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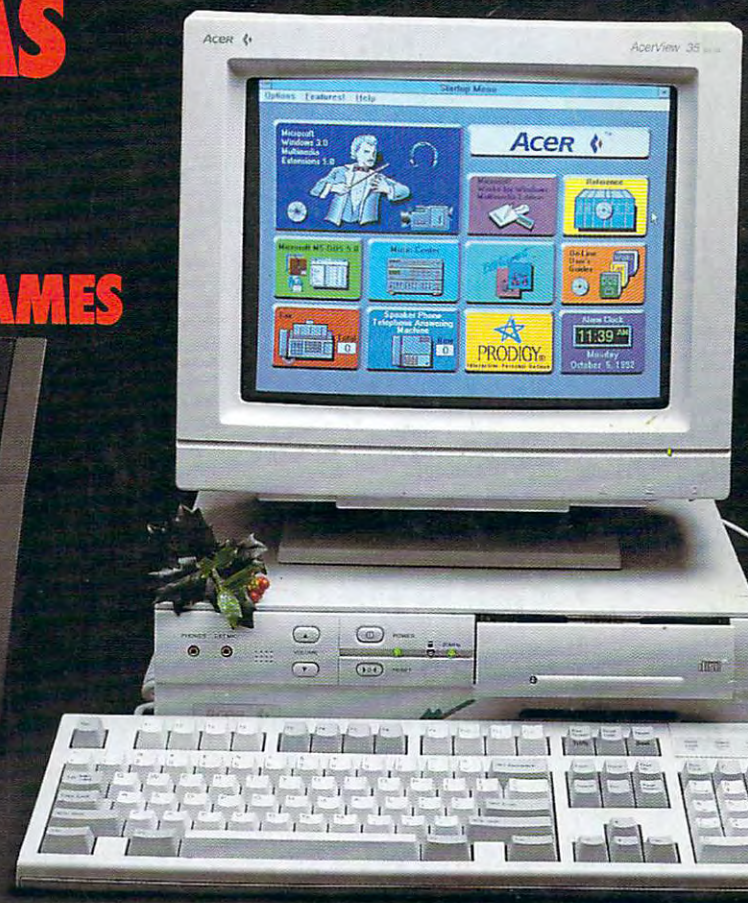

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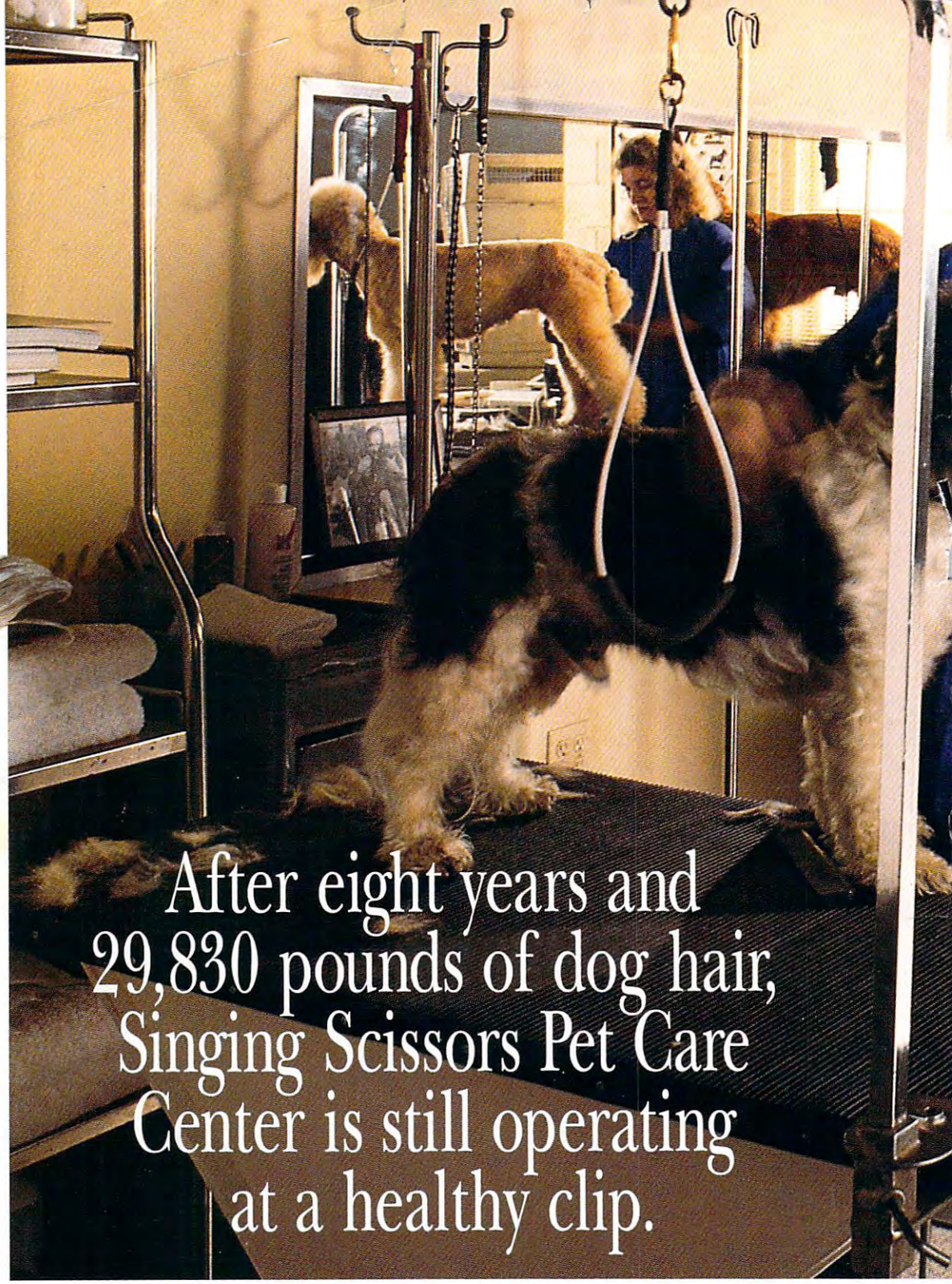

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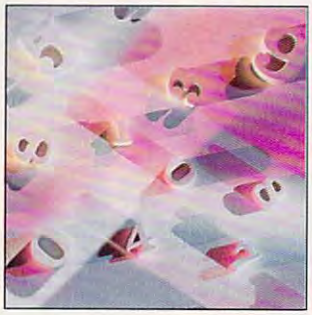

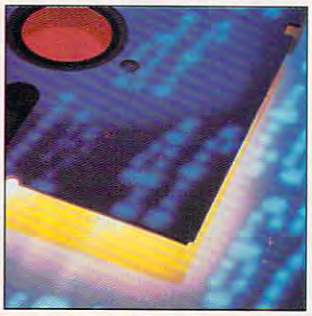

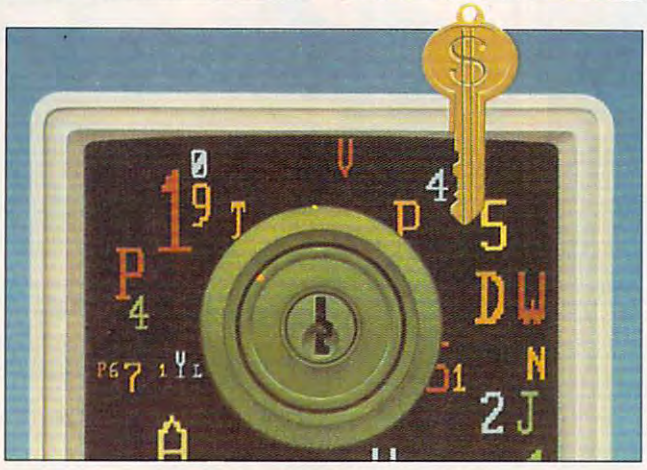

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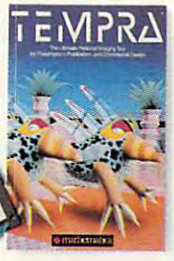

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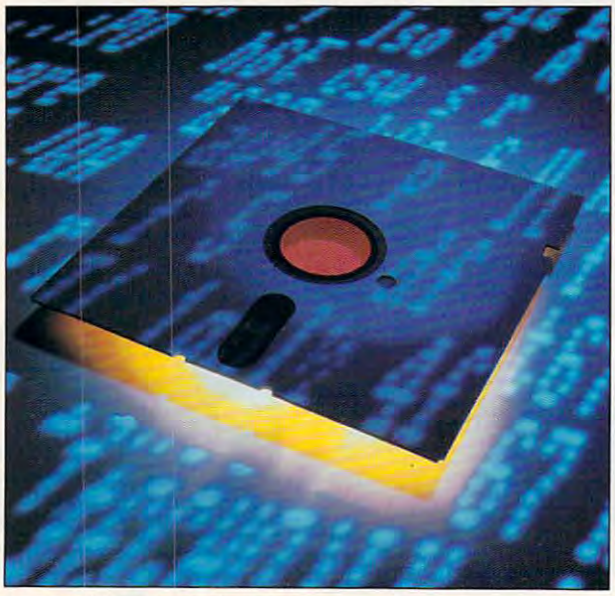
Clifton Karnes

Is Microsoft playing fair? *Undocumented Windows*, a superb recent book by Andrew Schulman, David Maxey, and Matt Pietrek from Addison-Wesley, raises this question, showing in great detail that Microsoft has used undocumented Windows calls in its applications. As soon as the book hit the shelves, Microsoft fired off a press release admitting that Microsoft applications did indeed use undocumented calls (something the company had previously denied), but it also went on to state that Microsoft's competitors used these same calls, so Microsoft has no unfair advantage.

There are three main questions that emerge from this revelation that Microsoft applications use undocumented Windows calls. First, did Microsoft systems and applications divisions knowingly conspire to gain an unfair advantage over Microsoft's competitors? Second, if they did *not* conspire, did Microsoft's applications division have greater access to undocumented information than Microsoft's competitors? Third, what should be done about the situation?

There are three main questions that emerge from the revelation that Microsoft applications use undocumented Windows calls.



Regarding the first question, whether there was a conspiracy at Microsoft, the answer is certainly no. Microsoft used these calls, to be sure, but the same company created tools for general distribution that make it fairly easy to find undocumented calls in applications. Microsoft was obviously not trying to hide the fact that it used undocumented calls. This is especially important, since there are techniques Microsoft could have employed to hide the use of these calls in its programs.

The second question, about Microsoft's applications programmers having greater access to undocumented information, is harder to answer. In *Undocumented Windows*, the authors point out that Microsoft's systems programmers have usually helped independent developers with information about undocumented calls, if they thought the programmers really needed the info. It stands to reason that they do the same with Microsoft applications programmers. But since the applications and systems programmers are in so much closer contact, they would simply have more opportunities to acquire this information. The answer to the second question, Do Microsoft's applications programmers have greater access to this information?, is almost certainly yes.

Before answering the third question, What should be done?, it might be a good idea to backtrack and talk a little about why there are undocumented calls at all.

First, every operating system has undocumented calls. There are several reasons for these. Some calls are just old code that's been replaced with better (usually documented) code. Other times, undocumented functions are quick fixes to system problems. The code usually isn't clean, and the company doesn't want developers to use these calls, because it'll probably change them in the future. You'll find undocumented calls like this not only in Windows but in DOS, Unix, OS/2, and VMS.

Then why are Microsoft and its competitors using these calls? Sometimes these calls aren't necessary because there are documented equivalents. But other times they are essential. *Undocumented Windows* takes us through the calls used by several applications and clearly shows which ones are useful and which ones aren't. You quickly get the feeling that to do real-world Windows programming, you need these calls.

So, what should be done? My first recommendation is for Microsoft to document all Windows calls. Instead of making a distinction between documented and undocumented, it could divide Windows into supported calls (those the company guarantees to keep in future versions of Windows) and unsupported calls (those the company doesn't guarantee). This would give Microsoft the flexibility it needs to determine which functions should represent the official core of Windows and would give developers access to the forbidden fruit, but with a use-at-your-own-risk caveat.

My second recommendation is for Microsoft to move its applications or systems division to another area to avoid the appearance of collusion. Although I don't think Microsoft's applications division intentionally takes unfair advantage of its competition, as long as systems programmers and applications programmers are all eating at the same Burger Master, there will always be the suspicion of impropriety. ❐

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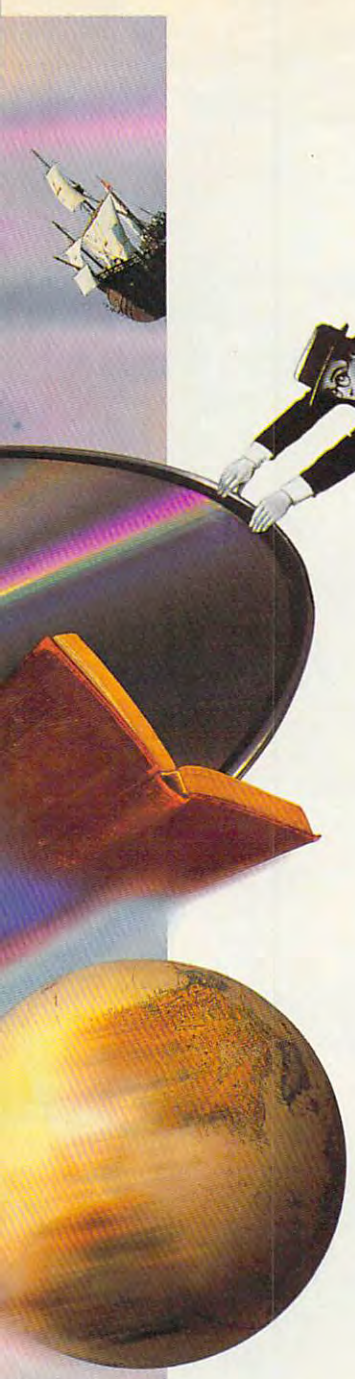

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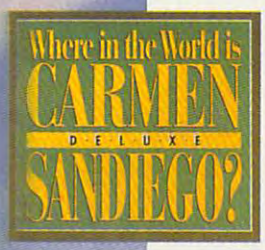

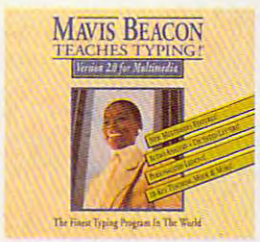

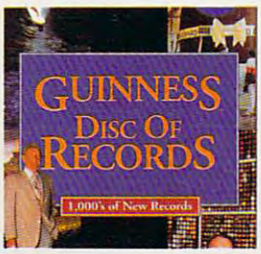

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Windows Programming From Scratch

Sometimes, a deal comes along that's so sweet you're foolish not to take advantage of it. Microsoft's C/C++ 7.0 is one of those deals. If you're serious about programming in Windows and haven't yet decided on a development environment, get it.

Microsoft used to sell its professional C development system for $450. It's added a C++ compiler and tossed in the SDK (the latter without printed documentation) and dropped the price to an obscenely low $139. You get 5000 pages of fabulously written and superbly printed documentation on C, C++, the runtime libraries, and the highly esteemed Microsoft Foundation Classes (MFC). You also get a somewhat staid but incredibly flexible programming environment, a topnotch debugger, the debug version of Windows, and a substantial amount of online documentation for less used features, which doesn't appear anywhere in the printed manuals.

Unless you already have a comprehensive library of third-party books on the SDK, go the extra $150 for the printed manuals (see "Should You Fight or Switch?" if you're still not convinced). This article assumes you're willing to trade six months of intense study of the Windows API and C++ in exchange for guru-level Windows programming skills, and that you may, but probably don't, have a favorite development system (other than Microsoft's) already. If so, it will help you decide whether Microsoft gives you the best tools for the job.

Microsoft's C/C ++ 7.0 may be the programming deal of the century

By Tom Campbell

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Don't make the mistake of thinking that all of these tools and manuals will make programming Windows applications easy. They won't. What they will do, however, is to provide the strongest foundation any programming environment has ever had for any operating system—and all in a single environment. Nor are all of these tools the very best. Here, though, the whole vastly exceeds the sum of its parts.

Megabyte Paradise

Installing C/C++ 7.0 and the SDK took about an hour on my 33-MHz 386 and consumed a terrifying 50MB of disk space. You need not apply if you don't have at least a 386, by the way.

C/C++ 7.0 is so memory hungry that Microsoft throws in a $150 memory manager called 386-to-the-Max that you have to run if you fire up the compiler in DOS (you don't need the memory manager to run C/C++ 7.0 from a DOS box in Windows, however).

As I mentioned above, my installation took 50MB. Expect to surrender about 40 megs for a minimal system. The installation programs do a great job of letting you choose what to install, so you can easily shave 10 megs from that number (by eliminating online help options and sample code), or you can add 10 megs to it (by adding a couple of memory models and including the full complement of online help).

In a vivid metaphor for the greatest weakness of C/C++, the C/C++ installation program forced my machine into running Windows. Then, not only did the SDK installation refuse to run under Windows, but it wouldn't even run in a DOS box. You must exit Windows to install the SDK—the modules used to create Windows applications! And in fact, there's no Windows environment in which to program Windows applications; you must compile under DOS and then switch to Windows to run the program. This is the product's Achilles heel, and it's made acceptable only by the correspondingly high quality and selection of the other tools and documentation.

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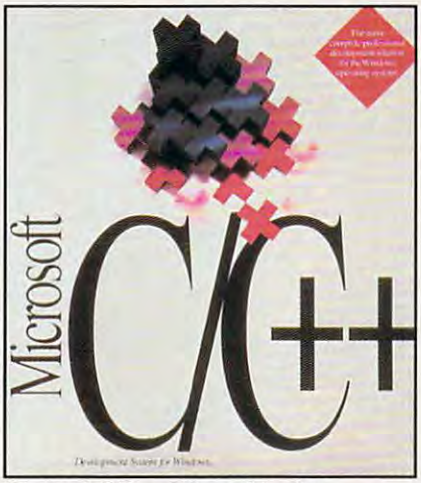
A Windows program is usually made up of several C or C++ source files, a resource script (which instructs a set of auxiliary tools to construct dialog boxes and other parts of the user interface), a command file just to run the linker, and a text file describing this process for a utility called Nmake, which oversees the entire process and helps you avoid wasting time during this necessarily slow and laborious process.

The C compiler takes care of the C or C++ source files, natch. Another utility or three will process the resource scripts, and the linker literally puts them all together. If this sounds like a much slower turnaround time than with, say, Visual Basic or ToolBook, you're right. If you suspect that you can probably do a ton of things with the SDK that would be totally impossible in Visual Basic or ToolBook, you're right again. (What language do you think they were written in, anyway?)



Microsoft C/C++ 7.0 provides the strongest foundation any programming environment has ever had for any operating system.

Hammering Out the Code

The C 7.0 compiler is no speed demon, but it turns in respectable times. Slower than Borland but faster than Watcom, it produces solid code with some good optimizations. There are many, many command line switches and extensions to the C language to let you fine-tune the generated code. The C++ support seems to be good, but the C++ classes I've written are only a few thousand lines long. Note that while the product is called C/C++ 7.0, the 7.0 only applies to the C compiler itself. C++ support is at version 1.0, but I've heard of very few bugs in the C++ compiler. That's an unexpected but very welcome development.

The linker is also much slower than Borland's, but on projects of over 50,000 lines or so, they start to reach parity; Microsoft seems to have a pronounced lead in resolving thousands of references at a time. The dialog, font, and bitmap editors are all good, and I'd say they were excellent if I hadn't seen Borland's Resource Workshop. But they more than do the trick. In neither product can you edit TrueType fonts. One unique tool is the Hotspot Editor, most helpful for editing the clickable images in online help.

Windows programmers never have enough debugging tools, but Microsoft goes a long way toward redressing that problem with this release. The MFC has a full complement of integrated debugging and memory-tracing macros. A replacement Windows kernel that runs dog-slow but which catches many heretofore invisible programming errors gives you one of the ultimate tools there is—an operating system that helps you debug. (It's also fun to see how other programs fare under the debugging kernel, because you don't need source code to find out what's going on with a Windows executable.)

Utilities are included to monitor Windows messages and view Windows memory usage graphically. HeapWalker, for example, shows you icons and cursors in memory while Windows is running. Stress lets you fake heavy system usage to see how your program survives in the low-memory conditions that seem to be a way of life in multitasking environments, and the serviceable Source Profiler lets you see what routines eat up the most time.

I can't say CodeView is my favorite debugger, but it does the trick. It can finally work with Windows applications in graphics mode, unlike Borland's Turbo Debugger, and it fully understands C++. If you have a second monitor, such as a Hercules, you can use it to show code while the program runs unmolested under Windows.

Should You Fight or Switch?

Questions and answers about the development deal of the decade:

Q. Isn't $150 a lot for just 5000 pages of documentation?
A. You're getting greedy. That's like buying ten books of 500 pages each at the bookstore. Assuming you pay the bargain price of $25 per book, you're still saving a hundred bucks. Spring for it. Especially if you haven't invested in a lot of third-party books, this is a no-brainer.
Q. Does that 5000 pages of documentation include any filler?
A. No, there's not a page of fluff. In fact, it's so good, I wish there were more. And there is—online. Even the 33 pounds of freight this $289 deal drops on your doorstep mentions important material that is available only online.
Q. Does all this make programming C++ or Windows easier?
A. No, no, no! At least, not as easy as, say, ToolBook or Visual Basic (which still have a learning curve that's a few weeks long). But you will find a mother lode of information, tools, code examples, and cross references you can't get anywhere else. And you'll have everything you need to program anything that can be programmed in Windows—a claim that couldn't be made for Visual Basic or any other Windows programming kit on the market. If you don't know how to program in C, you'll need an introductory text on that subject. But the C++ tutorial is fabulous, rivaling even the best of the third-party books.
Q. Should I switch from Borland C++ if I'm happy with it?
A. No, not if you're happy—but here are a few kickers. Borland's OWL sheath over Windows depends on nonstandard C++ coding, so it's not portable. However, Microsoft's Foundation Classes have been ported to Zortech, Watcom, and Borland C++. I know a number of programmers who bought the Microsoft special just for MFC, the documentation, and the abundance of development tools. As a longtime fan of Borland's, I must reluctantly suggest that a good alternative would be to buy Borland C++ without the Application Frameworks option, get the Microsoft special, and log on to CompuServe to find out how to port MFC to Borland C++.
Q. Is it worth the full $495 if I miss the special?
A. If you don't own another Windows development system, it's worth every cent—and more. If you're happy with the C you have, stick with it. Vicious competition in the development market means your product will be forced to improve its tools and documentation immensely or die a quick but humiliating death.
Q. There must be a downside. What don't I get if I go all the way and pay $139 for C/C++ with the SDK and $150 for the manuals?
A. Tech support. Learning how to program Windows is just plain hard, and at that price, Microsoft isn't going to hold your hand. Expect to read Charles Petzold's classic *Programming Windows*, to do a lot of studying of the supplied manuals, and to spend a good $50 every month on CompuServe. Believe me, it's worth the investment.

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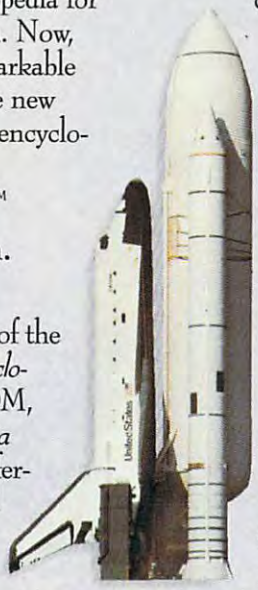

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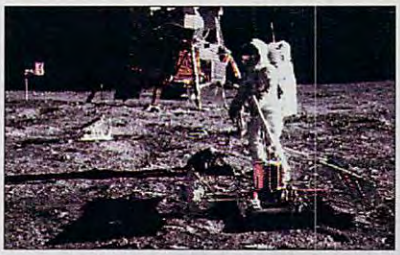

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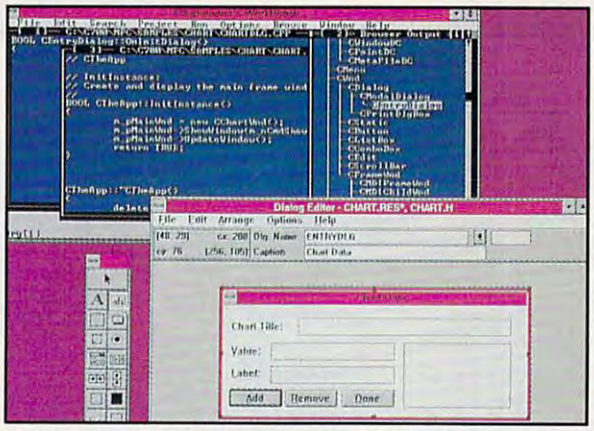
Microsoft Makes Good

Microsoft deserves to be a billion-dollar company, and one of the main reasons is that it learns from its mistakes. The documentation for its C 5.1 was so good that I actually sent a fan letter, but that documentation consisted of three loose-leaf volumes. It costs a lot to print and ship that many manuals, and many users claimed to be sick of so many books.

Consequently, version 6 came with just a few introductory paperback texts and the rest of the documentation online. I was so disgusted that I didn't even ask for a review copy. Meanwhile, I switched to Borland but used Microsoft's great version 5 documentation because I couldn't find its equal anywhere.



Microsoft C/C++ 7.0 comes with Programmer's Workbench and a Dialog editor.

Evidently, a lot of users felt the same as I did, because Microsoft has finally bounced back with the best documentation of any development system around. It would take an article at least this long just to outline all the manuals, but here are the highlights.

A slim but complete Getting Started guide takes you through not just installation but where to go depending on whether you want to code in C or C++, DOS, or Windows. To learn how to program Windows in C++ using MFC, take the time to read the 400-page C++ Class Libraries User's Guide. Although Getting Started implies you can learn to program Windows from scratch with this book, you probably can't. You'll probably need to learn C and plow through Charles Petzold's excellent *Programming Windows*, even though you'll have some unlearning to do when you use MFC.

C++ Class Libraries User's Guide is a great way to see real live C++ classes in action and to learn MFC itself. There is also a much-needed tutorial on the iostream class of C++, which is infinitely more powerful than the C standard I/O library but harder to learn. It goes deep into the heart of the iostream, even showing

Windows Programming Made Easier

It's true that programming Windows with C isn't for the fainthearted, but there are tools that can make working with C easier and faster. These tools fall into two groups: code generators and custom controls.

Code generators are programs that let you create a Windows interface interactively. If you've used Visual Basic, ToolBook, or almost any Windows dialog editor, you have an idea of what this means. Instead of writing code to create the fundamental aspects of your window, you work with a simulation of the window and interactively modify it to suit your design.

After you're satisfied with the window's design, you tell the code generator to generate the source code for your interface. You then take the source code and add your own routines to handle the main tasks your window is supposed to accomplish. Finally, you compile the code, and you're done.

Code generators are expensive, but they take the most tedious aspect of Windows programming and make it quick and fun. And since it's so much easier to create an interface with these programs, you'll probably be willing to spend more time on interface design and wind up with a better, easier-to-use program. It's also easy to experiment with a code generator, which makes one a great learning tool.

The Windows code generator market is shared by three excellent programs: WindowsMAKER Pro 4.0 (Blue Sky Software, 800-677-4946, $995), Case:W 4.0 (Caseworks, 404-399-6236, $995), and ProtoView (ProtoView, 908-329-8588, $395). All three offer the essentials outlined above: You work in a simulation of your window, and when you're finished, the generator produces the code to create the simulation.

All three of these programs can generate code for every major compiler, including Microsoft C/C++ 7.0 and Borland C++ 3.1, and versions are coming out that support these two companies' C++ class libraries: the Microsoft Foundation Classes and Borland's OWL.

Case:W offers some extra features for generating CUA-compliant code, and it's the only tool that has an OS/2 Presentation Manager version. ProtoView is the bang-for-the-buck winner and has recently been selected by Borland to bundle with its C++, which is quite an endorsement.

WindowsMAKER Pro is the easiest to use of the group, and it offers some outstanding features. First, it sports a toolbar that not only generates source code with the press of a button but lets you build your application and run it, too. You can also quickly find and edit your source code using any text editor you specify. With these features, WindowsMAKER Pro can easily become the interface for your development environment. In addition, WindowsMAKER Pro has a powerful dialog editor that supports custom controls and is very easy to use. You just can't go wrong with this program.

Programming in C can also be simplified with custom controls. In Windows, most of the objects that populate dialog boxes and other windows are called controls. The most common of these are buttons (including push buttons, radio buttons, and check-box buttons), text boxes (both for displaying text and editing it), and list boxes.

You've probably noticed that in some programs these controls appear in simple black, white, and gray, but in others they have a sculpted 3-D look. The sculpted controls are examples of custom controls. You can create these from scratch yourself, or you can buy a library. Obviously, the easier way to go is to let an expert do the work and buy a prepackaged set. There are three excellent groups worth considering: Borland's Resource Workshop (Borland International, 408-438-8400, $49.95), Blaise Computing's Control Palette for Windows (Blaise Computing, 510-540-5441, $169), and Farpoint's Drover's Toolbox for Windows (Farpoint, 614-765-4333, $345).

Borland offers only a few controls with the Resource Workshop, but they aren't the package's main attraction. The Resource Workshop is an amazing resource editor that's an unrivaled tool for creating dialog boxes and decompiling resources from exe and dll files. You'll probably want to get it whether or not you wind up using the controls that come with it.

The Farpoint and Blaise controls are both superb. They are easy to work with and produce stunning results. I've found the Blaise controls to be a little more flexible, but the Drover package comes with a huge number of functions to enhance the Windows API, which balances things out. Both are excellent values.

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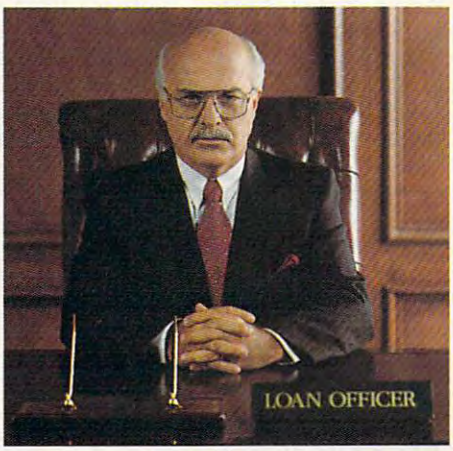

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you how to create your own manipulators, which format output more flexibly than vprintf( ). The tutorial develops a Windows phone book application of several thousand lines, so you get a realistic view of MFC in action.

Programmer's Reference, Volume 1: Overview is the kind of book that should be with every major programming environment but never is. Certainly, Borland has nothing like it, and ridiculously few third-party books even approach it in scope. This is truly an overview, directed at the capable Windows programmer but covering issues that only an expert could explain properly. There's a section on the new common dialogs with code fragments; an extensive, if still too short, section on OLE; a section on GDI; and a short description of network programming issues. These are all well and good, but there are some tremendous bonuses. The data decompression API is covered, a whole section on writing screen savers comes with the code for a screen saver, a stress testing section shows you how to shake out memory leaks, and some useful tips for international applications round out the group.

C and C++ language reference guides explain Microsoft's implementation and compare it to the international C and C++ standards. Anyone interested in portable software (not to mention compiler design) is well advised to scrutinize the section comparing ANSI C to the Microsoft flavor, which is a superset of ANSI.

The trendier among you will appreciate manuals on multimedia and pen support; these aren't as well documented as some of the more mature parts of Windows, but they're still exceptionally well covered. Along with the working example code, this is enough to get you going for 90 percent of your pen and multimedia programming needs; for the other 10 percent, you'll need to visit CompuServe.

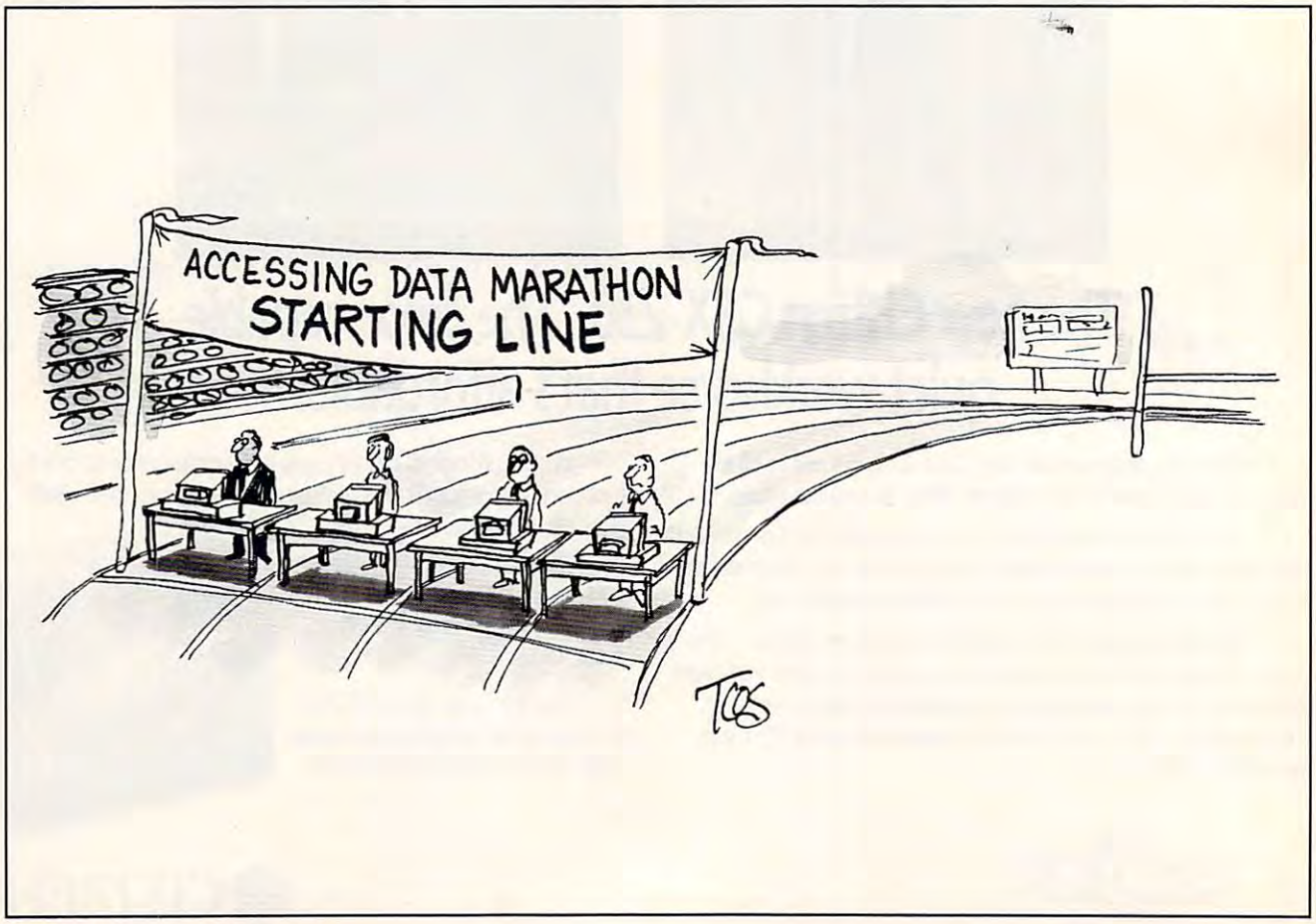
Although this article is mostly concerned with the C programmer, it would be a crime not to mention that the DOS runtime library reference has examples for every routine and can hold its own with any book on the shelf at B. Dalton. The reference is in alphabetical order but preceded by summary chapters that attack the subject from all possible angles. Every routine and variable has example code, and a see-also note is provided whenever it makes sense. Not only is the manual itself a masterwork, but the DOS runtime and graphics libraries have both grown to be major achievements. Read the first chapters carefully before you create your next DOS app, because there's a good chance a lot of the code you expected to write will already be there, ripe for the picking.

Is It Worthwhile?

I'd like some refinements to the devastatingly powerful one-two punch of the C/C++ and SDK bundle. Obviously, the compiler and editor should be Windows based and run faster. I'd like more on learning to program Windows in C. I still don't like CodeView as much as Turbo Debugger.

But these shortcomings pale when set against what can only be described as a magnificent product. There is simply no other way to get so many high-quality tools and so much insanely good documentation at such a low price. If you're serious about programming Windows applications from scratch, you can't go wrong with Microsoft C/C++ 7.0.

IBM PC or compatible (80386 or faster), 4MB RAM, hard drive with 20- to 50MB free, 1.2- or 1.44MB floppy drive, Windows 3.0 or higher—$495 list, $139 on special; printed SDK documents—$150 extra ❑



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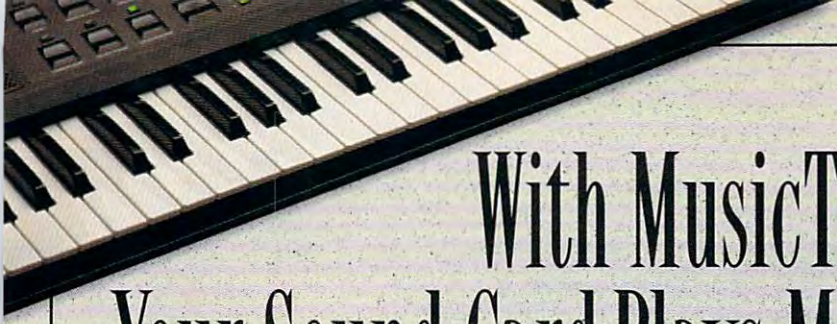

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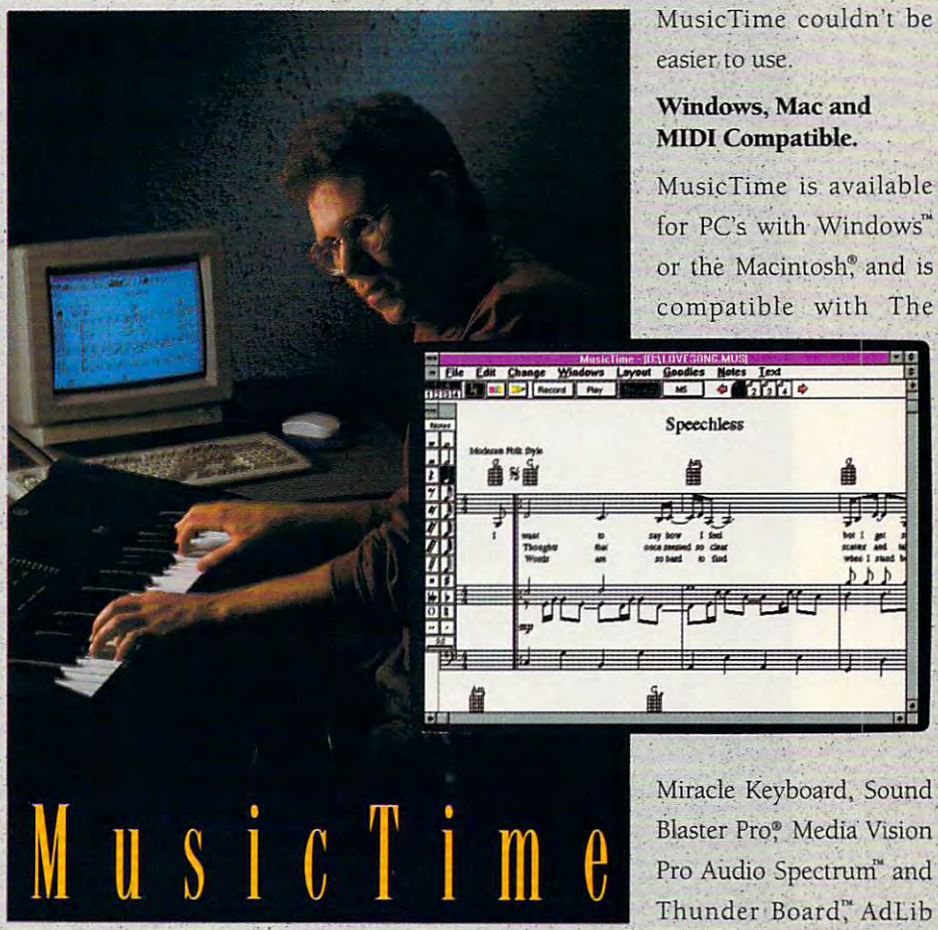

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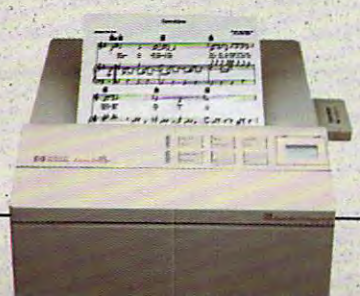

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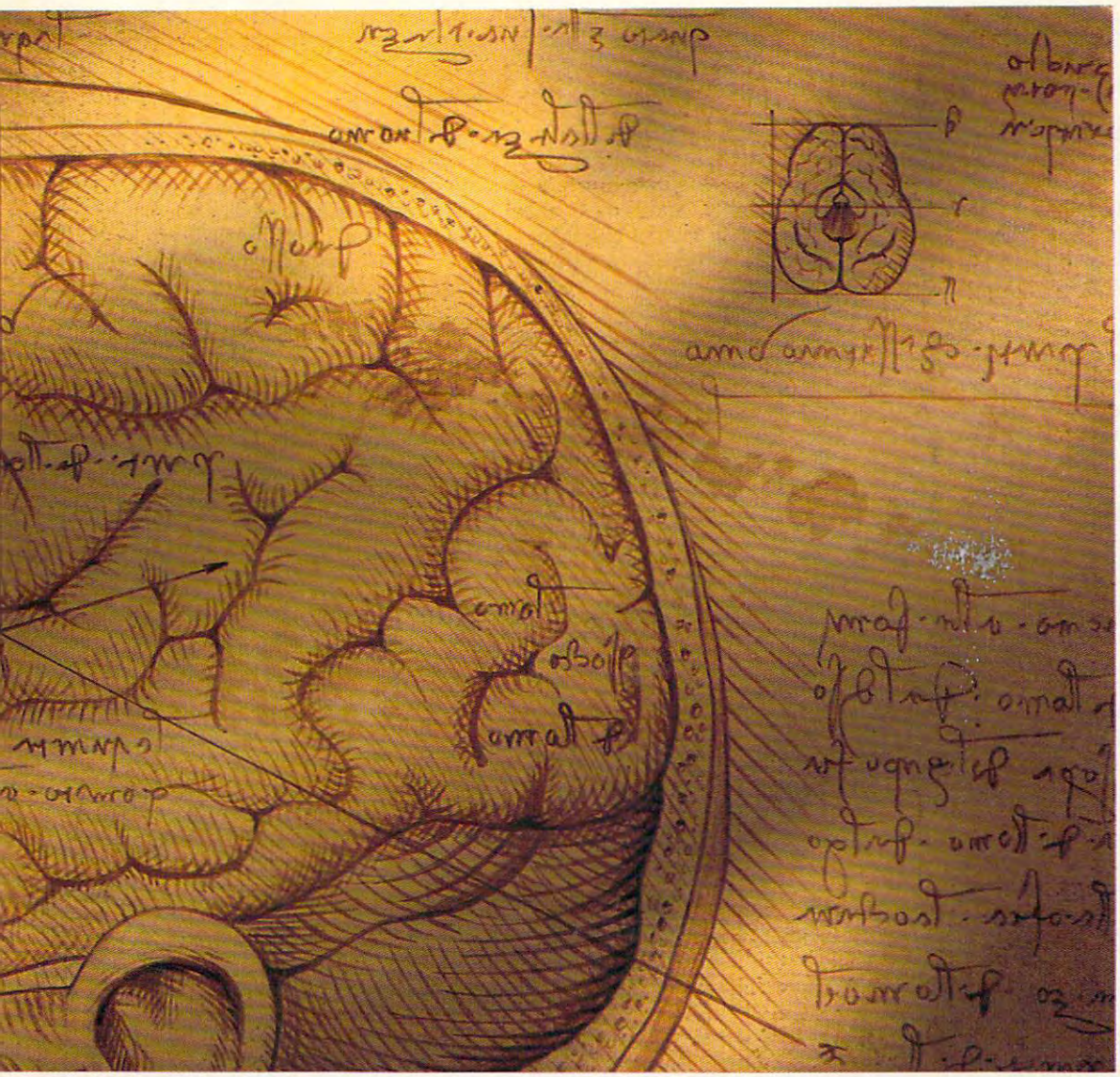

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TEST LAB

Edited by Mike Hudnall
Reviews by Tom Benford

More informative, more persuasive, more fun—that's multimedia. And for a number of reasons, it's a technology you should consider now.

Increasingly powerful processors, bigger drives, and advances in sound and CD-ROM technology mean that multimedia works better than ever before. Falling prices in the hardware market and increased competition among multimedia manufacturers mean that you can afford more in a computer than ever before, including multimedia capabilities.

Who needs multimedia? Just a year or two ago, CD-ROM–based applications were mostly limited to the areas of institution-based education, business presentations, computer-aided training, and information kiosks. Today, there are hundreds of CD-ROM applications for the average PC user, including business, general-education, and entertainment programs. Many of these, especially those with full MPC support, have digitized voice, music, and sound effects; full-motion video; and a screen resolution of 640 × 480 with 256-color graphics. If you've been waiting for enough MPC applications to become available before you consider buying an MPC or an MPC upgrade kit, you don't need to wait any longer.

The sound capabilities of multimedia are truly impressive.

Do you still need to use the MPC version of Windows instead of the more up-to-date Windows 3.1? In November 1990, when Microsoft, Tandy, and other major companies in the industry announced the MPC specifications, the software platform was officially named Microsoft Windows graphical environment 3.0 + Multimedia Extensions 1.0 (or Windows with Multimedia for short). It was a separate version of Windows with the various multimedia drivers built in. In April 1992, Microsoft brought the audio drivers into Windows 3.1, as well as the MCI (Media Control Interface), which lets you add CD-ROM drives, videodisc players, MIDI sequencers, and other multimedia devices. As a result, you can run just about any MPC application under Windows 3.1 as long as you have the appropriate multimedia software drivers.

This month, Test Lab looks at four MPCs and four multimedia upgrade kits from Acer, ALR, AST, Creative Labs, Media Resources, Media Vision, NEC, and Tandy. These powerful yet competitively priced computer systems and upgrade kits offer you a range of prices and technologies from which to choose. You'll find sound boards from Acer, Creative Labs, Media Vision (including its 16-bit sampling board), NEC, and Tandy; CD-ROM drives from Mitsumi, Panasonic, Sony, Tandy, and NEC (the speedy MultiSpin drives); and an abundance of features—headphones, microphones, speakers, voice mail, communications hardware, an AM/FM tuner, and much more. And keep in mind that the manufacturers offer a variety of configurations and options.

How to choose? As always, you'll want to consider your budget as well as your current and future needs. To help you make a more informed decision, this month's Test Lab provides in-depth reviews, with discussions of installation, configurations, special features and capabilities, documentation, software bundles, and performance. Pay particular attention to the CD-ROMs provided with each package; often offered at an unbelievably low price, these discs are frequently a major selling point for a package. For convenient side-by-side comparison of features, you'll want to take a look at the features grid.

Because multimedia technology involves concepts and terminology that may be new to you, this month's Test Lab provides helpful sidebars: a glossary, a description of the MPC standards, and a description of the testing methodologies. Whether you're a techie or a novice, you'll appreciate the authoritative descriptions, definitions, and explanations prepared in collaboration with industry experts.

While price and software bundles are important, you'll also want to consider performance, and here our benchmark results should prove quite useful. The graphs that present the results of the various tests are designed to help you understand as much as possible about the sound and CD-ROM technologies provided by the various manufacturers. Once you've considered all that multimedia has to offer, the only reason you may have for not buying a system now is that the future promises even more capable multimedia technologies. But then, there's always something better on the horizon. Why put it off? Multimedia beckons!

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The AcerPAC 150 is so feature rich that a term like *multimedia* doesn't tell the whole story. Acer calls it a Personal Activity Center, hence *PAC*, and when you look at the list of standard features, you can see why this term fits so well.

Based on a 20-MHz Intel 386SX CPU, the AcerPAC 150 offers as standard equipment a 130MB hard drive and 4MB of RAM (expandable to 16MB on the motherboard). The system's footprint measures 14.4 inches wide by 16.5 inches deep, and the box stands 5 inches high, so this is a reasonably compact computer.

On the front, you'll find the high-density 3½-inch floppy drive just below the internal CD-ROM drive. Jacks for attaching headphones and an extension microphone are also front mounted along with push-button volume controls and switches for power and reset. A built-in condenser microphone and a built-in monaural speaker also grace the front of the unit, along with LED indicators for power, disk drive activity, turbo speed (20 MHz), and CD-ROM activity.

Two serial ports, a parallel port, a joystick or MIDI port, a dedicated PS/2-style mouse port, audio line in and out ports, a coaxial antenna jack, and a modem connection port round out the list of basic I/O connectors. A single 16-bit expansion slot is vacant for adding a peripheral board of your choice, and the system will accept an E-mu daughterboard (for very advanced MIDI and sound-sampling capabilities), as well as an 80387 math coprocessor.

The front-mounted CD-ROM drive doesn't require a caddy. Pushing in the front of the drive lightly causes the disc drawer to extend. Lifting a door inside this drawer provides access to the disk compartment, and closing the door and pushing in on the drawer seats the disc and readies it for use. "Caddiless" CD-ROM drives are usually a tad slower than those which use a caddy, but the Acer CD-ROM drive performed respectably nonetheless.

What makes this a Personal Activity Center? There's an internal 9600-bps send/4800-bps receive fax unit with 2400-bps Hayes-compatible modem capabilities built in. There's also a built-in digital Telephone Answering Device (TAD), which is a functional voice mail system featuring automatic switching between the phone's answering machine and the fax functions.

You also get a Sound Blaster–compatible audio board with a software-controlled eight-channel mixer installed in the system and, of all things, a built-in AM/FM stereo tuner (now you know what the antenna jack is for). A flat ribbon antenna also comes supplied to improve radio reception.

The radio at first seems an unusual idea, but it has its practical purposes. Since you can make and receive telephone calls through the PC (as well as faxing and using the modem), the built-in radio can serve as your "music on hold," in addition to providing listening enjoyment as you use the system.

The AcerPAC 150 offers an attractive software bundle. The included software starts with MS-DOS 5.0 and Windows 3.0 with Multimedia Extensions. Delrina's WinFax, a Prodigy startup kit, Microsoft's Windows Entertainment Pack, and Acer's Music Center software and Telephone Answering Machine/Speaker Phone software are all provided on floppy media. The bundled CD-ROM–based software titles include Microsoft Works for Windows Multimedia Edition, Microsoft Bookshelf, and Compton's MultiMedia Encyclopedia—all excellent productivity and reference titles.

The Telephone Answering Device is really something special that deserves mention here. If you're away from the PC, the TAD records incoming messages and lets you retrieve them remotely. The ability to send and receive faxes, exchange data via the modem, place and take voice phone calls through the PC, and have it receive faxes and telephone messages when unattended is a significant achievement that you will readily appreciate whether you use your AcerPAC 150 at home or in a small business. A single telephone line connected to the PC can perform all of these functions, and they are all seamlessly integrated to work together while running under Windows—talk about productivity!

The VGA graphics adapter with 512K of video RAM supports 256-color palettes; an AcerView 35 UVGA color monitor with flat screen presents a dazzling display that makes your computing a truly pleasurable experience.

This package includes a comfortable 101-key keyboard, a two-button Microsoft-compatible mouse, and a one-year parts-and-labor warranty with on-site service. And in addition to excellent user manuals, Acer also provides a toll-free help line if you need further assistance.

With all this going for it, the AcerPAC is easy to love, indeed.

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ALR FLYER 32DT 4SX/25 MPC MODEL 80

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List price: $3,195
Warranty: one year (limited), parts and labor

Multimedia readiness and 486SX power are the flagship features of the ALR Flyer 32DT 4SX/25 MPC Model 80. And in keeping with ALR's usual practice, the list of features goes on and on.

The Flyer 32DT has a low 3-inch profile and occupies a standard PC footprint area measuring 14 inches wide by 17 inches deep. Weighing in at a trim 25 pounds, the Flyer 32DT is nonobtrusive and light enough to move around if necessary.

As one would expect with a full-featured machine such as this, the I/O ports consist of a pair of 9-pin serial connectors, a parallel port, and a dedicated mouse port (an ALR two-button mouse is included), all located at the rear of the machine, along with the connector for attaching the 101-key keyboard. Audio I/Os, which reside on the mounting bracket of the sound card (a Media Vision Pro AudioSpectrum Plus), consist of jacks for microphone input, line input, and line output; you'll also find a jack for a joystick (or optional MidiMate kit). On the front of the internally mounted Sony CD-ROM drive, you'll find a headphone jack.

Although external speakers can be connected to the line-out jack on the sound board's bracket at the rear of the machine, you won't need them unless you want additional volume; the ALR features its own built-in speaker system, which provides more than adequate sound reproduction and plenty of volume. This factory-equipped audio setup should prove to be entirely satisfactory for most users.

The heart of the Flyer 32DT, an Intel 80486SX CPU running at 25 MHz, gives the machine the computing oomph required to run today's GUI-based applications at a respectable clip. To aid the CPU in its computing chores, the Flyer 32DT comes with 4MB of RAM as its standard complement, although you can expand this to a maximum of 36MB. A 16-bit Super VGA controller with 512K of RAM and capable of 1024 × 768 256-color resolution drives the 14-inch ALR FlexVIEW 3X color monitor; this video package offers both text and graphics in dazzling color and brilliant clarity.

A single 3½-inch 1.44MB floppy drive is front mounted just above the Sony CD-ROM drive; adding another internal device such as a second hard drive is possible, though your options are limited because of the case size (one additional 3½-inch drive bay is available). This Flyer 32DT came with a 19-ms 80MB IDE drive (you can order a 200MB drive), which proved to be a speedy and reliable performer for all the applications loaded and run from it during the reviewing process.

MS-DOS 5.0 and Windows 3.1 come preloaded on this PC. To make your use of the system even easier, ALR preconfigures Windows for the Pro AudioSpectrum Plus sound board and preinstalls the requisite Windows sound drivers and a special Multimedia Tools group containing four audio applications. These complete and useful accessories allow you to enjoy the full sound potential of the machine.

The Pro Mixer application, a mixing console, combines synthesizer, CD, microphone, and auxiliary audio sources, adjusting their individual volumes and recording and playing back from each of these sources. You get eight individual banks of slider controls with left and right sliders for each bank. The Mixer application sets the overall volume of music, CD-audio, microphone, wav sounds, and auxiliary sounds. The Pocket Mixer application, yet another utility for recording and mixing sounds, uses more of an analog-type interface, with dial controls rather than sliders. The Pocket Recorder records sounds and is quite similar in appearance and operation to the Windows Sound Recorder accessory.

The internal Sony CD-ROM drive uses a standard CD-ROM caddy (supplied). And to get you started immediately in the realm of multimedia, three Microsoft MPC CD-ROMs are also included with the system: MultiMedia Works 2.0, Microsoft Bookshelf, and MultiMedia Beethoven. Because ALR preconfigures Windows for you, you can run these CD-ROMs as soon as the system is turned on. ALR even includes an excellent multimedia presentation that acquaints the new owner with the Flyer 32DT's features. All documentation is excellent and easy to understand, even for the novice.

The Flyer 32DT provides an excellent means of getting 486 power along with multimedia capabilities painlessly in a factory-configured system built right here in the U.S.A.

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Like 28 internal fonts, side-loading font card. 512K standard memory, expandable to 4.5 megabytes. And flexible paper handling, with a 200-sheet multi-purpose cassette, accommodating letter and legal sized sheets plus envelopes—without changing cassettes. All this and a true 5 pages-per-minute print speed!

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TEST LAB

AST ADVANTAGE! 386SX/25 MULTIMEDIA

AST RESEARCH
16215 Alton Pkwy.
P.O. Box 19658
Irvine, CA 92713
(800) 876-4278
(714) 727-4141
List price: $1,699
Warranty: one year, parts and labor

Snappy performance, an excellent assortment of standard features, and full MPC Level 1 compatibility make the AST Advantage! 386SX/25 Multimedia a machine worth taking a closer look at if you're in the market for a multimedia PC that's ready for action right out of the box.

The system gets its computing power from an Advanced Micro Devices AM-386SX CPU running at 25 MHz. As part of the standard configuration, you get 4MB of RAM, expandable to 8MB or a maximum of 16MB (1MB or 4MB SIMMs populate the four sockets on the system board, but you cannot intermix them to produce configurations other than those listed; for example, a 5MB configuration isn't possible).

The data storage chores are handled via a 3½-inch 1.44MB floppy drive and an 80MB IDE hard disk, a slimline unit side mounted at the rear of the chassis. Just below the floppy drive you'll find a Matsushita (Panasonic) CD-ROM drive. Internal drive expansion is limited to adding one additional side-mounted hard drive, as the system box doesn't offer any more front-accessible bays.

An average-size PC, the Advantage measures 15½ inches wide by 16½ inches deep by 6 inches high. AST supplies an AST SVGA 13-inch color monitor with .28-mm dot pitch as the standard video device for the system, driven by a Super VGA adapter with 512K of video memory. Because AST integrates this 1024 × 768 resolution video adapter right into the motherboard itself, you have a valuable expansion slot available for other uses. Of the five full-size, 16-bit expansion slots on the motherboard, four are vacant and can accept any user-installed peripherals (the audio card occupies one slot).

MS-DOS 5.0 and Windows 3.1 come preinstalled on the Advantage!, and for input and control, you get a comfortable 101-key keyboard and a two-button mouse. The Advantage! provided for review came with software preloaded on its hard drive.

Documentation—an MS-DOS 5.0 User's Guide (Condensed Edition), a Concise Guide to Microsoft Windows 3.1, and a Microsoft Works User's Guide—accompanied the system, but no floppy disks were anywhere to be found. I should note that all of the

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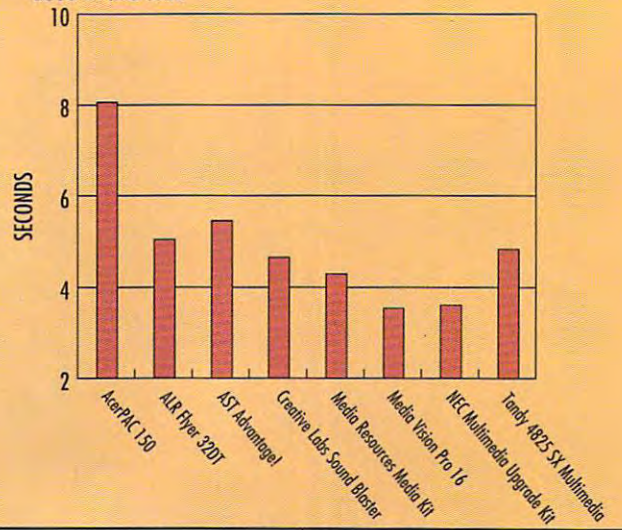
The Hi-Res Image Retrieval Test measures the actual elapsed time in seconds and hundredths of seconds required to retrieve three high-resolution scanned color images and display them. The recorded time is the average of three individual tests. Nimbus Information Systems' Romware Magazine CD-ROM contains the source files used in this test.



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user manuals bear the AST logo and color scheme rather than the standard Microsoft blue, so these are apparently special editions. Upon calling AST, I learned that in the haste of getting a review unit out in time to meet our editorial deadline, the company inadvertently left the disks out of the box. However, the company representative assured me that end users will indeed have the original floppy copies of the software.

The Advantage! comes with a Sound Blaster Multimedia Upgrade Kit already installed in it, so users are ready to start adventuring into multimedia immediately. The Sound Blaster Pro audio board provides stereo output, which you can enjoy through a pair of amplified Labtec CS-150 bookshelf speakers. A Labtec AM-20C dynamic microphone lets you sample your own sounds.

The internal Matsushita CD-ROM player connects to the Sound Blaster Pro, so all audio (CD-ROM, FM synthesized sounds, wav files) is channeled through the audio board. A headphone jack at the front of the CD-ROM drive allows for private listening, and a joystick port (which can also do duty as a MIDI port) is available on the audio board's mounting bracket, along with the microphone and auxiliary input jacks. The CD-ROM drive bears the MPC logo on its front bezel, since it, along with the Sound Blaster Pro audio board it works with, complies with MPC Level 1 standards (the Advantage! case itself bears no MPC logo, however).

Four CD-ROM titles come packed with the Advantage!. King's Quest V and Mixed-Up Mother Goose from Sierra On-Line are sure to provide pleasant recreation for all age groups; Macmillan's Dictionary for Children supplies ready reference in an easily digestible format for younger PC users; and Microsoft Bookshelf offers up a wealth of reference resources with a mere mouse click, including an online encyclopedia, dictionary, atlas, thesaurus, and more.

All of the CD-ROM applications are set up at the factory to run through Windows, which is very convenient. I did, however, experience some clicking and choppiness in the audio portions of King's Quest V when running the game through Windows; these problems were not present when I ran the program from the DOS prompt. I also noticed that the game moved along faster in general when run from DOS rather than Windows. Bookshelf and Macmillan's Dictionary for Children require Windows to run, while King's Quest V and Mixed-Up Mother Goose run from DOS as well as Windows.

AST presents this machine as a good entry-level multimedia system. Having worked with it myself, I agree with that appraisal.

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CREATIVE LABS
1901 McCarthy Blvd.
Milpitas, CA 95035
(800) 998-LABS
List price: $799.95 (internal CD-ROM drive); $899.95 (external CD-ROM drive)
Warranty: one year, parts and labor

CREATIVE LABS SOUND BLASTER MULTIMEDIA UPGRADE KIT

You can't say, "Sound Blaster," without immediately thinking of the best-known sound cards with the longest list of supporting software titles available today. Creative Labs, the company that practically set the standard for PC sounds cards with its Sound Blaster models, now provides a complete multimedia upgrade kit that includes everything you need to get started in multimedia.

The heart of the Sound Blaster Multimedia Upgrade Kit is the company's flagship product, the Sound Blaster Pro audio card. This three-quarter-length card fits into a 16-bit slot and features stereo output utilizing the Yamaha YMF262 OPL-3 FM synthesizer chip to produce 20 voices of instrument sounds and effects. Jacks, mounted on the metal mounting bracket of the card, are provided for microphone input and stereo line input and output. A wheel on the bracket controls volume. Doubling as a connector for the included MIDI kit, a joystick port, also mounted on the bracket, can handle one or two joysticks.

The Sound Blaster Pro card contains the proprietary interface required to activate the CD-ROM drive that comes with the kit. A flat ribbon cable mates the audio board's 40-pin connector with its equivalent on the CD-ROM drive. A CD-ROM audio interface cable routes CD audio through the Sound Blaster Pro for amplification and mixing. All of the system's multimedia audio (CD, sampled, synthesized, MIDI) thus comes through the sound board, so you'll need only one set of speakers or headphones (not included), regardless of the sound's origin.

If you don't have an available drive bay for a CD-ROM drive, take heart. You can buy the kit with either internal mounting for the CD-ROM drive (this was the one supplied for review) or external mounting. Essentially, the only difference between the two (aside from a slight difference in price—the external version being a tad more expensive) is that the

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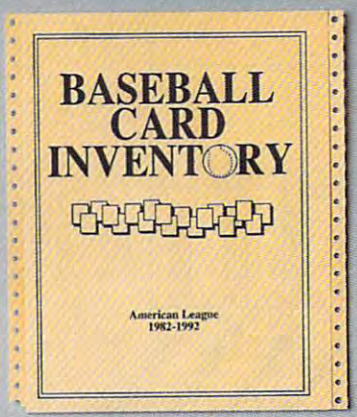

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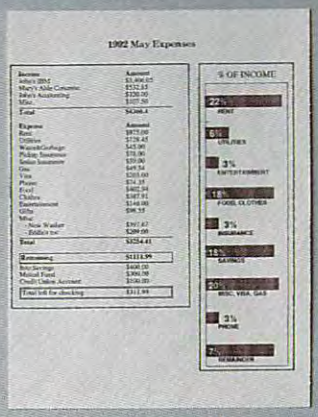

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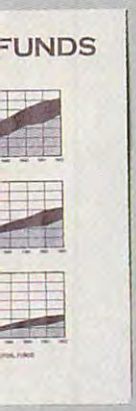

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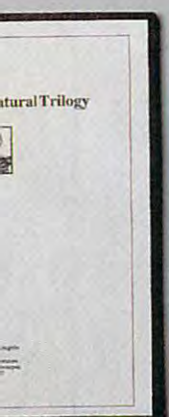

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external version encloses the CD-ROM drive in a freestanding cabinet containing its own power supply, whereas the internal version mounts internally in a 5¼-inch half-height drive bay and gets its electrical current from the PC's power supply.

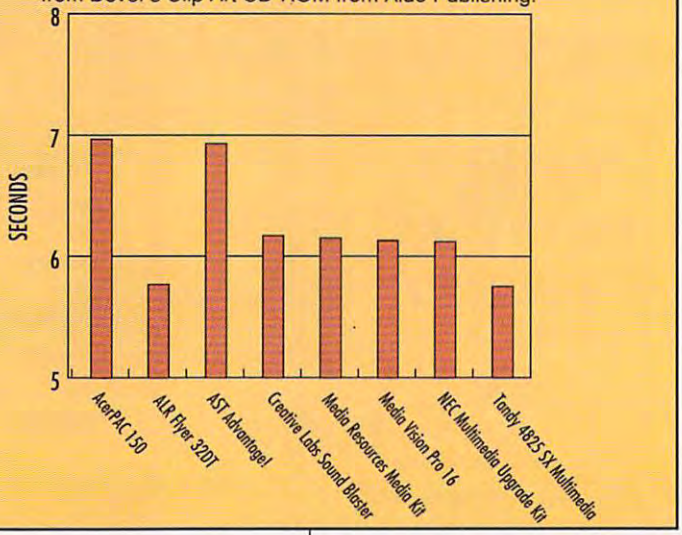
Not all upgrade kits permit using the audio card's MIDI capabilities right out of the box; most require the purchase of an additional MIDI accessory kit to access these functions. Such is not the case, however, with the Creative Labs kit; it includes a cable which attaches to the joystick port at one end and terminates with DIN connectors for MIDI input and output at the other end. MIDI sequencing software comes with the package.

Good instructions and keyed cable connectors simplify installation. The internal version even provides mounting screws for installing the CD-ROM drive in an available front-accessible drive. The software portion of the installation is highly automated, only occasionally requesting user input in response to a prompt. The only disk-based software provided consists of 3½-inch floppies containing the CD-ROM drive installation program (a single disk) and Mathematica's Tempra, a DOS-based paint program (two disks). All other software is provided on optical media.

An excellent assortment of software comes on the six CD-ROMs packed inside the kit. Microsoft Bookshelf, a versatile multivolume reference work, is included along with the multimedia edition of Microsoft Works to get you off to a productive start. To lighten things up in a recreational vein, you can take a stroll down Baker Street or tour old London Towne in a horse-drawn cab with ICOM Simulations' Sherlock Holmes—Consulting Detective. You also get a CD-ROM called Software Library, which contains Authorware Star and Macromind Action! for creating and producing your own multimedia presentations and productions. On another disc you'll find Windows 3.1, the Sound Blaster Pro software, and an assortment of music clips. A Creative Sounds disc with an abundance of music and effects rounds out the optical media software library.

MULTI-IMAGE RETRIEVE/DISPLAY TEST

The Multi-Image Retrieve/Display Test uses our proprietary TIME_IT program to record the actual elapsed time in minutes, seconds, and hundredths of seconds required to retrieve and display 28 black-and-white clip art images from an automated display/viewing program. Our source files for this test come from Dover's Clip Art CD-ROM from Alde Publishing.



Creative Labs certainly didn't skimp on the audio and multimedia utilities included in the Sound Blaster kit. You get Voice Editor, a full-featured waveform editor; SBTalker, a text-to-speech program; FM Intelligent Organ, an easy-to-use music creation and playback program; MIDI Sequencer SB Pro, a full-featured sequencer package; CD Player, a control panel for playing audio CDs on the system; and MMPlay, a utility program for integrating graphics and animations with synchronized audio.

Most of the kit's documentation is truly top-drawer, from the materials checklist through the reference and application manuals. Do pay careful attention, however, to the instructions for attaching the cables between the sound card and the CD-ROM drive; some versions of the kit have used a ribbon cable that can be attached incorrectly if you're not careful.

The Sound Blaster Multimedia Upgrade Kit packs lots of value and features into a single box. Just add speakers and a microphone, and you're off to explore the fascinating world of multimedia on your PC!

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All Benchmark/Performance Testing is conducted by Computer Product Testing Services (CPTS), an independent testing and evaluation laboratory based in Manasquan, New Jersey. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.

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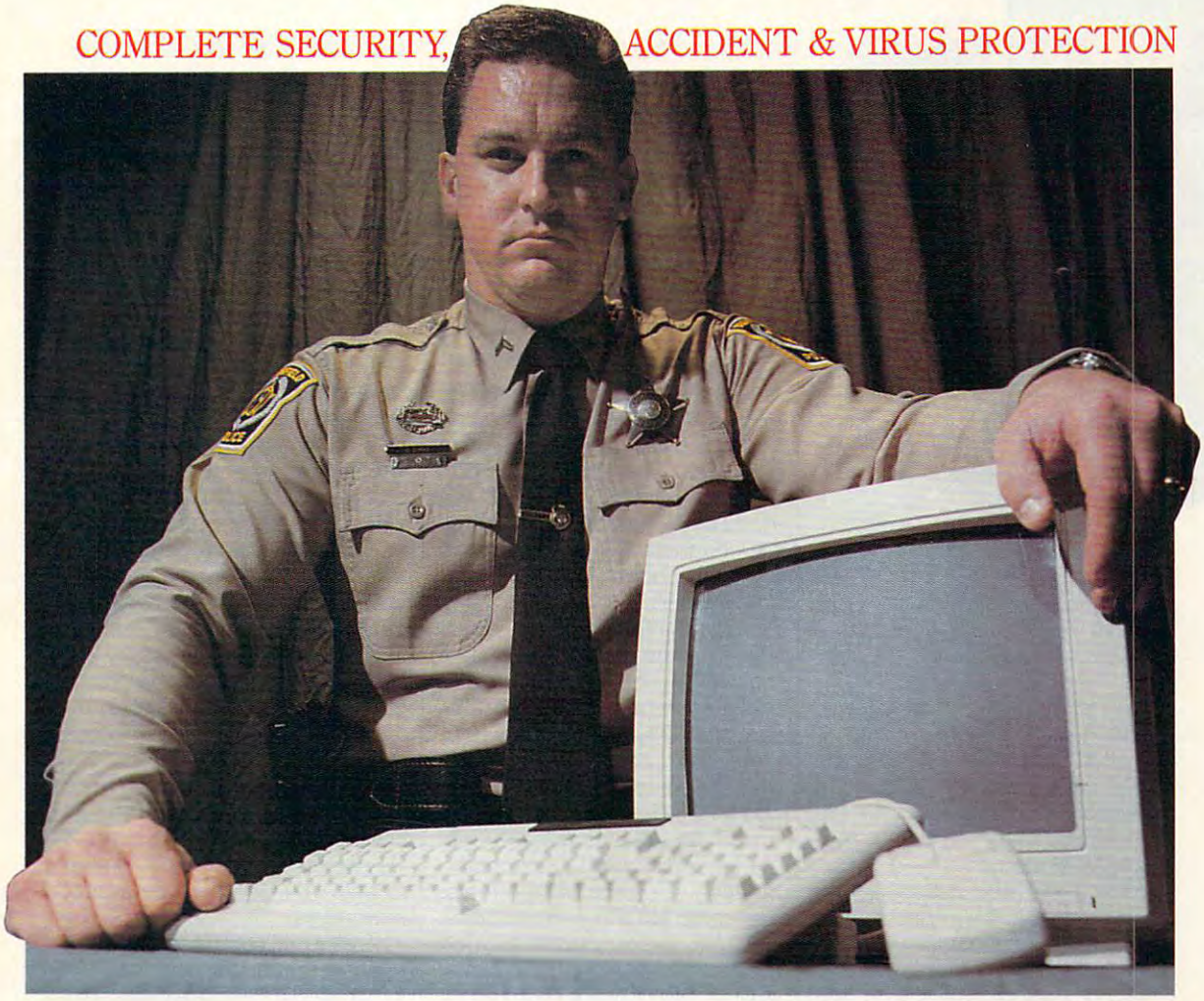

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MEDIA RESOURCES MEDIA KIT (ADVANCED MODEL)

MEDIA RESOURCES
640 Puente St.
Brea, CA 92621
(714) 256-5048
List price: $1,499; $1,599 with Compton's MultiMedia Encyclopedia for Windows; pricing for MPCs, multimedia components, and other multimedia upgrade kits available from the manufacturer
Warranty: one year, parts and labor

If you're interested in professional-level music and sound capabilities that go far beyond the basic MPC Level I requirements, you'll want to learn more about the the Media Resources Media Kit (Advanced Model).

The designation *Advanced* certainly applies to this multimedia upgrade kit, since installing it turns a mundane 386-or-higher PC into a commercial-level sound and multimedia production facility. The kit provides a higher-speed CD-ROM drive than Media Resources' basic multimedia upgrade kit and adds a dedicated MIDI card in addition to the standard sound card, increasing the sound capabilities of the system significantly.

Since two cards come supplied in the kit, you'll need two slots for installation. The three-quarter-length audio card, a Media Vision Pro AudioSpectrum Plus, requires a 16-bit slot for installation; you can install the three-quarter-length Roland SCC-1 MIDI board also included in the kit in an 8-bit slot.

An NEC CDR-83J internal-mount CD-ROM drive with its blazingly fast MultiSpin technology takes care of the optical reading capabilities for the kit. The drive interfaces via an included ribbon cable to the SCSI connector on the audio board, and another cable channels CD audio through the sound board for mixing and amplification.

Adding the Roland MIDI board to the system increases the number of voices from the 20 available through the Pro AudioSpectrum Plus itself to a whopping 317 sounds and nine rhythm sets using both the audio and MIDI boards in combination. Additional benefits derived from the Roland board include reverberation and chorusing effects; dedicated MIDI in and out ports, which leave the joystick port on the audio board free (an optional MIDI breakout box is required for MIDI in and out with the basic version of the kit); and a dedicated MIDI headphone jack and left- and right-channel RCA jacks for direct connection to external amplification sources.

Hardware installation is easy and doesn't require any special talents, but since there's an extra peripheral to install, it takes a couple of minutes longer to complete than with most other kits. I found all cabling clearly marked and keyed, all required hardware supplied, and the instructions excellent. Even a novice shouldn't have any difficulty completing the installation in well under an hour.

The kit includes the Microsoft CD-ROM Extensions (MSCDEX), of course, and a collection of Roland Utilities for the MIDI board, both supplied on 3½-inch disks.

The optical media software is provided on two CD-ROMs. The first contains Midisoft's Recording Session for Windows, which is a MIDI sequencing package with realtime music notation; Brightstar's At Your Service animated talking appointment calendar software with greetings, reminder, system report, and health-watch services; Gold Disk's Screen Craze animation package; and Microsoft Windows 3.0 with Multimedia Extensions 1.0. The second is Nautilus CD Sampler, an MPC CD-ROM "magazine" chock-full of samples of music, sound effects, games, photo images, multimedia industry news and views, programming tools, utilities, and tips.

You get all the necessary cables and adapters, along with a pair of amplified speakers, although no microphone comes with the kit.

User manuals and reference guides accompany all of the kit components, and everything is well written and clearly illustrated to help you get the most out of multimedia.

If your multimedia computing needs are modest, you may opt for the Media Resources Media Kit (Basic Model), a less expensive kit (model MKB-01) which consists of a sound card, a CD-ROM drive, software, and accessory items. An intermediate multimedia upgrade kit, possibly available when this review is published, will include Digital MIDI sound. And if you own a Sony Laser Library, you may wish to look into the Media Kit for the Sony Laser Library, which includes a CD controller, a sound card, and Windows 3.1.

However, if you're interested in doing serious music and audio production work with professional-caliber results, the Media Resources Media Kit (Advanced Model) is definitely a multimedia solution you should consider.

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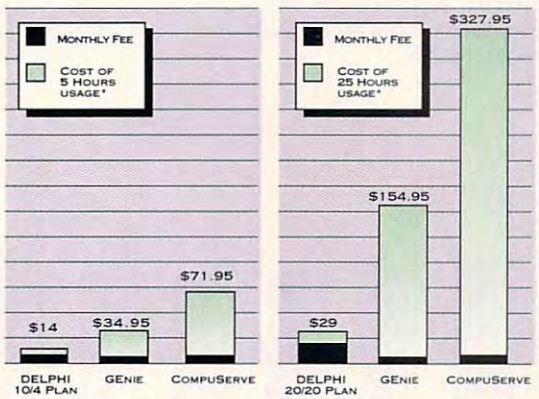

**Comparison is based on total evening/weekend use in one month of GEnie℠ Value Services and CompuServe® Extended Services at 2400bps. Rates are current as of July 10, 1992. GEnie is a service mark of General Electric Company. CompuServe is a trademark of H&R Block, Inc.*

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MEDIA VISION PRO 16 SYSTEM

MEDIA VISION
3185 Laurel View Ct. Fremont, CA 94538
(800) 845-5870
List price: $1,195; $895 for Multimedia Upgrade Kit Plus; $1,295for CDPC
Warranty: three years

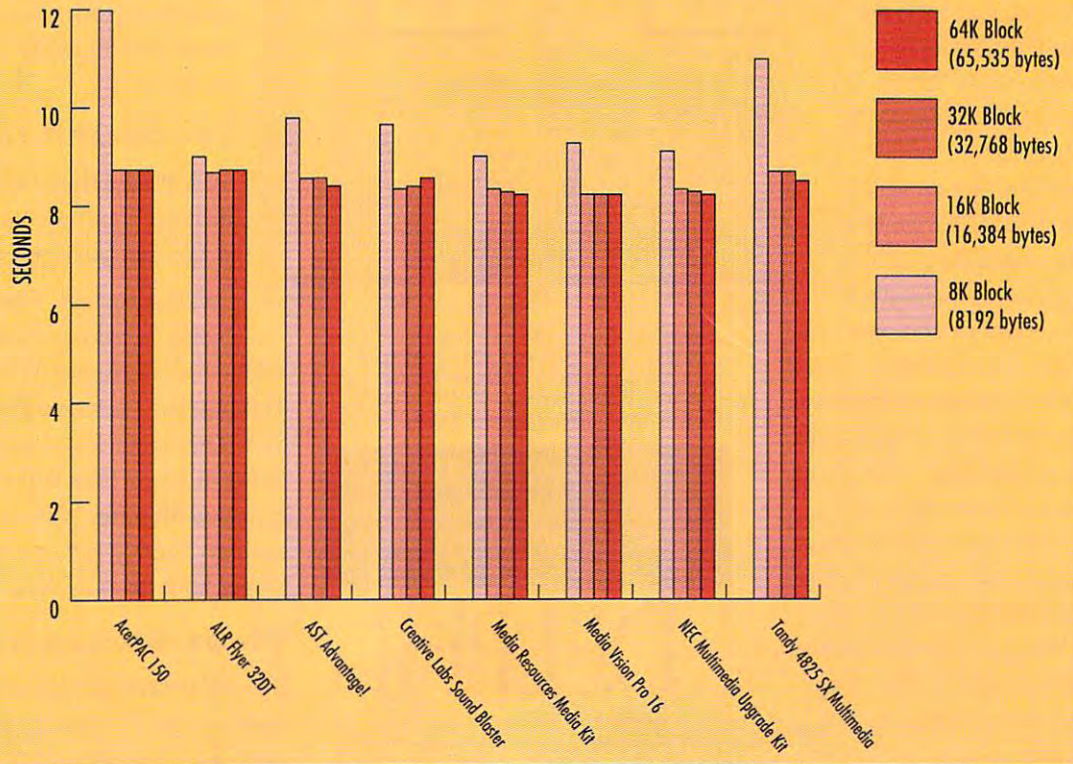
High-quality components are integral to the success of any product. That reality is obvious in Media Vision's wise choice of individual components for its multimedia upgrade kit, the Pro 16 System. What makes this system really special, however, is the 16-bit sampling rate of the Media Vision Pro AudioSpectrum 16 card. The result is a high-end, high-powered multimedia upgrade kit that will delight virtually any PC user.

The Media Vision Pro AudioSpectrum sound card handles the sound functions, as well as providing the essential SCSI interfacing required to control the CD-ROM drive. This 16-bit three-quarter-length card uses a Yamaha YMF262 (OPL-3) 20-voice stereo synthesizer chip to generate sound, and the board delivers four watts per channel of output power. While almost every other multimedia sound card offers only an 8-bit sampling rate, the Pro AudioSpectrum 16 offers both 8-bit and 16-bit sampling rates. The 16-bit rate gives you more sound information and cleaner samples.

The kit's NEC CD-ROM drive mounts internally in any front-accessible 5¼-inch half-height drive bay of your PC. A ribbon cable connects the CD-ROM drive

ELAPSED TIME TESTS

The Elapsed Time Tests measure the elapsed time for the transer of a source file (1,257,344 bytes) from Compton's MutliMedia Encyclopedia CD-ROM. As in the tests of rate of transfer, we used four data block sizes in the test passes.



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*Open Link Extender is sold separately. †Requires NetBIOS connection.

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to the SCSI interface on the audio board, and an audio cable routes the CD audio through the sound card, as well. Having all of the audio (CD, wav, and FM-synthesized sounds and music) emanate from one location (the output port of the audio board) means that you can intermix sounds with individual volume adjustments for each audio source. Additionally, you need only one set of speakers (or headphones) for all audio playback.

I found installing the kit an essentially straightforward process that doesn't require any particular technical or mechanical skills. Excellent descriptions and illustrations in the documentation facilitate your installation of this upgrade equipment. To install the hardware, you remove the PC's system cover, insert and secure the Pro AudioSpectrum board in an available 16-bit slot, install and secure the CD-ROM drive in an available bay, attach the "pigtail" power connector from the PC's power supply to the socket on the CD-ROM drive, connect the SCSI ribbon cable to both the drive and audio card, connect the audio-link cable to both devices, replace the system unit cover, and attach a pair of speakers or headphones to the audio output port on the board's mounting bracket. All connections are keyed so that they will only mate when properly oriented to each other, which greatly reduces the chances of making a mistake.

As for the software, you'll install Windows 3.1 (supplied on floppies with the kit) on the system if it isn't already resident and then run the Pro 16 Multimedia System installation program, contained on two 3½-inch disks. Highly automated, the installation process only occasionally requests user input in response to a prompt. An additional disk contains Media Vision drivers for Windows. And a fourth floppy contains Monologue, a memory-resident text-to-speech utility that runs from DOS

THE MPC STANDARD

The MPC standard is a set of technical specifications for multimedia hardware products which is being widely adopted in the PC industry. The standard provides plug-and-play simplicity for the consumer and helps the marketplace develop quickly for products that comply with these specifications.

The MPC Hardware Specifications Version 1.0 are as follows:

CPU
The minimum requirement is a 386SX or compatible microprocessor.

RAM
The minimum requirement is 2MB of extended (linear address space) memory.

CD-ROM
The drive must be capable of a sustained 150K-per-second data transfer rate with an average seek time of one second or less. (For specific benchmarks, see the bar graph with Data Transfer Speed Rate Test results.) The drive must also provide Mode 1 audio capability (the ability to play your audio CDs) and an MSCDEX 2.2*x* (Microsoft CD Extensions) driver that implements extended audio APIs (Application Programming Interfaces). The drive cannot consume more than 40 percent of the CPU bandwidth (in other words, no more than 40 percent of the CPU's computing power) while maintaining a sustained transfer rate of 150K per second. The drive must provide CD-DA (Red Book) audio outputs and have a front-mounted volume control.

VIDEO
There must be a VGA-compatible display adapter and a color VGA-compatible monitor.

INPUT DEVICES
There must be a 101-key IBM-style keyboard with a standard DIN connector or a keyboard which delivers identical functionality using key combinations, a two-button mouse with a bus or serial connector, and at least one additional available communication port.

I/O
There must be a standard 9- or 25-pin asynchronous serial port, programmable up to 9600 bps, with a switchable interrupt channel; a standard 25-pin bidirectional parallel port with interrupt capability; one MIDI port with input, output, and throughput capability with interrupt support for input and FIFO transfer; and an IBM-style analog or digital joystick port.

MPC SYSTEM SOFTWARE
MPC system software must conform to APIs, function, and performance as described in the Microsoft Windows Software Development Kit Programmer's Reference, Volumes I and II (version 3.0) and the Microsoft Multimedia Development Kit Programmer's Reference (Beta version, published November 15, 1992, and due to be updated at the final release of the Multimedia Development Kit).

MPC™
Multimedia PC

Additional information on the technical specifications required for hardware compliance are available upon request from the Multimedia PC Marketing Council.

The term *multimedia* applies to a number of new computer technologies on the market today. Keep in mind, however, that only MPC upgrade kits and full systems which have been certified by the Multimedia PC Marketing Council as being compliant with its MPC specifications are granted the right to use the official MPC trademark logo, shown above. Look for it when considering a product.

—TOM BENFORD, PRESIDENT, COMPUTER PRODUCT TESTING SERVICES; IN COLLABORATION WITH GLENN OCHSENREITER, MANAGING DIRECTOR, MULTIMEDIA PC MARKETING COUNCIL (A SUBSIDIARY OF THE SOFTWARE PUBLISHERS ASSOCIATION)

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(not Windows).

The kit consists of the audio board, the CD-ROM drive, the requisite cabling for connecting the two devices, documentation, software disks, and five CD-ROMs; no additional accessory items come with the kit. If you want to use speakers, headphones, a microphone, or any other accessories, you'll have to purchase them separately.

You'll find plenty of sound utility software in this kit, most of which runs under Windows (a program called Audio Mate is a DOS-based multimedia application, and the Monologue program mentioned earlier also runs under DOS). The Windows utilities include Stereo Studio F/X, a stereo waveform sound editor; TrakBlaster Pro, a four-track music studio; SP Spectrum, a MIDI sequencer that facilitates composing and playing back music; Control Panel, a software-controlled mixing console; and an assortment of music and sound files.

The CD-ROM software included with the kit provides something for everyone: Lotus 1-2-3 for Windows with Multimedia SmartHelp provides spreadsheet and charting for the business user, Compton's MultiMedia Encyclopedia provides a wealth of reference material on myriad subjects for users of all ages, King's Quest V provides recreational adventure for the whole family, and MacroMind Action! provides all the tools needed to create dazzling multimedia presentations easily. As a bonus, you also get an introductory "sample issue" of Nautilus, a multimedia "magazine" on CD-ROM with sound bytes, MIDI and wav music files, graphics images, demos of software programs, utilities, and lots more.

The Media Vision Pro 16 System has lots of the "right stuff" to get you off to a fine start and keep you happily running with multimedia.

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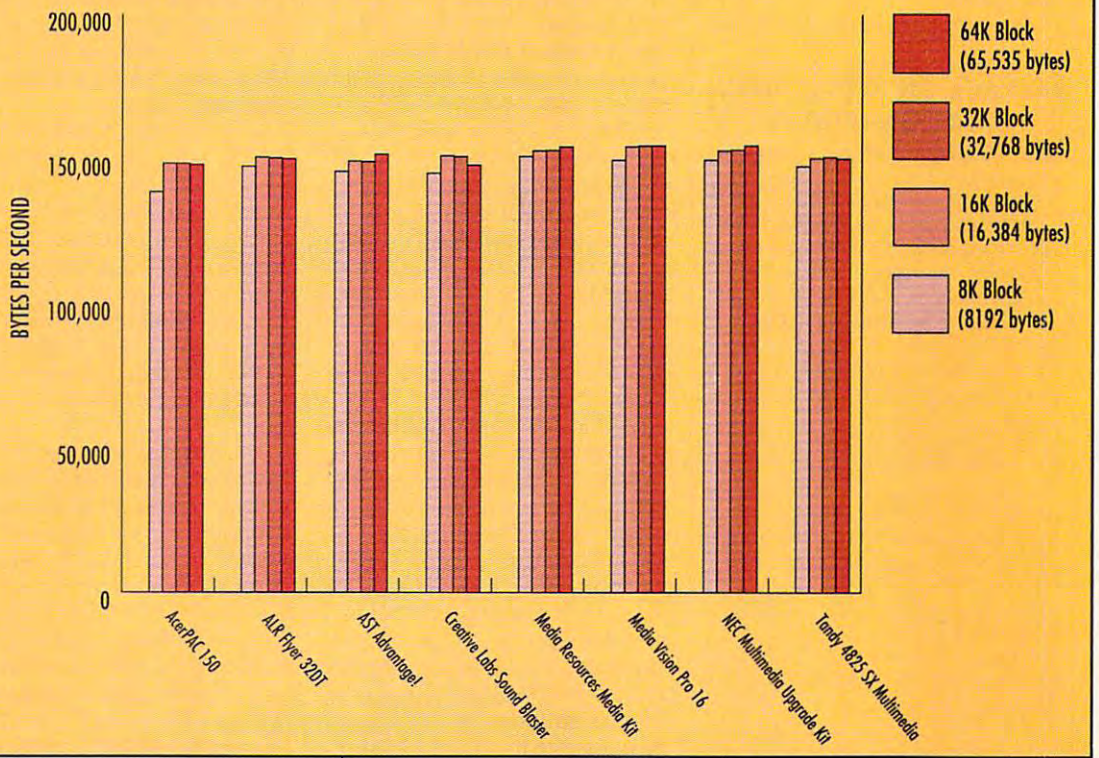
DATA TRANSFER SPEED RATE TESTS

The Data Transfer Speed Rate Tests measure the actual transfer rate in kilobytes per second. Our source file (1,257,344 bytes) comes from Compton's MultiMedia Encyclopedia CD-ROM. We used TIME_IT with our CD-SPEED utility to automatically record the performance data. Performance was measured using four data block sizes in the test passes. While these drives are optimized for one particular block size, you're likely to use more than one block size in your daily work, so we felt that it would be useful to show performance for these other block sizes as well.



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NEC MULTIMEDIA UPGRADE KIT

NEC TECHNOLOGIES
1255 Michael Dr.
Wood Dale, IL 60191
(800) NEC-INFO
List price: $1,379 (external); $1,299 (internal)
Warranty: two years (limited), parts and labor

The NEC Multimedia Upgrade Kit offers you quality and features that show just how seriously the company takes multimedia technology. In addition to a CD-ROM drive that's among the speediest around, you get just about every component and accessory you could possibly ask for in this kind of kit.

The heart of the upgrade kit is the NEC CDR-74 CD-ROM drive. An external unit, this drive has its own cabinet and power supply. It connects to the PC via a supplied SCSI cable (a SCSI terminator plug is also provided for the drive's pass-through SCSI port). The CDR-74 drive (which is the same as the NEC CDR-84, except that the latter installs internally in your PC) features NEC's MultiSpin technology, which makes it the fastest MPC-compliant drive available (as of the time of this review).

The cable that links the CDR-74 to the host PC also has audio and MIDI cables attached to it so that CD audio can be played through the audio board. Line input and output jacks and dual MIDI connectors on this master umbilical cable facilitate connections. NEC labels all cabling clearly, making the installation quick and easy for virtually any PC user, even the novice.

The audio board supplied with the kit is a Media Vision Pro AudioSpectrum Plus unit that has been modified to NEC's specifications. The board supports full stereo output using a pair of Yamaha YMF262 OPL3 synthesizer chips (one for each channel), which deliver 22 voices in 18 timbres. Two MIDI ports (one for input and one for output) are also supported by the board and accessed via the DIN connectors on the umbilical cable. In addition, the audio board contains the SCSI interface for controlling the CD-ROM drive.

This kit offers a rich assortment of accessories—the most complete of all the kits (and systems) reviewed here. In this kit, you get a pair of amplified Labtec CS-150 miniature bookshelf speakers and a DC power adapter for powering the speakers when you don't want to use the four C cells. However, the speakers do not have to be powered to operate; without batteries or DC power connected to them, the speakers operate in the passive mode, deriving their volume from the sound board itself. Adding power to the speakers amplifies the audio coming from the sound board and provides a bass boost, as well.

A pair of lightweight Labtec stereo headphones also comes with the kit for private listening. The headphones are equipped with a stereo miniphone jack, but you can also use an adapter supplied in the package to plug them into your home stereo or other audio devices sporting standard-sized headphone jacks.

A Labtec AM-20 deluxe microphone with an on/off switch comes with the kit. With the Labtek microphone, you can sample sounds and record your own voice. As with the speakers, the mike has a stereo miniphone jack installed on its eight-foot cord and comes with an adapter so that you can use it with devices requiring a standard phone plug.

The kit also includes a copy of Asymetrix's Multimedia Toolbook software package, an "industrial-strength" multimedia authoring system. Of the multimedia authoring and development packages available on the market today, Multimedia Toolbook is probably the most flexible and is certainly the best known. NEC's decision to include Multimedia Toolbook was a solid one, adding significant val-

A NOTE ON PRICES AND CONFIGURATIONS

The multimedia market is changing rapidly, partly because of competition among manufacturers and partly because of the rapid advance of technology. As you make your way through this month's Test Lab, please keep in mind that between the time we receive our information and the time the issue hits the stands, there may have been changes in prices, packages, and components. As hard as we try to keep up with changes and provide you with the latest information, it isn't always possible to do so.

To make sure that you're getting exactly what you want at the price you want, you should check with the manufacturer or retailer before buying. Also, keep in mind that we provide suggested list prices and that you can often find street prices that are much lower. It pays to shop around.

—MIKE HUDNALL

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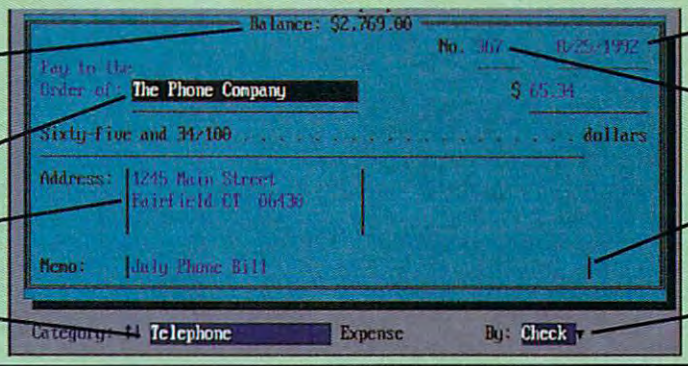

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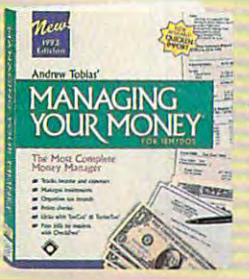

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All rights reserved. System Requirements: **DOS** — IBM PC, XT, AT, PS/1, PS/2, or IBM compatible. DOS 3.0 or later. 512K RAM. Hard disk. **Macintosh** — System 6.0.2 or later. System 7 compatible. Mac Plus or later. 2MB of memory recommended. 3 MB of free hard disk space for installation. Macintosh version does not perform all of the functions in DOS version.

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ue and versatility to this excellent upgrade kit.

NEC provides only one CD-ROM application with the kit—a copy of Windows 3.1 along with the appropriate drivers required to upgrade your PC to multimedia Windows and activate all of the MPC features of the hardware.

The documentation in NEC's upgrade kit is truly excellent, explaining every step of the installation in lucid detail with a generous assortment of illustrations to further clarify the upgrade process. Most of the installation is automatic, requiring only minimal user input. Believe it or not, you can install the entire upgrade, including Windows 3.1, in under an hour, and it doesn't require any special technical knowledge or prowess. NEC keys all cable connections so that they will fit together only one way (the correct way), a good feature that further guarantees a successful installation.

Make no mistake about it: This is not a "bargain basement" multimedia upgrade kit for the budget conscious. But then again, quality never comes cheap. Looked at in that context, the NEC Multimedia Upgrade Kit is indeed a bargain when you consider the quality and quantity of the goodies it contains. With it, you get more than your money's worth.

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MPC AUDIO TERMINOLOGY GLOSSARY

ADPCM. This is an abbreviation for *Adaptive Differential Pulse Code Modulation.* ADPCM is an algorithm for compressing audio data so that it requires less memory and disk space. The amount of compression appears in ratio format, such as 4:1, 3:1, and so forth. The ratio numbers indicate the degree of compression in a sample. For example, a 2:1 ratio means that the compressed sound is only one-half the size of the original uncompressed sample; a 3:1 ratio indicates that the sound has been compressed to one-third its original size.

chip sets. The YM3812 and the YMF262, manufactured by Yamaha, are known as frequency-modulated (FM) synthesizers, since they can generate sounds. The principal difference between the YM3812 chip and the YMF262 chip is that the latter has stereo capabilities and produces 20 voices, while the former is a mono chip producing 11 voices (thus, two YM3812 chips are required for stereo sound cards). Also, the YMF262 has four additional "operators," or modes, which makes it capable of producing a wider variety of sounds and timbres. See **timbre.**

dynamic range. This is a representation of the span of volume between the loudest and softest sounds, expressed in decibels.

MIDI. An acronym for *Musical Instrument Digital Interface,* the specification was developed as a cooperative effort among major manufacturers of electronic musical instruments in the 1980s with the objective of permitting musical instruments of different brands to communicate with each other. Additionally, several MIDI-equipped devices can be linked together under the control of a PC and software for creating, storing, editing, and playing back music in digital data format.

MPU-401. The Roland company (a major developer and manufacturer of music synthesizers and sound processors) developed the original MPU-401 MIDI interface for use with PC-compatible and Apple II series computers. MPU-401 is a widely accepted interface, featuring its own onboard CPU for processing some MIDI data without taxing the system's CPU for these tasks. The MPU-401 interface also supports the UART (Universal Asynchronous Receive and Transmit) mode, which bypasses the card's processor and relies entirely on the host PC for all processing.

sample size. This is not to be confused with the physical size of the expansion slot the sound board fits into. Simply put, the sample size is the range of data for the sampled sound, with 16-bit sampling encompassing double the amount of sound data that 8-bit sampling does (8-bit sampling provides 48 decibels of dynamic range, whereas 16-bit doubles the range to 96 decibels). Since more sound information is involved, 16-bit sampling requires more memory and more disk space for storing the sounds than 8-bit sampling.

sampling rate. Measured in kilohertz (kHz), this refers to the lowest-possible and highest-possible ranges of sound that can be successfully digitized. According to the Nyquist Sampling Theorem, the highest audio frequency that can be reproduced must be sampled at a frequency at least twice that high. This means that in order to reproduce a 20-kHz tone, you must sample it at 40 kHz.

Windows 3.1 has a sampling limit of 44 kHz, although some audio cards are physically capable of sampling up to 88 kHz. The threshold of human hearing is about 21 kHz. Why sample at rates beyond the limits of human hearing? The higher rates provide much cleaner samples by reducing the amount of alias distortion (extraneous information that filtering removes from the sampled sound).

signal-to-noise ratio. This number, usually represented in decibels, depicts the strength ratio of the desired signal (for example, music) to the extraneous noise present (such as background hiss). The higher the number, the "cleaner" the sound will be. The signal (music) is measured at full volume, whereas the noise (hiss) is measured when no signal is present (during silence). In addition to hiss, noise can also be the whine of the computer or any other undesirable noise that isn't a part of the signal itself.

timbre. Also called tonal color or musical quality, this term refers to the sound characteristics that allow us to differentiate one sound from another, the qualities that make sounds unique. For example, timbre is what makes a saxophone sound like a sax instead of a guitar.

—TOM BENFORD, PRESIDENT, COMPUTER PRODUCT TESTING SERVICES; WITH TECHNICAL ASSISTANCE FROM BRAD STEWART, VICE PRESIDENT, PRODUCT DEVELOPMENT AND ENGINEERING, COVOX

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Education

As any teacher knows, getting a student interested is half the battle. The other half is trying to satisfy the demand for knowledge once it's sparked. Interactive software on a Multimedia PC helps in both areas, enabling the user to link pictures, sound and music. It pulls information out of the linear, page-flipping world of books into the dynamic world of hyperlinks, in which each idea is connected to a rich web of associations. One idea sparks another; each discovery gives birth to three more. Learning becomes exploration and students become explorers in search of the sound, images, text and animation that bring information to life - explorers driven by inspiration.

Entertainment

From the modest beginning of the common PC come the rich sound and inter- activity of the Multimedia PC - one integrated system that can play audio, show animations and display high-quality photo images. You can explore CD-based travel brochures or mail- order catalogs complete with the engaging sights and high-fidelity sounds that bring the world to your senses. Play inter- active computer games that combine actual photo images with arcade-style sounds and full-color animation. Create your own artwork and animate it. Or link your Multimedia PC to a keyboard to record, store and replay MIDI music. The possibilities are as limitless as your imagination.

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TANDY 4825 SX MULTIMEDIA

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List price: $2,188 without the monitor, $2,500 with the monitor.
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Editor's note: After testing and review evaluation of this system had taken place, Tandy announced its new Sensation! multimedia system. According to Tandy representative Fran McGehee, you'll still be able to order the 4825 SX system with the multimedia features described in this review when the December issue hits the stands. The Sensation! uses the same CD-ROM drive as the 4825 SX but a different audio card.

In the same way that Tandy brought computers to the home, the Fort Worth company is now bringing multimedia computing to the masses. Its 4825 SX Multimedia PC takes the new user gently by the hand on a colorful audiovisual excursion into MPC-land.

A compact PC, this Tandy offers a baby-AT form factor of 15½ inches wide by 15 inches deep with a low profile of 4¼ inches and a weight of about 17 pounds. The review unit came equipped with the standard configuration of 4MB of RAM, although you can expand memory up to a maximum of 32MB.

An Intel i486SX CPU provides the power to make it all happen, and with a clock speed of 25 MHz, this PC makes things happen fast. The machine's highly integrated motherboard features a built-in 16-bit IDE hard drive interface, as well as a built-in Super VGA video port. The standard video memory configuration is 512K, which yields noninterlaced 1024 × 768 and 800 × 600 graphics modes with 16-color palettes. Tandy offers an optional upgrade kit for boosting the video RAM to 1MB, which supports 1024 × 768 noninterlaced graphics in 256 colors (the review unit had the standard 512K video RAM setup). A socket on the motherboard lets you install a math coprocessor.

A 3½-inch 1.44MB floppy drive and a 3½-inch 120MB IDE hard drive move and store data on this machine. A PS/2-style Tandy two-button mouse plugs into a dedicated PS/2-style port, also integrated into the motherboard. Two serial ports and a parallel port handle the input-output chores, while an excellent 101-key keyboard with audible key clicks makes typing fast and comfortable.

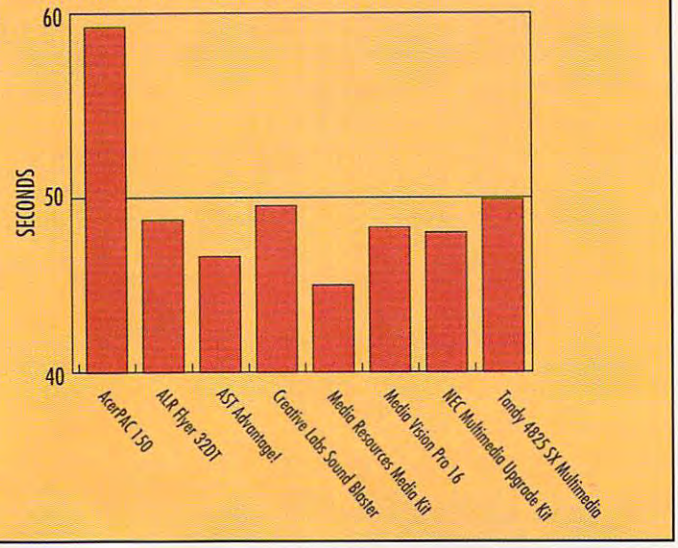
Since the audio board in the 4825 SX occupies one of the three 16-bit expansion slots, only two remain available to accept additional device cards. A single 3½-inch front-accessible drive bay is available for adding a second floppy or hard drive or a compact tape-backup unit.

A Tandy VGM-441 14-inch color monitor supplied with the 4825 SX for the review provided crisp, comfortable viewing, even for very prolonged sessions exploring the MPC capabilities of the machine, as well as for extended text and number-crunching sessions.

MS-DOS 5.0 and Windows 3.0

Rolling Video Test

The Rolling Video Test uses a full-motion video segment from the National Geographic Mammals CD-ROM to provide comparative playback times.



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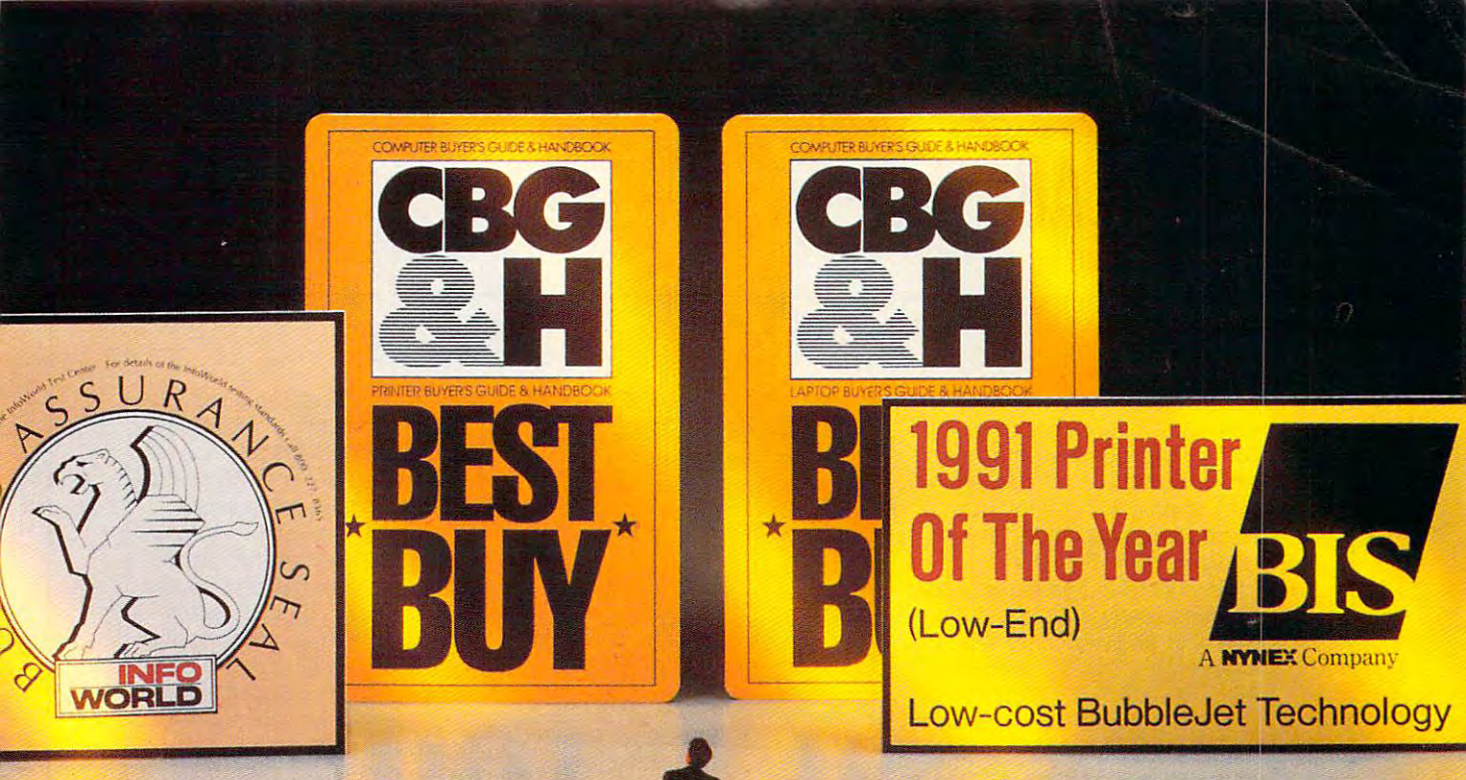

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with Multimedia Extensions came preinstalled on the 4825 SX. I was somewhat puzzled when I first booted the system and saw the 3.0 opening screen, since I fully expected to see Windows version 3.1. A bright red card in the documentation packet immediately caught my attention with its boldfaced heading: "WARNING: DO NOT UPGRADE THIS COMPUTER TO WINDOWS 3.1!" The message went on to say that the Multimedia Extensions work correctly with Windows 3.0 but not with 3.1. (I know from personal experience that this is true; however, since 3.1 already has the Multimedia Extensions built into it, I found this message to be even more confusing.) The message also said that Microsoft plans to release Windows 3.1 with Multimedia Extensions in the fourth quarter of 1992 and, at that time, owners of registered 4825 SX multimedia systems will be notified about how to receive their free 3.1 upgrades. The message ended with a repetition of the bold warning it began with.

Indeed, Windows 3.0 with Multimedia Extensions is installed on the system, and it moves along at a decent clip, thanks to the 25-MHz CPU. Having become accustomed to the faster performance that Windows 3.1 delivers, I was pleasantly surprised at how swiftly this machine performed with the older, slower Windows version.

The built-in CD-ROM drive doesn't require a caddy. With a slight push, a drawer extends from the drive to accept the CD-ROM directly. Another push retracts the drawer and seats the disc in the drive. Tandy's published specifications list CD-ROM drive disc spin-up time as one second, although it certainly seemed much longer than that whenever the drive was accessed initially (the benchmark test times for the 8K block test corroborate this); after the initial "logon," subsequent access of the CD-ROM drive was almost instantaneous. This wasn't a great surprise, however, since "caddiless" drives almost always take longer to achieve proper spin-up speed than drives that use caddies.

The audio board contains jacks for connecting two Tandy-compatible joysticks and a MIDI cable, as well as a jack for attaching speakers or headphones and another jack for plugging in a microphone. No microphone, speakers, or headphones are supplied, although a MIDI cable comes with the system.

You'll find Microsoft Works for Windows supplied on floppy disk and also preinstalled on the hard drive. Manuals for Works, DOS 5.0, Windows with Multimedia, and general system features are up to Tandy's usual fine standards.

The one CD-ROM disc in the package provides lots of software demos of programs, including multimedia titles for entertainment, education, reference, and productivity, as well as an introduction to the system's multimedia capabilities.

While this is a good system for getting started in multimedia computing, the sparseness of accessories (no mike, speakers, and so forth) and the demo-only CD-ROM (instead of at least one fully functional, useful CD-ROM software title) put a damper on my enthusiasm for it.

Circle Reader Service Number 311

MULTIMEDIA TESTING METHODOLOGY

Complete MPC systems were tested using only the hardware supplied by the manufacturer unless a required component was not part of the standard package (for example, a microphone for sampling sounds); in such cases, a Shure Unidyne dynamic microphone served as the standard test instrument. A pair of Labtec SS-100 series amplified speakers and a pair of Sennheiser HD-414 Professional Series dynamic headphones allowed us to check audio quality when manufacturers did not supply speakers or headphones.

MPC upgrade kits, on the other hand, were all tested on the same computer. The test system used a Mylex i486/33-MHz motherboard with 8MB of RAM. The chassis for the test system was equipped with a calibrated 200-watt Senstron regulated power supply provided by Triton Technology Lab (New Hyde Park, New York) along with hard and floppy drives.

The **MPC Audio Test Suite** consists of several tests designed to establish the sound card's ability to record and play back sampled sounds using the supplied software utilities as well as those provided in the Microsoft Multimedia Development Kit. We tested sound cards to ensure correct playback of sound files with the wav extension as well as MIDI files using the card's on-board FM synthesizer. Wav files use the native sound format understood by Windows (digital sound data). Not actual sound files, MIDI files contain control signals for activating a MIDI device.

Additionally, our MPC Audio Test Suite included numerous tests to check the audio capability of the CD-ROM drive itself, its playback audio capabilities through the audio card, its conformity to the MPC hardware standards, and its ability to read the ISO 9660 High Sierra data format (the original CD-ROM format agreed upon by major manufacturers) as well as audio-only CD-ROMs.

—TOM BENFORD, PRESIDENT
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TEST LAB

MULTIMEDIA FEATURES

	AcerPAC 150	ALR Flyer 32DT	AST Advantage!	Creative Labs Sound Blaster	Media Resources Media Kit	Media Vision Pro 16	NEC Multimedia Upgrade Kit	Tandy 4825 SX Multimedia
CD-ROM DRIVE INFORMATION								
CD-ROM interface	proprietary	SCSI	proprietary	proprietary	SCSI	SCSI	SCSI	proprietary
Location of interface	motherboard	audio board	audio board	audio board	audio board	audio board	audio board	motherboard
CD-ROM manufacturer	Mitsumi	Sony	Panasonic	Panasonic	NEC	NEC	NEC	Tandy
Headphone jack	yes	yes	yes	yes	yes	yes	yes	yes
Phono (RCA) jacks	no	no	no	no	adapter included	no	yes	yes
Auxiliary audio hookup cable	yes	no	yes	yes	yes	no	yes	yes
Caddy required	no	yes	yes	yes	yes	yes	yes	no
Internal (fits in bay)	yes	yes	yes	yes[1]	yes	yes	no[1]	yes
External (stands alone)	no	no	no	no	no	no	yes	no
Plays audio CDs	yes	yes	yes	yes	yes	yes	yes	yes
Number of CD-ROM titles	1	3	4	6	2	6	1	1
Speakers supplied	2	1 (internal)	2	0	2	0	2	0
AUDIO BOARD INFORMATION								
Audio board	Acer	Pro AudioSpectrum Plus	Sound Blaster Pro	Sound Blaster Pro	Pro AudioSpectrum Plus	Pro AudioSpectrum 16	NEC MM Plus	proprietary[2]
IRQ and DMA setup	software	software	software	software	software	software	software	software
Drivers for Windows 3.1	yes	yes	yes	yes	yes	yes	yes	yes
Stereo or mono	stereo	stereo	stereo	stereo	stereo	stereo	stereo	stereo
Power of built-in amp (watts per channel)	2.5	4	4	4	4	4	4	2
Volume control								
External	yes	no	yes	yes	yes	no	no	yes
Through software	yes	yes	yes	yes	yes	yes	yes	yes
Sound Blaster compatible	yes	yes	yes	yes	yes	yes	yes	yes
Ad Lib compatible	yes	yes	yes	yes	yes	yes	yes	yes
Sound sampling	yes	yes	yes	yes	yes	yes	yes	yes
MIDI	yes	requires MidiMate	requires MIDI kit	yes	yes	requires MidiMate	yes	yes
MPU-401 compatible	yes	yes	no	no	yes	no	yes	no
Sampling								
8-bit	22 kHz	2–44 kHz	4–44.1 kHz	4–44.1 kHz	2–44.1 kHz	2–44.1 kHz	2–44 kHz	5–88 kHz
16-bit	no	no	no	no	no	4–44.1 kHz	no	11–44 kHz
Audio compression	none	ADPCM 2:1	ADPCM 2:1, 3:1, 4:1	ADPCM 2:1, 3:1, 4:1	ADPCM	ADPCM 2:1, 3:1, 4:1	ADPCM 2:1	ADPCM 2:1, 3:1, 4:1
Synthesizer chip set	Yamaha YM3812;2	Yamaha YMF262	Yamaha YMF262	Yamaha YMF262	Yamaha YM3812	Yamaha YMF262	Yamaha YMF262	Yamaha YM3812;2
Number of voices	8	20	20	20	20	20	22	11
Sampled audio PCM (noise)	na	55 dB	48 dB	48 dB	55 dB	90 dB	55 dB	na
Microphone supplied	internal	no	yes	no	no	no	yes	no
Headphones supplied	no	no	no	no	no	no	yes	no

[1]internal and external versions available
[2]with Creative Labs chips

na=information not available

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NEWS & NOTES

Jill Champion

And the Survey Said . . .

Logitech, the world's largest producer of sensory input devices, recently conducted its "PCs and People" poll to find out what PC users think about using products that bring human sensory dimensions to computing. However, the results were a bit more newsworthy than the research team expected, so the company released its findings at PC Expo last June.

Serge Timacheff, Logitech's senior manager of public relations, says that in this poll, people who are using computers are saying to people who don't that it's not as bad as they thought it would be, and they're more productive as a result.

The Vertical: It's not just another QWERTY keyboard.

Over 55 percent of PC users personalize their computers by giving them names; nearly 50 percent think computers need to be more user-friendly; overall, women focus on getting their PCs to decrease their workload while men focus on making "touch and feel" improvements; and American businesswomen outnumber men two to one as PC users in all occupations.

According to Timacheff, "The people making computers assume their audience is 84 percent male, because the company buyers are typically male. Their advertising is directed toward men, but the end users are mostly women."

Open the Pod Bay Door

If you've ever dreamed of turning your home into a *2001*-style computerized home, check out the HAL catalog from Home Automation Laboratories for the latest in futuristic home-automating goods. The mail-order catalog specializes in equipment for do-it-yourselfers who want to automate their homes.

Featured in particular are X-10 remote-control products—modules that send control signals to appliances and lights over existing house wiring. Prices are reasonable—$12.99 for plug-in lamp and appliance modules, $13.95 for wall switches—and there are many specialized products for things like ceiling fans and hot-water heaters. About half of the more than 400 products for sale can be controlled by your IBM-compatible PC using HAL's Dynasty software ($395.00), which lets you program lights, heating and air conditioning, and entertainment and security systems to respond to your every whim.

The catalog is free. Write or call Home Automation Laboratories, 5500 Highlands Parkway, Suite 450, Smyrna, Georgia 30082; (800) 466-3522.

What's in a Keyboard?

Concerned about the stresses caused by ordinary keyboards? You might want to get Vertical.

The Vertical is designed to eliminate torque of the wrists and arms and reduce the risk of repetitive-motion injury. Inventors Jeffrey Spencer and Stephen Albert of La Jolla, California, say their design is conceptually endorsed by hand surgeons and therapists from the University of California at San Diego Medical Center and at OrthoMed, UCSD's hand-rehab center.

While The Vertical uses a QWERTY configuration, the right and left sides of the keyboard are split and mounted vertically. This design allows the keyboard to adjust to your torso width, which eliminates pronation (downward rotation of the hand and forearm), eliminates arm and shoulder extension, and accommodates your hands. Currently under testing at the UCSD Medical Center, The Vertical isn't yet on the market, but Spencer and Albert say they're shooting for a price under $250. To find out more, contact The Vertical, P.O. Box 2636, La Jolla, California 92038; (619) 454-0000.

Mini Travelers

Looking for big things in small packages? Look into these new finds from ZEOS and Best Data Products.

The Pocket PC from ZEOS is barely the length of two passports. Yet this ultralight computer comes bundled with eight different software programs, including DOS 5.0 and Microsoft Works, and its adjustable, nonglare LCD screen measures a full 7 × 2¾ inches with 600 × 200 resolution (80 columns × 25 lines) and 16 shades of gray. The 81-key QWERTY keyboard is designed for touch typing and includes 12 function keys, an embedded numeric keypad, and handy built-in hot keys that let you instantly access preselected software windows. The battery gives you ten hours of con-

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Circle Reader Service Number 119

tinuous use and up to 30 days of operation in suspend mode. Suggested retail prices start at $595, which will buy you 1MB of RAM and 1.5MB of ROM. Two built-in slots enable the system to accept memory cards.

Based on the Intel 25-MHz 386SL chip, the Freestyle/SL is a complete system with 2MB of RAM upgradable to 20MB, a 60MB hard drive, one 3½-inch 1.44MB internal floppy drive, and a 64K internal processor cache. Prices start at $1,895 for the system described here. For more information on either system contact ZEOS, 530 Fifth Avenue NW, St. Paul, Minnesota 55112; (800) 423-5891.

The Freestyle/SL notebook from ZEOS sports a unique tilt-and-swivel LCD screen.

From Best Data comes the Traveler, a 9600- or 4800-bps send/receive fax and 2400-bps data modem combined in one pocket-sized package. The Traveler's background mode allows you the option of continuing your work while you receive a fax. DOS, Windows, and MacTraveler versions are available at a suggested retail price of $199 each. For more information, contact Best Data Products, 9304 Deering Avenue, Chatsworth, California 91311; (818) 773-9600.

Day Runner's Complement

"The need for a software program that works with our organizers became obvious when we learned that nearly half of Day Runner purchasers use a PC every day," says Hope Neiman, vice president of marketing for Day Runner, makers of the popular Day Runner paper-based organizers that account for more than half of all U.S. retail sales of personal organizers. The company knew that its busy customers wanted simple-to-learn computer products that would make planning easier, and the result is Time Plus software.

At a suggested retail price of $60, Time Plus is an affordable personal information manager full of time-saving features that are easy to learn. When scheduling appointments, you can quickly note open blocks of time during a week by checking the Time Bar. Try to schedule two appointments at the same time, and the program will indicate a conflict and offer a resolution.

Especially appealing to Day Runner users are the program's numerous print options that produce letter-perfect pages for you to carry in your organizer.

For more information, contact Day Runner, 2750 West Moore Avenue, Fullerton, California 92633; (800) 635-5544.

Yesterday Once More

The wall is down, but anyone who remembers the chilling events of the Berlin Crisis is in for a fascinating trip down memory lane when Warner New Media releases its CD-ROM program Seven Days in August, slated for the first quarter of 1993. This "interactive documentary" takes you back to 1961 to the events that led to the building of the Berlin Wall. If you're too young to remember, or even if it happened before your time, you'll appreciate this meticulously researched history lesson on one of the more frightening periods in the Nuclear Age.

While the Berlin Wall is the documentary's main emphasis, other areas and icons of early-1960s pop culture are also explored. For example, the program includes a game called First Lady of Fashion, based on Jackie Kennedy. Exemplifying her tremendous popularity, the object of the game is to choose which outfits she wore to different events during her reign as first lady.

Another game, Four Minutes to Midnight, focuses on stocking a fallout shelter. True to the times, you feel that nuclear war is imminent, and in four minutes you must stock your fallout shelter with enough provisions to last for two weeks. Along with the list of supplies you're given, taken from official civil-defense publications of that time, are several worthless items, such as gamma radiation suits and no-glow salve, that were actually sold to consumers.

Other games in Seven Days in August include For the Record, a baseball trivia contest, and Out of This World, an early-1960s space fantasy. Suggested retail price for Seven Days in August is $79.98. For more information, contact Warner New Media, 3500 West Olive Avenue, Burbank, California 91505; (800) 593-6334.

Companies with items of interest suitable for "News & Notes" should send information along with a color slide or color transparency to News & Notes, Attn: Jill Champion, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Although space is limited, all items will be considered for publication. ❐

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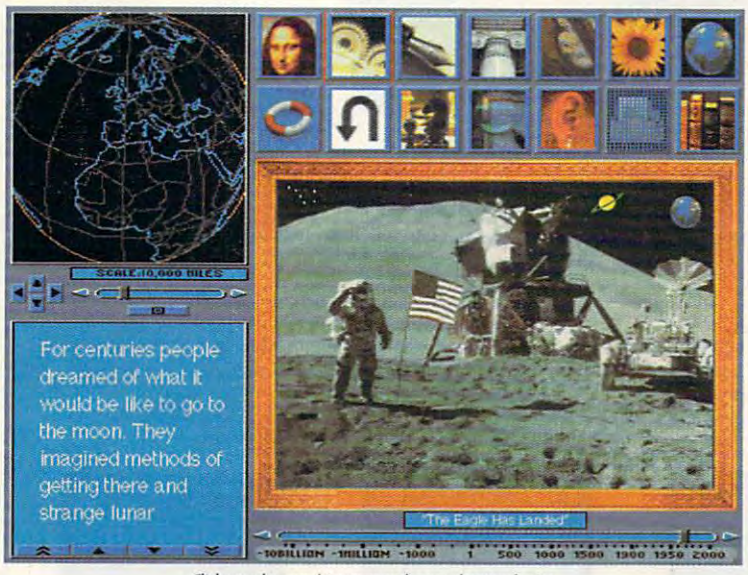

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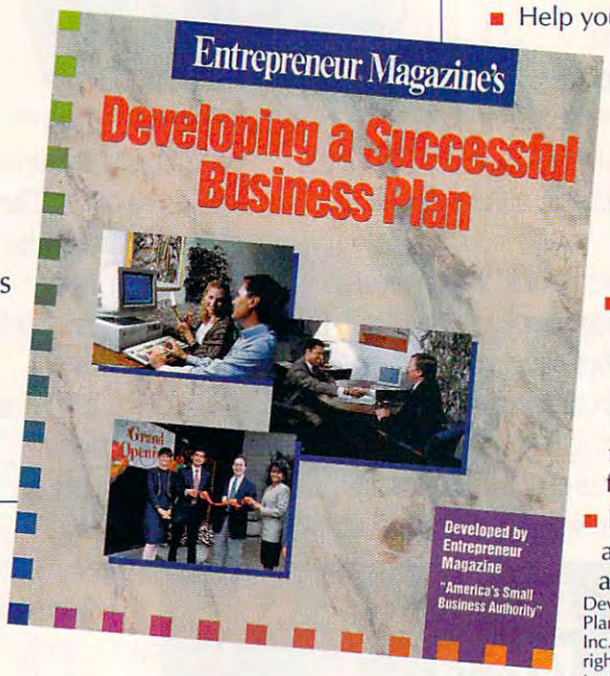

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FEEDBACK

High/Scope Number

Thank you for publicizing the *1992 High/Scope Buyer's Guide to Children's Software* in a recent issue. I noticed, however, that you identified our fax number as our phone number. Our phone number is (313) 485-2000. Our fax number is (313) 485-0704.

RITA TODERAN
HIGH/SCOPE EDUCATIONAL RESEARCH FOUNDATION
YPSILANTI, MI

Searching

I'm looking for a way to write a BASIC program that will search for a string in a file and replace that string with another string.

APRIL WAKEMAN
SHEPHERD, MI

Here's a pretty bare-bones routine that does what you say. When it runs, it asks for the file to search, the search string, and the replacement string. It replaces the search string with the replacement string and names the changed file TEMP.$$$. It's case sensitive and doesn't search for whole words, but you could easily overcome those shortcomings.

```
CLS
INPUT "Enter name of text file: ",
  filename$
INPUT "Enter string to look for: ",
  search$
INPUT "Enter replacement
  string:", replace$
OPEN filename$ FOR INPUT AS #1
OPEN "temp.$$$" FOR OUTPUT
  AS #2
WHILE NOT EOF(1)
c$ = INPUT$(1, #1)
IF c$ = LEFT$(search$, 1) THEN
d$ = INPUT$(LEN(search$) - 1,
  #1): d$ = c$ + d$
IF d$ = search$ THEN
c$ = replace$
ELSE
SEEK 1, SEEK(1) - (LEN(search$)
  -1)
END IF
END IF
PRINT #2, c$;
LOCATE 1, 1: PRINT SEEK(1);
  "bytes read,"; LOF(1);
  "remaining."
WEND
CLOSE 1
CLOSE 2
```

This program was written in QBASIC but should be translatable into most versions of BASIC.

PC Programming

About six months ago I purchased a Gateway 2000 computer. Prior to that purchase, I owned a Commodore computer for many years. It has been quite some time since I had seen COMPUTE; then my son brought one home recently. It didn't appear to have much in it for programming the PC or learning about its systems. Isn't there a need for a magazine for people who want to learn programming and learn more about their systems in general?

Also, I have a Commodore computer, and there doesn't seem to be much interest in Commodores in my area. You almost have to give them away to get rid of them.

JIM MULLER
GREENE, NY

If you're interested in introductory programming and system information, check out the "Programming Power" and "Intro-DOS" columns in COMPUTE. Tips & Tools and this column often have programming examples, too.

Many book publishers have books out that cover BASIC on the PC. Most full-service bookstores will stock at least a few books on DOS, the PC operating system. If you don't find any books on the shelf, check with the proprietor. A quick glance at Books in Print *will reveal several dozen books on programming the PC in DOS and various other languages.*

Although there isn't a large market for used Commodore 8-bit computers, they're much more in demand than any other kind of 8-bit computer. Run a want ad in a local paper or buyers' guide, and you'll probably get a few calls from interested parties (assuming the price is low enough). After all, the Commodore 64 is still being manufactured and sold. And there's virtually no difference between a used one in good condition and a brand new one.

Only 4 Million Colors

I'm having trouble figuring out how to mix and cycle colors with QBASIC. Can you explain the process? The manuals can't.

RUPERT SILVERSTEIN
WALLED LAKE, MI

Pull on a string, learn to program, add 4,210,752 colors to QBASIC, and more.

*It's not nearly as complicated as it might seem, and yet a review of the manuals for three kinds of BASIC and a dozen books turned up nothing helpful. The key is to create a long integer (a variable name followed by an ampersand is the mark of a long integer). The reason you need such a big variable type is that you can create up to 64+256*64+65536*64 (that's 4,210,752) colors. You've probably heard that some graphic adapters can draw their colors from a palette as large as 16,777,216 colors—the current QBASIC only provides about a quarter of that. Here's a program that mixes colors and cycles them.*

```
RANDOMIZE TIMER
DIM a(2550), b(2550), c&(256)
id = 1: jd = 1
tryagain:
INPUT "Please enter 12 for 16-
  color VGA or 13 for 256-color
  MCGA"; screenmode
IF (screenmode <>12) AND
  (screenmode <>13) THEN GOTO
```


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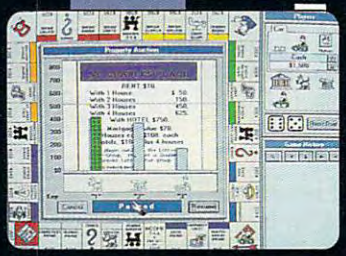

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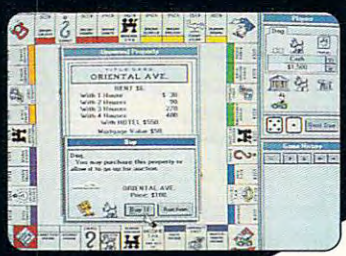

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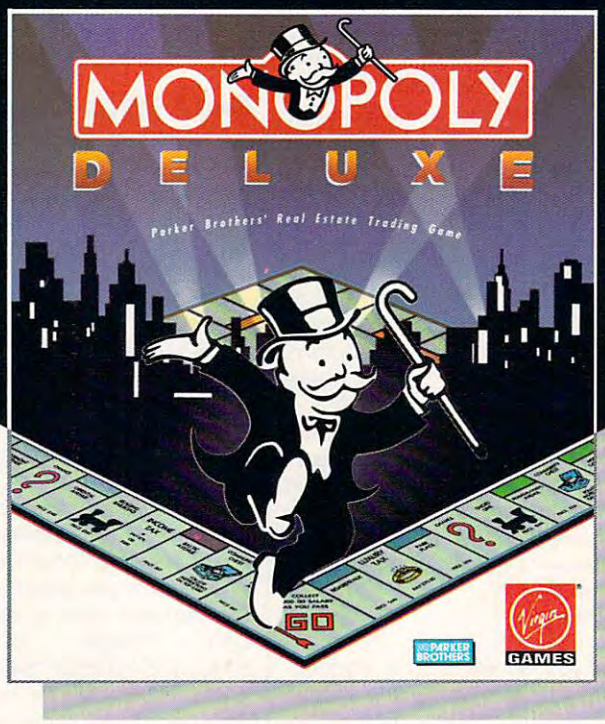

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FEEDBACK

```
tryagain
IF screenmode = 13 THEN
SCREEN 13: colors = 256: xwidth =
 320: yheight = 200
ELSE
SCREEN 12: colors = 16: xwidth =
 640: yheight = 480
END IF
FOR mi = 0 TO 63
c&(mi) = (mi) + (mi) * 256 +
 65536 * INT(mi / 4)
c&(mi + 64) = (mi) + 256 * INT(mi
 / 4) + (mi) * 65536
c&(mi + 128) = INT(mi / 4) + (mi)
 * 256 + (mi) * 65536
c&(mi + 192) = (mi) + 256 *
 INT(mi / 4) + 65536 * INT(mi / 4)
NEXT mi
PALETTE USING c&(0)
mixer:
FOR i = 0 TO yheight / 2
LINE (i, i)-(ABS(xwidth - i),
 ABS(yheight - i)), (INT(i / -(1.5 *
 (colors = 256) + 4 * (colors = 16))
 AND (colors - 1))), BF
NEXT
i = xwidth / 4: j = yheight / 4
tv = (RND * 8 + 1) * 5: av =
 INT(RND * 5 + 1): counter = 0
top:
i = i + id: IF i < 1 OR i >xwidth
 -(tv + 2) THEN id = id * -1
j = j + jd: IF j < 1 OR j >yheight
 -(tv + 2) THEN jd = jd * -1
GET (i, j)-(i + tv, j + tv), a(1)
GET ((xwidth - (tv + 1)) - i, j)-
 (((xwidth - (tv + 1)) - i) + tv, j
 +tv),b(1)
PUT ((xwidth - (tv + 1)) - i,
 (yheight - (tv + 1)) - j), a(1),
 PSET: REM (also try preset, and,
 xor, and or)
PUT (i, (yheight - (tv + 1)) - j),
 b(1), PSET: REM (also try preset,
 and, xor, and or)
FOR mj = 0 TO 5
mi = mi + 1
IF mi >= colors THEN
mi = 0: c&(colors) = c&(mi)
ml = ml + 1
IF ml > -10 * (colors = 256) - 100
 * (colors = 16) THEN
ml = 0
rd1 = RND * 63: rd2 = RND * 63:
 rd3 = RND * 63
FOR dk = 0 TO -15 * (colors = 16)
 - 63 * (colors = 256)
c&(dk) = INT(ABS(dk - rd1)) + 256
 * INT(ABS(dk - rd2)) + 65536 *
 INT(ABS(dk - rd3))
NEXT
END IF
END IF
c&(mi) = c&(mi + 1)
NEXT
PALETTE USING c&(0)
```


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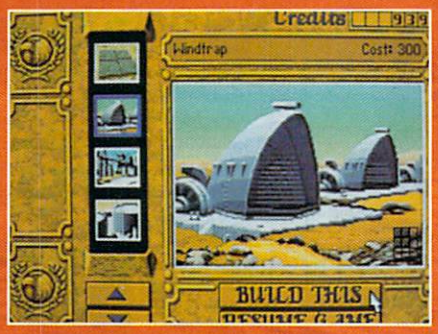

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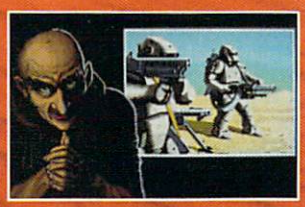

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FEEDBACK

```
counter = counter + 1
IF counter > 1000 THEN GOTO
  mixer
quitter$ = INKEY$
IF quitter$ <>"q" THEN GOTO top
END
```

The Sony Also Rises

In the January issue of COMPUTE, the 800 number for Sony was incorrect. The following is the correct name, address, and telephone number for Sony.

Sony Corporation of America
Computer Peripheral Products
Company
655 River Oaks Pkwy.
San Jose, CA 93514
(800) 352-7669

CATHY SELDIN
TECHNOLOGY SOLUTIONS
NEW YORK, NY

Hit the Road, Jack

Thank you for your recent review of WinConnect. In the review you mentioned that WinConnect was written by hDC. This is incorrect. WinConnect was designed and developed solely by Traveling Software. hDC wrote the file enhancer included with WinConnect.

ELAINA HOLLAND
TRAVELING SOFTWARE
BOTHELL, WA

Ware, Oh Ware

In the June issue of COMPUTE, three hardware vendors were mentioned in the "Quest for Perfection" article by Gregg Keizer. The three companies were Insight, HD Computer, and FastMicro. I was unable to find the addresses of these companies. Can you help?

JILL HARRELL
PUEBLO, CO

Insight, 1912 West Fourth Street, Tempe, Arizona 85281; HD Computer, 1196 Kern Avenue, Sunnyvale, California 94086; and FastMicro, 4405 Baseline Road, Phoenix, Arizona 85044.

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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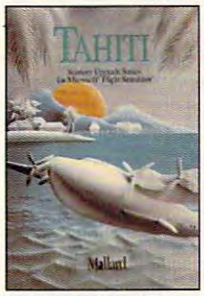

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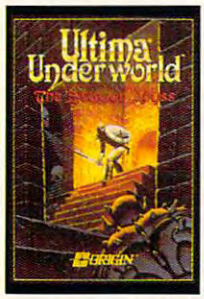

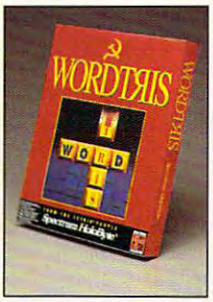

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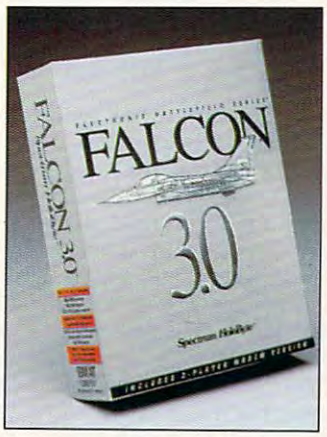

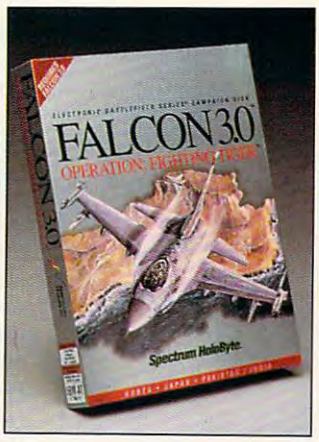

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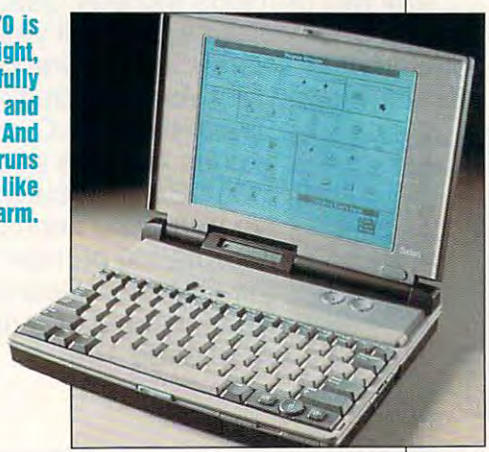
WINDOWS WORKSHOP

Clifton Karnes

GREAT WINDOWS NOTEBOOK

Is the NCR 3170 the perfect Windows notebook? Although some people may disagree with me, I think this computer has an ideal combination of small size, light weight, and Windows-ready power.

If you remember the NCR Safari NSX/20, which caused such as stir when it was released about a year ago, you'll have a basic idea of what the 3170 is like. From the outside it looks exactly like its predecessor, but the 3170 is smaller, faster, lighter, and more powerful.



The NCR 3170 is small, light, rugged, beautifully designed, and expandable. And it runs Windows like a charm.

Right out of the box, you can tell that this machine is different. The case is sleek, modern, and sensual. The exterior is a rich, textured dark brown, and the inside is khaki, with important controls and other accents highlighted in turquoise. The 3170 is amazingly small (8 × 11 × 1.8 inches) and light (4.9 pounds with a battery), but it feels solid and rugged, and its fit and finish are outstanding.

The soul of this machine is a snappy 25-MHz 386SL CPU with a 64K cache. Memory checks in at 2MB RAM, upgradable to 20MB. The display is a 9.5-inch paper-white VGA with a maximum resolution of 640 × 480 and 32 shades of gray. I found the display to be excellent in almost all lighting conditions. The keyboard has a very good feel for a laptop. The full 101-key AT keyboard is simulated with 78 keys, including 12 function keys (F11 and F12 are key combinations) and an embedded numeric keypad. The Enter and Shift keys are large enough to hit easily, and the space bar is almost normal length.

The most interesting aspect of the keyboard is the FingerMouse. This is a pointing device that uses a pivot to control movement and has buttons on each side of the pivot that work just like a mouse's left and right buttons. The FingerMouse comes with a ballistic driver and boasts a very large pointer that's easy to find in Windows.

The FingerMouse doubles as a cursor-control station, so you have to switch modes when you need these keys. This is a bit of a challenge at first, but you soon get used to pressing Function+Shift to toggle modes.

The FingerMouse is very responsive, and while not quite as fast and fluid as a real mouse, it's a close second.

In terms of storage, the 3170 comes with either an 80- or a 120MB hard drive. My review unit had an 80, which I transformed into a 160 with Stacker 2.0. The machine also features a 1.44MB external floppy drive (there is no internal floppy). I found the external drive arrangement to be a good way to make the machine lighter and faster on the road. When I'm en route, I never need a floppy drive, but back in the hotel room, I may, so I can pack the external unit in my suitcase.

The 3170 also includes a PCMCIA slot, so you can plug in credit-card-sized PCMCIA cards for almost anything you can imagine, from extra memory to Ethernet adapters. I tested a 1MB static RAM card that worked like a charm. Although PCMCIA cards are relatively new, they're the wave of the future, so don't buy a laptop without one.

The 3170 was designed from the ground up for communications, and ports abound. In addition to the PCMCIA slot, there's one serial port; one parallel port; one PS/2 mini DIN for an external keyboard, keypad, or mouse; an external FDD port; an external VGA connection; an internal 9600-bps data/fax modem; and an external bus for an expansion chassis.

The ni-cad battery has an advertised life of about three hours, and using suspend mode, this time can be extended to about one week, according to NCR. I didn't have a chance to test the battery for a full three hours, but it was still pouring out juice after two hours of heavy computing.

The 3170 comes with some useful bundled software, including DOS 5.0, Windows 3.1, BitFax 2.0/SR, AT&T Mail Access PLUS, a 3170 Tour Guide, Microsoft Productivity Pack, some utilities, and the Windows User's Guide on disk in Write files. This last item is especially useful. You never carry manuals on the road, but you often need to refer to them, and this is an excellent compromise.

In the final analysis, at $3,181, the 3170 may be a tad expensive, but it's small, light, rugged, beautifully designed, and expandable. And it runs Windows like a charm (NCR, Dayton, Ohio 45479; 800-225-5627). ❐

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TIPS & TOOLS

Edited by Richard C. Leinecker

How to run Debug, directory listings with multiple file specs, and a Caps Lock beeper

Debug Tips

Lots of people have asked how you enter those Debug scripts. Here's how.

First, make sure the DOS Debug program is in your path or the current directory. How can you tell? From the command line just type *debug*. If you see an odd-looking prompt that looks like a hyphen, it's there. If not, you'll have to look through your DOS disks for a file called debug.exe or debug.ex_ (for earlier versions of DOS, it might be called debug.com). Once you find it, put it in your DOS directory or somewhere else in your path. If you're using a recent version of DOS, all the files will be in their compressed state, so Debug will look like debug.ex_. To install this file, type *expand a:debug.ex_ c:debug.exe*. To get out of the Debug program, type *Q* and press Enter.

When you begin to type in one of the programs, you'll see different styles of type. The italic text represents what the computer prints; the roman text is what you need to type. It's not always easy. The hyphen at the beginning of each line of code is put there by the computer.

Typing in the programs always begins the same way. You type *debug* followed by the program name and then press Enter. The computer should always print the line *File not found*. If it doesn't, that means you have another file with the same name. You'll have to delete that file or try using a different filename.

Next, you'll see the hyphen prompt. Enter each line of data. Each one starts with *e* and continues with the data. Each line is ended by pressing Enter. It doesn't matter whether the alphabetical characters are uppercase or not.

After you've entered all of the data lines that start with an *e*, you'll type *RCX* and press Enter. The computer should print the line *CX 0000*. Then you'll type in a hexadecimal number representing the size of the file and press Enter.

The next line is the character *W* followed by Enter. This tells Debug to write the file to disk. The computer will print the line *Writing 0028 bytes* (or whatever the file size should be). Finally, type *Q* and press Enter to quit Debug and return to the DOS prompt.

I've received a number of Debug codes as tip submissions. That's great, but I also need source code so I can take a look at how the program works.

RICHARD C. LEINECKER
MIAMI, FL

New Slants on Old Tips

Your program for showing directory listings of multiple file specs, dirr.com, inspired a batch file that I named m.bat. To use it, simply enter *M* and then one or more file specs.

```
echo off
if !%1==! goto end
:loop
dir %1
shift
if !%1==! goto end
goto loop
:end
```

Capoff.com in the June issue is almost what I've been looking for. I say "almost" because what I really want is a program that will warn me with a beep whenever I hit Caps Lock.

DAVID PHELPS
ST. LOUIS, MO

Ask and ye shall receive. Here's a program that beeps when Caps Lock, Num Lock, or Scroll Lock is pressed. If you run Checksum (July 1992 "Tips & Tools") on this com file, 079 should appear.

```
debug keybeep.com
File not found
-e100 e8 67 00 2a e4 a3 7a 01
-e108 b8 1c 35 cd 21 89 1e 76
-e110 01 8c 06 78 01 ba 24 01
-e118 b8 1c 25 cd 21 ba 20 00
-e120 b4 31 cd 21 50 53 52 e8
-e128 40 00 2e 8b 1e 7a 01 3a
-e130 c3 74 19 8a d8 b7 05 ba
-e138 61 00 ec 0c 03 ee b2 43
-e140 b0 b6 ee 4a b0 ff ee b0
-e148 05 ee eb 11 0a ff 74 0d
-e150 fe cf 0a ff 75 07 ba 61
-e158 00 ec 24 fc ee 2e 89 1e
-e160 7a 01 5a 5b 58 2e ff 2e
-e168 76 01 1e 2b c0 8e d8 a0
-e170 17 04 24 70 1f c3
-RCX
CX 0000
:76
-W
Writing 0076 bytes
-Q
```

Make and Enter

The June column contained a simple utility called mcd.com that needed to be typed in with Debug. The same thing can be done with a batch file. Here's mcd.bat.

```
echo off
IF %1.==. goto noparam
md %1
cd %1
goto end
:noparam
echo parameter missing - need
echo name of new subdirectory
echo example: mcd newdir
:end
```

As long as the batch file is in your path, you can create and enter a new subdirectory by typing *mcd* and the subdirectory.

DENNIS SULLIVAN
DAYTON, OH

dBASE DOS Commands

The June 1992 "Tips & Tools" column featured a dBASE tip. It provided a short QuickBASIC program that lets you shell temporarily to DOS from dBASE and then type *exit* to return. It's an undocument-

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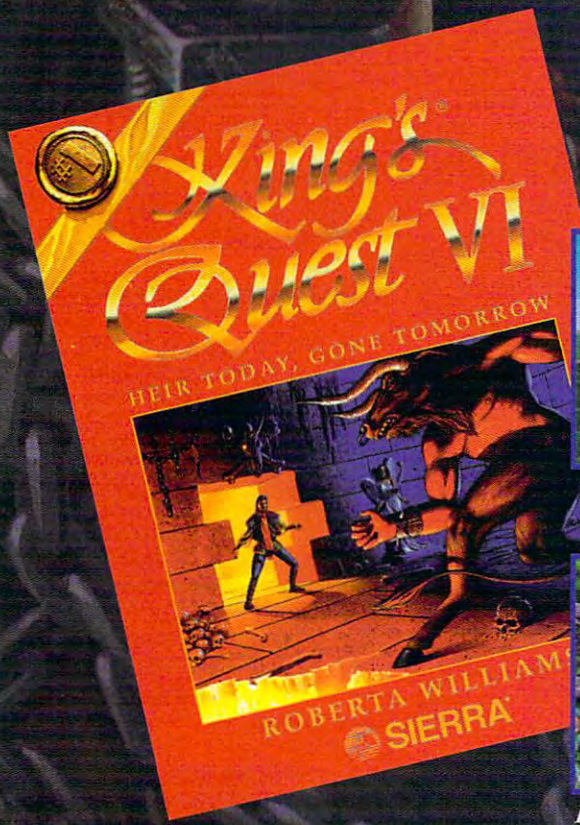

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ed feature, but dBASE provides for this very task. You simply run !COMMAND or RUN COMMAND at the dot prompt. It'll even display the *Type EXIT to Return* message.

JAMES A. MCKNIGHT
ADDISON, TEXAS

Easy access to DOS from dBASE, directory of directories from a batch file, simplifying daily backups, and performing DOS commands from within WordPerfect

Directory of Directories

There's another way of seeing a directory of directories besides typing in the dirdir.com program from the December 1991 issue. It's a batch file called dirdir.bat that uses the DOS filter in combination with Find. It takes advantage of the fact that subdirectories have a < character in the directory listing. (It's part of the <DIR> text string that indicates the entry is a subdirectory and not a file.)

```
echo off
dir|find"<"
```

KENNETH DEAN
CENTRALIA, WA

Easy Backups

I back up my work every day. But I don't like backup software for my simple needs. The problem is that there's no convenient way to back up only the files that have been updated for that day. I've written a small program called today.com that can be entered with Debug. That in combination with a batch file gives you everything you need for daily backups.

```
debug today.com
File not found
-e100 ba 82 01 b4 3c 2b c9 cd
-e108 21 8b d8 2b c9 ba 74 01
-e110 b4 4e cd 21 72 0e e8 13
-e118 00 b4 4f cd 21 72 05 e8
-e120 0a 00 eb f5 b4 3e cd 21
-e128 b4 4c cd 21 b4 2a cd 21
-e130 81 e9 bc 07 8a e9 8b c1
-e138 8a c6 b1 04 d2 e0 d1 e0
-e140 0a c2 3b 06 98 00 75 1e
-e148 ba 78 01 b9 05 00 b4 40
-e150 cd 21 ba 9e 00 e8 0f 00
-e158 b4 40 cd 21 ba 7d 01 b9
-e160 05 00 b4 40 cd 21 c3 be
-e168 9e 00 2b c9 ac 41 0a c0
-e170 75 fa 49 c3 2a 2e 2a 00
-e178 43 4f 50 59 20 20 25 31
-e180 0d 0a 46 4c 2e 42 41 54
-e188 00
RCX
CX 0000
:89
-W
Writing 0089 bytes
-Q
```

If you run Checksum (July 1992 "Tips & Tools") on this com file, 000 should appear. The batch file is called backitup.bat. To use it, type *backitup destination*, where *destination* refers to the path to the backup disk or directory. It'll copy to the destination every file in the current directory that matches your system's date.

```
echo off
if !%1==! goto end
rem First call the today program.
today
rem Now call the fl.bat file
rem created by the today program.
call fl %1
rem Now delete the fl.bat file.
del fl.bat
:end
```

RICHARD C. LEINECKER
MIAMI, FL

WordPerfect Shell

I stumbled on an easy way to do a single DOS command from within WordPerfect. Normally, I press Ctrl+F1 and then 1 to exit to DOS. In my haste, I pressed Ctrl+F1 and forgot to press 1. I then began to type the word *copy*, but after I'd typed the character *c*, I saw the prompt *DOS command:. I then typed copy filename a:* and was returned to WordPerfect.

I now press Ctrl+F1 followed by *c* every time I want to run a single DOS command. It's easier than using Ctrl+F1 followed by 1 because, when you're done, you don't have to type *exit* to return to WordPerfect. It's also quicker than the combination of F5 (List Files), 8 (Copy), and Y (Confirm).

JERRY BILLIOT
HOUMA, LA

Easy DOS Macros

There's an easy way to add macros as long as ansi.sys has been loaded. And they can be part of your prompt statement to simplify things in your autoexec.bat.

You might want to experiment from the command line before adding anything to your startup files. Here's an easy one that causes F2 to do a directory.

```
prompt $e[0;60;"dir";13p$p$g
```

The $e translates to Esc when used in a prompt; [0;60; stands for the keycode being hijacked. Substitute any value from 59 to 68 for keys F1–F10. Dir is the command you invoke when you press F2. The 13p simulates pressing Enter. The pg prompt follows to display the path and greater-than sign.

Here's the same command except that it attaches to the F1 key the command Type c:\autoexec.bat.

```
prompt $e[0;60;"dir";
   13p$e[0;59;"type c:\auto-
   exec.bat";13p$p$g
```

KEVIN LO
PALM BAY, FL

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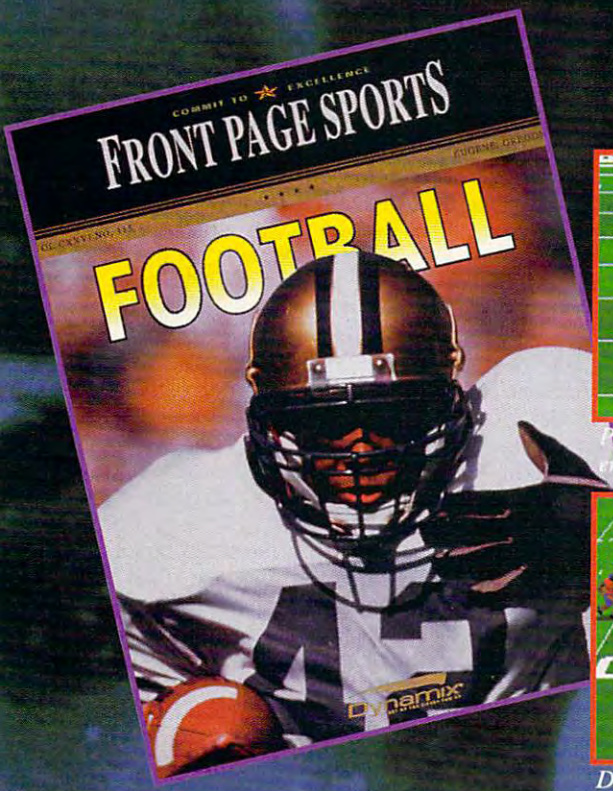

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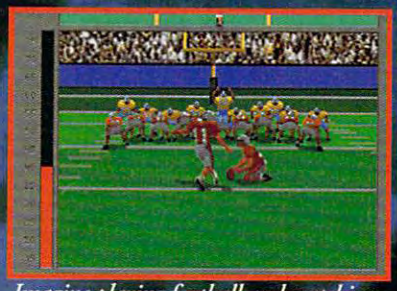

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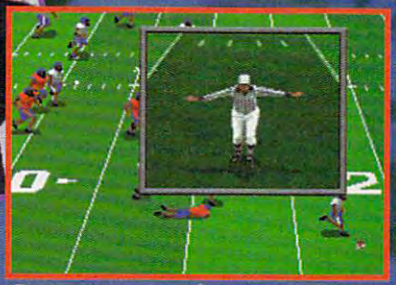

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INTRODOS

Tony Roberts

PLAYING THE SHELL GAME

If you have DOS 5.0 and don't run MS-DOS Shell every once in a while, you may be missing a few tricks.

MS-DOS Shell is a file manager. It provides a menued environment for managing files, launching applications, and performing DOS commands. If you prefer to issue commands with a mouse rather than with the keyboard, you'll be more at home in MS-DOS Shell than on the command line.

MS-DOS Shell knows tricks that the command line can't match.

It certainly isn't the most elegant file manager in the world, but if you don't have access to a better program, MS-DOS Shell certainly beats the command line for some tasks.

For example, if you have several files to copy, move, or delete, tagging them in MS-DOS Shell is quicker and significantly less susceptible to error than typing in names one by one at the command line.

Another of MS-DOS Shell's fancy tricks is that it allows you to view your entire disk as one unit rather than as a collection of subdirectories.

To try this option, select All Files in MS-DOS Shell's View menu. The display will switch from a view of the currently selected subdirectory to a listing of all files on the entire disk. They'll be ordered according to your default sorting option—most likely alphabetically.

What good is such a list? You can use it to find duplicates. As you scroll through the list, you may find several files with the same name. This indicates that you may have duplicate copies of those files in different subdirectories. When you select a file in the listing, an information panel displays all the details about the file—subdirectory, size, date of creation, attributes. By comparing this information for each of the possible duplicates, you can determine whether the files are identical copies or are different files that happen to share the same name.

Running out of disk space? Use MS-DOS Shell's All Files listing to show you the largest space eaters on your hard drive. After selecting All Files from the View menu, select File Display Options on the Options menu. Select Display by File Size, and select the Descending Order option.

The result is a listing of all the files on the disk from largest to smallest. You'll be able to concentrate your disk-cleaning efforts where they will do the most good—on the largest files.

If looking at everything on the disk is a little overwhelming (large hard disks can hold thousands of files), return to the Options menu and select File Display Options. Instead of specifying *.* to see everything on the disk, narrow the selection, depending on your focus.

For example, enter **.txt* to see all the files with a txt extension. If you enter **.bak*, you can locate all the backup files on the disk and delete them all in one fell swoop if you like.

MS-DOS Shell has a search function that lets you search an entire disk for filenames that match a pattern, such as *.txt or *.bak, but the resulting display lists only the pathname for each file. I find it more helpful to use the All Files approach outlined above, because the resulting directory includes information such as file size and date of creation.

In addition to being a file manager, MS-DOS Shell is also an application launcher and swapper. You can set up a program list with the titles of your favorite applications. For each application title, you fill out a properties box in which you specify what happens when you activate that application. You specify a command line, a startup directory, a shortcut key combination, and even a password if you like.

Once you have an application running, you can switch back to MS-DOS Shell and run another program without shutting down the first application. Under this scenario, the programs aren't all active at the same time. MS-DOS Shell swaps the inactive programs to the disk and places the active program in memory. The speed with which this happens depends on the speed of your hard disk.

MS-DOS Shell also is good at associations. If your word-processing program, for example, uses the doc extension for its document files, you can associate the doc extension with the word-processing program. From that point on, double clicking on any doc file will start the word-processing program and load in the selected doc file. Follow a similar procedure for your database files, spreadsheet files, and so on.

With all its file management and program management features, MS-DOS Shell is a little like a combination of Program Manager and File Manager in Microsoft Windows. In fact, MS-DOS Shell's menus, file selection conventions, and operating procedures are similar to those of Windows.

If you're accustomed to running Windows, you should be quite comfortable with MS-DOS Shell operations. If your machine doesn't have the speed or memory to run Windows, MS-DOS Shell can give you a similar operating environment without all the overhead. ❐

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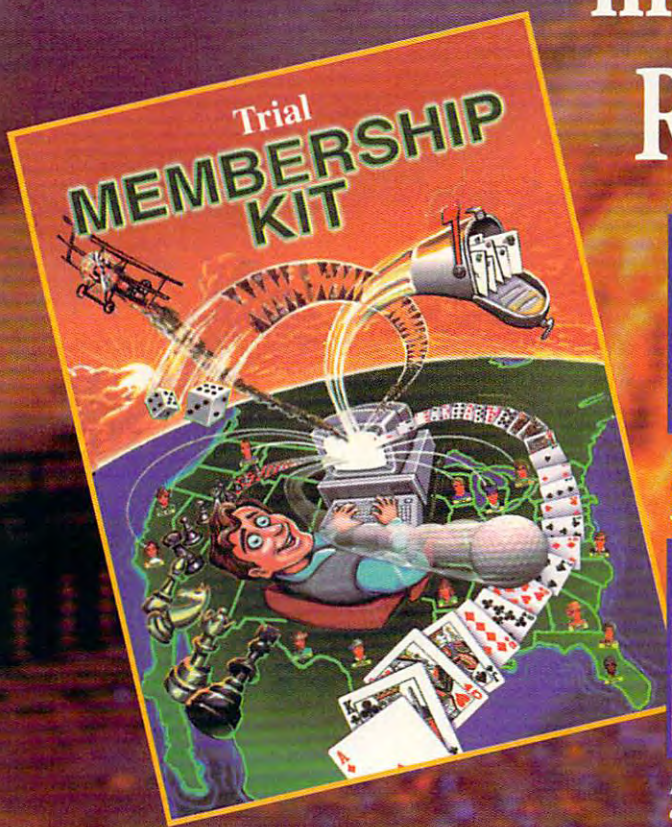

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Tom Campbell

INIT FILES AND EXTRA MEMORY

If you've ever used Windows, you may have noticed several text files that end with the extension ini in your Windows directories. These are simply text files with the following appearance: [SectionName] EntryName=AddString.

Init files let an application know how to select variables on startup.

Initialization files, usually called init files, let an application know how to select variables on startup. Say you have an application that needs to DIM an array at startup. The more you DIM, the more memory is used before the program even starts. The less you DIM, the poorer performance becomes on a high-RAM machine because there's extra memory lying around with no way for you to get at it. The fix is to DIM that array with a variable at startup and to have your program read that value from an init file.

Here's the format of an init file. The text in brackets is called a section. The variable name on the left is called an entry. The value on the right can be changed. It's like assigning to a variable in BASIC: PI=3.14159.

Windows has a routine called WriteProfileString that automatically updates an entry in win.ini and that used to be the preferred place to put your application's configuration variables. Reading a configuration value, which was a text file, meant reading every line of the file until the preferred section and entry could be found. Predictably, system performance on networks and on hard disks of users with lots of programs slowed to a crawl whenever a program started because win.ini could be thousands of lines long.

Beginning with Windows 3.0, Microsoft came to its senses and added the API call WritePrivateProfileString, which takes a filename, a section, an entry, and the string to write to the entry. This column presents a BASIC version of that routine.

WritePrivateProfileString is complicated. If the init file doesn't exist, it's created. That's pretty easy. The tough part is changing the value in an init file and section that already exist, because it requires that these laborious steps be taken: Create a temporary file. Read in each line of the existing init file. If it's not the entry in question, copy the line out to a temporary file. When the entry is found, write out the new value instead of the old one. Copy the rest of the init file to the temporary file. Delete the old file. Then rename the temporary to the name of the old file. And this assumes no errors occur! The working code is even more complicated because it accounts for errors every step of the way and because of the deceptively simple phrase *create a temporary file.*

Like Windows, this routine first checks for the existence of a temp environment variable, which specifies the drive and directory Windows and some other Microsoft applications use for temporary files. It also checks for tmp, which some other applications create. Since it's possible that neither environment variable has been defined, the routine must check for a hard disk. Then a unique filename is created. It's based on the system time, so it's unlikely that such a file already exists (the function fails if so; call it again in a loop because the time will have changed later). The routine is then appended to the temporary drive and path already created. All of these create a mother lode for you; in all, 12 spanking new routines were necessary for the creation of WritePrivateProfileString!

This Month's Routines

FileExists% Returns nonzero value if the specified file is present or 0 if the file can't be found.

FindFirst% Returns information about the specified file such as size, attributes, and time of creation. If a wildcard specification (like *.txt) is used, it returns information on the first matching file. FindNext is used for each remaining file.

FindNext% Returns information about files matching a wildcard specification such as *.txt. Must be preceded by FindFirst.

GetCurrDir$ Returns the current working directory.

GetCurrDrive$ Returns the currently logged drive.

GetTempDir Returns the name of the temporary directory by checking the temp environment variable.

GetTempDrive (based on Windows routine of the same name) Selects the system hard disk if the parameter is 0 or the letter of the next available hard drive.

GetTempFilename (based on Windows routine of the same name) Calls DOS to determine the name of a file guaranteed to be unique.

IsAlphas% Returns nonzero value if the specified string consists only of letters or 0 if there are characters other than letters.

IsDigits% Returns nonzero value if the specified string consists only of digits or 0 if there are characters other than digits.

NumHardDisks% Returns the number of hard disks installed on the system.

SplitFilename Breaks the input filename into drive, directory, name, and extension.

WritePrivateProfileString% Changes an entry in the specified init file if it exists or creates the file, section, and entry if it does not exist. ❐

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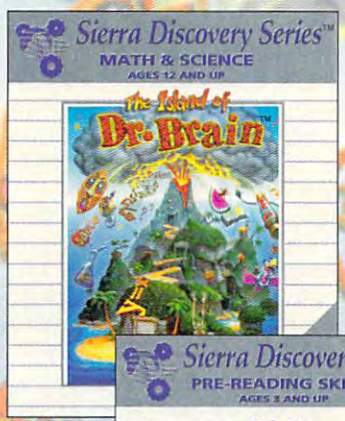

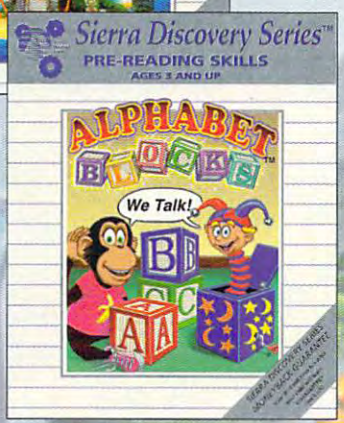

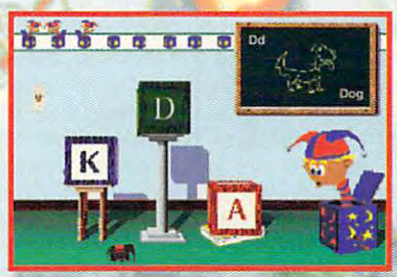

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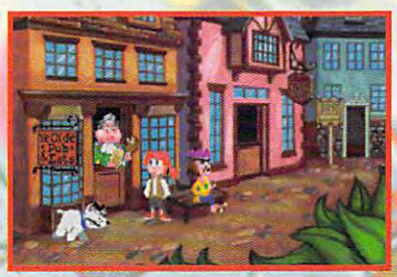

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HARDWARE CLINIC

Mark Minasi

MORE ON BATTERIES

Two new battery technologies have some real disadvantages.

The more I find out about this battery stuff, the more there is to know. This month, a bit more on the nicads and chargers, a discussion of their would-be successors—the nickel metal hydrides, and a quick peek at the El Dorado of batteries . . . lithium.

Last month, I talked about some of the basic problems with nicad batteries and their chargers. For those who are just joining us, here's a quick review. Nicads are the most popular form of batteries that store electricity for portable computers, hand-held radios, videocassette recorders, and the like. Nicads can't really store that much juice, so anything that really needs a lot of power won't work well with nicads. That's why you'll never see nicads under the hood of an electrically powered car.

Look back at the list of devices that use nicads—VCRs, notebooks, and walkie-talkies—and you see devices that are basically solid-state. It always amazes people when I tell them this, but computers basically use no power at all. For example, my 386SX notebook contains 16MB of RAM, a floppy drive, a backlit LCD screen, and a 120MB hard disk, yet it only draws 15 watts of power. Fifteen watts! That's about one-fourth of the amount used by the common 60-watt bulb that you probably have in your desk lamp. My earlier 8088-based laptop with no hard disk and a backlit screen drew an even more pusillanimous 8 watts, but that computer was a power spendthrift when compared to the 386SX notebook. Even though the notebook uses more power, it's doing a lot more.

Notebooks have to be more miserly in their use of power, largely because it's hard to make batteries better, and batteries are heavy. The battery in my Dataworld notebook is just a tube containing four D-cell batteries, and that probably accounts for 20 percent of the weight of the notebook all by itself. By the way, in the process of researching this article, I found that the battery classification system that's based on letters was developed in 1926 by the American National Standards Institute—ANSI to its friends. It includes not only the common AA, AAA, C, and D batteries, but an A (kind of long and narrow like the AA and AAA), as well as a B (which pretty much doesn't exist any more), an E, and an F. You can find an F by opening a lantern battery; there's a bunch of them in there. Nowadays, there are also AAAA (really tiny), as well as G, J, N, and 6. Some of these can actually be found in your local Radio Shack; I know because I need the N batteries for my hand-held laser pointer that I use in class.

Merely saying that a battery provides, say, 1.5 volts doesn't tell the whole story. Battery capacities are rated in terms of milliamp hours, which tell how many milliamps the battery can provide for a period of one hour. The batteries in my laptop, for example, provide about 6000 milliamp hours.

Milliamp hours measure capacity, but, again, we're interested in capacity that's lightweight. That's where a new unit of measure comes in. Energy density is a measure of how many milliamp hours each pound of a battery provides. Obviously, if my battery could hold 6000 milliamp hours in one ounce, my laptop would be a lot lighter. That's where nickel metal hydride comes in . . . or so they say.

According to the makers of nickel-metal-hydride batteries, these batteries have an energy density that's 25 to 50 percent better than that of nicads. But the more you know about them, the less you like them.

First, most makers of nicads underreport the capacities of their batteries by 20 percent or so. Nickel metal hydride, on the other hand, doesn't get underreported. (I don't know why. Perhaps because it's a new technology and needs some hyping?) As a result, nicads don't look as good as they would if put on an equal basis with nickel metal hydride. While that dulls hydride's luster a bit, don't give up hope for battery improvement in general.

Figure 1: Typical Battery

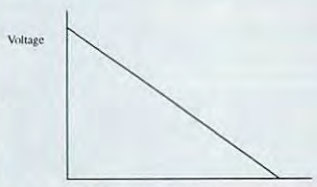

Figure 2: Rechargeable Battery

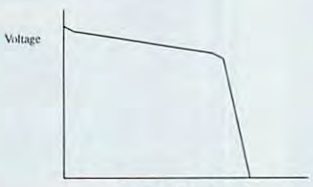

Figure 3: Damaged NiMH Battery

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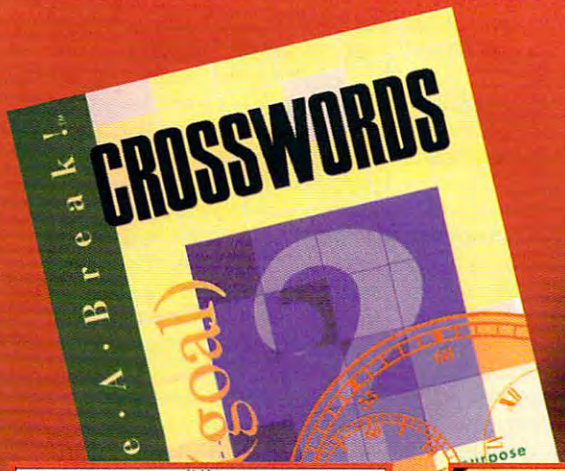

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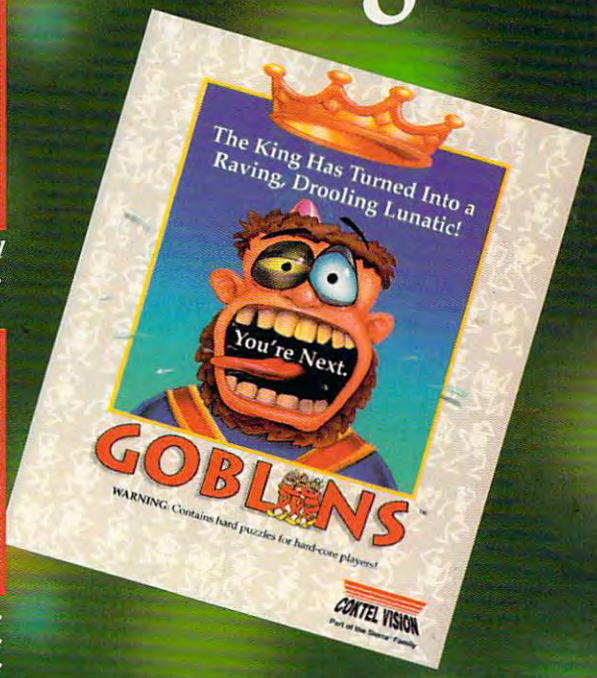

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When a nickel-metal-hydride battery is damaged, it's damaged for good.

An even newer technology, the lithium battery, promises an energy density two or three times better than that of nicads. But it's still on the drawing boards. And with rechargeable batteries, it's always a guessing game as to how much longer they'll work until they die. To see why, take a look at figure 1. What you see is a graph of the voltage output of a battery plotted against its remaining capacity. As the graph marches from left to right, more of the battery capacity is gone, but so also goes the output voltage. As most batteries discharge, their voltage drops steadily. That makes it easy for a sensing circuit to predict when the voltage will drop below some critical point. It's also why the built-in battery tester on the Energizer batteries works—it's measuring output voltage and using that as a proxy for the remaining milliamp hours. But look at the same curve for a rechargeable battery in figure 2.

Rechargeable batteries provide just about the maximum voltage level until right before they die. That's why your laptop runs just fine up until the moment it dies. It's also why you need a computer-controlled charger and battery analyzer, as I explained last month. If you use a laptop, I can't stress strongly enough that you must have some kind of charger and analyzer. I used to get about an hour's use from my laptop when I used the charger that came with the laptop. But after buying the HME System 90 charger (call 800-233-6868 or 619-458-1500 for information), I've gotten almost three hours of work out of a single battery. It's simply wonderful that I can carry three batteries with me and get a solid eight hours' worth of computer time to write, draw, and, of course, play Risk for Windows. With the kind of deadlines that I've had this month, I simply couldn't have written my latest book, *The Windows Problem Solver*, on time without it.

The second thing to consider about nickel metal hydrides is that, as with nicads, there's the old problem of recharging these things. I told you last month that nicads must be treated properly when they're being recharged or they'll grow crystal dendrites that reduce their charging capacity. That's related to the common notion that nicads can develop a memory problem whereby they lose their capacity to charge. Nickel metal hydrides don't have that problem, which sounds good.

Nicads grow dendrites if they're overcharged or charged when hot. Removing the dendrites involves a process called conditioning the battery. Again, an analyzer and charger can help; mine took a severely abused battery (OK, I was the abuser, but I didn't know any better at the time) that could deliver only about 4100 milliamp hours and raised its capacity to 5900 milliamp hours!

The bad news with nickel metal hydride is that it can also be damaged by overcharging, but when it's damaged, it's damaged for good—no conditioning is possible. Worse, a damaged battery may exhibit a discharge cycle like the one in figure 3. About halfway through, the battery drops its voltage output dramatically, perhaps below the voltage level needed for the laptop. Result—you've instantly halved the useful capacity of the battery. Again, no fix.

Another popular feature of many rechargers is a fast-charge feature whereby a battery charges fully in only an hour or two. That's possible with nicads, but not nickel metal hydrides. You need a fairly complex charge cycle to safely charge them quickly, and even then they don't charge as quickly as nicads.

While on the subject of recharging, there's another problem with nickel metal hydrides. Battery chargers use charging circuits that detect when the battery is charged so the charger can throttle back to a trickle mode, rather than continuing to force power into the already-full battery. One way of doing this is negative voltage detection; the nicad kind of splashes back power when it's full. Some charger circuits use this method, but it won't work on nickel metal hydrides—they don't show a negative voltage when full.

The third problem is outgassing. In plain English, that means the emission of gases by the battery when it's charging or discharging. If charged when hot, nickel metal hydrides outgas hydrogen gas—you know, the stuff that blew up the Hindenburg? I mean, I like a hot notebook as well as the next guy, but there are limits . . . I should mention here that outgassing is one of the big reasons why lithium batteries are still on the drawing boards; they produce some fairly toxic gases.

Finally, nickel metal hydrides just don't last as long. Nicads can be charged and discharged many times more than nickel metal hydrides can. If you routinely charge a nickel metal hydride to 80 percent of its capacity, you'll only get 50 percent of the service life you would've gotten from a corresponding nicad.

So what's the bottom line? It seems to me that the money spent on laptops that use nickel metal hydrides isn't well spent. If you want good capacity and less trouble, get a nicad laptop and a computerized analyzer and charger.

But what about making the laptops use less power? That's next month. ❐

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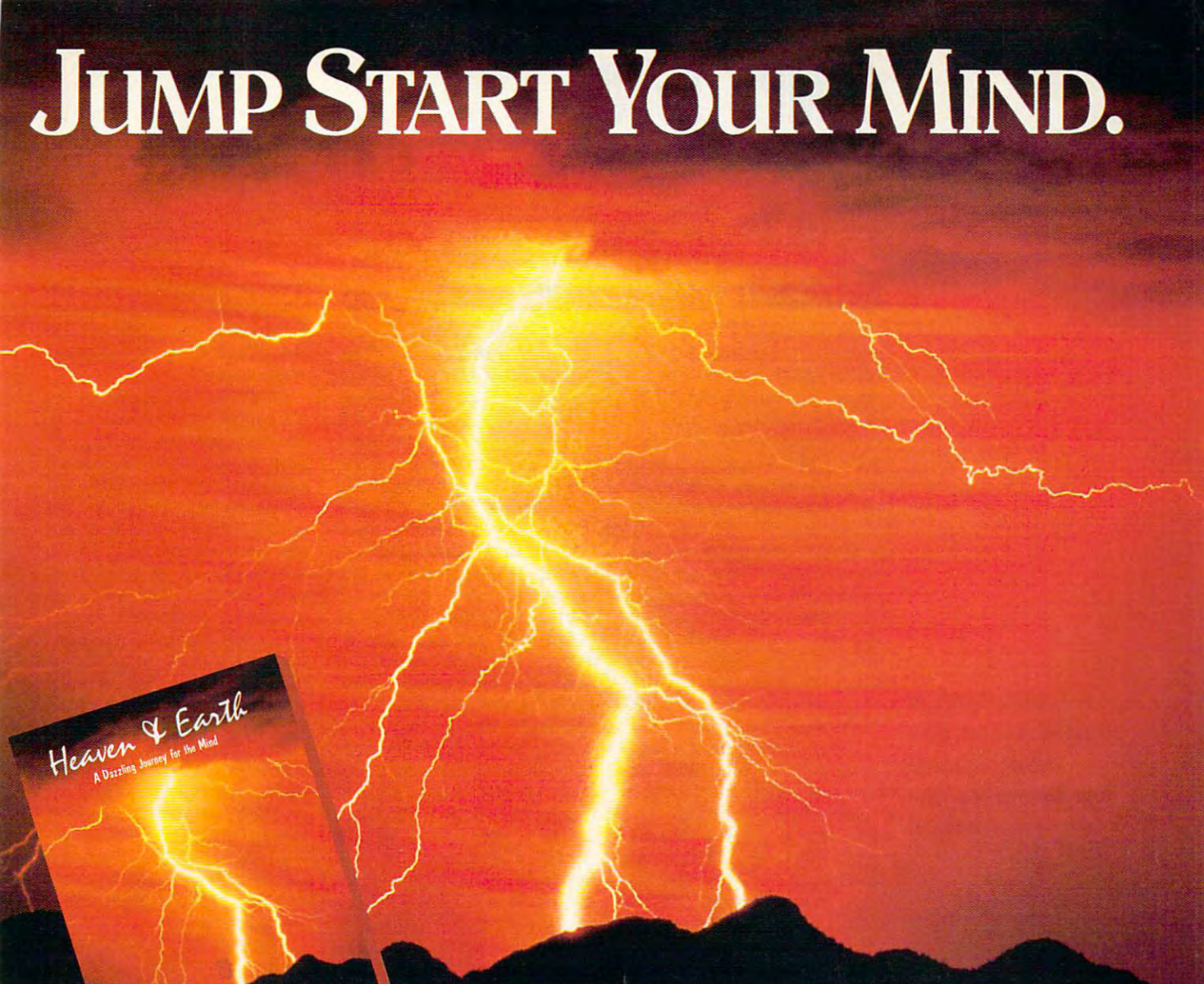

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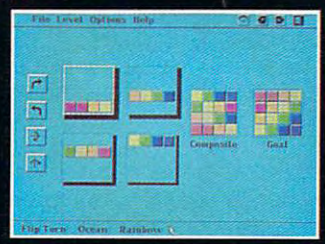

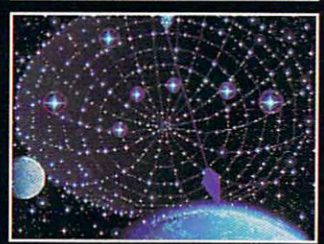

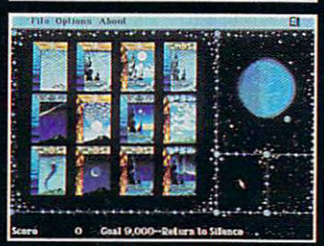

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COMPUTE/NET

Troy Tucker

COMPUTE/NET is unveiled. Let me take you on a guided tour through our new service.

MAKING IT BIG

COMPUTE/NET has been offline for a few months now. We've spent that time designing and testing the new COMPUTE/NET. At last, it gives me great pleasure to announce that COMPUTE/NET has been reintroduced as COMPUTE/NET PowerVision on VideoTex of America.

We offer an electronic version of COMPUTE that is quite different from anything available online anywhere. In this installment, I'll guide you through our new service, show you how things work, and reveal the future of COMPUTE/NET PowerVision.

When you log on to VideoTex for the first time, you'll notice that every screen is in VGA graphics mode. The screens are in 640 × 480 resolution with 16 colors. You'll find COMPUTE/NET on the main screen. Simply click on the corresponding button to enter. Once inside, you'll be presented with a (free) Welcome screen that displays rate information and the latest news. From there, you are placed on the main COMPUTE/NET screen. Our colorful logo is drawn at the top of the screen, and several buttons are displayed in the center. These buttons provide you with a means of navigating through the service. The main menu gives you the following choices: News & Information, Software Library, COMPUTE Magazine, E-Mail, Chat, and COMPUTE Mart.

The News & Information button will take you to a screen with the following selections: News, Help, and Contests. The News section serves as a newswire that alerts you to new file uploads in the Software Library section, changes to the service, new products for sale in the COMPUTE Mart section, and rate changes. The Help button provides helpful information about navigating COMPUTE/NET, uploading and downloading files, procedures for the E-Mail section, and how to order products online. Just about anything you need help with can be found in this section. The last section under News & Information is Contests. You'll find puzzles, word hunt games, and scavenger hunt games. Winners receive free online time, subscriptions, T-shirts, mugs, hats, and more.

The next item on the main menu is Software Library. Our Software Library area is separated into specific sections so you can quickly find what you're looking for. These sections are as follows: Programming, Utilities, Games, Graphics, Productivity, Education, Books Online, and COMPUTE Disks. In each section you'll find software packs that include several programs already archived together for you to download. Now, you can download several great programs at one low price, regardless of the bps rate! Prices are marked in the file descriptions, so you'll know the cost before you download.

Returning to the main menu, our next option is COMPUTE Magazine. This is where the editorial content of our magazine resides online. In this area, you are presented with Tips & Tools, News & Notes, Readers' Feedback, IntroDOS & Hardware Clinic, Windows Workshop, Getting Started with . . ., and Test Lab. When you select one of these, you can read the corresponding articles and columns online. These files will be available for downloading in the future. One special feature in these sections is that many of the articles are accompanied by online photos. For example, the Test Lab section may contain photos of the equipment reviewed. Not only are you provided with factual test information, but you get to see the product being reviewed while online.

The next two items are E-Mail and Chat. I'm sure you're familiar with the concept of both, but you're in for a shock when see ours. The Chat area works just like any other chat service, except that you can see who you're talking to. To see the person you're chatting with, simply pull up the profile to receive personal information, such as residence, age, and sex. And a color photograph of the person. The subscriber can limit the amount of information obtainable by others. E-Mail works much the same way as Chat. With E-Mail, users may send and receive pictures along with their letters. At 9600 bps, it takes only 12 seconds to download the photo and view it; at 2400 bps, the process takes about 30 seconds.

The last item on the main menu is COMPUTE Mart, which is our discount online store. Here, we offer a variety of products at discount prices. You can take advantage of special subscription rates on any General Media publication by ordering online. We'll also be offering COMPUTE disks, COMPUTE books, and special promotional items online. We hope to work with some of the major software companies so that we can provide you with special prices on commercial software, too.

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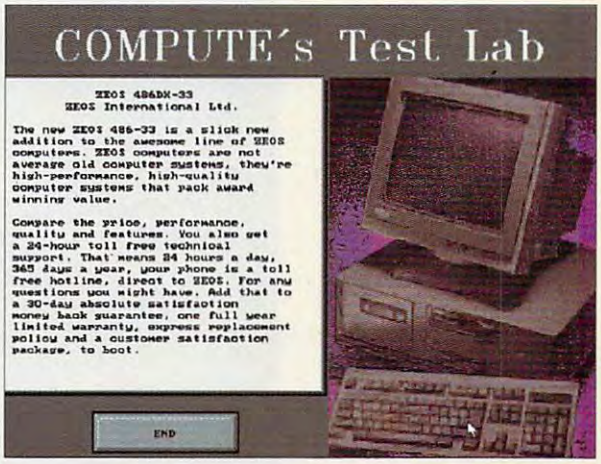

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10

What can you get for the computer users on your gift list who seem to have everything? The perfect gift might not be the obvious one. Here's a list of ideas—some off the beaten path and some off the wall—that will lose those holiday blues. You don't have to break the bank to get interesting and useful computer gifts. This list contains gifts in every price range, including both hardware and software.

1. *Parent's Guide to Educational Software for Young Children:* Compiled by the educational team at Edmark. Tells how to select developmentally appropriate software while balancing technical considerations. Lists additional resources. Free. Edmark, 6727 185th Avenue NE, P.O. Box 3218, Washington 98073-3218; (206) 861-8200.

2. Panic buttons: Save your keyboard when the urge to smash it against the wall arises. $3 for a set of two, $30 for 12 packages of two each. Computer Museum Store, 300 Congress Street, Boston, Massachusetts 02210; (617) 426-2800.

3. Templates: Quick help for those times when keypresses escape you. Color coded, nonglare, UV coated, stackable, and easy to use. Custom templates and decals also available. $3.50 each, $33.00 for 10, $79.00 for 25 (no mixing allowed in sets). Max Data, 625 North Gilbert Road, Suite 104, Gilbert, Arizona 85234; (800) 292-4629.

4. ChocWare Diskette: Pure milk chocolate disk. $4.50. See 2 for order information.

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Great Gift Ideas

Seasonal gift suggestions for the computer enthusiast who has everything

By Tracy Mygrant and Danielle Best

5. Disks in bulk: Always a great gift. Prices usually include sleeves and labels and run anywhere from $0.49 to $1.25 apiece, depending on how many you buy. Check out your office supply stores, computer supply retailers, and computer catalogs for the best prices.

6. Disk cases: Hold either 80 3½-inch or 100 5¼-inch disks and stop you from asking, "Now where did that disk go?" Locks included. $4.95 for 3½-inch case and $7.48 for 5¼-inch case. MidWest Micro, 6910 U.S. Route 36 E, Fletcher, Ohio 45326; (800) 972-8844.

7. Fellowes New Document Holder: Easily attaches to the side of your monitor to be used as a convenient copy holder. Its pact size makes it a practical way to keep messages, reminders, and information in clear view. List price, $5.99. Fellowes, 1789 Norwood Avenue, Itasca, Illinois 60143; (800) 955-3344 or (708) 893-1600.

8. Computer wimp poster: "COMPUTER WIMP: 166 Things You Should Know Before You Buy a COMPUTER!—or before you give up on the one you have." 23 × 31 inches. $7. See 2 for order information.

9. Murphy's Computer Law poster: Contains adages such as "Every task takes twice as long as you think it will take. If you double the time you think it will take, it will take four times as long." 23 × 31 inches. $7. See 2 for order information.

10. Antiglare filter: A 14-inch filter that

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relieves eye stress for comfortable, glare-free viewing. $15. Disk Count Software, P.O. Box 3, Carteret, New Jersey 07008; (800) 448-6658.

11. Surge strips: Steel cases that house multiple outlets and protect equipment from electrical surges. Come in handy if you ever run out of places to plug things in. Can be found in most supply or hardware stores and computer catalogs.

12–14. Quick help with Windows, Word for Windows, and Excel for Windows: *101 Essential Windows Tips*—$9.95, *101 Essential Word for Windows Tips*—$9.95, *101 Essential Excel for Windows Tips*—$9.95. Order through local bookstores or direct from COMPUTE Books, c/o CCC, 2500 McClellan Avenue, Pennsauken, New Jersey 08109. Send cover price plus $2.00 shipping and handling per book in the U.S., $4.00 per book in Canada, and $6.00 per book elsewhere.

15. *Business Forms for the Fax and Copier:* This book provides 64 professionally designed tear-out forms for faxing, memos, notices, greetings, and more. $9.95. Hello Direct, 140 Great Oaks Boulevard, San Jose, California 95119-1347; (800) 444-3556.

16–17. Smack II and Data Dog: Stuffed versions of your computer ready to suffer the wrath that you can't afford to take out on your PC. And they even come with owner's manuals. $10 each. See 2 for order information.

18. Multicolored propeller beanie and cap: For S, M, L, and XL propeller heads. $11.50. See 2 for order information.

19. Discalculator: A solar-powered calculator in the shape of a 3½-inch floppy. $12.95. See 2 for order information.

20. Dust Control Cleaning System (for computer and home/office electronics): Includes two six-ounce cans of STATX high-tech cleaner and dust repellent (which also repels static electricity), a ten-ounce can of Tornado dust remover, and two lint-free wipes with LintBlock. Also cleans keyboards. List price, $14.99. STATX Brands, 1110 Lake Cook Road, Suite 150, Buffalo Grove, Illinois 60089; (708) 520-0007.

21. Discoasters: Coasters willing to entertain any glass you bring home. Look just like 3½-inch disks, except they're a lot more colorful. $15 for a set of six. See 2 for order information.

22. Fractal T-shirts: 100-percent cotton shirts with full-color fractal images. Choose from two designs: Nautilus Shell/Newton's Julia or Candy/The Jewel. $18. See 2 for order information.

23. COMPUTE subscription: One-year subscription to the practical computing magazine. $19.94 in U.S., $32.04 in Canada, and $29.94 elsewhere. COMPUTE, P.O. Box 3245, Harlan, Iowa 51537-3041; (800) 727-6937.

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Fractal T-shirts and Discoasters help support the Computer Museum.

24. F-1: A tabbed, flip-over reference pad for organization and fast retrieval of information, offering left- or right-side mounting on a computer monitor. List price, $19.95. Husco Engineering, 17 Calvin Road, Wilton, Connecticut 06897; (800) 752-3181 or (203) 762-3181.

25. Fax Kleen: Are you getting snow on your incoming faxes? It's caused by oily residue in the fax machine. Running a Fax Kleen sheet through the machine removes the buildup, so your faxes are clear again. Ten sheets per box. $19.95. See 15 for order information.

26. Computer floor stand: Holds your computer case vertically on the floor to free up desk space. Adjustable base fits standard PC cases from 4 inches to 7½ inches wide. $19.95. JDR Microdevices, 2233 Samaritan Drive, San Jose, California 95124; (800) 538-5000.

27–30. Service and repair kits: MidWest Micro sells a useful repair kit for $23.95 that contains 23 tools, including antistatic strap, vacuum, cleaning fluid, screwdriver bit/handle, flat screwdriver, tweezer, crimp, wire cutter, cleaning stick/pad/disk, and more. Also available are a computer cleaning kit for $12.95, a cleaning kit for 3½-inch disk drives for $23.95, and a cleaning kit for 5¼-inch disk drives for $19.95. See 6 for order information. But check around—you can get them almost anywhere computer supplies are sold.

31. Wave of the Future poster: A 23 × 36 inch computerized, digitized version of a print created by the nineteenth century artist Hokusai. $25. See 2 for order information.

32. Laser paper with a twist: Unique laser paper products that range from the ornate and oriental to the rugged and recycled. Call (800) 272-7377 for a free catalog. PaperDirect, P.O. Box 618, 205 Chubb Avenue, Lyndhurst, New Jersey 07071-0618; (201) 507-5488.

33–34. VIRUSCAN and CLEAN-UP: Anti-virus programs that are sold separately but work well together. VIRUSCAN scans your system for infections, and CLEAN-UP removes them. What a team! A home-use license is $25 for VIRUSCAN and $35 for CLEAN-UP. Products come bundled for business users. Prices differ for business and network users. McAfee Associates, 3350 Scott Boulevard, Building 14, Santa Clara, California 95054; (408) 988-3832.

35. Adjustable footrest: Raises feet to reduce stress and ease back strain. Continually adjusts to body position. List price, $29.95. Computer Coverup, 2762 North Clybourn Avenue, Chicago, Illinois 60614; (800) 282-2541.

36. ROM LC 1 (CD-ROM laser lens cleaner): Cleans the optical lens of CD-ROM drives. List price, $29.95. AudioSource, 1327 North Carolan Avenue, Burlingame, California 94010; (415) 348-8114.

37. cardsNOW: Designs and prints custom business cards. Includes enough cardstock for 250 cards, but you can order more at affordable prices. List price, $39. Topitzes and Associates, 6401 Odana Road, Madison, Wisconsin 53719-1158; (800) 233-9767 or (608) 273-4300.

38. *How to Buy and Price a Used Computer:* A reference book showing where to find equipment and how much you should expect to pay for it. Provides thousands of product listings, as well as names and phone numbers of used-computer dealers, a directory of hardware and software manufacturers with customer service numbers, and a list of major applications with prices. $39. Orion Research, 14555 North Scottsdale Road, Scottsdale, Arizona 85260; (800) 748-1984.

39. Hexabacus: A handcrafted hexadecimal abacus in natural wood finish that helps you add and subtract hex numbers up to eight digits or 32 bits. $39.95. Amziod, 40 Samuel Prescott Drive, Stow, Massachusetts 01775;

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Continuing our fifteen-year evolution of the best-selling flight simulation software, the voice of Air Traffic Control now comes alive for SoundBlaster users! Flight Assignment: ATP (Airline Transport Pilot) lets all computer users experience the wonders of flight. Watch the ingenious autoflight mode fly a Boeing 737, 747, 767, Airbus A-320 jet airliner or Shorts 360 turboprop across a scenery-filled United States. When you're ready to earn your wings as an Airline Transport Pilot, take the controls and fly any of hundreds of predefined flight assignments with onscreen text (and optional spoken) Air Traffic Control instructions and feedback. Or go exploring on your own in free flight mode.

As a fifteen year anniversary promotion, new ATP buyers will receive a free SoundBlaster-compatible Air Traffic Control voice module that will launch you into an entirely new level of flight realism. Other leading edge features (full autoflight, structured assignments with grading, much more) have been newly refined to make ATP the standard in traditional flight simulation software. For IBM and compatibles. Suggested retail price $59.95.

Photos of Flight Assignment: ATP running default scenery, Great Britain and California Scenery Collections, USA Scenery.

See your dealer or call SubLOGIC to order. Circle the reader service number or call SubLOGIC to be placed on our mailing list or for information about our scenery and support software for Microsoft Flight Simulator and Flight Assignment: ATP.

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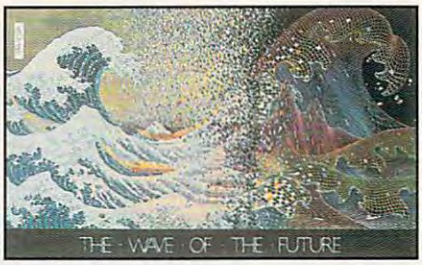
(508) 897-5560 (voice) or (508) 897-7332 (fax).

40. KidDesk: A DOS utility for children ages 3 to 8. Graphical menuing program gives kids their own desktop. Kids can launch programs with access to only those parts of the hard disk that you specify. $39.95. See 1 for order information.

41. Destiny I: Numerology program that prints out a 20-page numerology chart, including a 12-month forecast. Compatibility mode shows strengths and weaknesses in relationships. List price, $49.95. PM Ware, 346 State Place, Escondido, California 92029-1365; (800) 845-4843.

42. SpreadSheets: Bed linens printed like computer paper, complete with tractor-feed holes. Twin size, $45.95; queen size, $59.95; two standard pillowcases, $19.95. See 2 for order information.

43. Just Grandma and Me (CD-ROM): The first in a series of Brøderbund Living Books, animated storybooks filled with talking characters and interactive play. Based on Mercer Mayer's children's book of the same name. List price, $49.95. Brøderbund Software, 500 Redwood Boulevard, P.O. Box 6121, Novato, California 94948-6121; (415) 382-4400.



Wave of the Future poster combines the old and the new.

44. Millie's Math House: Program that teaches early math skills to children ages 2 to 6 through animated characters, colorful graphics, music, and digitized voices. Reading not required. List price, $49.95. See 1 for order information.

45–50. Online service subscriptions:

PowerVision: $79.95 for membership kit. $18.95 per month. Two hours of free connect time every month, with a connect charge of $0.09 per minute after the first two hours. PowerVision, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408; (919) 275-9809.

America Online: Free membership kit and no sign-on fee. $7.95 per month. Five free hours the first month, then two free hours for subsequent months, with a connect charge of $6.00 per hour after the free hours are used. America Online, 8619 Westwood Center Drive, Vienna, Virginia 22182; (800) 827-6364.

CompuServe: $49.95 for membership kit that includes a $25.00 usage credit. $7.95 per month for unlimited access to about 30 basic services. Other services are available on an hourly basis. CompuServe, 5000 Arlington Centre Boulevard, Columbus, Ohio 43220; (800) 848-8199.

GEnie: No membership kit or sign-on fee. $4.95 per month for unlimited, non-prime-time access to basic services. GEnie, 401 North Washington Street, Rockville, Maryland 20850; (800) 638-9636.

PRODIGY: $49.95 for membership kit that includes the software. $12.95 per month for unlimited access, day or night. PRODIGY, 445 Hamilton Avenue, White Plains, New York 10601; (800) 822-6922.

DELPHI: No membership kit or sign-on fee. $10.00 per month with four free hours per month. $4.00 per hour thereafter. An alternative plan costs $20.00 per month with 20 free hours ($1.80 per hour thereafter). DELPHI, 1030 Massachusetts Avenue, Cambridge, Massachusetts 02138; (800)

LINKS 386 Pro

Rivaled only

This all new LINKS 386 Pro version of our award-winning LINKS golf game offers many dramatic improvements that make playing LINKS 386 Pro more enjoyable – and gives you exciting new golfing possibilities!

Super VGA Graphics and 386 Power!

The new *LINKS 386 Pro,* featuring Harbour Town Golf Links, is the first golf game specifically designed for the graphic capabilties and computing power of your personal 386/486 computer system. SUPER VGA 256-color graphics at 640x400 resolution display breathtaking views of LINKS Championship Courses. Your friends won't believe that your computer looks so good!

Texturing of fairways, rough, sand, and other surfaces adds an extra level of realism.

Male and female golfers.

You can use any of the 7 existing LINKS courses or upgrade your favorite course to the Super VGA version.

A lot of listening went into LINKS 386 Pro.

Many of the new features and improvements were added in response to direct requests from LINKS users like you! An exciting new feature is our Unique Computer Opponent. Play a round of golf and save your game. The new *LINKS 386 Pro* recorded every shot you made. Send your game off to your buddy and he can play against you right on the screen, shot for shot, as if you were right there next to him! We've also included pre-recorded games from worthy opponents, statistics, a variety of game play modes and much, much more.

Over 345 combinations of Viewing Windows.

With the new *LINKS 386 Pro* you're not stuck with just one standard viewing window. With a few clicks of your mouse you can split the screen giving you a real-time reverse view of your shot to the green or add a scaleable top-view that displays the flight of your ball. Scorecard, club distance chart, terrain profile and other panels give you the flexibility to display what you want to view while playing and you can change your viewing setup at anytime!

*Actual Links 386 Pro Super VGA Screens

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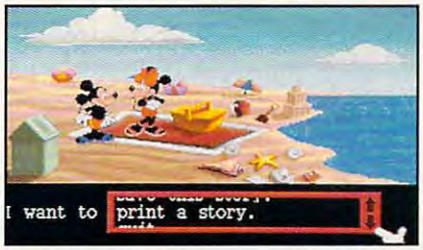
695-4005. To sign on, dial (800) 695-4002 with your modem.

51. The Sleeping Beauty: Divided into pages, this multimedia storybook is linked to illustrations, a recorded voice that reads to a child, and a dictionary that explains difficult words. List price for the CD-ROM, $49.95. Several other classic children's books are available in multimedia format. Ebook, 32970 Alvarado-Niles Road, Suite 704, Union City, California 94587; (510) 429-1331 (voice) or (510) 429-1394 (fax).

52. Sprout: Virtual vegetables? Not quite. Sprout helps you plan your vegetable garden, providing graphical tools, a database of gardening wisdom, and lots more. Just the thing for the midwinter blues—and just ahead of the seed catalogs! House and railroad planners also available for the same price. $59.95. Abracadata, P.O. Box 2440, Eugene, Oregon 97402; (503) 343-2324.

53. Sports Adventure: Covers the history of sports from the invention of baseball in 1869 to present using multimedia techniques. Includes *Sports Illustrated* photography and text contributed by sports journalists and authors. List price, $59.95. Knowledge Adventure, 4502 Dyer Street, La Crescenta, California 91214; (800) 542-4200.



Your child will love to learn with Follow the Reader.

54. Custom Greetings Kit: Lets you make holiday greeting cards for friends, customers, and business prospects. Includes 15 predesigned, laser-compatible Christmas and Hanukkah cards with matching envelopes, ColorFoil transfer sheets, envelope seals, Avery label production software, two sheets of clear laser labels, and red, green, and gold envelope seals. $65.95. See 32 for order information.

55. The History of the Grammy Awards (multimedia CD-ROM): A full database of winners and nominees, as well as more than 250 pictures and 45 minutes of sound. List price, $69.95. Compton's NewMedia, 2320 Camino Vida Roble, Carlsbad, California 92009; (800) 532-3766.

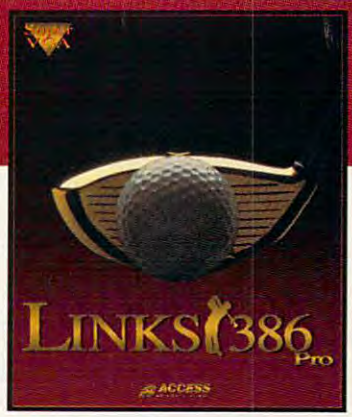
56. Jungle Safari: Focuses on African habitats: plains, tall grass, rain forest, and riverfront. Illustrates how animals interact with the environment. Uses text, sound, and animation. List prices are $79 for multimedia CD version and $59 for floppy disk version. Orange Cherry New Media, P.O. Box 390, Pound Ridge, New York 10576; (800) 672-6002.

57. Poetry Processor: Perfect for rappers, songwriters, poets, or teachers. Contains everything you need to write formal poetry, from sonnets to villanelles. Includes form editor, rhyming dictionary, and much more. $89.95 ($69.95 until January 1, 1993, for COMPUTE readers). NewManWare, 141 Sheffield Avenue, #2-C, New Haven, Connecticut 06511; (212) 439-4777.

58. AUTOWORKS: Get to know your car better. Automotive engineering made fun. List price, $79.95. Software Marketing, 9830 South 51st Street, Building A-131, Phoenix, Arizona 85044; (602) 893-2400.

59. BODYWORKS, An Adventure in Anatomy: Explores the systems, structures, and functions of the human body with detailed full-color graphics and a database of facts, descriptions, and explanations. List price, $79.95. See 58 for order information.

by the game itself.



The Experience Continues...

The challenge doesn't end with Harbour Town. You can play each of the original LINKS Championship Courses (sold separately) with *LINKS 386 Pro*. Seven internationally-acclaimed golf courses on your desktop! Torrey Pines, Firestone South Course, Bay Hill Club, Pinehurst #2, Troon North, Dorado Beach, and Barton Creek with additional courses being released as fast as they are completed.

If you're a LINKS owner, you can purchase *LINKS 386 Pro* at a special introductory price. Call us today for more information.

1-800-800-4880

Call toll-free, 24-hours a day, Mon-Sat in the U.S. and Canada or visit your local software dealer.

NEW!

What Reviewers Are Saying about LINKS 386 Pro:

Strategy Plus:

"...with LINKS 386 Pro, *Access* has not so much pushed back the 'envelope' as redefined the term 'simulation.' Right from the opening screen it's clear that something special is happening here."

"...represents a new generation of computer game. Just play it and love it."

PC Entertainment:

"...for sheer, unadulterated realism, no golf simulation equals the performance of LINKS 386 Pro."

"...if you're serious about golf simulations, treat yourself to LINKS 386 Pro. And if you don't own a 386 to run it on, youi've finally got a real good reason to lay out the money for an upgrade."

Computer Gaming World:

"...if you have a fast 386 or 486, think of LINKS 386 Pro as a Ferrari or a Corvette."

"...the ground texturing is dramatically realistic."

New Features for Links 386 Pro!

•Seven different viewing windows, with over 345 different combinations. Improved club selection feature. • Wide, panoramic views giving you a better feel for the course. • Statistics recorded for each player, game and course, with optional print out. • A "Saved Shot" feature. • Scaleable "Top View". • "Profile View" which shows changes in elevation between the ball and the pin. • All new sounds! Supports SoundBlaster, SoundBlaster Pro, Adlib and other compatible sound cards & RealSound. • Improved swing indicator for more realistic putting. • Male or female golfers, with 10 different shirt colors to choose from. • Spectacular texturing of fairways, rough, sand, water not offered in other golf games.

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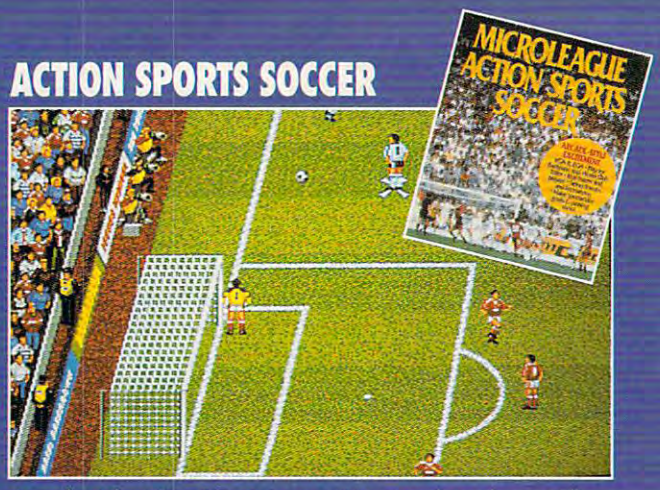
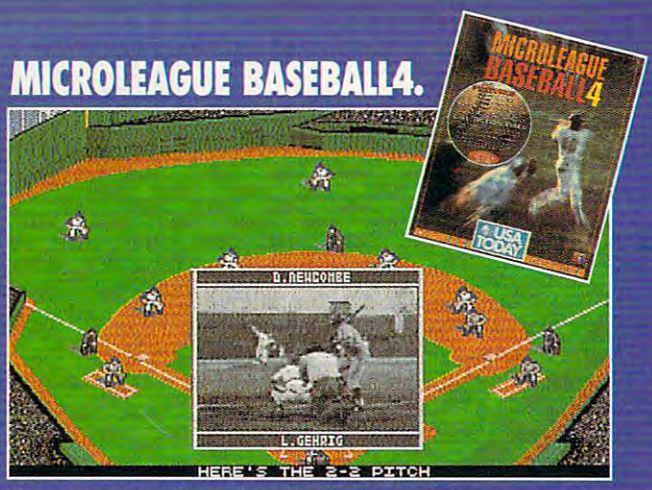
ACTION SPORTS SOCCER



Arcade-style action! European critics raved, and you will, too. Test your coordination—and your managerial skills—as you play for the European-championships. More than 170 actual clubs are included. VGA and EGA. Arcade, management and full simulation modes. Real life action: corner kicks, free kicks, trick shots. Much more! It's the best game yet for the soccer buff—and a perfect way for the novice to learn the game.

MICROLEAGUE BASEBALL4.



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60. Roger Ebert's Movie Home Companion (CD-ROM): Contains the cumulative works of movie critic Roger Ebert from 1986 to 1992, with more than 1300 movie reviews and 80 interviews with stars and directors. List price, $79.95. Quanta Press, 1313 Fifth Street SE, Suite 223A, Minneapolis, Minnesota 55414; (612) 379-3956 (voice) or (612) 623-4570 (fax).

61. PANTONE Process Color Imaging Guide 1000: A fan-format guide of 1000 PANTONE colors. Gives a visual comparison of how a color appears onscreen and how it will look when printed. Helpful for desktop publishers who use service bureaus for color printing. List price, $85. PANTONE, 55 Knickerbocker Road, Moonachie, New Jersey 07074; (800) 222-1149 (for nearest dealer).

62. SpinRite II: A utility that keeps your hard disk healthy. Checks the disk, repairs and/or flags bad sectors, recovers data, and increases disk speed. List price, $89. Gibson Research, 35 Journey, Aliso Viejo, California 92656; (714) 362-8800.

63. Talking Classic Tales: Five illustrated fairy tales with digitized narration. The Frog Prince, Rumpelstiltsken, The Elves and the Shoemaker, The Queen Bee, and Puss in Boots. List prices are $89 for multimedia CD version and $59 for floppy disk version. See 56 for order information.

64. Software Carousel: Load up to a dozen programs or files into memory at once and switch among them with a keystroke. List price, $89.95. SoftLogic Solutions, One Perimeter Road, Manchester, New Hampshire 03103; (800) 272-9900.

65. Shareware Grab Bag: Contains 6500 shareware and public domain software programs at a little over half a cent per program. List price, $99. ISLOTECH, 6520 Edenvale Boulevard, Suite 110, Eden Prairie, Minnesota 55346; (612) 934-4239.

66. Lappac 5 Deluxe Case: Oxford nylon case for small to mid-size laptops. Combines a carrying case, briefcase, and portfolio into a single portable system. List price, $99. Targus, 6190 Valley View, Buena Park, California 90620; (714) 523-5429.

67. Universal Notebook Case: Carrying case for notebooks. The computer compartment has Velcro straps and an extra layer of foam padding. The other compartment has adjustable/removable dividers to fit other equipment. List price, $119. See 66 for order information.

68. AUTOMAP: Helps plan road trips for the fastest, most scenic, or most convenient route with hundreds of up-to-date color maps. List price, $99.95. See 58 for order information.

69. First Electronic Jewish Bookshelf: An electronic version of general-interest Judaica featuring two volumes of *The Jewish Book of Why* and an encyclopedia of Jewish knowledge among many other titles on history and Jewish contributions to music, art, and culture. List price for the CD-ROM, $99.95. ScanRom Publications, 555 Chestnut Street, Cedarhurst, New York 11516; (516) 295-2266 (voice), (516) 295-2240 (fax), or (516) 295-2409 (BBS).

70. Portable Power Plug: Plugs into your cigarette lighter to give you 140 watts of AC power on the road. Great for laptop and camcorder owners. $99.95. Home Automation Laboratories, 5500 Highlands Parkway, Suite 450, Atlanta, Georgia 30082; (404) 319-6000.

71–72. The Writer's Toolkit for Windows and The Writer's Toolkit for DOS: Seven writing aids, including The American Heritage Electronic Dictionary and Roget's II Electronic Thesaurus. List price, $129. Systems Compatibility, 401 North Wabash Avenue, Suite 600, Chicago, Illinois 60611;

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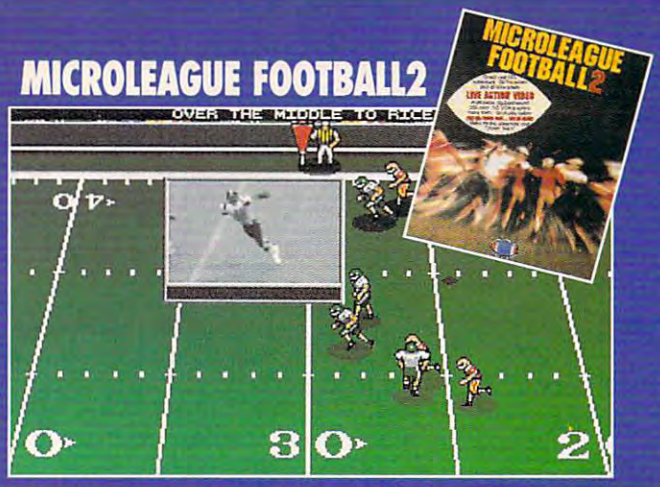
MICROLEAGUE FOOTBALL2



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73. Disney Animation Studio: Full-featured animation program that utilizes state-of-the-art techniques. Adding audio is a snap if you have The Sound Source, Sound Blaster, or Tandy Sound. List price, $129.95. Walt Disney Computer Software, 500 South Buena Vista Street, Burbank, California 91521; (800) 688-1520.

74. Follow the Reader: Lets youngsters create, record, replay, and print their own stories while sharpening reading and computer skills. See 73 for order information.

75. Stunt Island: Hollywood stunt directors helped Disney create this combination flight simulator/movie-making program. Fly, film, edit, and show stunts with 40 aircraft and over 600 set-styling objects to choose from. See 73 for order information.

76. Lotus 1-2-3 for Home: A personal financial analysis spreadsheet. Includes a set of 50 customized application templates to help manage household financial matters such as college costs and refinancing a mortgage. List price, $149. Lotus Development, 440 Lincoln Street, P.O. Box 100, Worcester, Massachusetts 01653; (800) 343-5414.

77. WORD FOR WORD Professional 5.1: Automatically converts files from one format to another without losing the original document's special formatting. Works with over 90 different word processor, spreadsheet, and data formats. List price, $149. Mastersoft, 6991 Camelback Road, Suite A-320, Scottsdale, Arizona 85251; (800) 624-6107.

78. Gigabyte Gold: More than a gigabyte of virus-free shareware and public domain software on CD-ROM. Contains more than 120,000 recent files organized into 100 subjects, including CD-ROM utilities, and an index to 49 other CD-ROMs of shareware and public domain software containing almost 2 million entries. List price, $169. CD-ROM Users Group, P.O. Box 2400, Santa Barbara, California 93120; (805) 965-0265.

79. Crosspoint Autoswitcher: This automated secretary answers the phone on the first ring and routes calls to fax, modem, answering machine, or you as appropriate. $199. See 15 for order information.

80. Presentation Task Force: 3500 pieces of clip art designed to work with over 60 DOS, Windows, and OS/2 applications. List price, $199. New Vision Technologies, 38 Auriga Drive, Unit 13, Nepean, Ontario, Canada K2E 8A5; (613) 727-8184.

81. Premier Leather Case: Combines a leather briefcase and a laptop carrying case with four fully lined document sections, a zippered portfolio section, and a padded computer compartment. List price, $299. See 66 for order information.

82–84. Stacker 2.0: A data compression product that instantly and safely doubles hard disk capacity. Ideal for those who are constantly in danger of running out of disk space. List prices are $149 for Stacker 2.0, $249 for Stacker AT/16, and $299 for Stacker MC/16. STAC Electronics, 5993 Avenida Encinas, Carlsbad, California 92008; (800) 522-7822 or (619) 431-7474.

85. Jumbo 120: Backs up 120MB with data compression onto one data cartridge. Can back up 80MB in about 20 minutes if you also purchase a TC15 dedicated controller card for $129.95. List price for the tape drive, $250.00. Colorado Memory Systems, 800 South Taft Avenue, Loveland, Colorado 80537; (800) 845-7905.

86. Ready-to-assemble computer furniture: Costs 25 to 50 percent less than preassembled furniture. A variety of pieces at various prices. Sauder Woodworking, 502 Middle Street,

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Archbold, Ohio 43502; (800) 523-3987.

87. BigmOuth PC voice mail system: Centralized message retrieval system allows you to send and receive messages. Features call processing, autodialing, and a phone book/database. List price, $295. Talking Technology, 1125 Atlantic Avenue, Suite 101, Alameda, California 94501; (800) 934-4884.

88–89. Amiga 500 512K system: Plays better videogames than a Genesis but has hundreds of serious applications available, too. Buy the 520 modulator and hook it to your TV, and the kids and spouse won't fight you for your PC. Pick up a copy of *Kids and the Amiga* ($16.95; see 12 for order information) to go along with your purchase. $499.00 (though widely available for $299.00) with mouse, disk drive, and windowed multitasking operating system. Commodore Business Machines, 1200 Wilson Drive, West Chester, Pennsylvania 19380; (800) 662-6442.

90. FileSafe minicartridge series: A line of tape backup subsystems based on the DC2000 minicartridge technology. Data compression for up to 304MB of storage per cartridge. Priced from $315 to $935. Mountain Network Solutions, 240 East Hacienda Avenue, Campbell, California 95008; (800) 458-0300.

91. Panasonic's KX-P2123 dot-matrix printer: Ideal for budget-conscious small business and home office users who desire the benefits of quiet technology, high-quality output, and color capability at a low price. List price, $419.95. (800) 742-8086 (for nearest dealer).

92. The Complete Communicator: A voice/data communications board that turns your PC into a voice mail service, a fax, and a modem. List price, $499. The Complete Communicator Gold, packed with additional fax and scanning features, is available for $699. The Complete PC, 1983 Concourse Drive, San Jose, California 95131; (800) 229-1753.

93–94. CD Express: Everything you need to get started with CD-ROMs. Includes an NEC CDR-25 CD-ROM drive, complete interface, speakers, and ten CD-ROM software titles for $499. Multimedia Gallery: Everything you need to get started in multimedia—an NEC CDR-74 CD-ROM drive, complete interface, NEC audio board, speakers, headphones, and six top multimedia titles for $999. NEC Technologies, 1255 Michael Drive, Wood Dale, Illinois 60191; (800) 826-2255.

95. ScanMan Color: Powerful 24-bit color hand-held scanner that provides virtual page scanning, automatic scan stitching, color image-editing software, and much, much more. List price, $699. Logitech, 6505 Kaiser Drive, Fremont, California 94555; (800) 231-7717.

96. The Microsoft Office for Windows: Four business applications in one package. Microsoft Word for Windows (word processing), Microsoft Excel for Windows (spreadsheet), Microsoft PowerPoint for Windows (presentation graphics), and Microsoft Mail Windows Workstation (electronic mail for PC networks). List price, $799. Microsoft, One Microsoft Way Redmond, Washington 98052; (800) 426-9400.

Ten Things to Know Before You Buy

Whether you're buying for a computer-loving friend, spouse, teenager, or youngster, you need certain information to make an intelligent choice. The following list specifies ten information bits you may need handy to purchase software or hardware compatible with the individual's computer system. Call a local dealer for guidance on which of these ten to investigate and to help answer these questions if you'd rather not ask the person directly.

1. What kind of computer is it?
2. Is the processor a 286, 386, 386SX, 486, or 486SX?
3. How many megabytes of RAM does the system have?
4. How much hard drive space does the system have, and how much is unused?
5. Does the system have XT, AT, or MCA bus architecture (or 8-bit, 16-bit, or 32-bit bus cards)?
6. Are there any bays available for an internal backup system, 3½- or 5¼-inch floppy drive, or CD-ROM drive?
7. If you're buying a tape backup system, how many megabytes of data does the person need to back up?
8. What kind of software does the person like (productivity, games, education)?
9. If you're buying software, does the person need a package that suits a DOS or Windows environment?
10. Does the software provide mouse support, and does it require a sound card, modem, or CD-ROM drive?

—TRACY MYGRANT

97. Logitech Fotoman: A portable, automatic-flash, digital camera that downloads photos to your PC. Comes with a host of image-editing tools. List price, $799. See 95 for order information.

98. Media Vision Pro 16 Multimedia System: Contains everything you need to convert a 286, 386, or 486 PC into a multimedia PC system. Includes a complete NEC CD-ROM drive kit; multimedia tutorials, applications, and demonstrations; Compton's Multimedia Encyclopedia; and more. $1,195.00. Media Vision, 47221 Fremont Boulevard, Fremont, California 94538; (510) 770-8600. Also available is the Sound Blaster Multimedia Upgrade Kit from Creative Labs, featuring the Sound Blaster Pro sound card, CD-ROM drive, MIDI kit with sequencer software, Windows 3.1, Microsoft Bookshelf, Microsoft Works for Windows, and more. $799.95. Creative Labs, 1901 McCarthy Boulevard, Milpitas, California 95035; (800) 998-5227.

99. Okidata OL400 LED Page Printer: Highly recommended if you're in the market for a basic, entry-level laser printer that can be upgraded as your printing needs increase. List price, $1,099. Okidata, 532 Fellowship Road, Mt. Laurel, New Jersey 08054; (800) 654-3282.

100. SNAPplus: Lets you capture, edit, and record video from your VCR, camcorder, or any other video source. A video capture board and VGA card all in one—something that desktop publishers can really appreciate. List price, $1,295. Cardinal Technologies, 1827 Freedom Road, Lancaster, Pennsylvania 17601; (800) 233-0187.

101. The Notepad 386SX-20 leather notebook computer: Designed with the discriminating executive in mind. Comes with a matching portfolio case; a 9600-/2400-bps fax/modem; a 40-, 60-, or 80MB internal hard drive; and more. List price (with a 40MB hard drive), $2,499. Lighthorse Technologies, 4105 Tolowa Street, San Diego, California 92117; (800) 443-3446 or (619) 270-7399.

More Stuff

If you want to see more gift ideas in the entertainment area, check out "The Top 25," the entertainment feature in this issue, and Test Lab for multimedia products.

When All Else Fails . . .

Ask the sales associates at your local computer store if gift certificates are available. Also, check with resellers who normally put out catalogs that show you what they have in stock. ❑

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SHAREPAK

Steve Draper

THE BEST OF THE BEST

This month, COMPUTE's SharePak brings you three of the best programs you'll find anywhere. We've included two programs that were recently nominated in the shareware industry's annual awards ceremony, as well as a brand-new program that will add a new twist to many of the programs you already own. So whether you're looking for a great value for yourself or a gift for a friend, give the SharePak a try.

Spice up the holiday season with three great programs.

Chinese Checkers is still a challenge for all ages.

Take the pain out of file editing with QEdit.

All of the programs on this month's disk are shareware. The shareware concept is pretty simple. You're given a copy of the program to evaluate for a certain length of time, usually 30 to 60 days. If you like the program, you are expected to register it. If you don't like it, simply quit using the program. It's that easy.

QEdit

QEdit really stands out in the category of text editors for the IBM PC and compatible computers. If you need an easily configurable editor, you won't go wrong with this program. QEdit's main functions are creating and maintaining text files, such as program source code, listings, and other similar files. However, QEdit also can function as a word processor, since it includes easy-to-use word-wrapping and quick paragraph-reformatting capabilities.

QEdit was created to meet three main goals: fast operation, ease of use, and compact size. The program easily meets these requirements. QEdit loads, searches, and saves files with blazing speed even on slower computers. Optional pull-down menus, a file selector, and a customizable help screen make it easy to get up and running with the program. And if you need more help, the manual includes a user's guide and a reference section which explains all of QEdit's commands. You'll also like QEdit because it uses a minimum amount of your computer's memory and because it can be operated from a single file (q.exe)—you don't have to worry about losing any support files if you want to move the file to another disk.

QEdit will run on any IBM PC or PCjr or compatible with 128K RAM and any 80-column monitor. DOS 2.0 or higher is required. The registration price is $54.95.

Chinese Checkers

Chinese Checkers as a game needs no introduction. Everyone remembers playing the game as a child, but most don't remember the challenge of facing a good opponent or the intricate strategies required to win. I thought Chinese Checkers was a boring game, until I played this version of the classic game.

The game is beautifully rendered in high-resolution EGA graphics, with animated moves that look so realistic that the marbles seem to lift off the screen when a move is made. The playability level is also very high for this game. There isn't much documentation, but the game is so easy to use that it's not needed. There are six colors of marbles to choose from, so one to six players can play. And if there's no one else around, you can mix in as many computer players as you want. Be warned, though—the computer shows no mercy and makes few mistakes.

Chinese Checkers runs on any IBM PC or compatible with 640K RAM. An EGA or VGA monitor and a mouse are required. The registration price is $14.95.

Text Font

Text Font is a neat little program that does a unique thing: It replaces the normal text mode or system font on your PC with one of several more interesting fonts. The program is easy to use; in just a couple of keystrokes, you can dramatically alter the appearance and overall feel of all your text-based applications. Some of the fonts are easy to read, while others add an exotic flavor to what is displayed on your monitor.

Included in the shareware version of Text Font are 12 fonts, including Tiny, Old English, Medieval, Script, Tall Thin, Computer, and several others. Registered users receive about two dozen new fonts and a TSR version of Text Font that will recover from video-mode changes.

Text Font runs on any IBM PC or compatible running DOS 2.1 or higher. An EGA or VGA monitor is required for text font changes. The registration price is $19. ❐

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DEC 91: EZ-Menu, access programs with a single keystroke; PuzzleMaster, an assortment of challenging brainteasers; PCBENCH, get a complete report on your system's performance. **(#CDSK1291)**

JAN 92: Hi-Lo Joker Poker, draw poker with a new twist; LINEWARS, an excellent modem space-combat game; ZipZap, view and modify files and disk sectors; FormGen, generate original business forms. **(#CDSK0192)**

FEB 92: CredCard, financial register for credit cards; EZ-Disklone Plus, make multiple, single-pass disk copies; PC VALET, easy shell for DOS commands; TSRMAKER, make pop-up TSR help and reminder screens. **(#CDSK0292)**

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MAY 92: Sharks, battle man-eating sharks to get valuables; CD Dot Challenge, the classic game computerized; RDIR, graphical charts of disk space usage; LZEXE, save disk space by compressing EXE files. **(#CDSK0592)**

COMPUTE's SharePak disk contains the best of shareware—handpicked and tested by our staff—to complement this month's focus. You'll sample entertainment, learning, and home office software at a great savings. Each SharePak disk includes two to five programs plus complete documentation for one low price:

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PRODUCTIVITY CHOICE

This state-of-the-art DOS spreadsheet provides some of the latest features pioneered by Windows products.

Stephen Levy

QUATTRO PRO 4.0

Once, you couldn't think about spreadsheets without thinking about Lotus. Then Borland introduced Quattro Pro with an aggressive pricing and upgrade strategy. But pricing and upgrades do not, by themselves, make a spreadsheet popular. To compete with the likes of Lotus, a spreadsheet must give current Lotus users a reason to switch and new users a reason to forgo buying the product long considered the industry standard. Quattro Pro 4.0 succeeds here by taking an already powerful and easy-to-use application to new heights. Pull-down menus, a mouse option, a WYSIWYG display, and powerful graphing capabilities combine with other special features to make Quattro stand as tall as—or taller than—the competition.

Borland followed the lead of the Windows spreadsheets: Quattro now sports SpeedBar, an enhanced point-and-click selection bar for frequently used commands. So if you have a mouse, you can use the SpeedBar to avoid having to move through the menus to complete common tasks. All the most often used spreadsheet tasks appear on the SpeedBar, but you can customize the bar if you need to change or add a command.

Quattro actually comes with two SpeedBars. The general-purpose SpeedBar, available in Ready mode, allows you to copy, erase, move, or format a cell and to do a number of other tasks such as deleting or inserting a row or column. The inclusion of the @SUM function on the SpeedBar is quite handy. To add a column of numbers, all you need to do is place the cursor in the cell where you want the @SUM function and then click on the SUM button. Quattro adds all the numbers immediately above the cell you've selected—and it works the same way if you want to add a row of numbers.

The second SpeedBar is available only in Edit mode and is designed to assist in editing formulas. Although it's not as useful as the SpeedBar found in Ready mode, many users will find the Edit mode SpeedBar a welcome addition.

Essentially, each SpeedBar sports a series of 15 macros. You can define 2 macros in Ready mode and 3 in Edit mode; the remaining macros in each mode are predefined. However, if you'd like, you can rewrite any of the predefined macros. Making modifications to the SpeedBars is easy, as long as you're familiar with Quattro's macro language. Fortunately, the package includes a manual that exclusively deals with function and macro commands.

If you're unfamiliar with spreadsheet macros, you'll find the whole macro process a bit intimidating. But if you're willing to take some time to review the commands of the predefined macros and make use of the tables included in the manual, you'll overcome your apprehension and begin to appreciate the convenience of creating your own. Remember to use the Update menu option to save your changes whenever you customize something within Quattro, for Quattro doesn't remind you to save changes to your default setting.

In addition to its SpeedBars, Quattro now has pull-down menus and all their conveniences. Just as in Lotus 1-2-3, you simply press the slash key to activate Quattro's menus. Many of the most frequently used tasks are intui-

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tive if you're familiar with basic spreadsheet operations. Most experienced users will opt, though, for keyboard control of the menus.

Quattro has no trouble sensing the presence of a mouse. If no mouse is present, the SpeedBar is absent. If you connect a mouse, you can use the keyboard or the mouse to make selections. All users, though—with or without a mouse—will have to wade through multiple menus and submenus to complete many important tasks not included on the SpeedBar. For example, although the options are easy to understand, you must make a minimum of four selections to define a single cell as currency.

If your system includes EGA or VGA, you'll be able to take advantage of Quattro's nicely styled WYSIWYG display. This option lets you see exactly what will print—even the fonts, boxes, lines, graphs, and other features you may have added to your spreadsheet. While it's a valuable feature, the WYSIWYG display slows the spreadsheet screen updates and the movement of the cursor; it also is hard to read on a VGA gray-scale notebook computer. Borland realized these inconveniences and made the WYSIWYG display an option, not a standard feature. Most users will find it best to do their spreadsheet work in a standard text mode and move to WYSIWYG only when needed.

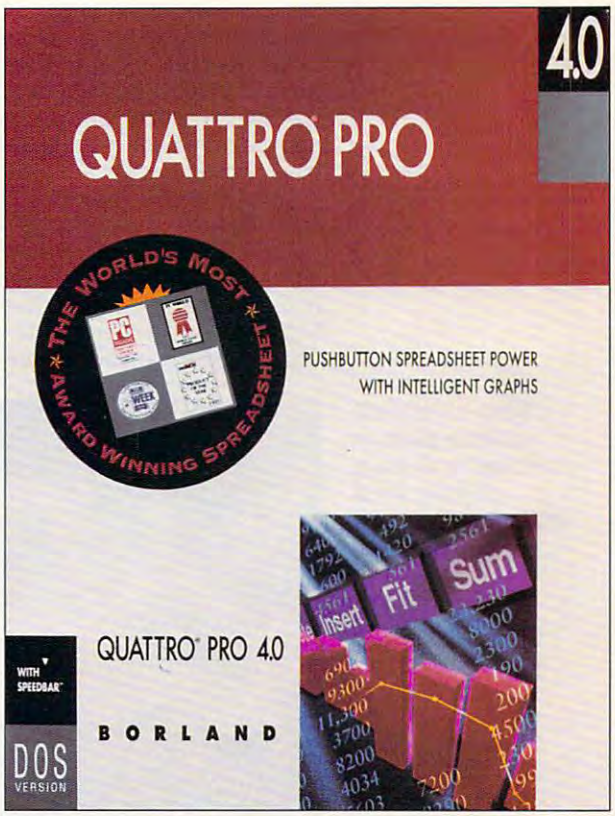
Creating attractive spreadsheets is easy, since Quattro comes with eight type styles predefined. Equally important, though, is the ability to define your most-used styles. Two heading styles come predefined in the program, but you'll probably want to define your own—another task that's easily accomplished.

One of the reasons so many spreadsheet users chose Lotus 1-2-3 in the past was to be assured of compatibility with other spreadsheet users. Borland long ago addressed that concern. As with all its predecessors, Quattro Pro 4.0 can easily load files from a variety of other programs. You simply retrieve or open a file, and Quattro translates it for you. Saving files in another format is as easy as using the appropriate file extension.

Quattro's graphing capabilities have always been competitive, but now they are outstanding. Quattro now boasts what Borland calls intelligent graphs. Essentially, these graphs give you the ability to perform specific statistical analysis on a series of data and then graph the results.

Plus, Borland has replaced some Quattro menus with dialog boxes to make it easier for you to set multiple options. If solving complex what-ifs is your bag, you'll find the new Optimizer menu useful. The Optimizer lets you preselect the results of a formula; Quattro then will change the appropriate cell values to achieve the desired results. Other new features include special copy, custom @ functions, formula protection, and improved network support.

If you've never used or been exposed to a spreadsheet, you'll need to take some time to learn to use the power of any spreadsheet you choose. First-time users will find there's more here than seems imaginable and will be discovering new ways to access Quattro's power to do more all the time.



Experienced users will find that Borland has included many features they'd only expect to find in a Windows product. If you've been considering moving to Windows just so you can move up to the next generation of spreadsheets, you'll be pleasantly surprised with Quattro Pro 4.0.

The original Quattro Pro was well worth its $495 price. This new DOS version is much more robust and feature rich, yet it will still run with just 512K RAM and a hard drive. It has all the options and abilities we've come to expect from a spreadsheet. While Lotus 1-2-3 is no slouch, given a choice, I'd choose Quattro Pro as my DOS spreadsheet. ❐

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Most people would probably say that statistics has no place in the real world of inventories, sales, and bottom lines. But what if the numbers derived from data you already have on hand could help you get more return on your investment dollars?

"In a lot of small businesses, all the computer does is regurgitate financial data," says Micki Johnson, a business faculty coordinator at Nova University in Fort Lauderdale, Florida. Johnson, who consults with small businesses, encourages proprietors to analyze business data more creatively.

Using a statistical software package can lead to strategic planning and a better bottom line for your business.

PC-based integrated statistical software is here to help: Minitab ($695; Minitab, 3081 Enterprise Drive, State College, Pennsylvania 16801; 800-448-3555), StatPac Gold IV ($795; StatPac, 3814 Lyndale Avenue South, Minneapolis, Minnesota 55409; 612-822-8252), SPSS/PC+ 4.0 ($195 for first module; SPSS, 444 North Michigan Avenue, Chicago, Illinois 60611; 800-543-2185), SPSS for Windows ($395 for first module), and SYSTAT and SYSTAT for Windows (both $895 for the basic system; SYSTAT, 1800 Sherman Avenue, Evanston, Illinois 60201; 708-864-5760). For the first time, PC users enjoy statistical-analysis power once reserved for corporate mainframe users.

What can you use statistics for? No matter what your type of business, it's important to know who your customers are and what they are thinking. Market research gives you that ability. By surveying a sample of potential or actual customers, you can better determine whether your new product line will be a hot seller.

Market research results are sometimes meaningless, and this might not be obvious from the raw data. You need some measure of the significance of the results. To compute the significance of a survey on a spreadsheet would be cumbersome at best; a statistical package would handle it much more efficiently.

Statistical software also makes it possible to find out how well your customers like what you are currently selling. In fact, you might be able to analyze existing information you have in a customer or accounting database or spreadsheet.

If you are an air-conditioning service company, for example, you may want to know your catchment, or the geographic area in which your customers fall. To figure your catchment, you can draw a scatter diagram based on customer ZIP codes showing your market penetration in various geographical areas. By pulling this information from your accounting database and importing it into a statistical package, you can determine whether, for example, advertising in more local periodicals would serve your needs better than an ad in the city newspaper. Once you've placed your ads, if you've coded them you'll be able to accurately evaluate their effectiveness.

Statistics can help small manufacturers with quality control. Say you publish software. If you want to keep track of how well your staff is packing the materials in the boxes, you can regularly take a sample of your product, enter the independent variables, such as day of the week, hour of the day, number of workers, and rate of production, and the dependent variable: the number of mistakes made. Run a statistical analysis, and you'll be able to determine which of these most powerfully affect shipment quality.

Wouldn't it be interesting to know that when a certain manager or worker is on vacation or sick, productivity and quality improve? Or that certain workers always take sick leave on Monday? A statistical analysis could help you determine where the deadwood is—and where the rotten apples are—in your organization.

While a college course in statistics (dreaded as it might be) can help you to interpret the results obtained from these statistical packages, it's not a requirement. The beauty of these packages is that they enable virtually any small business manager to use statistical methods. Whatever the results, using a statistical software package can lead to strategic planning and a better bottom line for your business. ❐

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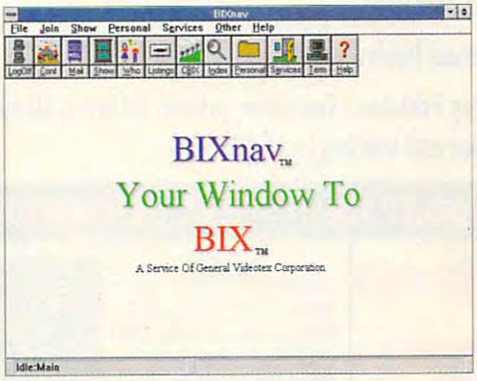

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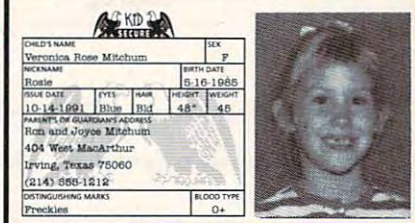

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SERIAL PORTFOLIO

Are you getting broker while your full-service broker gets richer? If you know what you're doing, you can save money by trading online.

By Rosalind Resnick

If you've ever played the market, you've probably experienced the exhilaration of spotting an undervalued stock, playing a hunch, and reaping a tidy profit—on paper, that is. But if you're like most small investors, chances are that you've also experienced the shock and disappointment of seeing your stock market winnings whittled down to size by the hefty fees and commissions your full-service broker charges you.

Make and Save Money

There's another way. If you have a modem and a home computer, you're already way ahead of the game. These days, anybody with the financial savvy to buy and sell securities without a broker's advice can trade stocks, bonds, options, certificates of deposit, and mutual funds online, cutting out the broker's fee and saving big bucks.

You can play the game two ways: Either place your trade through the online service to which you already subscribe—PRODIGY, CompuServe, GEnie, America Online, and Dow Jones News/Retrieval all offer online brokerage capabilities—or invest in an off-the-shelf software program like Reality Technologies' Smart Investor by Money Magazine or MECA Software's Fidelity On-line Xpress, both of which sell for under $100.

The savings can be substantial—as much as several hundred dollars on a single trade, depending on the size of your order. For example, Personal Control Financial Network (PCFN), the online brokerage service offered on PRODIGY, charges commissions as low as $45 for a trade of 200 shares priced at $25 a share. That's $81 less than you'd ordinarily pay a full-service broker who might try to sell you stocks you don't want to buy. Plus there's no monthly service charge. Some brokerage services that also take orders over the phone—such as Fidelity and Charles Schwab—offer 10 percent off their already discounted rates to customers who trade by modem.

"Online trading is more objective," says Bruce Lowry, 62, a retired North Hollywood, California, MIS (Management Information Systems) director who switched from a full-service broker to PCFN about a year ago. "It's also about half the price."

A good deal? You bet. But there's a catch. Though the online services often charge lower rates than telephone brokers, most of them tack on some sort of access fee—either to dial up the brokerage service, to log on to the online system

Painting By David Wilcox

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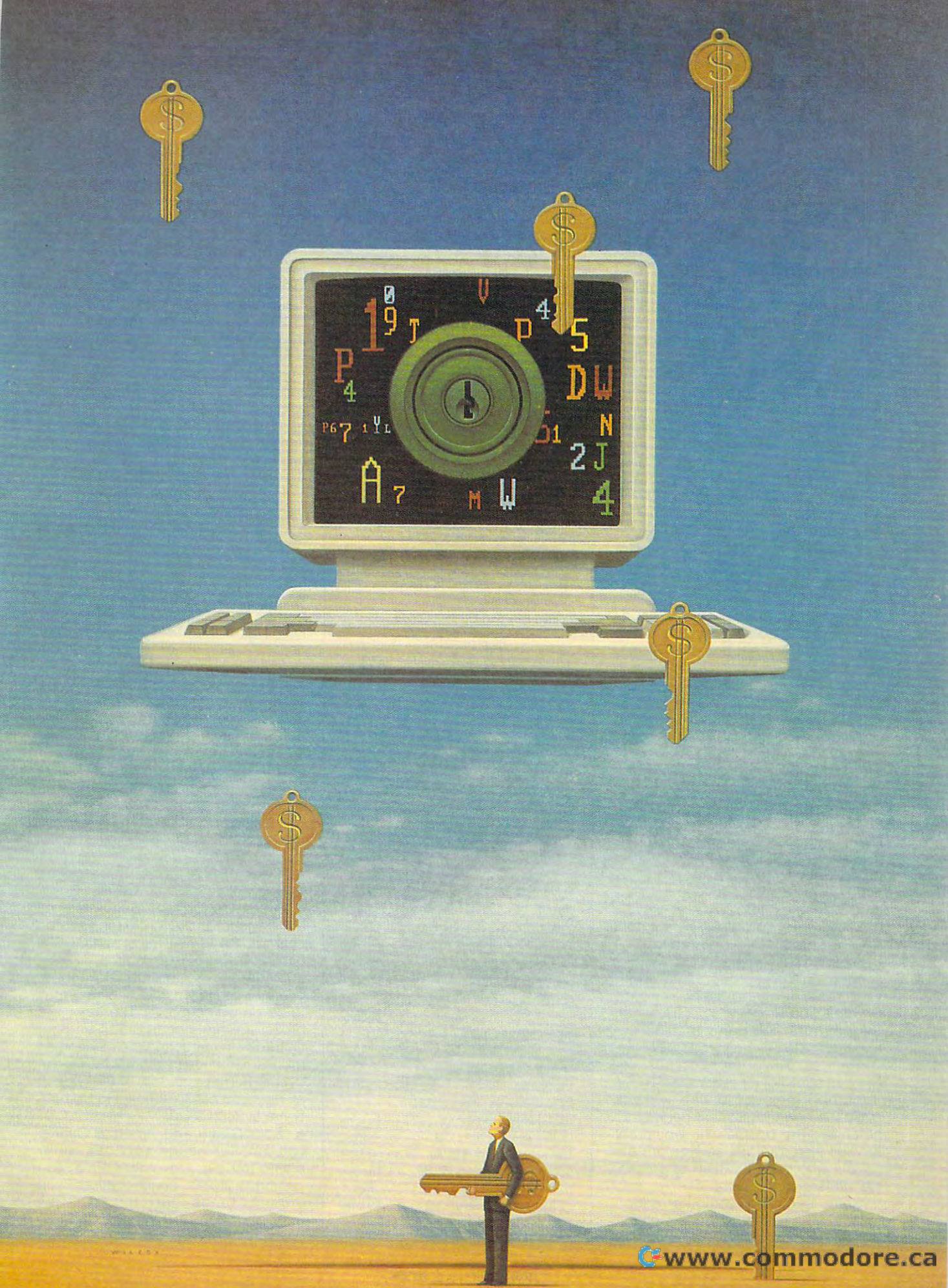
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that offers it, or to download the financial data needed to make an intelligent trading decision in the first place. When you phone in an order (assuming it's a local call or an 800 number), accessing your broker is free. Plus, even though mistakes are less likely when you type your orders directly into your PC than when you place them verbally, foul-ups can happen online, too, some users warn.

Timing Is Everything

"I've [earned] a Ph.D. cum laude in the school of hard knocks when it comes to [online] brokers," says Sandy Schupper, from Venom, Pennsylvania, an experienced user of online trading services who now sticks to offline brokerage firms. "When they make an error, you eat it. This has cost me thousands of dollars. In one case, I called in an order at 6:14 a.m. Pacific time, and they entered it at 6:39 a.m. Then, they refused to make it good, saying this was a reasonable period of time [in which to execute the order]." Delays can happen with full-service brokers, too, but one of the selling points of online brokerages is that they are supposed to be fast.

Despite experiences like Schupper's, online trading seems to be catching on. Richard Brueckner, managing director of Donaldson Lufkin & Jenrette Securities, the New York brokerage firm that manages PRODIGY's PCFN service, concedes that online trading got off to a slow start in the 1980s but estimates that today more than 100,000 people trade stocks online. Though this represents only a tiny fraction of the roughly 20 million Americans who buy and sell securities each year, the number of online traders is growing fast. PCFN has grown eightfold over the last two years and now handles about 1000 trades a day, according to Brueckner.

Besides low prices, "there's also the element of convenience," Brueckner says. "This is the kind of service where you can make an investment decision after reading *Barron's* and the *New York Times* on Sunday afternoon and then forget about it."

Even so, Brueckner concedes, online trading is not for everyone. "This is designed for people who want to make their own investment decisions," he says. "The people who would not be well suited to this service are the people who need the help of a financial professional of some kind."

Some degree of computer adeptness is also essential, adds CompuServe member Ben Black, 25, of Nashville, Tennessee, a veteran online trader. "I would only recommend online trading for someone who is skilled in using a computer," Black warns, "because it's just as easy to call the order in to your broker."

Foolproofing Investment

Perhaps. But these days, some online services are nearly as goof-proof as automated-teller machines. To buy 100 shares of Apple Computer through PCFN, for example, simply log on to PRODIGY, call up your PCFN account, and choose Stocks from the menu. The easy-to-follow menu that appears will then prompt you to enter the company's stock symbol or name, the number of shares you wish to buy, the price at which you want to purchase them, and other necessary information. Or click on the Trade Assist button at the top of the screen, and a series of pop-up windows will explain each choice and describe each step as you go along.

If you want to change an instruction before submitting the order, simply move the cursor up to the item and make the new selection. When your order is ready, choose Recap to open a window with a summary for your review, then choose Send to PCFN to execute your purchase or sale. Once your trade is completed, an online execution report will show you the price quoted, the number of shares traded, the commission cost, the total amount to be settled, the settlement date, and any funds that are due.

Here's a sampling of what's out there and how much it costs:

- For the same $12.95 a month you'd pay to subscribe to PRODIGY, you can access online brokerage services, too. There's no monthly charge to trade stocks, bonds, options, mutual funds, or CDs through PRODIGY's PCFN, and there are no hourly connect charges, either. PCFN is simple to use—it shares PRODIGY's user-friendly interface—and offers instant, online trade confirmation and market analysis from the Wall Street firm that runs the service. Rates are low, too: $40 for a stock or option trade of under $2,500, and $50 for most Treasury bonds. Heavy traders can qualify for frequent-trader discounts by racking up $1,000 or more in PCFN brokerage commissions over a 12-month period.
- CompuServe offers three online trading options: Quick & Reilly, Spear & Rees, and E-Trade Securities. All are discount brokers, though E-Trade charges the lowest rates by far—$29 on any trade of 100 shares or less, and there is no additional connect charge beyond what you normally pay to be on CompuServe. The other two brokerage firms charge $14 an hour on trades made during the day and $4 an hour for trades made in the evening. That's on top of the $12.80 an hour you pay to connect to CompuServe at 2400 baud.
- Both GEnie and America Online, two smaller online services, offer online trading, too. With GEnie, you can trade stocks, bonds, options, and mutual funds through Charles Schwab, one of the nation's leading discount brokers. Though Schwab

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(800) 522-3567, ext. 130

Fidelity On-line Xpress—$89.95
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- Dow Jones New Retrieval offers Fidelity On-line (which will be covered shortly) but is an investor's first source for information about companies and investments. It's the only major online service devoted to providing the information people need in order to make money.
- Smart Investor by Money Magazine ($99.99) is a new software program by the people who brought you WealthBuilder. It's ideal for the investor who wants the convenience and cost savings of trading online but also wants some hand-holding and portfolio management. Using a four-step approach to investing, the program builds a personal financial profile based on your responses to a series of questions, then identifies the best investments based on your needs and lets you buy the appropriate stocks, bonds, mutual funds, CDs, and money market funds online. If you prefer to have mutual funds, CDs, and money markets suggested, it will identify investments that match your profile. Once you've built your portfolio, the program alerts you to changes in the market, investment performance, and new investment opportunities every time you log on. Smart Investor also gives you a choice of discount brokers—PCFN, which PRODIGY offers, or Quick & Reilly, which is also available on CompuServe and America Online. There's a $9.95 flat monthly usage fee for the basic service, which includes updates to the mutual fund, CD, and money market databases as well as unlimited access to online brokerage and other services such as stock quotes, investment alerts, and portfolio updates. The first month of online service is free. For $8 more per month, you can get stock and bond updates plus historical pricing charts and graphs.
- Fidelity On-line Xpress ($89.95), another new software product, was created by Fidelity Brokerage Services, the giant Boston brokerage house, in conjunction with MECA Software, the publisher of the popular Managing Your Money program. With Fidelity On-line, you can place orders direct to the exchanges, access realtime quotes, track the market with research, news updates, and screening services from Dow Jones News/Retrieval, Telescan, and Standard & Poor's MarketScope, and download your investment, income, and tax data into Managing Your Money for further analysis. To make trading easier, the program also offers pull-down menus, a Windows-like interface, mouse support, and help screens. As with the Schwab service, there's also a 10-percent discount on Fidelity's already discounted commissions. There are no hourly access fees or monthly charges.

Which One's for You?

Which online brokerage option you choose will probably depend on how often you trade and how comfortable you are with making your own investment decisions. If you're market savvy and already subscribe to an online service, it's probably a good idea to use the broker offered by that service rather than pay extra fees to save a few dollars elsewhere. Investors who want soup-to-nuts portfolio management may be better off with one of the new software programs or simply staying with a full-service broker, while heavy traders who know their way around a computer ought to consider CompuServe's E-Trade.

Another advantage to online trading is the wealth of information you can get just by logging on. If you've got a modem hooked up to your personal computer, there's a treasure trove of financial help and information as close as a phone call away—stock quotes, company balance sheets, financial analysts' reports and predictions. Depending on what you're looking for and how much you're willing to spend to get it, you can download data that's the envy of any Wall Street pro. And, like the financial professionals, you can use this information to spot a hot stock, plan for your retirement or just keep track of how your money's doing.

If, on the other hand, you trade only rarely and feel more comfortable talking to a human being, it's probably less trouble just to call your broker on the phone. Personal attention is your broker's stock in trade. That's why you pay the big bucks.

Remember, the risks you take trading online are your own. Never invest money you can't afford to lose. And if you need expert advice, you need a professional portfolio manager. Still, with all the user-friendly options out there, now may just be the time to tap in, log on, and kiss those full-service brokerage commissions goodbye. ❑

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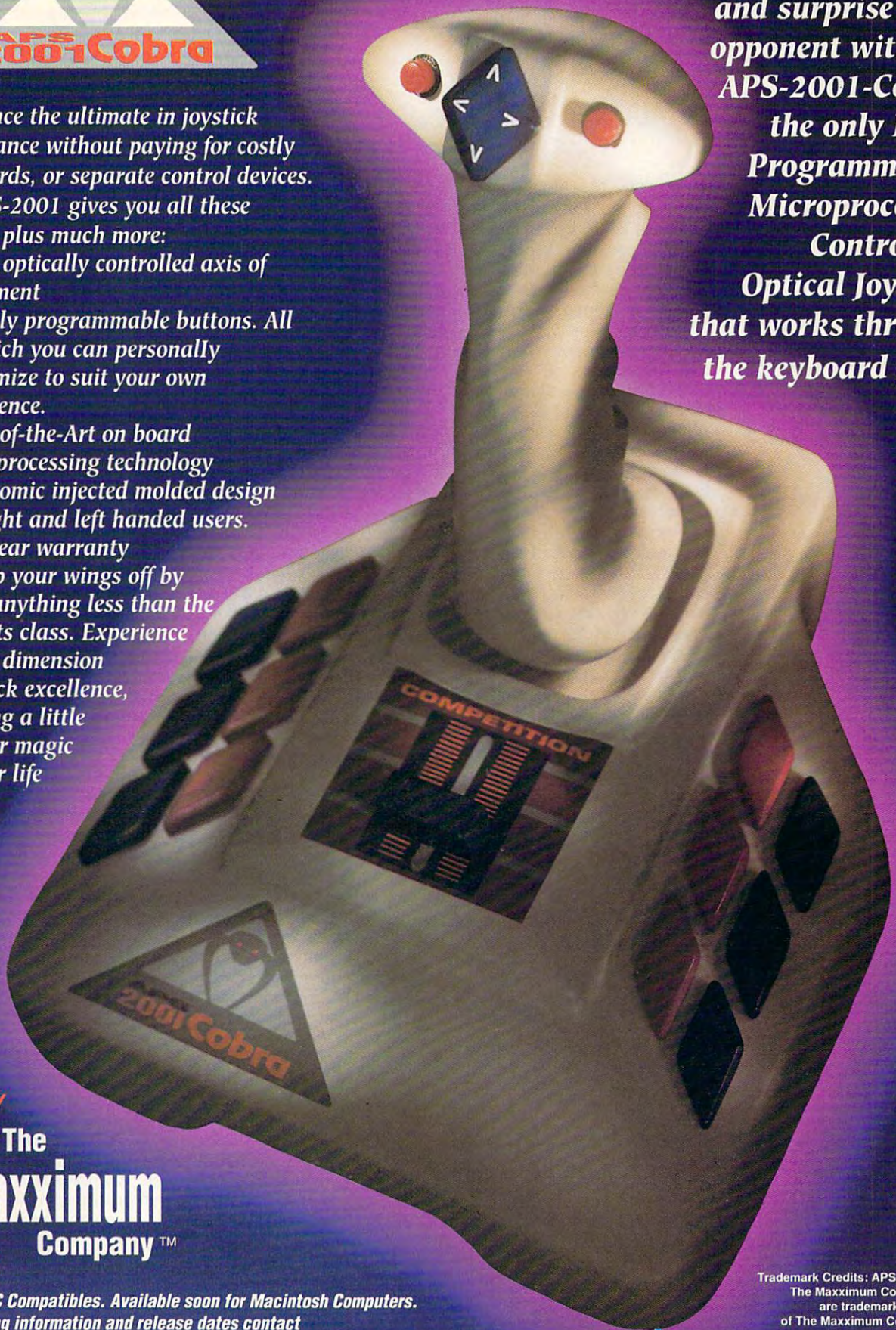

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ART WORKS

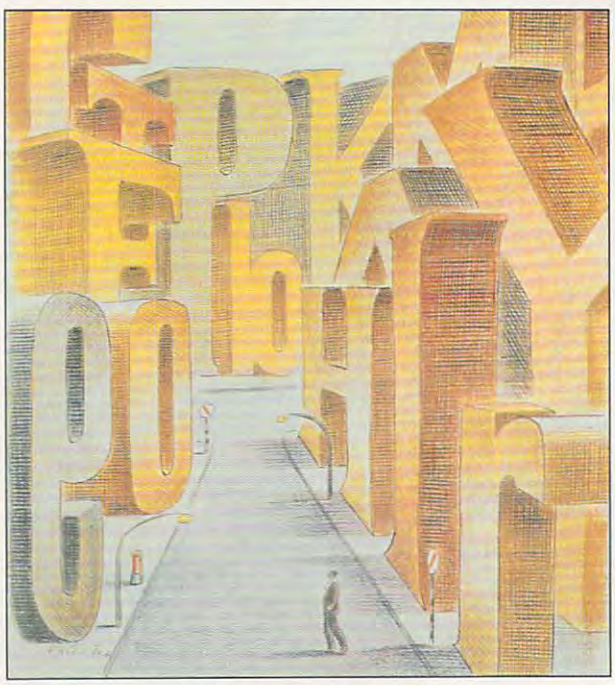
Robert Bixby

FONTS ARE FUN

Thanks to TrueType and a handful of software products, fonts are finally becoming as much fun as other aspects of desktop publishing. How can you get in on the action? Take a look at these products: Bitstream TrueType Font Pack for Microsoft Windows 3.1 (Bitstream, 215 First Street, Cambridge, Massachusetts 02142; 800-522-3668), AllType (Atech Software, 5964 La Place Court, Suite 125, Carlsbad, California 92008; 800-786-3668), and MakeUp (also from Bitstream).

The story I've heard is that Microsoft approached Adobe about bundling a type manager and a collection of PostScript fonts with Windows. Adobe refused. Then Microsoft and Apple got together to create a competing fonts standard that was easy to use. TrueType was the result. All you have to do is tell the Fonts program under the Control Panel to install the fonts. As soon as the installation program works its magic, your fonts are pure enjoyment.

Fonts: Now you can enjoy working with them, create effective designs, and avoid the headaches caused by incompatibilities.



So where do you get your fonts? You could buy a font package. Fonts can cost between $10 and $100 each, but if you're in a hurry to get a collection of handsome display and body faces, get the Bitstream TrueType Font Pack. It features several families of fonts such as Imperial (which resembles Times Roman), Revival (Palatino), and Geometric and Humanist sans-serif fonts. In all, there are 40 fonts, but don't be confused by this. In type designer parlance, the roman style of a typeface is one font, the italic style is another, and so on. There are 5 families of body faces and 16 families of display faces. The price of the collection is $79 (a collection of 20 more fonts is also available for $39), or less than $2 per font. If you install all 40 fonts, they take up about 1.5MB, but you can install them as you need them. There's no reason to install them all unless you intend to use them all.

What if you already have a collection of fonts but they aren't TrueType? For example, you might have purchased GeoWorks or one of the inexpensive font packs that is compatible with GeoWorks. You can convert typefaces easily from one format to another with AllType from Atech. AllType is a DOS program that converts fonts easily among the following formats: Adobe PostScript Type 1 or Type 3, CorelDRAW! WFN format, Nimbus Q, GeoWorks, Intellifont, an Atech standard called FastFont, and TrueType. You can convert Bitstream Fontware (not the same as TrueType) into any of the other formats, but you can't convert other formats into Fontware. Remember that Fontware is different from TrueType. That means you can convert the TrueType fonts discussed in the previous paragraph into other font formats.

Not only can AllType convert your fonts from format to format, but it can also create variations on fonts, making them bold, italic, hollow, condensed, expanded, and so forth. It's a powerful utility for the desktop publisher, and it only costs $79.95.

Atech also sells FastFont fonts in collections of two for $29.95. If you buy FastFonts, however, you'll need to purchase either Atech's Publisher's PowerPak or AllType in order to use the fonts with most applications.

One of the things you can do with fonts in a drawing program is to manipulate the individual letters as graphic elements. Most drawing programs have this capability now, along with warping and extruding options that allow you to manipulate groups of objects in systematic ways. This is a little hard to imagine unless you've tried it yourself, but the closest analogy I can think of is pressing a glob of Silly Putty against a newspaper headline. The ink used by newspapers comes off on the putty. You can then stretch the putty to distort the text. These are the kinds of tricks you can perform with a new group of dedicated text manipulation programs. And you don't even have to put the putty back in the egg afterward.

Using MakeUp ($149), you can make your fonts do gymnastics and appear with shadows, perspective, and other effects. You can match colors, export to 20 graphics file formats, and lots more. MakeUp even comes with five fonts to get you started. Fonts have always been beautiful design elements. Now you can enjoy them, create effective designs, and avoid incompatibility headaches. ❐

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ISAAC ASIMOV'S SCIENCE ADVENTURE

Isaac Asimov was, to use Carl Sagan's phrase, "the great explainer" of our age. In close to 500 books of nonfiction and fiction, he undertook a survey of virtually all of the world's knowledge, particularly the history of science and technology, and the impact of those pursuits upon our planet and our species. There has never been a writing career remotely like his in terms of breadth, quality, and influence. He was one of the great writers of the twentieth century.

Also the great anticipator, Asimov used science fiction and, frequently, nonfiction to explore the ramifications of scientific and technological advances. He laid the groundwork for much modern thinking about robotics, among other topics. Naturally, as a science-fiction writer and an educator, he speculated about the role of computers in education.

Much to our loss, Asimov died this past April. Fortunately, though, one of his final projects married his talents for explanation with those of an equally talented group of software designers, artists, and programmers. The result, Isaac Asimov's Science Adventure, is a delight.

It's an odd delight in some ways: Asimov wasn't the most visual of writers, and his books tend to consist of page after page of lively text with minimal illustration. Illustration in Science Adventure, though, carries a great deal of weight. Indeed, illustrative material occupies the majority of the default screen, with Asimov's text boxed beside it.

Such placement does not diminish the role of Asimov's text: This is one program designed for reading as well as viewing. The program's interface is thoughtful and efficient; even young users should be able to find their way around the program quickly. A result of careful design, the documentation is kept to a pleasing minimum, much of it consisting of reminders that there's no "right" or "wrong" way to use the program.

This is an important point. As the designers stress, this is an adventure, almost an educational software toy. While there are some clever games and quizzes included in the program, it otherwise carries no curricular agenda. Rather, Science Adventure serves as a sort of intellectual playground, a place where you can allow your curiosity full rein to explore the history of science, darting here and there at will.

The program offers several ways to dart. It proclaims itself "multimedia without CD-ROM," and it comes close to living up to its billing. While there is no animation or video in the program, there is a large database of illustrations, and there are interactive maps and time lines. Click on a country, time, or picture, and the program jumps to the appropriate section of Asimov's text to explain what you're looking at or what was going on in a particular discipline at a particular time. The text sections can be printed.

All of the major scientific disciplines are covered here: physics, chemistry, biology, mathematics, space and earth sciences, ecology, and technology. The program's interface allows for the exploration of a single discipline over the course of its development, or you can mingle the disciplines and watch them evolve side by side throughout the world. Thus, we can see the Industrial Revolution getting under way in England, while we're simultaneously examining the development of science and technology in other parts of the world.

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