machines are using more and more goes by the unfortunate acronym

Hard-Driving Acronyms

ARLL. Advanced Run Length Limited is a data-encoding method used in IDE drives that allows storage of 50 percent more data than standard RLL and 100 percent more data than MFM.

ESDI. Enhanced Small Device Interface is an interface standard that puts some controller functions on the drive itself. ESDI allows for data transfers of 1MB–3MB per second and can be used for drives up to 1 gigabyte in size.

IDE. Integrated Drive Electronics, like SCSI, is an interface design that puts the controller on the drive itself. IDE, however, only offers ST506 performance.

MB. One megabyte is 1,000,000 bytes, or 1,000K.

MFM. Modified Frequency Modulation is a data-encoding method that has been the standard until recently. Now, RLL is more common, at least for high-capacity drives.

ms. One millisecond is 1/1000 second. Milliseconds are commonly used to measure a hard disk's seek time.

RLL. Run Length Limited, like MFM, is a data-encoding method, but RLL allows storage of 50 percent more data than MFM.

SCSI. Small Computer System Interface is an interface standard that puts most of the controller functions on the drive itself. It offers transfer speeds of 1MB–4MB per second. SCSI also allows as many as eight devices to be daisychained together.

ST506. Shugart Technologies' 506/412 interface is an interface that supports transfer speeds of about 500K per second and is limited to a hard disk of 127.5MB or smaller.

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SCSI (pronounced *scuzzy* and standing for Small Computer Systems Interface). IBM's recent announcement of some PS/2 models with a SCSI interface and the U.S. government's recent gigantic purchase of SCSI-equipped PCs under its Desktop III contract will boost SCSI acceptance in the PC world.

SCSI transfers data at up to 20 megabits per second. Eventually SCSI will support over 100 megabits per second, but for now it's in the ESDI range of speed. Taking things a bit farther than ESDI, SCSI actually puts the whole controller on the drive—the board in the computer really doesn't have much to do and is, strictly speaking, not a controller but a host adapter.

SCSIs are also neat because the interface lets you daisychain up to eight devices. That means theoretically you could run a couple of SCSI hard disks, a CD-ROM player (which also uses SCSI), and a scanner all off a single host adapter. While SCSI is probably a better interface in the long run, ESDI is currently better suited to the DOS environment and probably the better bet for now.

IDE (Integrated Drive Electronics) is basically a SCSI-like approach to ST506. The electronics can't handle SCSI speeds, and the interface relies on ST506 technology, but the controller is, again, located right on the drive, allowing greater transfer rates. The resulting stream of digital data is already preformatted for an IBM-type bus on a 40-pin connector, rather than using the more common two-cable approach. Compaq uses IDE extensively in its systems.

Sound good? It is, basically, with one twist: You can't maintain IDE with software. You're not supposed to low-level format it, and in fact I've seen a low-level format damage a Compaq drive. *The Norton Utilities* will work for some data recovery, but, again, disk-fixer programs can't help you much because IDEs tend to be sector-translating systems. Further, there's not really a standard IDE interface. In fact, one data-recovery firm reports at least 25 different kinds of IDE. There's something a bit too disposable about these drives; they're basically reliable, but you're helpless if they do develop a problem. IDE would be a very good idea if programs could reformat the drive and the IDE manufacturers would agree on a standard. These things may be the case in a year or two. Right now, be careful.

What About Hardcards?

Several firms offer hardcards, which are controller boards with a slim drive mounted right on them. They don't take up a drive bay, but they do take up a slot. Some, in fact, are designed so badly that they take up three slots—look out for these!

Hardcards are nice if you need a means to transport a lot of information, such as if you had to set up 20 identical machines in a learning lab. You'll probably want to avoid them, however, since they tend to be IDE and many generate a fair amount of heat near your other circuit boards.

The Great Encoding Debate

Part of a disk-system designer's job is figuring out how best to pack data on a drive. That's called the disk's *encoding scheme,* and it's always a matter of compromise—more data in an area means less reliability. Most PC drive/controller combinations prior to 1988 used modified frequency modulation (MFM).

Around 1986, a newer encoding scheme, run length limited (RLL—the idea was borrowed from mainframe drive design), started appearing on PC systems. It took any given drive and packed 50 percent more data on it—a drive that held 20MB when connected to an MFM controller could hold 30MB when paired with an RLL controller.

Obviously, the extra 50 percent doesn't come without cost. You can't just hook up an RLL controller to a drive that's been doing MFM, reformat, and instantly get more space. The drive has to be engineered better to be able to reliably store the more compact RLL format. That's why you see drives rated as either MFM or RLL quality.

For example, the Seagate ST4096 (an 80MB MFM drive) and the ST4144R (a 120MB RLL drive) are basically the same drive—120MB is 50 percent larger than 80MB. The 4144R is just built a bit better, and it costs a little more. The 4096 is $527 discounted; the 4144R is $589 discounted.

RLL has unfairly gotten a bad name in some circles because some computer dealers in the late 1980s matched up MFM-quality drives with RLL controllers. The result was larger-capacity, unreliable drives and a legion of headaches for PC fix-it people.

So when you're buying an RLL controller, buy an RLL-quality drive. Or you could buy a little insurance by matching up an RLL-quality drive with an MFM controller. Consider this: The ST4096 is a good drive, but why not spend $60 more for the ST4144R and format it under MFM as 80MB? After all, $589 is still a reasonable price for an 80MB drive, and you'd have an overengineered system that's very reliable.

By the way, when people advertise MFM or RLL drives, they really mean MFM- or RLL-encoded ST506. ESDI, SCSI, and IDE all encode with RLL.

Recommendations

Growing program sizes, downloadable fonts, and graphics make drives of 80MB and larger a necessity. The Maxtor or Seagate 80MB drives are both good and widely discounted. If you buy a 40-megger now, you'll only save a little money over an 80, you'll end up buying a larger drive in a year or two, and you'll be giving up a voice coil for a band stepper.

For an XT system, buy a 1:3 controller like the Western Digital (WD) XT-GEN or the Data Technology (DT) 5150 CX; both are good, basic, inexpensive 8-bit MFM controllers that can support a wide variety of drives. For XT RLL, try the WD 1004-27X. Avoid the Seagate ST-11R XT RLL controller, as it has a peculiarity that limits data reconstruction and recovery possibilities, and, besides, it only supports Seagate drives.

For an AT system, WD offers the 1006V-MM2 MFM controller and the 1006V-SR2 RLL controller. DT's 7280 MFM controller is also quite trouble-free. All three are 1:1 controllers, and each can be had for about $120.

If you need something larger (over 120MB), you'll probably have to go ESDI. CDC Imprimus (now owned by Seagate) makes good drives, as do Maxtor and Micropolis.

When buying computers, think twice about IDE drives. Again, IDE is a good idea, and you'll save a few bucks, but it robs you of a lot of disk-maintenance options. That means you should be careful about buying hardcards.

Ensure that on-board cache and sector translation, if present, can be disabled to get the maximum benefit from disk-maintenance programs. ⊡

**Gidget, the dog on our title page, was treated fairly and humanely.*

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PC DISK UPDATE

JOYCE SIDES

There's been some confusion about the difference between COMPUTE's two disk products: our *SharePak* disk and *COMPUTE's PC Disk*. The monthly *SharePak* disk is a thematic disk filled with two to five shareware programs. You can order a single disk for $5.95 for the 5¼-inch disk or $6.95 for the 3½-inch disk. Or you can subscribe to the monthly disk.

The subscription rate per year for the *SharePak* is $59.95 for the 5¼-inch disk and $64.95 for the 3½-inch disk. To see a description of the programs on the *SharePak* disk, look for the *SharePak* ad in *COMPUTE*.

PC Disk is different. It appears every two months and is filled with at least five commercial-quality free or shareware programs with a focus on utility and productivity software. We search through hundreds of programs and publish only the best. The *PC Disk* costs $9.95 for a single disk or $49.95 for a one-year subscription.

The bimonthly "On Disk" column in *COMPUTE* describes the programs and includes four screen shots to help you get a feel for each.

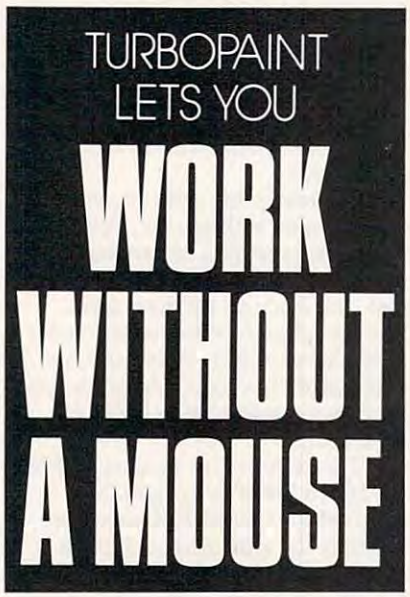
The "*PC Disk* Update" column covers reader tips and questions about the *PC Disk*. Questions concerning the *SharePak* should be sent to our customer service department at 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408, or you may call (919) 275-9809.

No Mouse Required

Unlike almost every other paint program I've used (including *DeluxePaint*), *TurboPaint* (October 1990) doesn't require a mouse to run. If you try to load other paint programs without a mouse driver installed, you won't get very far.

TurboPaint includes a keyboard driver that uses the cursor keys to move the mouse pointer. The 5 key acts as the left mouse button, and the Del key works as a substitute for the right mouse button. You have to press either key twice to get a complete mouse click. Pressing the 5 or Del key once tells *TurboPaint* that you're holding the button down. Use this when you want to drag the mouse pointer. Press the key the second time to release the button.

Of course, using the keyboard isn't as flexible as using the mouse, but it gives users who don't own a mouse the chance to try the program.



Starry-Eyed Tandys

Star Blaster (December 1990) may not work on your Tandy. If the program displays a message that it can't find your graphics card and you know that a graphics card is installed, call our customer service department at (919) 275-9809 or write to *PC Disk* Problems, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

Be specific about the problem. Give the program name, the issue in which the program was published, the nature of the problem, and the disk size you require. A disk will be sent to you with a version of *Star Blaster* that works on Tandy computers. We're sorry for any inconvenience this problem has caused our Tandy readers.

Mousing with *Screen Saver*

If you've had trouble installing the mouse option for *Screen Saver* (December 1990), here's how you do it. First, install *Screen Saver* using the SCSAVINS.EXE installation program. Choose option 8, *Ignore mouse movement,* and make sure the option is set to No. Save your changes and reboot the computer.

Install your mouse driver. Now run *Screen Saver* by entering SCSAVER ON at the DOS prompt. The install message should say *Mouse support enabled.*

To test the installation, run a program that uses a mouse. Wait for the timing interval to pass. When the screen blanks, press a mouse button. Please note that this option only works in programs that use a mouse.

DISKTRAK-tion

If you get the message *Advanced feature not available . . .* when you run *DISKTRAK* (December 1990), you're probably using a version of DOS earlier than DOS 3.0.

The author, Birk Binnard, advised me that he had updated the program since it was published in *COMPUTE*. The updated version still doesn't run under early versions of DOS, but it has a few bug fixes and added features such as path support for data files, a Restore function, and printer controls for printing reports.

The newest version is *DISKTRAK* 5.10, which you can get by downloading the program from CompuServe. It's located in area 6 of the IBM Utilities Forum.

If you don't have a modem or a CompuServe account, you can send a formatted disk plus $0.50 for postage in a reusable disk mailer to the address below. If you'd like to register the program, send a check for $15.00, or if you've already registered, send $5.00 to cover the cost of the disk, disk mailer, and postage to Peninsula Software, 28510 Blythewood Drive, Palos Verdes, California 90274. Make sure you include information about the size disk you need. ⊡

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TIPS & TOOLS

J O Y C E S I D E S

You can't nest FOR loops in batch files, as useful as this might be. A line entered in a batch file like the following won't work:

```
FOR %%t IN (C:\TP6 D:\TP) DO
    FOR %%p IN (*.PAS) DO DIR
    %%t %%p
```

Try it, and DOS will inform you curtly that FOR loops can't be nested. So what can you do when you want one command to apply to several disks or directories? You can fake it by employing COMMAND/C. (So you thought DOS 3.3 made COMMAND/C obsolete?)

The following is a tiny batch file I use to copy all my Pascal files from my D drive for *Turbo Pascal* version 5, and my C drive with the experimental version 6 files, all to a high-capacity disk in drive A.

```
FOR %%A IN (D:\TP C:\TP6)
    DO COMMAND/C FOR %%B
    IN (%%A\*.PAS) DO copy
    %%B A:
```

This horrifyingly convoluted program shows the best and the worst of the batch-file language. The best because it can do the job we want it to. The worst because doing it's unaesthetic!

The %%A stands in for the D:\TP directory and then the C:\TP6 directory. The FOR following the COMMAND/C is executed once for each directory in that first set of parentheses; there could be other directories listed as long as the entire line didn't exceed 128 characters. The COMMAND/C executes another copy of COMMAND.COM, so the second FOR statement has no idea that it's being executed from within another FOR statement.

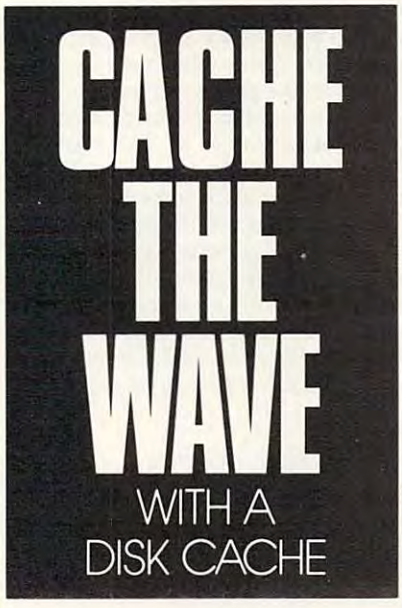
Tom Campbell
Irvine, CA

Windows 3.0 Switch-a-roo

The colorful icon of a *Windows* 3.0 application is probably the first thing a new *Windows* user notices. And it's neat that once a *Windows* application is installed in Program Manager, the icon for that program is automatically placed in the active window.

But did you know that many *Windows* programs give you a choice of icons? You can change the *Windows* 3.0 icons with a few mouse clicks. For example, *Corel Draw* and *Crosstalk* for *Windows* come equipped with two optional icons—the default icon that most of us use and a second icon that's there, if you know how to get to it.

In Program Manager, locate the



program that you'd like to check for alternate icons, *Corel Draw,* in my example. Click on the program once (don't run the program).

In Program Manager's menu, select the File menu and then the Properties option. You'll see the window Program Item Properties. Click on the Change Icon button.

When the Select Icon window appears, click on the View Next button, and cycle through the icons that the program contains. Not every *Windows* application has multiple icons. For instance, *Micrografx Designer* only has one icon, but *Corel Draw, Tetris,* and *Crosstalk* for *Windows* have two icons each. Experiment with your *Windows* programs to find which ones have extra icons.

Mark Minasi
Arlington, VA

Tipped Off

Are you thinking of turning that extra junk room into a computer room or an office? You may find that there isn't enough desk space for your CPU unit, monitor, keyboard, mouse pad, and so on among all the other paraphernalia in the room.

You could solve the space problem by turning your desktop computer into a tower unit. Of course, to do this, you should have enough room on the floor to place the unit. You should also make sure the system will get enough ventilation. It shouldn't be squeezed into a place where the fan can't circulate the air to cool the unit.

First, go to a computer accessory store and buy a stand specifically for converting units into tower systems. Then back up your hard drive (just in case), and install the unit in the stand.

Some computer dealers advise reformatting a hard drive once a desktop system has been installed as a tower unit. There could be a problem with misalignment of the read/write heads which might render the data on the disk unreadable (hence the reason for backing up your hard drive first). Reformatting the disk corrects any potential problems.

You don't have to perform a destructive format. You can do a low-level format that serves the same purpose as a complete format for aligning the disk drive heads, and it doesn't destroy the data on the disk. Use a program such as Gibson Research's *SpinRite II* to make sure the job is done right.

Peter Michaels
San Francisco, CA

Speed Up *dBase*

If your *dBase* databases are growing large, you can speed up processing by using the SET ODOMETER com-

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mand. When you use commands such as COPY, JOIN, COUNT, or SUM, *dBase* keeps you posted on its progress by posting a running counter, or odometer, on the screen as it moves through the records.

This slows processing because *dBase* has to refresh the screen after processing each record. If you use the command SET ODOMETER TO 10, or SET ODOMETER TO 100, the screen will be updated every 10 or 100 records. On large databases, this saves significant amounts of time, yet it still provides you with a progress report so you know *dBase* is still working.

SET ODOMETER TO 0 is similar to SET TALK OFF in that *dBase* does not report on its progress through the database. But unlike SET TALK OFF, SET ODOMETER TO 0 provides a count of the records processed when the task has completed.

Tony Roberts
Greensboro, NC

Cache the Wave

The most demanding mechanical activities for a drive are starting up in the morning and moving the head throughout the day. You can relieve the first problem by leaving your machine on all the time and avoid the second with a cache program. A disk cache minimizes the number of movements that the read/write heads in your disk drive must perform. In the process, it also helps speed up the system's activities.

Disk caches transfer data from memory to memory, which is much faster than disk-to-memory transfers. Disk drives respond to read and write requests hundreds of thousands of times more slowly than RAM memory responds to read and write requests. Disk caches let your system use the disk less and RAM more.

Part of COMMAND.COM is reread after you exit any large program. This means disk access. If you've ever noticed a quick flash of the hard disk light when you exit a program, you've seen the COMMAND.COM reload. Rather than firing up the disk drive and moving the head to reread COMMAND.COM, a disk cache files a copy of COMMAND.COM in memory and reads the file from the copy instead of from the COMMAND.COM disk file.

That's the idea of a cache. It's a memory-resident program that watches disk reads and writes and makes copies of disk activity in a section of memory (usually extended or expanded memory, since a cache of one to two megabytes is preferable).

Disk caches relieve your disk drive of work, and this might save on disk repairs.

SMARTDRV.SYS, shipped with MS-DOS and *Windows,* is a simple cache program that does the job. My favorite cache, however, is Multisoft's *SUPER PC-KWIK* cache, which costs less than $100. To get a copy of *SUPER PC-KWIK,* call Multisoft at (503) 644-5644.

Mark Minasi
Arlington, VA

Time Out

If the clock in your PC occasionally forgets the time, the battery might need to be replaced. Then again, it might not. The problem may be caused by the games you're playing.

Jack Nicklaus' Greatest Holes of Golf is one example. My Northgate AT forgets what time it is when I play the game. The clock stops during gameplay; however, it starts up again as soon as the game is over. I handle this problem by running the game as a menu choice, from a batch file running under *Automenu.* You can run the batch file from the DOS prompt if you're not using a menuing system.

```
D:
CD \GAMES \JACKN
GOLF E
C:
TIME
MENU
```

The batch file is called NICK.BAT, and you should enter the command NICK to run the batch file. You should also include the correct drive IDs and subdirectory names to fit your system.

James Condon
Gloversville, NY

Exporting Data the Easy Way

Almost everyone knows how to use OPEN and PRINT# in *QuickBASIC.* But you might not know that there's an embarrassingly simple way to create comma-delimited ASCII files. Just about every database program and spreadsheet in the world can import ASCII files. It's the universal format.

The WRITE # statement is a quick back door to the most popular data-management programs in the world, from *Lotus 1-2-3* to *dBase* to *Quattro Pro.*

Try running this program; it asks you for information similar to what you might put in a customer list. To stop it, simply press Enter instead of typing in the last name.

```
OPEN "DATA.TXT" FOR
   OUTPUT AS #1
DO
   LINE INPUT "Name: ";
      NAME$
   IF Name$ = " " THEN EXIT
      DO
   LINE INPUT "Address: ";
      ADDRESS$
   LINE INPUT "City: "; CITY$
   LINE INPUT "State: ";
      STATE$
   LINE INPUT "ZIP: "; ZIP$
WRITE #1, NAME$, ADDRESS$,
      CITY$,STATE$,ZIP$
LOOP
CLOSE #1
```

The output looks something like this:

```
"Tom Campbell","8 Hazelnut",
   "Irvine","CA","92714"
"John Seagull","1 McCartney
   Ave.","Hollywood",
   "CA","97114"
```

Note that all the data, numeric or not, is surrounded by quotation marks when written to the file with WRITE #. Items separated by semicolons in the WRITE # statement are separated by commas in the record. Each record ends with a carriage return or linefeed. The most difficult thing to remember about using WRITE # is never, under any circumstances, to let anyone know how easy this feature was to program.

Tom Campbell
Irvine, CA

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to COMPUTE's Tips & Tools, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you $25–$50 and send you a COMPUTE's PC LCD clock radio while supplies last. ⊡

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PROGRAMMING POWER

TOM CAMPBELL

CONSUMING FILES BYTE BY BYTE

Computer files come in different flavors. Some have a predictable structure—like text files or files of fixed-length records—but most are unpredictable. This month we'll learn how to read files with an unknown composition (notably COM, EXE, and OBJ files), and we'll see how to pick out the text strings hiding inside.

But before we begin, let's step back and look at what files actually are. A file is anything stored on disk. This includes what you normally think of as data files, such as the WK2 files from a spreadsheet, DOC files from a word processor, or DBF files from a database. But it also includes DOS, contained in hidden files on your boot disk; COMMAND.COM, your command line interpreter; and programs like DBASE.EXE, WP.EXE, and XCOPY.EXE.

It's no accident that DOS stands for *Disk Operating System.* Many people become confused when they discover that the operating system itself is usually nothing more than a file. But because they are files, DOS and executable programs can be read like any other data files.

That's why this month's program, *SNOOP,* can read through any kind of file looking for messages in ASCII text format. To use *SNOOP,* just enter SNOOP and a filename at the command line. Any messages the file contains will be written on the screen. Try entering these commands (supplying your system's path to each file):

SNOOP QB.EXE
SNOOP COMMAND.COM
SNOOP MODE.COM

Many have claimed that MS-DOS is arbitrary, illogical, and difficult to learn; and that may be true of some of its aspects. But file handling is one of the exceptions. To appreciate how logically DOS handles files, consider the peculiar foibles of the early Macintosh operating system.

Apple tried to avoid the term *file* when the Macintosh was introduced. Instead, programs (executable files) were called *applications,* and the files they created were known as *documents.*

It was a noble but misguided idea. Applying the term *document* to a 200-layer CAD drawing or a database containing 10,000 employees didn't make the notion of files more concrete but only added another confusing level of abstraction.

In short, a file is anything stored on disk, and the steps you take in using a disk file are analogous to the steps you would take with a manila folder. You must

1. Open the file.
2. Use the file (read it or write to it).
3. Close the file.

You deal with Manila folders the same way. You can't take anything out of a file before you open it, and you'll run into problems if you don't close the file and put it away when you're finished.

The next larger unit of the operating system is the subdirectory, roughly equivalent to a filing cabinet. DOS's earliest version left out subdirectories, and even after a tree subdirectory system was featured, many programs were unable to make use of it.

In *QuickBASIC,* a formal syntax chart of the OPEN command looks scary:

OPEN @file$ [FOR mode] [ACCESS access] [lock] AS [#]filenumber% [LEN=reclen%]

Indeed, the options are almost overwhelming, but we'll pay attention only to the configuration of this month's OPEN statements. The first courtesy owed a user by a program that uses existing files (as opposed to one that creates files) is to ensure that the requested file exists and to display a suitable error message if it doesn't.

QuickBASIC, like *Turbo Pascal,* doesn't have a particularly attractive means of doing that. You have to lie in wait with ON ERROR, open a file for sequential access (that is, as if it were a text file), input only, and wait for runtime error 53, which will occur when a file with that name doesn't exist. I couldn't find runtime errors (which is what ON ERROR traps) listed in the *QuickBASIC* documentation, so this information comes to you by way of experimentation. Other modes, such as BINARY and RANDOM, create a file if the file doesn't already exist. Then you must close the file and start your program—in this case, by immediately reopening the file in binary mode.

The first OPEN in the program, the dummy one whose only purpose in life is to see if the requested file is available, looks like this:

OPEN COMMAND$ FOR INPUT AS #1 ' Make sure the file exists.

This means *Open the file named on the command line for sequential access, and use file descriptor number 1.* Note that the word *sequential* doesn't appear anywhere. This is because of the history of file management. BASIC originally could open only text

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files, and other modes were tacked onto the syntax later. File handling is one of the features that seem to be completely different on each implementation of BASIC on minis and mainframes and among dialects in those environments.

As mentioned, opening a nonexistent file triggers a branch to the user's error-handling routine at runtime; this month's ON ERROR has a hard-coded check for error 53 because that's *QuickBASIC*'s internal error code for *File not found.* If the file exists, execution continues. We close the file immediately (because it's been opened in the wrong mode) and reopen it in the next statement:

OPEN COMMAND$ FOR BINARY AS #1

Binary access means the file is treated as a row of bytes on the disk, which the program is responsible for managing. In a text file, INPUT # searches for delimiters such as carriage returns instead of reading a certain number of bytes. So if you wanted to look for text strings in a file such as COMMAND.COM or WP.EXE, all kinds of nasty errors could happen because you have no guarantee that a delimiter will appear *anywhere* in a nontext file.

The best way to deal with a file of bytes is to create a data type that contains only one byte. You could use TYPE, but the easiest alternative here is to create an anonymous data type and immediately allocate space for it, a trick that C has had for years, Pascal still doesn't have, and *QuickBASIC* has acquired recently.

DIM NextByte AS STRING * 1

This statement creates a variable called NextByte that holds just one byte of data. We retrieve a byte from the input file this way:

GET #1, , NextByte: ' Get the next
' character from the input file.

The empty parameter betwen #1 and NextByte is the record-length parameter used in RANDOM mode. It's not necessary here, but it must be retained as a placeholder. In the program the GET statement is placed in a normal WHILE NOT EOF/WEND loop. ⊡

```
' SNOOP.BAS -- Finds messages in a file.
' Format:  SNOOP [d:][path]filename[.ext]
' Forward declarations--these routines are used in the program.
DECLARE SUB HandleError ()
DECLARE FUNCTION IsAlpha! (NextByte$)
DECLARE FUNCTION IsPrint% (NextByte$)
DECLARE SUB Pause ()
ON ERROR GOTO HandleError

' This creates a data type with no name.  It lets us read one byte
' at a time from the file.
DIM NextByte AS STRING * 1
CONST MinStr = 5 ' Minimum # of printable characters that form a word.
CONST True = -1, False = NOT True ' Constants for clarity.
DEFINT A-Z       ' All variables are integers unless a suffix character is used.
NextByteASC = 0  ' Do a CHR on this only once, to speed things up.
Position = 0     ' Tracks byte offset into the file.
StrSize = 0      ' # of chars in printable string so far.
Word$ = ""       ' Initialize the word collect so far.

OPEN COMMAND$ FOR INPUT AS #1  ' Make sure the file exists.
CLOSE 1                        ' It does. Close it.
' READ necessary because RANDOM mode defaults to read-write.
OPEN COMMAND$ FOR BINARY AS #1
PRINT "Processing file "; COMMAND$
PRINT "Press (Esc) to quit or (Space) to pause."
PRINT
WHILE NOT EOF(1) ' Continue until file 1, the input, has been read through.
  GET #1, , NextByte: ' Get the next character from the input file.
  Pause               ' The user may pause output or quit now.
  NextByteASC = ASC(NextByte)
  ' If it's extended ASCII, reset the string and exit the loop.
  IF NextByteASC AND 128 THEN
    StrSize = 0
  ELSE
    ' If it's an end-of-string character,
    IF (NextByte = CHR$(13)) OR (NextByte = CHR$(0)) OR (NextByte = "$") THEN
      ' and the accumulated string is long enough,
      IF StrSize >= MinStr THEN
        ' success!  Print the string!
        PRINT Word$
        ' And start back at square one by reinitializing state variables.
        StrSize = 0: Word$ = ""
      ELSE
        ' EOS found, but string was too short.  Reset state variables.
        StrSize = 0: Word$ = ""
      END IF ' StrSize >= MinStr
    ELSE
      ' Not an EOS character. See if it's printable.
      ' If there's no string yet,
      IF StrSize = 0 THEN
        ' and if this is a letter,
        IF IsAlpha(NextByte$) THEN
          ' then assume the first letter of a valid string has been found.
          StrSize = 1: Word$ = NextByte
        END IF ' IsAlpha
      ELSE
        ' This isn't the first letter of the word.
        IF IsPrint%(NextByte$) THEN
          ' Another printable char has been found, so add it to the
          ' uninterrupted string of printable chars.
          StrSize = StrSize + 1: Word$ = Word$ + NextByte
        ELSE
          ' A string of printable chars has been interrupted by an
          ' unprintable char.  This makes the whole string invalid,
          ' and we must start back at square one.
          StrSize = 0: Word$ = ""
        END IF
      END IF ' IF StrSize = 0
    END IF ' IF NextByte = Chr$(13)
  END IF ' IF NextByteASC AND 128
WEND
CLOSE #1 ' Return the file's resources to DOS.
END


' Display this if a runtime error occurs.
HandleError:
  IF ERR = 53 THEN  '  Handle the most common case.
    PRINT "File "; COMMAND$; " doesn't exist."
  ELSE
    PRINT "Runtime error #"; ERR
  END IF
  END

DEFSNG A-Z
FUNCTION IsAlpha (NextByte$)    ' Returns True if the character NextByte$
  SELECT CASE NextByte$         ' is a letter.
    CASE "A" TO "Z"             ' If it's in the range of uppercase letters,
      IsAlpha = True            ' return a nonzero value.
    CASE "a" TO "z"             ' If it's in the range of lowercase
      IsAlpha = True            ' letters, return a nonzero value (True).
    CASE ELSE                   ' If it's not in the prescribed range,
      IsAlpha = False           ' the function call fails.
  END SELECT
END FUNCTION

FUNCTION IsPrint% (NextByte$)  ' Returns a nonzero value (True) if the
  SELECT CASE NextByte$        ' character NextByte$ is printable.
    CASE " " TO "}"            ' Printable means not a control character
      IsPrint% = True          ' or not an extended ASCII character.
    CASE ELSE                  ' If it's not printable, return a zero
      IsPrint% = False         ' value (False).
  END SELECT
END FUNCTION

SUB Pause                      ' Check for a keystroke.  If it's the space
  GetKey$ = INKEY$             ' bar, wait for another keystroke.  If it's
  IF GetKey$ = CHR$(27) THEN   ' the (Esc) key, exit the program.
    PRINT "Interrupted"        ' (Esc) has been pressed. Say so.
    CLOSE 1                    ' Return file resources to DOS.
    END                        ' Return to DOS.
  ELSE                         ' (Space) was pressed.
    IF GetKey$ = " " THEN      ' If any other key, ignore.
      PRINT "Pausing..."       ' Print status message.
      DO                       ' Wait for any other keystroke.
      LOOP WHILE INKEY$ = ""   ' This returns to DOS if a key hasn't been
      PRINT "Continuing"       ' pressed.  Continues here when a key has
    END IF                     ' been pressed.
  END IF
END SUB
```

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POINT & CLICK

CLIFTON KARNES

What's the hottest programming tool to hit the PC since the original *Turbo Pascal?* Without a doubt, it's Asymetrix's *ToolBook* for *Windows* (Asymetrix, 110 110th Avenue NE, Suite 717, Bellevue, Washington 98004; 206-462-0501; $395).

Like *Windows* itself, *ToolBook* is an object-oriented, event-driven environment. This means that a program waits for events from the user and takes action based on the nature of these events. The user is in control, and the program is passive.

In *ToolBook,* this environment has two main elements: graphics objects and object handlers. Almost everything you see on the screen is an object, and a program communicates with these objects by sending messages to them whenever an event involving the object occurs. Objects, in turn, act on these events by executing handlers written in *ToolBook's* OpenScript programming language.

As an example, let's look at the familiar OK button. This button is an object, and when you click on it, this event causes the operating environment to send a message to the button telling it that it has been clicked. If you want to do something when this event occurs, you attach a message handler to the button. In the case of an OK button, the message handler might dismiss a dialog box.

That's the essence of *ToolBook* programming—objects and handlers, interacting by way of event-caused messages. *ToolBook* takes care of notifying you of events and sending messages. You have to create the objects for these events and attach handlers.

Creating objects using *ToolBook's* design tools is a pleasure. The program offers a high-quality set of object-based drawing tools, including Bezier curves, which rival those found in many dedicated drawing programs. Add to that support for millions of colors, most in dithered patterns, and you have an interface construction set that most programmers only dream about.

To help with interface design, *ToolBook* offers two basic groups of predefined objects: buttons and fields. (A third type of object, a hotword, is really a special type of button whose object is a word.)

Standard buttons come in a variety of types including push buttons, radio buttons, and check-box buttons. Styles are rectangular, rounded-corners, shadowed, and transparent.

TOOLBOOK PROVES OBJECTS MAKE SENSE

Fields are used to display text or other objects and have as much flexibility as buttons. You can have scrolling, bordered, transparent, and record fields; record fields are just one example of *ToolBook's* special support for database construction.

If these objects aren't enough, you can create your own, and you can combine any number of objects into a group. And all objects can be moved, resized, and recolored at any time.

Behind the objects that make up a *Toolbook* program's interface are handlers written in OpenScript. As a programming language, it is complete, powerful, and very English-like. You can do almost anything in it that you can do in C or Pascal, but since OpenScript is interpreted, it can be slower.

As far as large-scale organization goes, *ToolBook* was inspired, at least in part, by the Macintosh-based *HyperCard* and its HyperTalk programming language. *ToolBook* uses a book metaphor in much the same way that *HyperCard* uses the stack.

Programs in *ToolBook* consist of one or more pages in a book. A page, like a book itself, is an object and can be used to represent almost anything—a record in a database, the main window of a word processor, a dialog box, or a page of text in a hyperlinked document.

ToolBook is so powerful and deep that it's hard to describe. I've been working with it for months, and I don't feel like I've really tapped its full potential. My only complaint with *ToolBook* is its speed. Although it does some things extremely fast—like putting graphics on the screen and sorting—no program can ever be too fast or too small. With careful design and coding, however, a *ToolBook* program can be made fairly speedy.

If you decide to take the *ToolBook* plunge, there are two additional packages you should know about. The first is Asymetrix's *Author's Resource Kit,* or *ARK* ($450). *ARK* is intended for developers, and although it comes with a very useful utility, *BookLook,* its big draw is its license to distribute the *ToolBook* runtime. If you plan to market your *ToolBook* applications, you'll need *ARK.*

The second package is *R-Spy* (Syndetic Management Systems, 15530 SE 184th Street, Renton, Washington 98058; 206-228-4026; $125). *R-Spy* is a programmer's utility that gives you instant access to any *ToolBook* script or object. With *R-Spy,* you can simply click the right mouse button on any *ToolBook* object (this hot click can be redefined), and you'll see a dialog box that lets you edit the script of the target, the book, the current page, or the page's background. You can also change the target and edit or view its properties. If you're serious about programming in *ToolBook, R-Spy* is essential. ⊡

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Not long ago, the word *laser* brought to mind sophisticated weaponry, radio transmissions bouncing off the moon, microsurgery, and other futuristic images. Who would've thought that by 1990 literally millions of people would have laser devices sitting on their desks?

Like every other facet of the computer world, printing has evolved substantially. We used to be amazed at the speed of daisywheel printers. They were little more than computer-driven typewriters, but at speeds ranging around 200 words per minute (with no errors), they left human typists in the dust.

Dot-matrix printers seemed wonderful devices—they printed fast and were capable of producing graphics. Later, near-letter-quality (NLQ) printing allowed dot-matrix printers to be used for important business letters. NLQ involved nothing more than teaching the printer to put more ink in a smaller space, or increasing the resolution—the dots per inch (dpi).

Increasing print quality slowed a dot-matrix printer significantly, however—often to half its draft-mode speed. Printer technology had come a long way, but it was far from perfect. It wasn't until laser printers hit the market that computer hardcopy output reached exceptional quality.

Laser Technology

Laser printers use a technology similar to that of copy machines: The paper is electrically charged as it passes through the device so that a fine black powder called *toner* will leap from a device known as a *printer drum* to the paper in the desired patterns. The difference is in the way the image is electronically etched on the printer drum.

BY WILLIAM HARREL

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Copiers generally feed the image of the page being copied to the printer drum through simple optics. Laser printers use a laser beam to transmit a page in computer memory to the drum.

A big difference between laser printers and other printing devices is that the entire page is programmed, or *rasterized,* in memory before the paper begins its journey through the printer. Dot-matrix and impact printers, on the other hand, program as they print, printing a little of the page at a time.

The benefits of laser printers are many, one of the most important being speed. In draft mode, a good 24-pin dot-matrix will print at somewhere between 300 and 400 characters per second (cps), and considerably slower if it's in NLQ mode. Laser printer speed is measured, instead, by pages per minute (ppm). Many of today's laser printers will churn out eight ppm, and a few will do ten. Soon we'll see these desktop laser printer speeds double. On a basis of 300 words per page averaging five characters per word at eight ppm, a laser printer will approach 200 cps—about the speed of a dot-matrix printer—and all of it letter quality.

ROBERT PIZZO

Another advantage of laser technology is sound—or, rather, the lack of it. Dot-matrix and impact printers are annoyingly noisy. If you have several printers going at once, conversation is almost impossible, to say nothing of phone calls. All you hear from a laser printer is its fan and, when printing, the low hum of the printer engine as it carries the paper through.

The most significant difference between laser and other printers is the resolution of the output. The higher the resolution, the cleaner the output. Most of today's laser printers print at 300 dpi, though there are several higher-resolution devices on the market, some of them printing as high as 1000 dpi. Most dot-matrix printers produce somewhere around 75 dpi. Laser printers have allowed computer output to move into the realm of typesetting.

Better resolution means better text and graphics—much better text and graphics. Depending on the instructions from the software driving the printer, graphic lines are smooth, gray shading is evenly dispersed, and text (especially in larger fonts) doesn't have that blocky, stairstep appearance associated with computer output.

A Question of Character

It's difficult to talk about laser printers without using some fairly technical typesetting terms like *typeface, point size,* and so on. Let's pause here a moment for a few definitions.

A typeface, such as Courier, is a family of fonts. Typefaces usually include four fonts: normal, italic, bold, and bold italic. Fonts come in point sizes (abbreviated as pts—there are 72 points per inch) from 2 points on up. Therefore, you would be able to visualize a 12-point italic Courier as being like the output from a standard typewriter, 1/6-inch high, and slightly oblique.

Another pair of terms used in defining fonts are *proportional* and *fixed spacing* (or *monospacing*). Fixed-space fonts—if you are currently using a dot-matrix or impact printer—are probably what you're used to. Courier is a fixed-space font. The individual characters in Courier occupy the same amount of space on a line. An *I* is given the same amount of space as a *G,* for example.

Proportional fonts apportion line space to each character according to its width, and pairs of characters are kerned, which means that they're spaced in relationship to each other to give them a more pleasing appearance. For example, a capital *T* and a lowercase *o* can be squeezed closer together than their individual widths because the *o* can be moved slightly underneath the crossbar of the *T.*

Inside Story

Not only laser printers, but all printers, including typewriters, come with fonts built in. These are called *resident fonts.* Typewriters and impact printers have wheels or balls you can snap in and out to change type styles. An advantage of laser printers is their ability to accept hundreds of different fonts in all kinds of point sizes.

There are a number of methods to get fonts into a laser printer; the two most common ways are by using soft fonts and cartridges.

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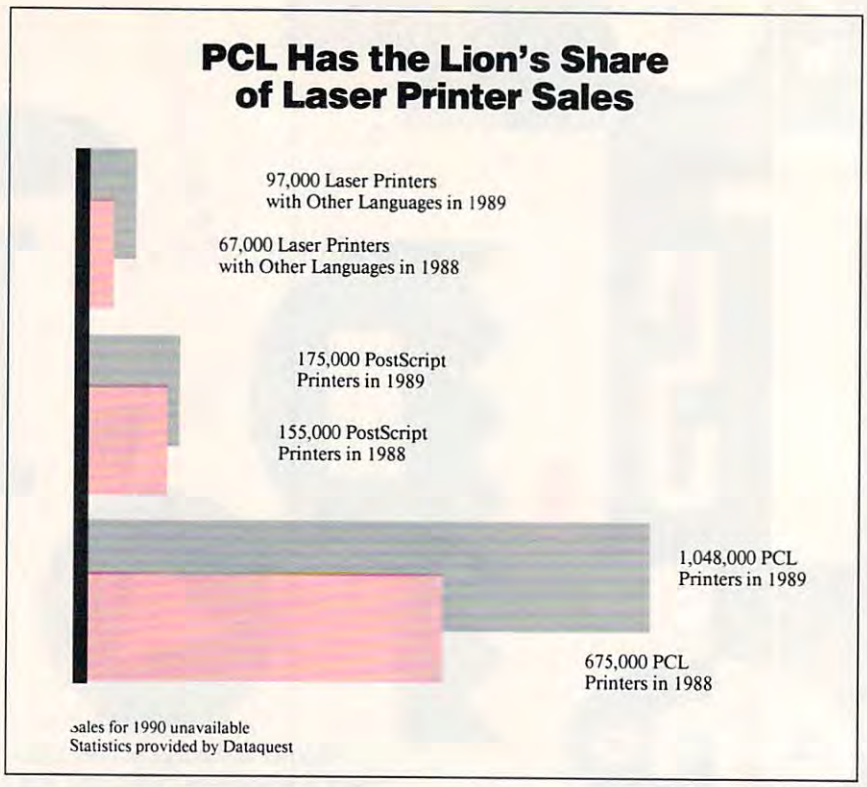
Soft fonts are software that is sent to the printer from your computer through a process called *downloading,* which is a common term for sending data from one device to another. Fonts can be downloaded into a printer's memory as needed for a specific print job (called *temporary soft fonts*), or they can be downloaded and kept in the printer's memory until the printer is shut off (called *permanent soft fonts*).

Although there are two different downloading techniques, that doesn't mean that you need two different kinds of fonts. All soft fonts are capable of being either temporary or permanent. The downloading technique is usually determined by the word processor or desktop publishing software.

Cartridge fonts come in cartridges that plug into special slots in the laser printer. Once the cartridge is plugged in and activated, the fonts in the cartridge become resident. There are literally hundreds of different font cartridges available, with a multitude of font combinations. The major drawback to most of them is that, unlike soft fonts, you are usually locked into a limited selection of fonts and point sizes. But cartridges are much easier to install and use than soft fonts.

High-resolution output like this is standard with 1250-dpi typesetters. The same graphic could be printed on a laser printer, with significant degradation in smoothness. (Graphic used with permission from Dynamic Graphics, Peoria, Illinois.)



The Great Language Debate

A laser printer uses a page-description language (PDL) to determine where to put toner on paper. Although there are several PDLs out there, two are at the forefront: Adobe Systems' PostScript and Hewlett-Packard's Printer Control Language (PCL). Which language is better? The best answer is that it depends on your application.

Among other major differences between the two types of printers is price. A PostScript printer can cost thousands more than a PCL printer; however, the prices of both kinds of printers have dropped considerably over the past year, making the decision to go with PostScript less onerous.

PostScript printers are the devices of choice for most high-end desktop publishers. The reasons are many. In several ways, PostScript is a more flexible language than PCL.

PCL printers use a convention for printing fonts called *bitmap.* Bitmap fonts are produced as patterns of dots that are fixed in position like the elements of a rubber stamp. Every character must have its own bitmap.

PostScript fonts, on the other hand, are drawn based on instructions that reside in memory or are downloaded from your computer. Fonts created from instructions rather than from bitmaps are called *outline fonts.* Since each character is drawn separately, it's easy to manipulate, stretch, or treat text with any number of other special effects, such as reversing (mirroring), skewing, outlining, and so on. PostScript fonts can be rotated to any degree or printed with different fills. The only limitation is your imagination.

Another font advantage of PostScript is that most devices using this language come with 35 scalable fonts, meaning that all 35 can be sized in increments of 0.5 points, from 2 points to more than 700 points (depending primarily on your software). Any outline soft font downloaded to a PostScript printer can also be scaled accordingly.

Although the latest PCL version (Version V, used in the LaserJet Series III) does contain some limited font scaling and a few other font special effects capabilities, most PCL printers must have a separate font in the printer for each font attribute and point size. In other words, to use Times 10 point in normal, bold, italic, and bold italic, you must download four files to the printer. If you also want to use these four Times fonts in a 12-point size, you must download four more files.

Font files must be stored either on your hard disk or on floppies. They take up an enormous amount of disk space (to store three typefaces in various point sizes ranging from 6 point to 36 point in all four fonts can take ten megabytes or more).

Also, soft fonts require huge amounts of printer memory. This drastically limits the number of fonts and the size of graphics you can use per document page. Another PCL disadvantage is that, depending on the speed of your computer, it can take a

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This graphic was created in a large size at low resolution and then reduced in size to increase the number of dots per inch. (Graphic used with permission from Dynamic Graphics, Peoria, Illinois.)

long time to download fonts. Larger point sizes can take several minutes.

Even though PCL font cartridges follow the same convention—fonts must be present in specific attributes and point sizes—they can eliminate some of the inconvenience. As mentioned, most cartridges are limited. However, a number of megafont cartridges have recently become available. Computer Peripherals, for example, makes a cartridge called SuperSet+ that contains over 400 fonts. And several companies make PostScript emulation cartridges that give certain PCL printers all the font features of PostScript. PostScript printers, in contrast, have no need for cartridges. Their outline fonts use significantly less disk or printer storage.

Another PostScript advantage is greater graphics control. Since PostScript *draws* its lines and arches (rather than bitmapping them), the smoothness of graphic elements isn't dependent on the quality of the information sent from the computer (as it would be with a bitmapped language like PCL). Instead, it's dependent on the highest resolution of the printer. Any PostScript printer will provide output at the limits of its resolution, whether that is the standard 300 dpi of desktop laser printers or the far higher resolution of typesetting machines. PostScript printers are capable of printing Encapsulated PostScript (EPS) graphics, which can contain intricate patterns and fills unavailable in PCL.

Desktop publishers utilize PostScript laser 300-dpi output to create drafts of documents that require higher resolution typesetting. After all the revisions have been made, the document is then played out on Allied Linotype's Linotronic typesetters at 1270 dpi or higher for excellent quality. All you have to do is take your disk to the local graphics service bureau.

The question of whether you need PostScript or PCL is not the only consideration.

PCL will drive a few typesetting machines, but so far this type of output hasn't caught on. You could be hard-pressed to find a service bureau that can typeset from PCL files.

PostScript is not without its disadvantages. As mentioned, the price of PostScript printers has always been significantly higher than that of PCL printers. Laser printer prices have dropped dramatically over the past year or so. However, while the price of low-end PostScript printers has come down by 40 percent (to around $3,000), the price of the least-expensive PCL printers has dropped by 50 percent (to less than $1,000). The gap narrows almost to insignificance, however, with the introduction of a $995 PostScript printer called the JetScript by the Printer Works (3482 Arden Road, Hayward, California 94545; 415-887-6116). One reason for this printer's low cost is that it uses a refurbished printer engine. Watch for a review of this machine in an upcoming issue of *COMPUTE*.

PostScript is also notoriously slow. Waiting for intricate or bitmapped graphics to print on a PostScript device can be excruciating. However, relatively new technology has sped PostScript by as much as a factor of 5. Most documents will print with little or no delay.

Before You Buy

The question of whether you need PostScript or PCL is not the only consideration in buying a laser printer. Some printers don't use either language, which means you could have trouble using them with some of your software. Canon, for example, makes several printers that use a language called Canon Printer System Language (CaPSL). These printers have nine scalable fonts and can be upgraded to almost the same standards as PostScript. However, at present not all software programs support Canon printers. There are also printers, such as several NEC lasers, that support both PCL and PostScript.

There are many, many laser printer manufacturers and distributors out there today, and you'll find printers with all kinds of configurations and a wide range of prices. Printer RAM, for example, is an important feature. Many printers are shipped with only 512K of RAM, which is barely enough to download a couple of fonts or to print about half of a page of graphics. PostScript printers with two or three megabytes of RAM can store additional data while printing a page, freeing up your computer to start the next page sooner.

Printer RAM can almost always be upgraded, but at a cost somewhat higher than upgrading your computer's RAM.

PCL printers handle memory a little differently from PostScript printers, but a good rule of thumb is that you'll need a 1MB minimum for full-page graphics and more than 1MB if you want to use many soft fonts and intricate graphics on the same page. Printer RAM of 3MB is almost impossible to overload, unless you're doing high-end desktop publishing.

Laser printers also come with different font configurations. Some, such as the HP LaserJet Series IIP, come with only a few fixed-space fonts, and

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a few PostScript printers have well over the standard 35 fonts resident. Not all PostScript printers use true Adobe PostScript, which could mean that Adobe Type 1 (the one used by typesetters) downloadable fonts are not supported.

Paper-handling options are also important. Some printers cannot handle paper sizes smaller than 8½ × 11 inches, and many will not print envelopes. Some have paper trays that hold only 100 sheets of paper, while others have more than one 250-sheet paper tray, and many printers can be equipped with much larger paper trays. Still other printers, such as the HP LaserJet Series IID, support duplex printing—printing on both sides of the paper.

These configuration questions should all be considered before you go shopping for a laser printer. Sometimes one or two hundred dollars can make a world of difference in the printer you finally set on your desk. There are many good laser printers available and some that are not so good. A safe plan would be to purchase a product that can be upgraded later; you never know where your computer application might take you.

PostScript Alternatives

Buying a PCL printer for under $1,000 is for many computer users the only economically feasible means for obtaining a laser printer. Many PCL users find themselves wishing later they had the power of PostScript. Today there are a number of PostScript alternatives for most PCL printers—everything from low-cost software, like *GoScript* and *Freedom of Press,* to expensive boards and other not-so-expensive hardware.

Rotating, tinting, wrapping, and blending—all seen in this example—are only a sample of the typographic tricks you can play with PostScript. (Graphic used with permission from The WRITE Desktop Publisher, Ventura, California.)

Probably the most convenient and practical solution is a PostScript emulation cartridge. PostScript cartridges work the same as font cartridges: Just plug them in and tell your software to use PostScript. These cartridges endow PCL printers with all 35 scalable fonts and all other PostScript functions at a fraction of the cost. There are several available, and they range from $300 to $700. Vendors include Computer Peripherals, Adobe Systems, Pacific Data, and Hewlett-Packard.

The main thing to remember when buying a PostScript cartridge is that they all require more than the 512K of RAM that comes standard with some PCL printers. Currently, most require a minimum of 2.5MB of RAM, but Computer Peripheral's JetPage requires a mere 1.5MB. ⊡

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GEORGE CAMPBELL

ANSWERS TO QUESTIONS ABOUT MEDICINE AND HEALTH

Health is a key issue for all of us. Regular checkups and careful living are essential to maintain ourselves. Sometimes, however, we have questions about health issues and need answers. Where can we turn?

Books are one solution, but popular medical guides often don't offer enough information, and they aren't interactive. For PC users with modems, there's a better way to get answers about health. A wealth of online resources are available on any health issue.

More and more users are signing up to take advantage of GEnie's flat-rate Star Services. Among those services is GEnie's Medical Roundtable. At no extra charge, you can use the bulletin board area of this roundtable to get the answers you need.

To access this area, just type *medical* at any GEnie prompt. Once you're in the roundtable, choose the Medical Bulletin Board option on the menu. The bulletin board is divided into 15 categories, ranging from Clinical Consulting and AIDS to Medical Ethics and Ask the Doctor. Within each of these categories, you'll find hundreds of topics of discussion. You can read messages or ask your own questions.

While you can't expect to use this service as a substitute for regular medical care, it's a terrific place to go for any medical questions you might have. If you ask a question in one of the bulletin board areas, you can be sure of a quick and accurate response, usually from a physician or other health professional.

Just browsing through the topic list is fascinating. You'll find discussions on topics ranging from cancer and chiropractors to x-ray safety and even mundane topics like foot odor.

Getting all of that information costs no more than using any GEnie Star Service. However, you can also access the Medical Roundtable's file library at GEnie's normal hourly rates. Here you'll find files ranging from collections of medical papers to medicine-related programs for your PC.

If you're a GEnie user, take a few minutes the next time you're online to explore the Medical Roundtable. You'll be glad you did.

GEnie offers other medical services, most at an additional cost. To get a list of them, give the INDEX command at any GEnie prompt; then use *medicine* as a search keyword.

While CompuServe doesn't offer the low-cost flat-rate service that makes GEnie so popular, its medical forums are extensive. CompuServe users seeking health information should enter the command GO GOODHEALTH at any CompuServe prompt to reach the Health and Fitness forum.

This forum offers a message area where you can ask questions or read discussions on almost any health-related issue. There's a special section for teenagers, a section for drug and alcohol abuse questions, and sections on mental health, nutrition, and many other specialized areas.

As with GEnie, hundreds of files and programs are also available for downloading in the software library. Ranging from transcripts of online conferences to a guide for selecting a therapist, these files are just one more reason to get online.

CompuServe also offers other medicine-related services. There's a forum for diabetics (enter the command GO DIABETES), collections of articles on AIDS (GO AIDSNEWS), a cancer forum (GO CANCER), a forum for people with disabilities (GO DISABILITIES), and a forum on human sexuality (GO HUMAN). Each forum offers the same mix of BBS-like messages, a library of files, and real-time conferences.

Finally, at an extra cost, you can access several databases to search for articles and other information from medical journals. These services, however, are designed for medical professionals, and the costs are prohibitively high.

For a list of forums and health-related areas, give the command GO INDEX at any CompuServe prompt; then search for topics using the word *medicine* as a keyword.

If you don't use commercial online services, you still have plenty of options for online medical information. You'll find that hundreds of BBSs across the country specialize in medical issues. Wherever you live, there's likely to be a medically oriented BBS nearby.

Edward Del Grosso, M.D., operates a BBS that acts as a clearinghouse for the medical BBS community. His BBS, the Black Bag (302-731-1998), is a rich source of information on other online systems as well as being an excellent health-oriented BBS itself. Read Bulletin H, which lists hundreds of active health-oriented systems nationwide—most charge nothing for the service, and many of these are run by physicians.

As you explore the world of online medical information, remember that although these BBSs are a source of information to help you participate in your own health care, none can substitute for the care and advice of your personal physician. ⊡

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HARDWARE CLINIC

MARK MINASI

Buying a new PC or upgrading an old one? Want some good advice? Don't buy speed. For the past three years, big corporate buyers and the PC trade rags have been beating the drum about the great new PCs: 25- and 33-MHz 386 and 486 systems have become de rigueur. In fact, one large magazine recently said that 25-MHz 386s were the new entry level system.

Phooey on that, I say. Your best bet is to buy a 16- or 20-MHz 386 or SX, save a pile of money over the "faster" models, and plow that money into faster video and disks. The result will be a faster and cheaper system than that 33-MHz pile driver you wish you could afford. Here's why.

Your computer's speed is mainly determined by four things: the CPU's speed, its memory subsystem, its disk subsystem, and its video subsystem. Making just one of these parts superfast is of no value, since the relative pokiness of the other parts holds back the whole system. In essence, the system is no faster than its slowest part.

Let's look first at the CPU. You definitely want a 386 or 386SX. There's little price difference over a 286, and the 386 family can do so much more than the 286. Don't worry about losing in the long run by buying an SX; software-wise, it works just like a full 386 (a full 386 is officially called a DX). You don't buy 386-family PCs for the speed; you buy for the capabilities, like *Windows* 386-enhanced mode.

What do megahertz cost? Comparing the prices of a few representative bare-bones motherboards, you'll find that a 16-MHz SX motherboard costs $325 and a 25-MHz DX motherboard costs $900. How do they compare when doing real work? My advice is to try it. You won't be able to tell the difference for most real-world applications. Why is a 16-MHz SX so similar in apparent speed to a 25-MHz DX? It has to do with the video and the disk. You see, the video is controlled by a video board, which plugs into the PC's bus. The disk is similarly controlled by the disk controller board, which also plugs into the PC's bus. And there's the rub.

Virtually all PC systems today run their buses at 8 MHz. Spend a zillion dollars on a 33-MHz DX, and it's really only the CPU that runs at 33 MHz. All the expansion boards run at a mere 8 MHz. Every time that 33-MHz computer talks to the video board, the whole system slows down to 8 MHz—ditto for every disk access. Even worse, it probably doesn't run at a full 8 MHz, since the video or disk board may well be running slower than 8 MHz.

That's why it's silly to pour money into fast CPUs while hobbling them with slow peripherals. By spending less on the CPU and more on drives and video, you balance your system. Here's how.

First, get a fast disk. Disk speeds are called access time or seek time, and they are measured in milliseconds (ms), thousandths of seconds. With access time, the smaller, the better. There is no reason why you should get stuck with a disk with an access time slower than 28ms, yet I see clonemeisters *still* dumping 65ms drives on the public! Insist on 28ms or faster.

Get a fast disk controller. Disk controllers are rated by their interleave factor. Most 286 and 386 systems nowadays contain a 1:2 disk controller, a $90 item. For $20 more, you can purchase a 1:1 disk controller. Such a controller can read the data off your disk at twice the speed of a 1:2. Why does anyone ship 1:2 systems, when 1:1 costs only a bit more? Until recently, 1:1 controllers were four times the price of 1:2 controllers. As a result, 1:2 controllers became a standard, and old habits die slowly, I guess.

Get a fast video board. Ensure that you have a 16-bit VGA board, rather than the slower 8-bit VGA board. Once, 8-bit boards were half the price of 16-bit boards, but no more. Good 16-bit VGA boards can be had for around $80.

Your PC's memory subsystem also affects both your PC's upgradability and its speed. You've probably heard the terms *memory cache, interleaved memory,* and *wait states.* They all refer to methods of interfacing the CPU to its memory. There's not enough room here to explain all of them—memory would provide enough fodder for several articles. Basically, though, no one today makes inexpensive memory that is fast enough to keep up with today's CPU speeds of 16 MHz and up. So manufacturers hook up fast CPUs with slow memory and build tricks into the system to minimize the effects of this mismatch. Wait states are the worst way to handle the speed mismatch, interleave is a much better way, and cache is the best of all. Cache, unfortunately, also *costs* more—perhaps too much. Don't settle for wait states, however; you want a no wait-state, interleaved-memory system.

So you see that buying the 33-MHz screamer with the 8-bit video, 1:2 interleave, and 48ms hard disk isn't such a good idea after all. I recently bought a 16-MHz SX with 16-bit video, 1:1 interleave, and a 120MB hard drive (28ms access time). Lots of folks think it's a 25-MHz, and heck, who am I to dispel their illusion? ⊡

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INTRODOS

TONY ROBERTS

PLUMBING THE DEPTHS OF DOS WITH PIPES AND FILTERS

Redirection, pipes, and filters are tools that let DOS users accomplish seemingly impossible tasks. First, we need a few definitions. Your keyboard is the standard input device, and your monitor is the standard output device. Together, the keyboard and monitor are known as *CON,* or the *console device.* Most DOS input comes from the keyboard, and most DOS output is displayed on the monitor.

Redirection allows DOS to accept input from a source other than the keyboard and to direct output to a destination other than the screen. The greater- and less-than symbols are used to accomplish the redirection, and these symbols point out the direction of the information flow.

For example, DIR > DIRFILE redirects the output of the DIR command (which displays a directory listing) to a file called DIRFILE. That file can then be edited, printed, or treated like any other file.

If DIRFILE had already existed, the command would've erased the existing file and created a new one. Redirected information can be appended to the end of an existing file by using two greater-than signs: DIR >> DIRFILE. Redirection also can be used to fetch information from a source other than the keyboard. To do this, use a less-than symbol to reverse the direction of the data flow, as in SORT < INPUT.TXT. This command sorts the information in the INPUT.TXT file and displays it, in alphabetical order, on the screen.

Piping is similar to redirection, but it allows the output of one program to be used as the input for another program. The vertical bar is used as the pipe symbol.

Many computer users steer clear of redirection and piping because the results seem unpredictable. The key to setting up successful commands lies in knowing the distinction between redirection and piping. Redirection links a program with a device or a file; piping connects two programs.

Filters, which modify streams of data, are often used in conjunction with redirection or piping. DOS comes equipped with three filters—MORE.COM, FIND.EXE, and SORT.EXE. To use these filters, the program files must be on your system's default disk or path.

MORE is a filter commonly used to display text files. It displays a file one screenful at a time and pauses until the user presses a key. MORE can be used with redirection or with piping, depending on the situation. For example, TYPE SAMPLE.TXT | MORE uses piping because two programs (TYPE and MORE) are involved. The output of the TYPE command is piped through the MORE filter. The command MORE < SAMPLE.TXT accomplishes the same thing, but it does so using redirection. The MORE command gets its input from the SAMPLE.TXT file.

SORT can be used with redirection as indicated above, but if you want a sorted directory listing, you must use piping because SORT and DIR are both commands. DIR | SORT pipes the output of the DIR command through the SORT filter.

There are several options you can use with the SORT command. You can sort a directory listing by file extension, for example, using the command DIR | SORT /+10. The /+10 specifies that the sorting should be based on the tenth character in each line, the file extension. It also is possible to reverse the direction of the sort by including the /R switch. This would order entries from *Z* to *A,* then from 9 to 0.

Both SORT and MORE create temporary files on the default disk while they work, so be certain the disk is neither full nor write protected, or you'll get an error.

The FIND filter locates specific text strings in text files. The syntax for this filter is FIND *switch* "*text string*" *filename.* For example, FIND "Fred" NAMES.TXT displays all the lines containing the name *Fred* in a file called NAMES.TXT. FIND looks for an exact match, so if you're looking for *Fred,* you can't spell it *FRED.*

You can specify more than one filename for FIND to scan, but wildcards are not allowed. The switches that are used with the FIND filter are /N, which supplies a line number for each line it displays; /C, which simply counts the number of occurrences of the text string; and /V, which displays all the lines not containing the text string. Here are two examples of how to combine filters, piping, and redirection.

CHKDSK /V | FIND ".BAT" runs CHKDSK with the /V (verbose) switch, creating a list of all files on the disk. That list is then piped into the FIND filter, which searches for the string .BAT, the batch-file extension. What you see onscreen is a catalog of all the batch files on your disk. This command can locate a group of files or a single file. Just be sure to type the filename in all uppercase letters.

SORT < NAMES.TXT > NAMES.SRT uses SORT to alphabetize the names in the NAMES.TXT file. The sorted output will be placed in a file called NAMES.SRT. ⊡

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ARTS & LETTERS

ROBERT BIXBY

WAITING WAITING WAITING ON WINDOWS

Everyone agrees that there needs to be a friendly, smoothly operating graphical interface for the PC. The bare command line interface of traditional DOS-based computers is frightening to newcomers and beloved by only a small minority of the computing public.

Most of us cope with it as best we can. This coping has generated a hungry market for shells, macros, and task switchers.

Most computer users also agree that the PC's graphical interface isn't necessary for everything. Spreadsheets, databases, and word processors generally operate more quickly when text based because the text screen can be updated more quickly than the graphics screen.

The graphical interface is best for layout and drawing programs that help you visualize an eventual printout. There's no argument about whether artists need a graphical interface, only whether *Windows* is the graphical interface we need and whether *Windows* 3.0 is a step in the right direction.

With its slightly friendlier interface, *Windows* has helped computerphobes by reducing some of the anxiety associated with an empty screen. Almost no one cringes when the opening *Windows* screen appears.

Furthermore, *Windows* has established an operational standard. Even without a good manual, you can usually figure out how a *Windows* product works.

As you move from one *Windows* program to another, menus work the same way, dialog boxes work pretty much the same way, toolboxes work a little bit the same way, and so on. This similarity among programs allows you to master programs more rapidly.

But despite these advantages, there are problems. The major problem with *Windows* (and I am not the first to point this out) is that it's slow. It's ponderous. Sometimes it's glacial.

Artists of all kinds live on feedback. If you are working with crayons or oils, you can see your graphic even as it is being made. The line of motion through the center of the canvas or a shadow remains visible.

Compare this to working with a graphics program running under *Windows.* If you've just begun your drawing, you'll see rapid refreshes of the screen. The more complex the drawing, the longer it will take before you'll be able to see it displayed in full.

Based on my experience with *Windows* graphics programs, my drawings must be out on the fringe in terms of complexity, because I'm always crashing programs or causing them to beg for mercy because there are too many objects on the screen.

Sometimes (and particularly when the project includes extensive text, each letter of which is treated as an individual graphic element), the text literally crawls onto the preview screen letter by letter.

Programs that take maximum advantage of *Windows'* multitasking are particularly bad in this regard, indicating to me that the problem is with *Windows* or the hardware rather than the application.

I'm not the only person who has trouble operating *Windows.* At a recent *Windows* seminar, the embarrassed presenter had to do some fast clicking and dragging to make his applications operate. A warning box kept appearing telling him that too many applications were running and asking him to close some windows. (Here's the punch line: Nothing was running on his multimegabyte 386 but the Program Manager.)

Maybe *Windows* isn't the panacea we've been led to believe it is. Take as an example Ventura Software's port to *Windows* of *Ventura Publisher.* It's an excellent program (no less so than the GEM version), which in a single step was upgraded to the professional level and took on an alien environment.

Unfortunately, this advance was not without some pitfalls. New releases may be better, but the version I received crashes semiregularly.

Save early and often, the standard advice with all software, applies doubly to complex software like *Ventura Publisher,* but despite similar warnings in my book on GEM *Ventura,* I have never seen *Ventura Publisher* version 2.0 crash. From that standpoint, you might say that the *Windows* port represents one great leap forward and half a great leap back.

Fortunately, Ventura has elected to continue supporting the GEM operating system version, which it has had two years to debug. I hope Ventura will remain loyal to the original interface for a long time to come.

What choices do you have if you want to work with graphics but you're driven to distraction by the inadequacies and delays that seem to be built into *Windows?*

There are a few options open, including graphics programs that operate under other shells and programs that dispense with a shell entirely and go it alone against DOS, providing their own collections of menus, dialog boxes, macros, and so forth.

We'll talk about a grab bag of graphics packages that provide an alternative to *Windows* programs in the next "Arts & Letters" column. ⊡

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WORKPLACE

DANIEL JANAL

MAKING BOOK ON NEW MARKETS

For $10,000 you can hire a fancy designer, print a couple of thousand brochures, stuff them into envelopes, buy a whole lot of stamps, and send the brochures to everyone you hope will buy your services.

Or you could write a book, build credibility, and establish yourself as an expert. This is the wonderful, true story of how you can be a published author. All it takes is a great idea, discipline, marketing savvy, salesmanship—and a PC.

I had always wanted to write a book, ever since the second grade. I went to a top journalism school, worked at a great American newspaper chain for eight years, won awards, and rose through the editorial ranks. Then I went into public relations and handled big-name computer accounts for four years. When I started my own agency five years ago, I learned tactics that I realized would help people run their companies better. So I decided to write a book called *How to Publicize High-Tech Products and Services.*

I wrote 80 percent of the book between Christmas and New Year's 1989 while everyone else was partying. I showed the book to friends, who suggested changes and additions. I sent the manuscript to a big-time editor. He liked it but told me he could not publish it because the topic was narrow. "You'll sell 10,000 copies," he said. "But you'll sell them. We can't."

Ironically, an industry guru also said I'd sell 10,000 copies. I decided to publish it under the 10K Press imprint (10,000 copies, 10K—get it?), figuring the name sounded computerish and also active (like a 10K race). Also, because people don't value "vanity press" publications, I didn't use my name in the publishing imprint.

I tried to design the book with my desktop publishing software. However, there are so many design issues—margins, leading, borders, cover art, marrying text and graphics—that the best design I did looked amateurish. I decided to spend real money and get the job done correctly. I asked friends to recommend designers.

Each designer works and charges differently. One designer quoted me two prices: one if he entered all the codes on his computer and a second, lower price if I did the coding on my computer based on his design. Prices ranged from $25 to $75 an hour. I settled on a designer who offered a fixed price for designing the cover, text, and brochure—about $3,000 plus expenses.

If you're planning to self-publish a book, look for a designer who has experience creating books. There's a world of difference between designing a book and designing a brochure. An experienced designer will save you time, money, and credibility.

After the book was designed, I called for printing bids. Through referrals, I found a company that prints only books. I gave that bid to a friend in the business, and he matched it. I was able to get 3,000 copies for about $5,000.

Next came the marketing. I put the book, still in its *WordPerfect* format, into a three-ring binder and rented a booth at a trade show for people in the high-tech industry—the very people I thought my book would help.

At that show, an important thing happened. I created new markets. My book targets small companies that do their own publicity because they can't or won't hire a public relations agency. But when a PR agency representative walked by, I told him it would be a great training tool for newly-hired employees. He agreed. One woman wanted to use the book as an incentive to get people to sign up for her seminars. Another woman who operates a convention hall wanted to give books to exhibitors. A major magazine bought 200 copies to turn their advertisers into better marketers. The Software Publishers Association bought 150 copies to give to new members. This wasn't just a book; it was a premium incentive as well. I received enough orders to pay almost all my expenses.

To make selling easier, I arranged to take VISA and MasterCard orders. Since banks don't like giving cards to home-based companies or mail-order firms, I had to convince the banker I was more than just your average home office worker. I sent him a two-page backgrounder and copies of articles about my business that had appeared in *USA Today, Success,* and several other periodicals. I also told him I sold the book at conventions and seminars. When he asked about mail order, I repeated my assertion. I never lied. He didn't pursue the question, and I didn't volunteer information.

If you want to turn yourself into an expert, then write and publish a book. Just keep in mind these essential steps:

- Write a book that appeals to a lot of people.
- Find an experienced and economical designer.
- Shop around for a printer.
- Find companies that might buy multiple copies.
- Create new markets.
- Sell. Sell. Sell.

The beauty of this marketing strategy is that even if you don't sell the book, you can give it to prospects. They'll think you're smart because you wrote a book. And if they hire you for a project, you just might earn back your publishing costs. ⊡

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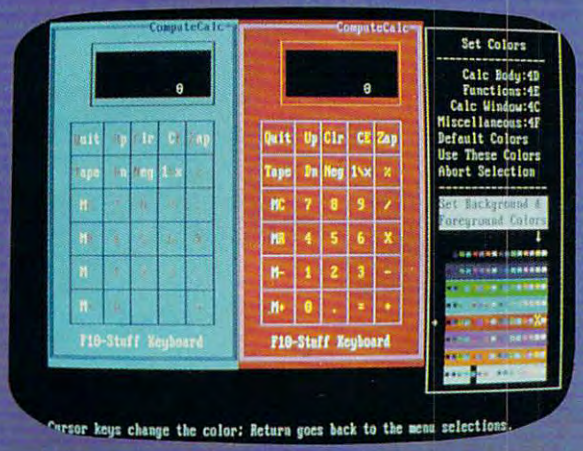

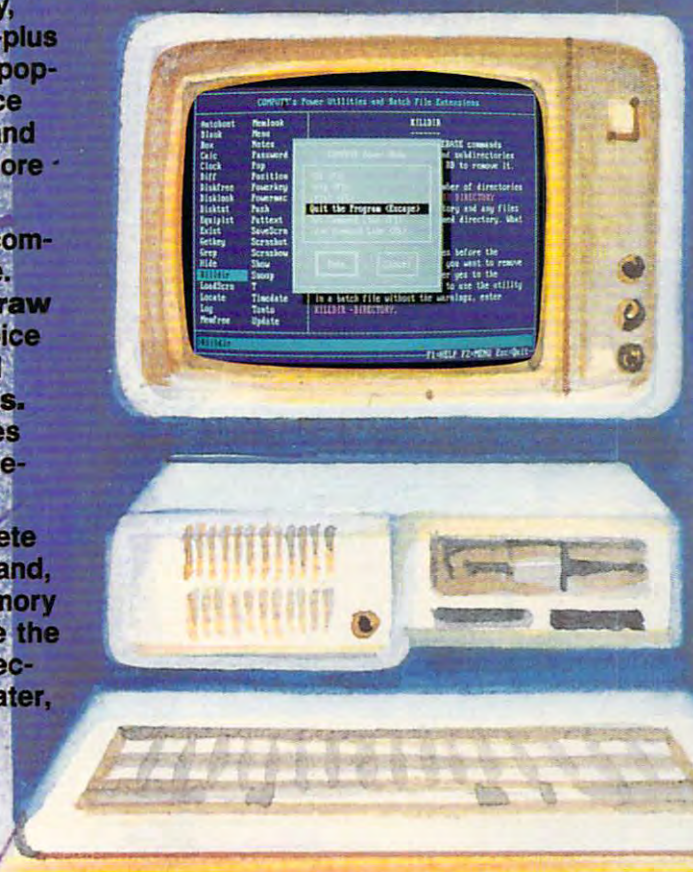

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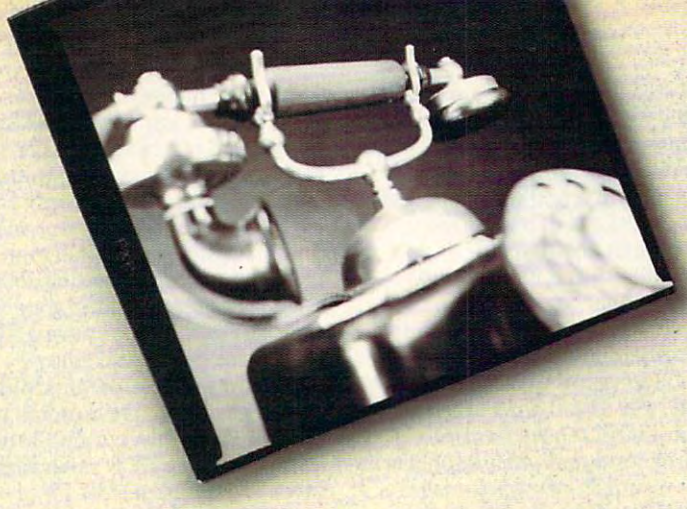

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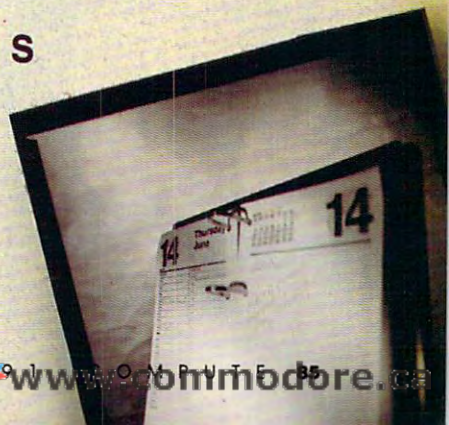
WHAT ARE THE MOST IMPORTANT TOOLS FOR THE HOME OFFICE? THESE ARE THE FAVORITES OF FOUR PROFESSIONALS WORKING AT HOME.

Tony Roberts

I operate a public relations and desktop publishing business out of my home. I spend most of my energies writing, laying out pages, and compiling databases of contacts at newspapers and radio stations.

Interface. *Windows* made a run at earning my vote for best interface, but it still falls short. I like *Windows* 3.0, but it can be slow and cumbersome even with a 386 and many megs of memory. Since I need several *Windows*-based applications, I use it often, but I keep dropping to DOS, specifically *4DOS,* when I need more than a program launcher. *4DOS* is a command processor that replaces COMMAND.COM. It adds new power to most DOS commands and soups up the batch processor. *4DOS,* which is what DOS ought to have been, is distributed as shareware. Try it.▷

CONTRIBUTING EDITORS



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Word processor. I doubt that any word-processing program will ever top *XyWrite* in my mind. *XyWrite* is fast, versatile, and best of all, text-based. I string together a lot of words in the course of a day; when I write, I want to concentrate on the words, not on how they look in different fonts and sizes. The makers of *XyWrite* support their product well, constantly updating it to make sure it's not left behind as new equipment, such as laser printers, and new platforms, such as *Windows,* change the way we work.

Utilities/desk accessories. I'm no fan of pop-up calendars, calculators, or card files. For me, a hand-held calculator works far better than any pop-up, and it *never* creates a memory conflict no matter what software I'm using. I can get along fine using my traditional desktop calendar and Rolodex. A file finder, though, makes a great utility. There are dozens available, and they go by names like *Whereis, Locate,* and *File Find.* File finders often come as part of larger packages. A good file finder will save you hours a week tracking down misplaced and forgotten documents and programs.

Disk management. I've relied on *PC Tools Deluxe* for years for backing up and optimizing hard disks, undeleting files, and sector editing. The software is easy to use and, best of all, effective. I've had no problems restoring backups when necessary, and the disk optimizations are fast and effective. *PC Tools* includes a DOS shell to help with file-management chores, but I use it rarely. Because I've had such good luck with this program, I've had little reason to look elsewhere for disk-backup software.

Telecommunications. *Telix,* a shareware program, meets my needs as an easy-to-use telecommunications program that does it all. *Telix* covers the gamut of file-exchange protocols and can handle nearly any configuration. The software's script-generating language allows you to create extremely sophisticated programs to handle telecommunications chores automatically.

Database/file management. Ashton-Tate's *dBASE III Plus* is a heck of a program, and it's done great work for thousands of businesses. What I like best about *dBASE* is its programmability and its flexibility. It may be more than you need to track your videotape library, but if you're dealing with hundreds of inventory items and thousands of customers, it can do the job. Because *dBASE* is so ubiquitous, most other software—spreadsheets and mail-merge applications, for example—makes some provision for importing *dBASE* data. So far I've stayed clear of problem-plagued *dBASE IV,* but it may be time to look into it, as the latest release appears to have resolved most of the difficulties.

Personal information manager. *Info Select,* a recent enhancement of the long-popular *Tornado,* handles information management on my system. This program is speedy and effective. Answer the phone, and before the small talk has finished, you can locate and display acres of pertinent information having to do with your caller. This program, more than anything else, has helped me organize client lists, project information, deadlines, and siblings' birthdays.

Spreadsheet/financial. *Quicken* is clearly the best financial program for the general public. For a household and/or a small service-based business, it's all you need to handle the checkbooks, budgeting, accounting, and reporting. For a decade, people have talked about using computers to balance their checkbooks. With *Quicken,* this notion finally makes sense. Intuit has announced a new version of the program, *Quicken* 4.0. I haven't seen it yet, but I ordered the upgrade right away. In the spreadsheet arena, don't overlook *Quattro Pro,* soon to be upgraded to *Quattro Pro* 2.0. This is a major-league spreadsheet with a major-league list price, but Borland's Philippe Kahn has sent me at least 15 letters in the last year offering me a $99 special. If you're on any high-tech mailing list, you've received one, too. If you need a high-end spreadsheet, find a way to qualify for Kahn's offer.

Graphics/DTP. When desktop publishing for clients, I use both *Aldus PageMaker* and *Ventura Publisher,* depending on the client and the job. If a client owns one of the programs, I'm usually asked to work in that format. Of the two, I lean toward *PageMaker,* maybe because I learned it first. Also, I prefer *PageMaker's Windows* environment to *Ventura's* GEM environment. (*Ventura Publisher* has a new *Windows* version, but I haven't tried it yet.)

Programming language. Over the years I've programmed in BASIC, Pascal, and machine language. In the early days of personal computing, programming was often the only way to get software tailored to your needs. Today's systems are much more complex, and my programming abilities haven't kept up. Besides, good software can be found for most applications these days. I still enjoy programming, though, and I find I can be most effective on small projects—writing telecommunications scripts, creating DOS batch files, and inventing useful macros for my word processor and spreadsheet.

George Campbell

As a computer journalist and shareware author, I spend long days at home in front of my computer. Top-quality software is essential to my work. Many times shareware programs fill my needs for a low cost.

Interface. Since I started using IBM-compatible computers in 1983, I've always been a command line fanatic. That's beginning to change now, with the introduction of *Microsoft Windows* 3.0. While I still prefer the classic DOS prompt for many jobs, the multitasking tools in *Windows,* along with *Windows* applications like *Ami Pro* from Lotus, have begun to lead me astray.

These days, I spend about half my computing time in the *Windows* environment. Still, for file operations and many of the programs I use, the command line makes the most sense.

Word processor. I make my living with words, so my word processor is very important to me. When I'm working with pure text, I use *Microsoft Word* 5.0. I like its logical interface, fast editing tools, and powerful macro language. By the time you read this, *Word* 5.5 will be available. Its new *Windows*-like interface makes it even easier to use, so I'm planning to switch as soon as I can.

When I need to add graphics, charts, or complicated layouts to my documents, I fire up *Windows* and run *Ami Pro.* With its ease of use, WYSIWYG display, desktop publishing features, and powerful graphics tools, it's a great program.

Utilities/desk accessories. I use several utility programs regularly, but two stand out above the others: Vernon Buerg's *List* and Phil Katz's *PKZIP.* For reading ASCII text files, there just isn't a better program than *List.* With its scrolling, searching, and file-selection tools, it makes dealing with text files a breeze.

PKZIP takes care of all my file-archiving needs. It has become every-

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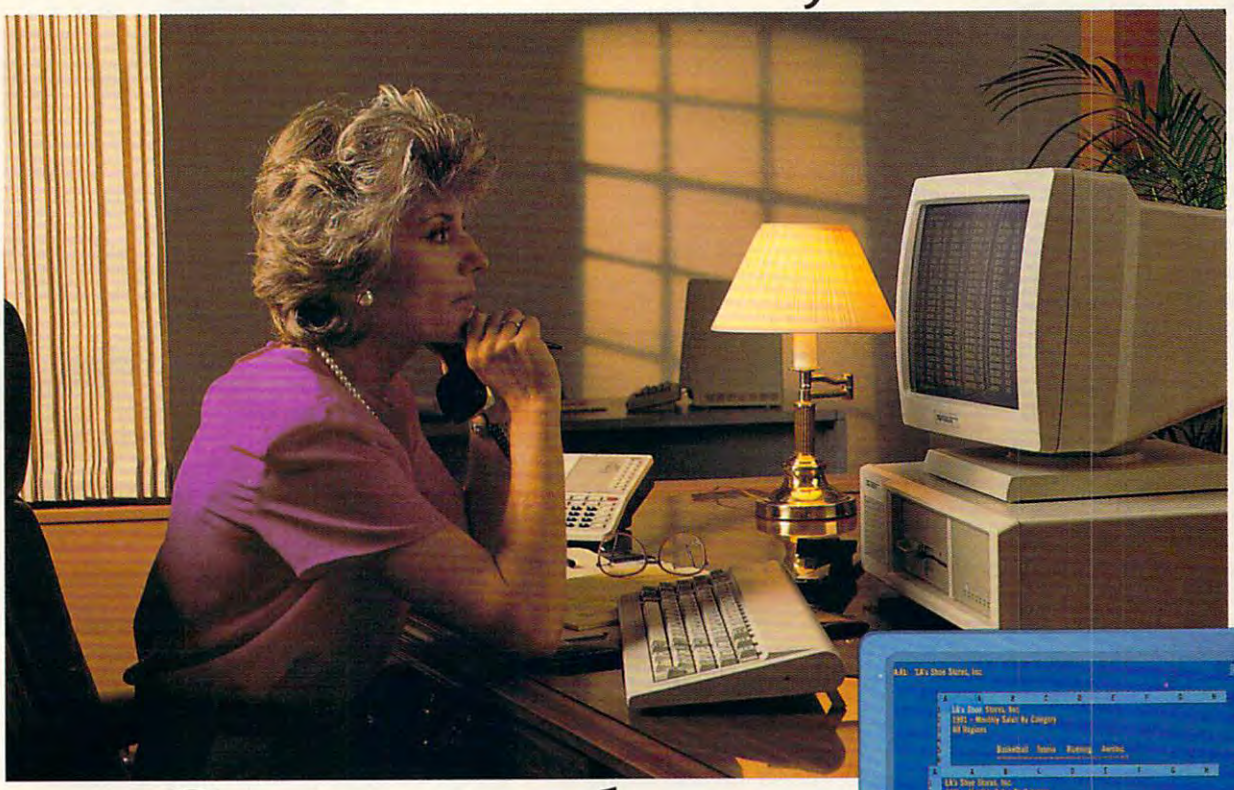

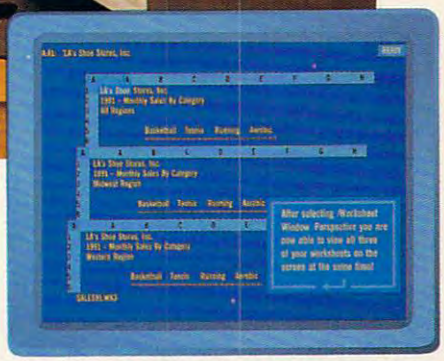

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one's standard file-compression utility. Since I spend a lot of time online, downloading files, I use this program dozens of times each day.

Disk management. To keep my hard disk organized and running smoothly, I use *PC Tools Deluxe.* However, I only installed parts of the program on my disk. I use its PC Shell to move files around quickly and to maintain the structure of my 80MB hard disk. The Compress program is the only other part of *PC Tools* I use. This disk-optimizing program quickly takes care of fragmented files and helps keep my busy hard disk clean and efficient.

Telecommunications. Since I spend several hours a day online with my modem, I need a powerful communications program. *ProComm Plus* is my choice for this job. It offers the power I need along with an easy-to-use interface and a powerful script language that automates my online sessions.

I also run a busy BBS. I looked at several BBS programs before choosing *Wildcat!* from Mustang Software. It's easy for callers to use and needs a minimum of maintenance by the sysop. And, since it can support multiple phone lines, it will let me expand the BBS.

Database/file management. Jim Button's *PC-File* 6.0 is the database that fills all my needs. I started using *PC-File* years ago and have upgraded the program with each new version. Its low cost, *dBASE* compatibility, and powerful features make it perfect for maintaining customer lists, address books, and even a database of my video collection.

Best of all, it's available in a shareware version, which lets you try the program out to make sure it fits your needs. While it probably couldn't handle the database needs of a Fortune 500 company, it sure works for me.

Personal information manager. I've looked at a few personal information management programs but just haven't found any need for them. I keep my address book in a *PC-File* database, use *Microsoft Word* for note taking, and write my appointments and deadlines by hand on a wall calendar. Call me old-fashioned.

Spreadsheet/financial. My finances are pretty simple. I use the shoebox method of accounting and manage pretty well. I find that it takes more time to enter my limited financial records in a financial package than it does to add everything up at tax time.

I do use a spreadsheet program, however, to create charts and gridlike comparison sheets of products I review. For this simple chore, I chose a shareware spreadsheet, *TurboCalc,* from P & M Software. It has all the power I need and can export files in DIF format for use by other spreadsheets. *COMPUTE!'s PC* included *TurboCalc* on its January 1990 disk.

Graphics/DTP. Since I switched to *Windows* for my graphical interface needs, I've found that the *Paintbrush* program included with *Windows* 3.0 satisfies the artist in me. The PCX files it creates are compatible with every application I use, and I never have to leave *Windows.*

I occasionally produce a flier or a small newsletter for a user group. I once used *Ventura Publisher* for these chores, but now I've switched to *Ami Pro.* It can easily handle a ten-page newsletter, and it's far easier to use than *Ventura Publisher.*

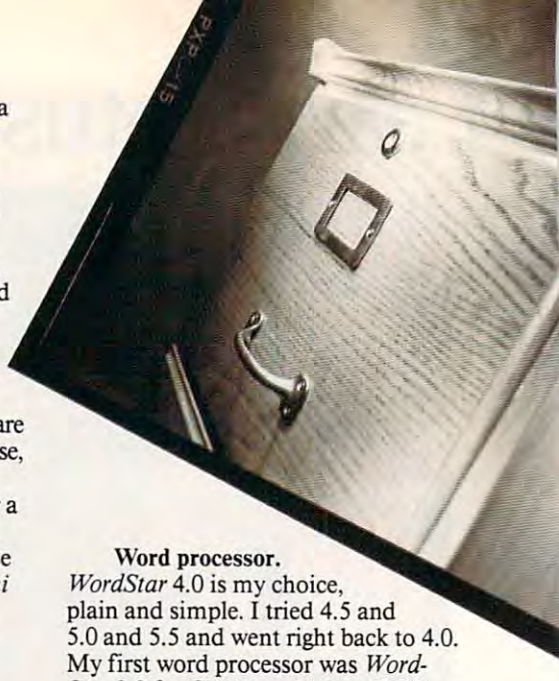
Programming language. Like most PC users, I began to learn programming with the GW-BASIC interpreter included with my copy of MS-DOS. These days, I produce shareware software, so I need a compiled language. Fortunately, I didn't have to give up BASIC. I use *QuickBASIC* 4.5.

Its use of a structured programming style, along with easy access to BIOS functions, lets me write state-of-the-art software quickly. Best of all, programs written in *QuickBASIC* are easy to maintain, since BASIC is more like English than most of the widely used programming languages.

Alan R. Bechtold

I have enslaved several personal computers to help edit *Info-Mat Magazine,* an electronically distributed news weekly published by BBS Press Service. I edit the magazine and write many of the news and feature items. I also freelance, writing and editing newsletters and other publications, including *Online Digital Music Review.* I can't remember what it was like to type on a typewriter.

Interface. I'm still attached to the DOS command line, probably because I'm always finding something I want to do in DOS that one shell or another won't let me do easily, if at all. The command line *always* lets me do it. It's this trust in the command line that makes *The Norton Commander* a favorite. At first, I dressed up my system with *Commander's* wonderful windowed point-and-shoot menus. It wasn't long, however, before my command line addiction took over and I found myself trying to get back to the basics, aborting out of the menus I'd designed. Without the menu interface, *Norton Commander* is basically a disk-management system that allows constant access to the DOS command line. I can always live with that.



Word processor. *WordStar* 4.0 is my choice, plain and simple. I tried 4.5 and 5.0 and 5.5 and went right back to 4.0. My first word processor was *WordStar* 2.3 for CP/M and 4.0 on DOS. It's what I'm used to. I've tried others that claim to emulate *WordStar.* Many do a good job, but they're not good enough to keep me using them.

Wordstar 4.0 maintains the purest feel of the *WordStar* I know and love and offers advanced features, such as the built-in spelling checker and thesaurus, that make it far more useful than the earlier versions.

Utilities/desk accessories. The utilities I use most often are PKWare's *PKZIP* and *PKUNZIP* (both available as one product) and System Enhancement Associate's *ARC+PLUS* program. These programs let me squeeze one or more files into smaller single files to make the many file transfers I do every day faster and less expensive. Otherwise, I don't even use an onscreen calculator. *WordStar* 4.0's math function usually serves all my addition, subtraction, multiplication, and division needs.

Disk management. *The Norton Commander* handles any disk management tasks that I don't care to handle at the DOS level. I use it most often to move files from one nested subdirectory to another and to clean up my hard disk. When your directory tree has many branches, just typing out those long paths is a chore. *Norton Commander* reduces this to a simple point-and-shoot operation. The program's split-screen layout provides a clear view of two different directories at once. Even an old command line addict like me can see the benefits of vastly reduced keystrokes.

Telecommunications. *ProComm Plus* is my telecommunications package of choice. There are a lot of good communications programs, and I've tried most, but I always go back to *ProComm Plus* because it offers a wide variety of file-transfer protocols and the most efficient and persistent

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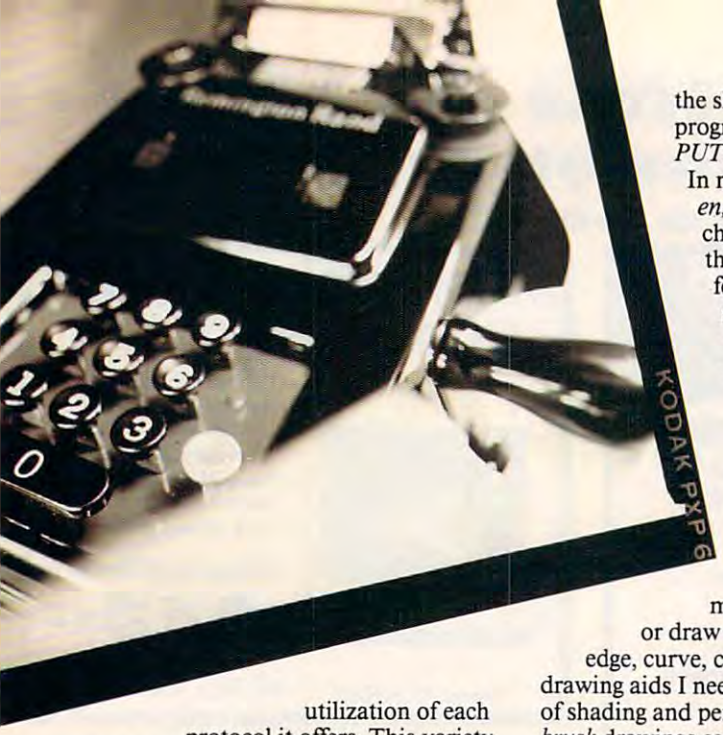

utilization of each protocol it offers. This variety and reliability, combined with the program's easy menu-driven operation, huge automatic dialing directory, and extensive macro language for use when creating your own automated communications sessions, make it a hands-down choice for me. I've also run a bulletin board system, for client and general public access, for over five years, and *TBBS* is the choice there. The program's ability to handle up to 32 incoming telephone lines on a single AT is simply uncanny.

Database/file management. *dBASE* is my favorite database management program. As with *WordStar,* I started out running *dBASE II* on a CP/M computer, so it's a program I've long been familiar with. I tried *dBASE IV* and went back to *dBASE III Plus. dBASE IV* was too bulky, required too much hard disk space, and didn't run with the speed and agility of *dBASE III Plus,* which handles all the data-management tasks I throw at it.

Personal information manager. This was a completely new software category barely a year ago. Because I spend almost every working day manipulating information, I immediately fell in love with the category itself. I also fell in love with *Lotus Agenda,* one of the most flexible, powerful, and imaginative products to come along in years. I like the way *Agenda* lets me enter my data free-form and then arrange it any way I please after the fact. That's the way information really happens, after all. *Agenda* 1.0 *created* this category, and 2.0 is keeping it on the leading edge.

Spreadsheet/financial. Unfortunately, I've never manipulated as much cash as I do information, so I've never had the need for a spreadsheet program. For home use, I run *CheX,* the shareware checkbook program I got from *COMPUTE!'s PC* (March 1990). In my office, I use *Quicken,* which maintains the checkbook approach that *CheX* uses but offers the kind of report-generation, billing, and check-printing capabilities that are necessary for running a small business.

Graphics/DTP. I draw with *PC Paintbrush.* It's a full-featured, powerful drawing program that allows me to sketch freehand or draw with all the straight-edge, curve, circle, and square drawing aids I need. I love the variety of shading and pen styles. *PC Paintbrush* drawings can also be easily incorporated into page designs created with my favorite desktop publisher, Timeworks' *Publish It!.* I prefer *Publish It!* over others because it's reasonably small and will run on a standard 8088-based laptop PC without too much trouble or the need for a hard disk.

Programming language. I'm still stuck on BASIC for general programming purposes, but I also write some programs in *dBASE III Plus.* BASIC is just that—basic. It's simple and straightforward. But most important, it's the one I've learned to use—and I haven't had the time it takes to learn another language. *dBASE III Plus* was simple to learn because so much of it is based on straightforward English. It's a language I can put to work on all my database operations.

Tom Campbell

I'm a columnist for *COMPUTE* and chief developer of *Builder* for Hyperkinetix. My memorable first exposure to programming was using a Commodore VIC-20 and devouring every word of *COMPUTE!* magazine starting with the September 1983 issue. My writing style was strongly influenced by the writing of Jim Butterfield. I use computers for writing and programming at home and at work.

Interface. My favorite interface on a PC is the DOS command line. I'd gladly trade it for the Macintosh MultiFinder but never *Windows,* OS/2 Presentation Manager, or any other replacement currently available on the PC. The command line is lean, logical, and universal. The others only supplement it, and none can replace it completely.

Word processor. *Microsoft Word* by a mile. *Word* isn't for everyone, but here's why it's the standard at my company. First of all, its style sheets mean that with a small amount of training anyone can produce attractive, richly formatted documents that all look as if they came from the same company (you'd be surprised at how few organizations of any size can say this). Style sheets also make maintenance a breeze: Change the style sheet for business letters, and everyone's letters will inherit the change with no individual effort. Second, its ability to generate indexes and tables makes *Word* the only game in town. We routinely produce manuals over 300 pages long, and in this business, you can't do an index by hand every time a manual changes. Programmers here use *QEdit.* It's flexible, reconfigurable, easy to learn; and it loads quickly.

Utilities/desk accessories. *The Norton Utilities'* Quick Undelete is worth the price all by itself, and SYSINFO also gets frequent workouts. We bought *PC Tools Deluxe* for backup, and it became the company's standard database manager and appointment maker as well. Except for Borland's languages, there's no better value on the market.

Disk management. My company's own *HYPE* utilities are my choice for disk management. They're absolutely free (we don't sell them; we only give them away). *HYPE* is available on BBSs everywhere. I use the file finder, the disk statistics, and the memory statistics utilities every day.

Telecommunications. I'm not thrilled with any telecommunications program. The ones I use are *ProComm Plus* (95 percent of the time) and *PC Tools Deluxe* (the other 5 percent). I have never yet felt comfortable with a telecommunications program or with most BBS software. I'm a regular on CompuServe, but learning to use it was a nightmare, and having to run a telecomm program on top of that was no fun. I look forward to the telecomm program that's so easy even *I* can like it.

Database/file management. For DBF files, I normally use *PC Tools Deluxe.* I'm irritated by its 5000-record limitation, but otherwise it's a godsend. But nothing beats *HyperPad* for putting together small or free-form database systems. It has the ideal combination of a language and applications generator for someone like me. I need to create small databases quickly every month or so, then distribute them throughout the company. The new version lets me include the *HyperPad Browser* ($99.95 to registered *HyperPad* users) with any application I want to send out. *HyperPad* gives me tremendous turnaround time and just the right set of features. It even imports DBF files. ▷

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Personal information manager. I must admit that normally I use *QEdit* and view or update a to-do list about a dozen times a day. Throughout my company, *PC Tools Deluxe* is the preferred program. I use it when I absolutely must remember an appointment and need to be beeped. Otherwise *QEdit* and my Mickey Mouse wall clock make do—a hardware/software combination that cost about $100 total.

Spreadsheet/financial. *Quattro Pro* is my spreadsheet. I much prefer *Wingz,* but I don't run *Windows* enough to justify it, and I need to exchange *Lotus*-compatible work sheets with my co-workers, who are *1-2-3* jocks. *Quattro* is quite fast, comes with the font and mouse support that I need, and has the simple graphics I want.

Graphics/DTP. *Microsoft Word* is my desktop publishing program. I need strong font control and moderately complex formatting. The formatting must be automated because long stretches of the manual must use the same layout, and only *Word* and *Ventura Publisher* give me what I need. Since *Word* is also a word processor, I use it and have completely dropped dedicated desktop publishing packages. It also costs a few hundred dollars less, but I've been upgrading *Word* since 1985, so that's not of direct concern to me.

Programming language. Programming languages are my livelihood, so my preferences are clear and wide-ranging. For systems utilities on the PC, nothing can match *Turbo Pascal Professional* 6.0, with the fastest compiler of all time and a great integrated environment. For programs that need to run in non-PC-compatible environments, ANSI C is the only way to go. I prefer the Borland environments, so I use its *C++ Pro* system. Both ANSI C and *C++* come with an excellent assembler, good documentation, and one of the best debuggers that ever walked the planet.

For fun, it's a tie between *QuickBASIC* and *Turbo Pascal. QuickBASIC* lacks dynamic memory allocation and strong type checking, but its integrated environment is a joy. It also has extensible online help and a no-wait compiler for the integrated environment, both of which are features that ought to be mandatory in all compilers. While I generally lean toward *Turbo Pascal* for short utilities, *QuickBASIC* steps into the fray as often as not.

When a program has to be in assembly language, I edit with *QEdit* and assemble using Borland's *TASM,* which is part of *Turbo Debugger and Tools,* but *QuickAssembler*'s online help is slowly becoming a permanent and welcome part of my life. ⊡

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***Aldus PageMaker* 4.0,** $795.00
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Mickey Mouse Clock, $40.00
The Disney Store
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***Microsoft QuickBASIC* 4.5**
$99.00
***Microsoft Windows* 3.0**
$149.00
***Microsoft Word* 5.5**
$450.00
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(800) 426-9400

***The Norton Commander* 3.0**
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***The Norton Utilities* 5.0**
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***PC Paintbrush IV* 1.0,** $99.95
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(404) 428-0008

***PC Tools Deluxe* 6.0,** $149.00
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(800) 888-8199

***PKZIP* 1.1**
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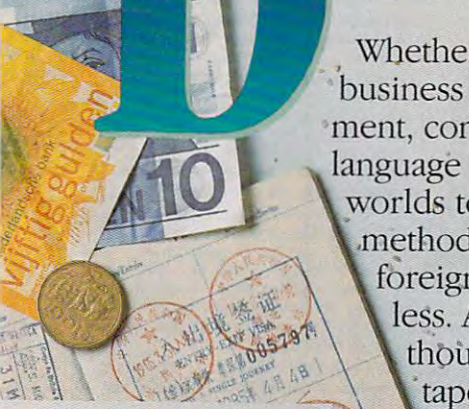

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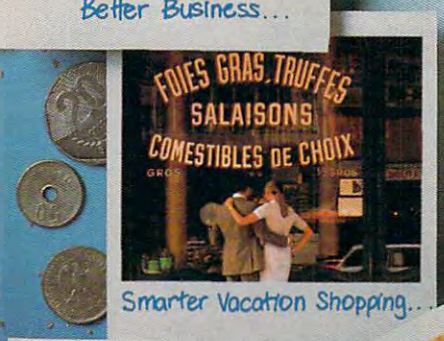

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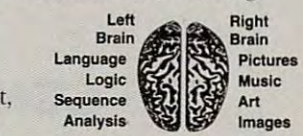

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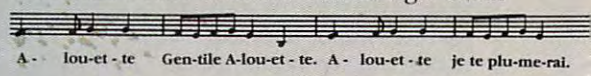

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No, this isn't a scene from the 1950s science fiction film *The Angry Red Planet*. It's *Mars: The Movie*, an amazingly accurate virtual reality simulation of the Martian landscape created by NASA's Jet Propulsion Laboratory. The JPL used actual electronic images from the Viking Mars probes to create a two-minute simulated journey across a U.S.-sized area of the red planet, re-creating scenery that no one has ever actually seen. The concept of virtual reality simulation is not that difficult to understand in principle. The process turns dimensionless numerical data—for example, radar readings of elevations taken at set intervals on the surface of a planet—into an accurate 3-D representation. You could do pretty much the same thing by using a topographic map as a guide for modeling a mountain range out of clay, though a computer can do it faster and more accurately. The wizardry lies in making the simulation look real.

Lighting, shadows, colors, and the reflectivity of different kinds of surfaces—impact craters, soil, vegetation, bodies of water—have to be convincing. In *Mars: The Movie*, JPL used image enhancement techniques to bring out small details, smooth the edges of landscape features, and seamlessly stitch together the edges of adjoining maps. All this makes *Mars: The Movie* and its JPL siblings, including *Miranda: The Movie* (Miranda is a moon of Uranus) and *Earth: The Movie*, too real not to believe. And believability is the true test of any simulation. (You can get a video copy of these and other simulations for $19.95 from Video Publishing Group, 5055 NW 159th Street, Miami, Florida 33014; 305-621-7283).

While virtual reality landscape simulations can be art in their own right, they are also useful for line-of-sight surveys, previews of large-scale civil and architectural engineering projects, environmental impact forecasting, exploration of exotic environments, and other applications involving sites too hazardous, difficult, or costly to visit in person. But suppose you simply wanted to make *My Town: The Movie*. Interestingly, you don't need a JPL supercomputer to do the job. In fact, all that's required is an Amiga 500 (one of the lowest-cost home computers around) and a program called *Vista*, from Virtual Reality Laboratories (2341 Ganador Court, San Luis Obispo, California 93401; 805-545-8515; $99.95). Like the big-time 3-D landscape simulation software, *Vista* can take 2-D elevation and contour data and convert it into a 3-D virtual reality that can be viewed from any angle. To make a fly-by movie, you move the viewpoint along a path and save pictures at set intervals to an animation program or VCR.

Vista can generate 4 billion fractal landscapes, but most people are using the program to simulate real places. *Vista* accepts the United States Geologic Survey's Digital Elevation Mapping (DEM) files, which currently cover about 40 percent of the country. A DEM file contains essentially the same information found in a USGS paper contour map, but in database form. Getting DEM data into *Vista* is not a task for the faint of heart. Once you've called the USGS to find out whether the area you're interested in has been digitally mapped, the Survey will send you (for a fee) an MS-DOS–formatted tape with the relevant DEM file. (How many of you have a tape drive at home?) Then you've got to convert it to an Amiga-readable format, which requires programming skills in C. If you take the time to master the file format, you don't have to limit yourself to USGS data—you can enter any topographic values you like. So, for example, you could create a 3-D map of your backyard, assuming you want to go out and measure all the bumps in the lawn. It doesn't have to be a landscape—one user has adapted *Vista* for molecular modeling. For nonprogrammers, Virtual Reality Labs is trying to make things easier by offering data disks with the most-requested DEM files, plus other goodies like 3-D projections of the latest Magellan probe maps of Venus.

Reality simulation in your own home—is it a more practical use of your time than balancing your checkbook? According to Susan Woeltjen, one of the developers of *Vista*, the U.S. military thinks it's practical. Apparently, the Department of Defense has been looking into *Vista* as an engine for cheap, fast simulations of Iraqi terrain. It's interesting to contemplate that the success of a multibillion dollar military operation in the Middle East might just depend on the virtual reality created with a $600 computer and a $99 software package. ⊡

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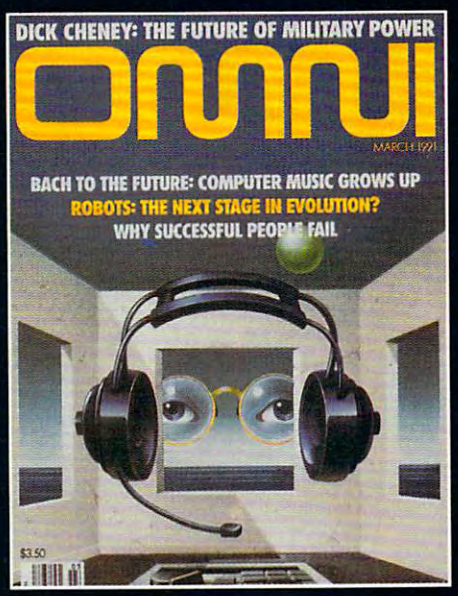

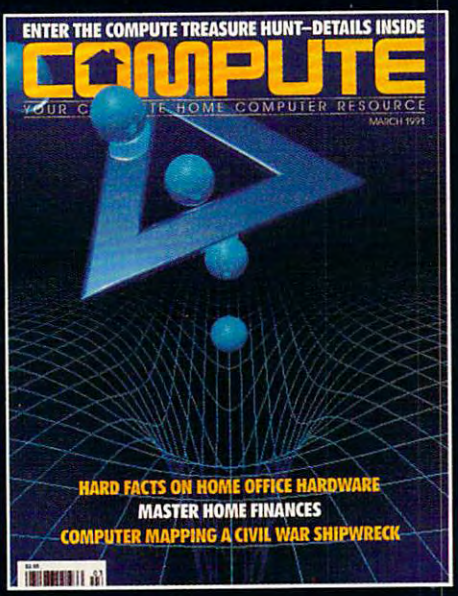

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