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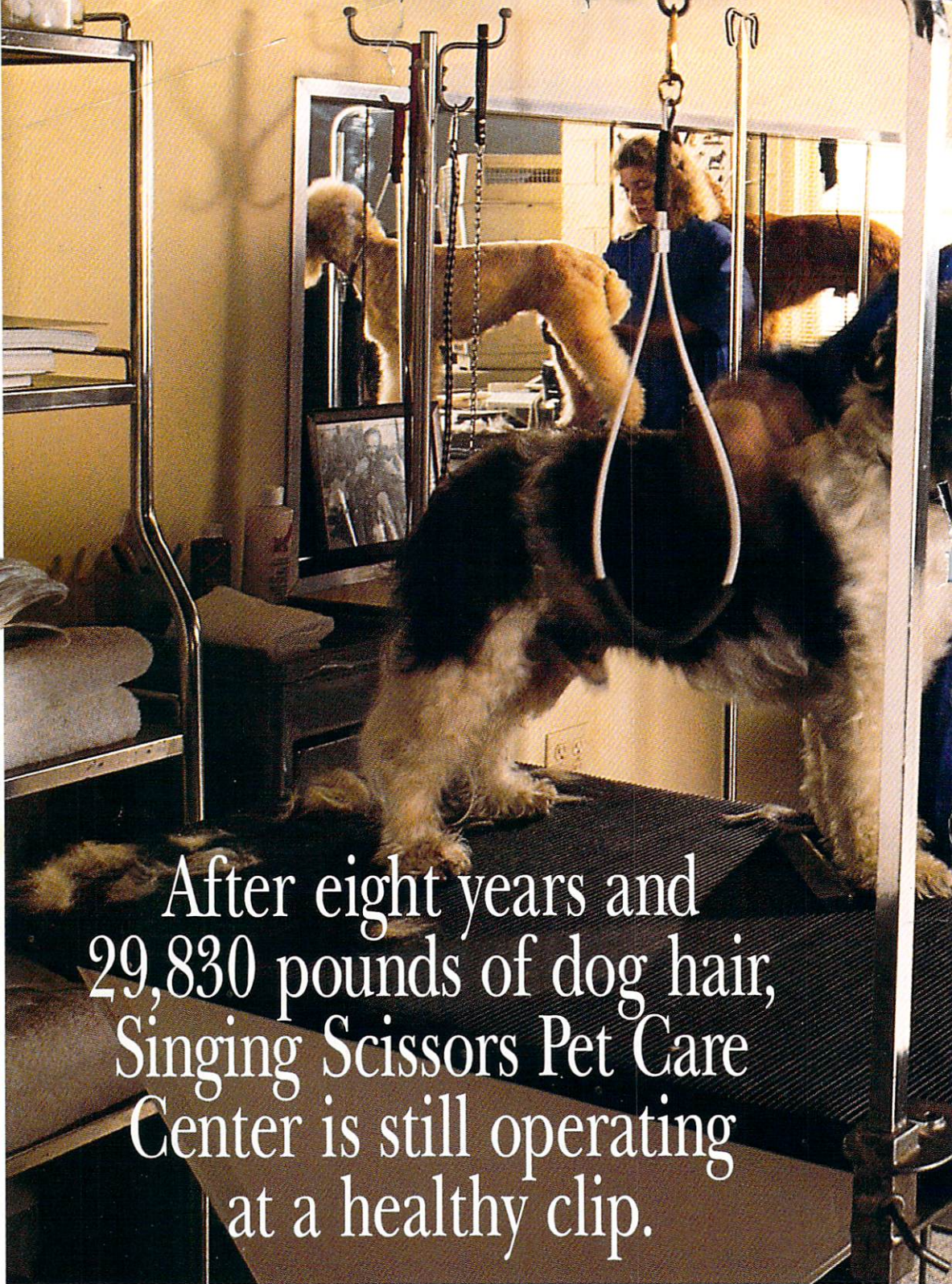
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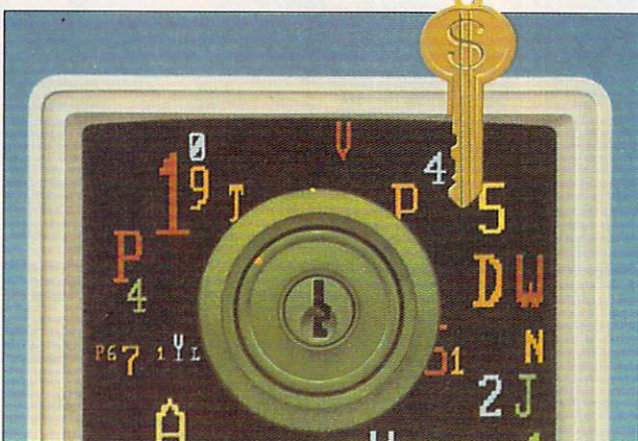
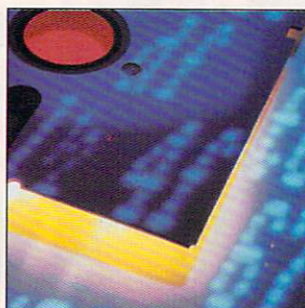
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Clifton Karnes

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

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

done about the situation?

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.

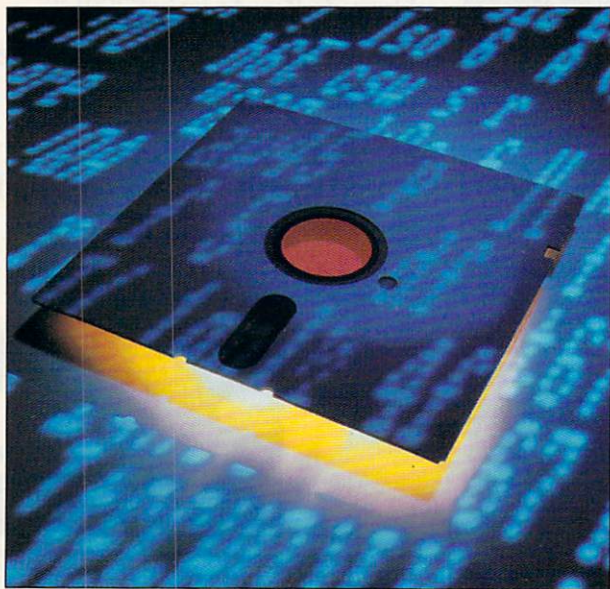
First, every operating system has undocumented calls. There are several reasons for these. Some calls are just old code that's been replaced with better (usually documented) code. Other times, undocumented functions are quick

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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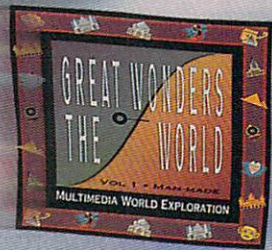
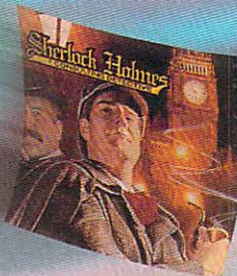
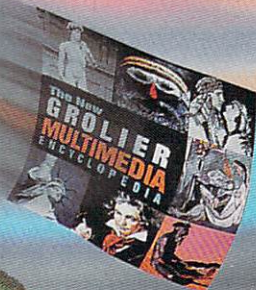
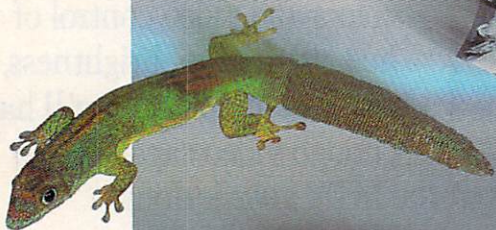
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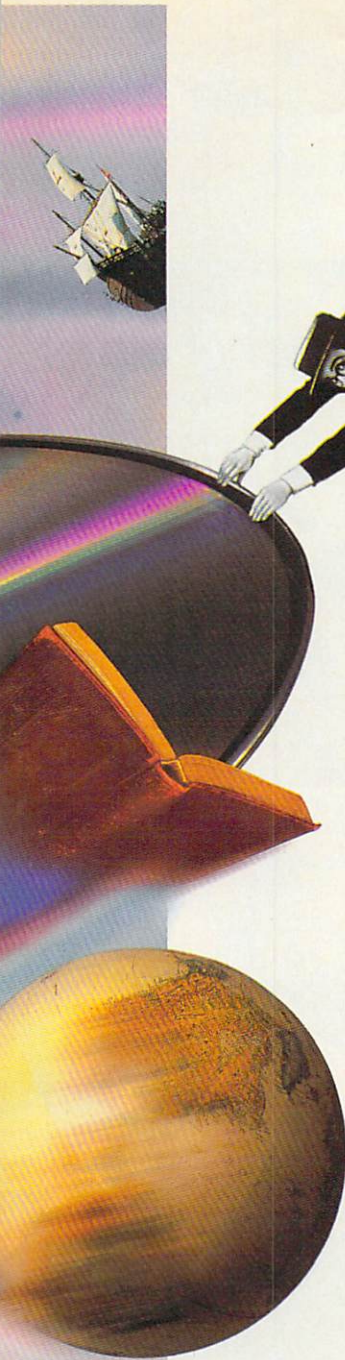


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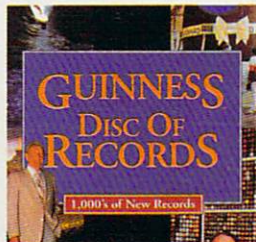
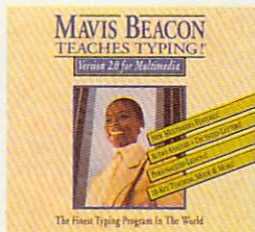
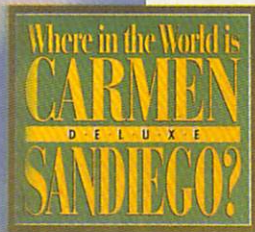
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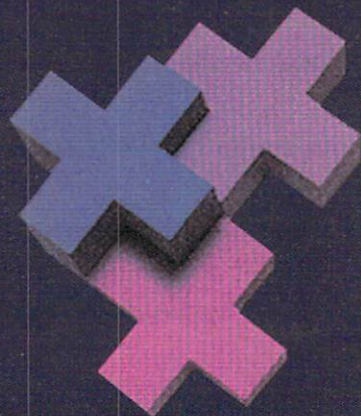
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Windows Programming From Scratch



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

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

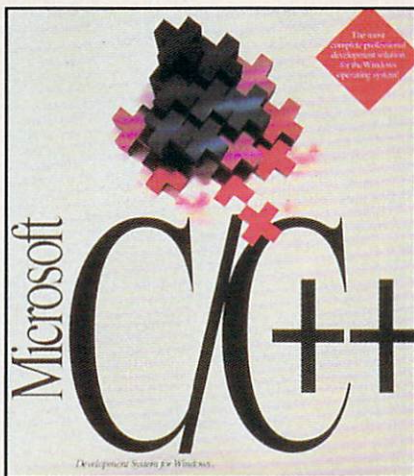
minimal system. The installation programs do a great job of letting you choose what to install, so you can easily shave 10 megs from that number (by eliminating online help options and sample code), or you can add 10 megs to it (by adding a couple of memory models and including the full complement of 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.

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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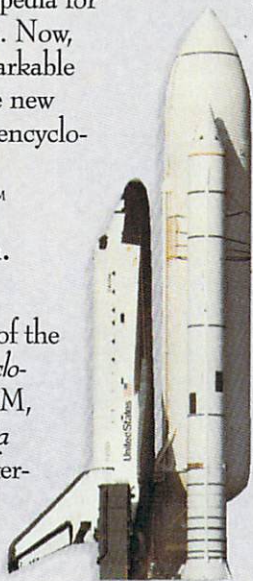


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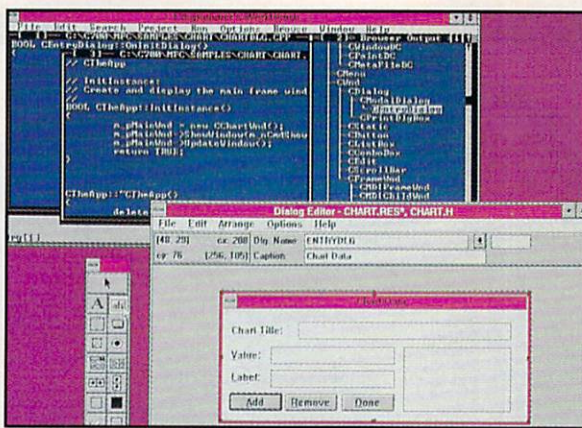
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Microsoft Makes Good

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.

Evidently, a lot of users felt the same as I did, because Microsoft has



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

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 but-

tons (including push buttons, radio buttons, and check-box buttons), text boxes (both for displaying text and editing it), and list boxes.

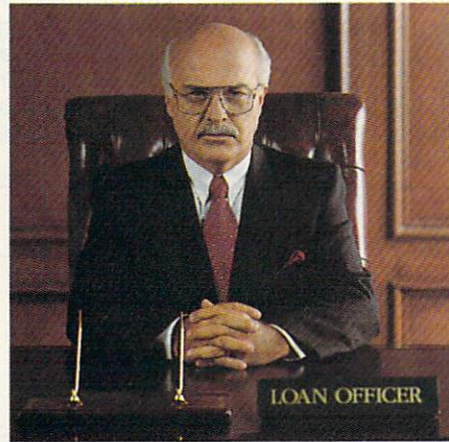
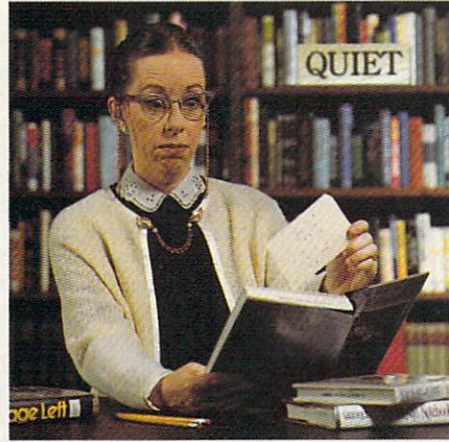
You've probably noticed that in some programs these controls appear in simple black, white, and gray, but in others they have a sculpted 3-D look. The sculpted controls are examples of custom controls. You can create these from scratch yourself, or you can buy a library. Obviously, the easier way to 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 decomiling 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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Circle Reader Service Number 166

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 implemen-

tation 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

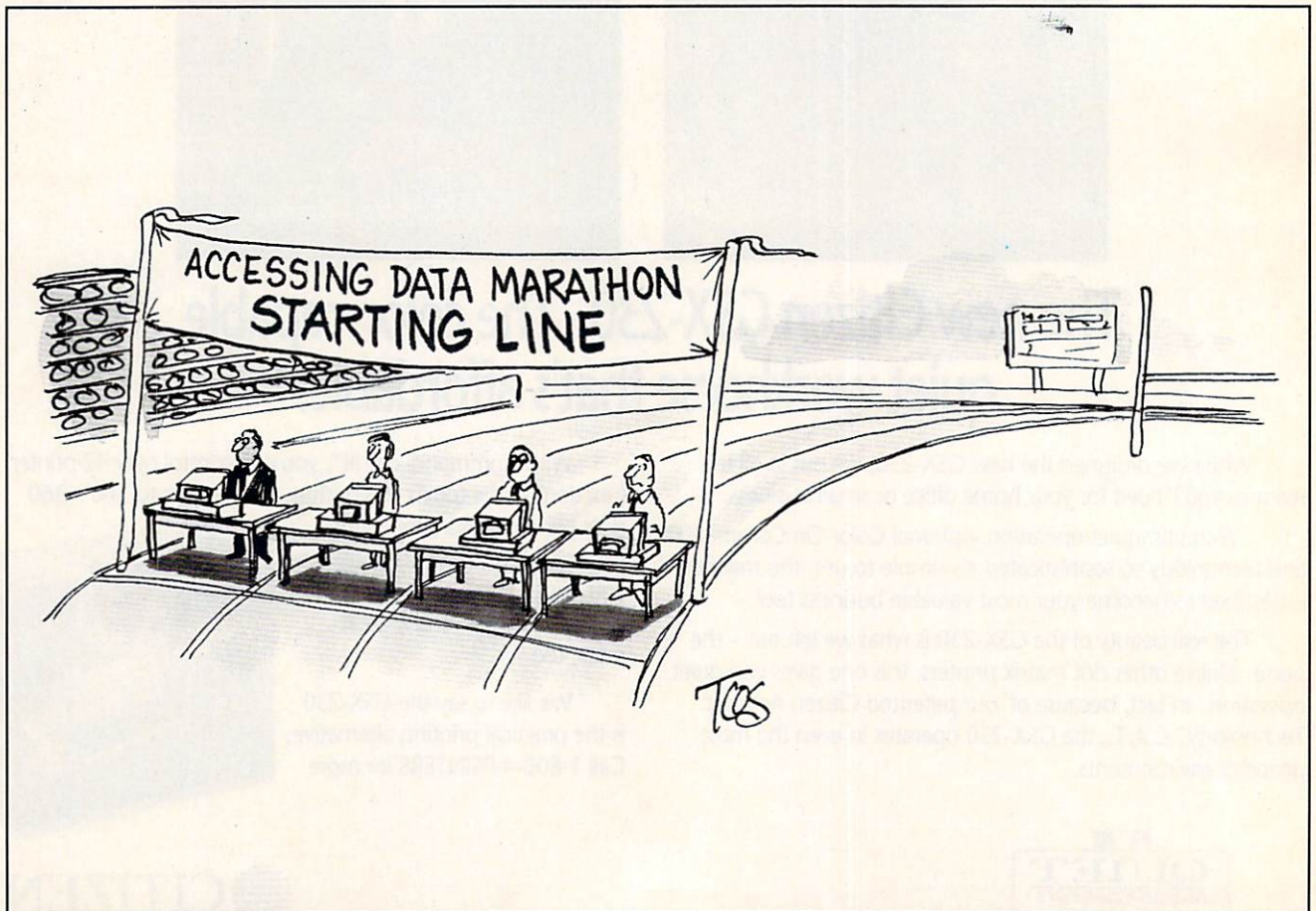
libraries have both grown to be major achievements. Read the first chapters carefully before you create your next DOS app, because there's a good chance a lot of the code you expected to write will already be there, ripe for the picking.

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.

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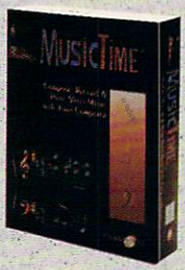
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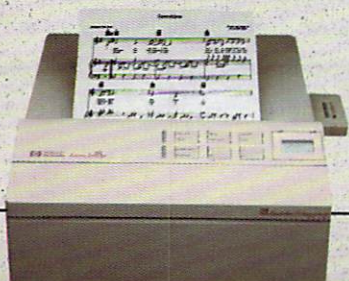


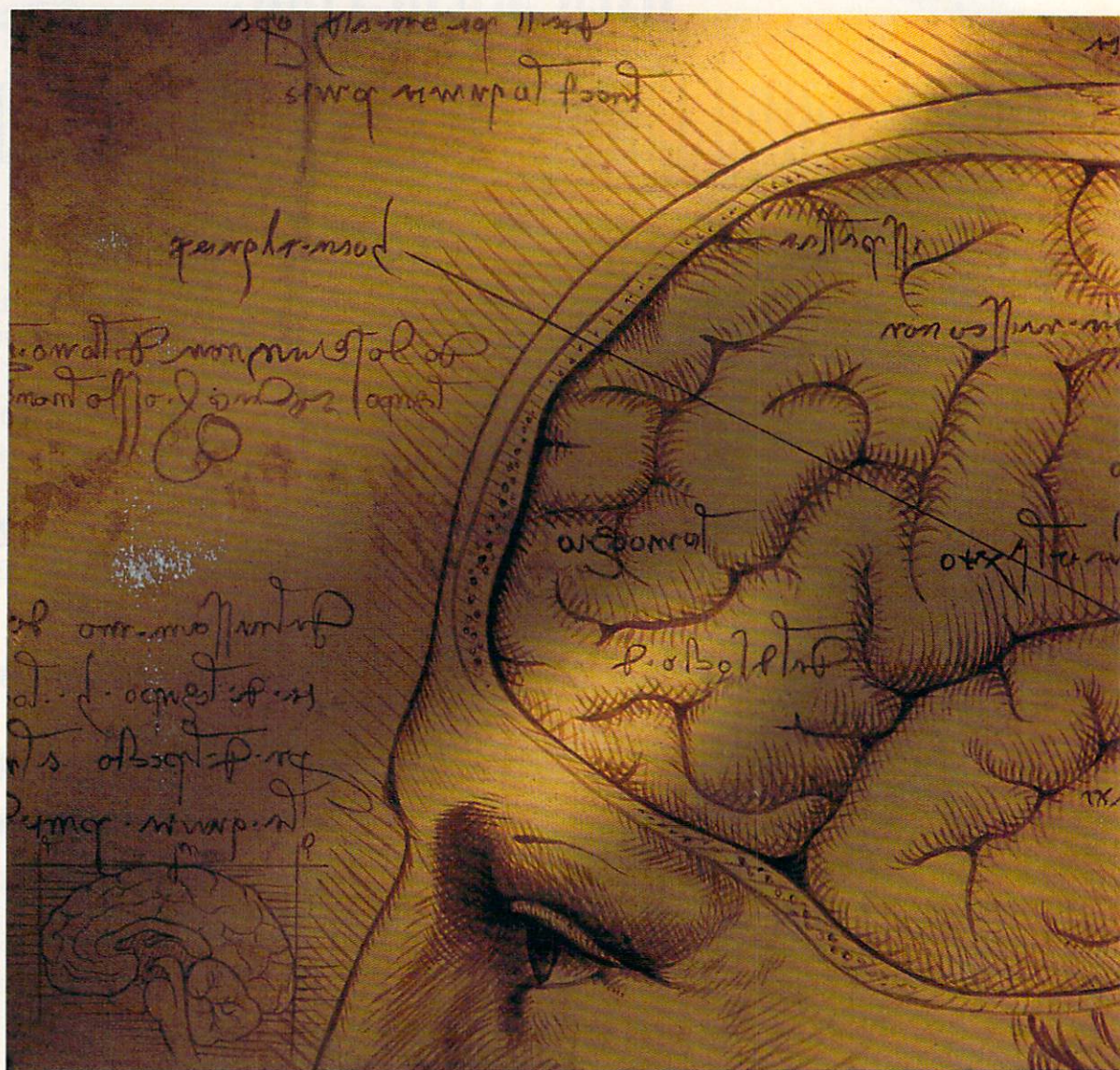
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TEST LAB

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 x 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.

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,

ture 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!

DAVID ENGLISH AND MIKE HUDNALL



The sound capabilities of multimedia are truly impressive.

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 fu-

ACERPAC 150

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 slow-

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er 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 Book-



shelf, 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.

Circle Reader Service Number 304

TEST LAB

ALR FLYER 32DT 4SX/25 MPC MODEL 80

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

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and labor

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 x 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.

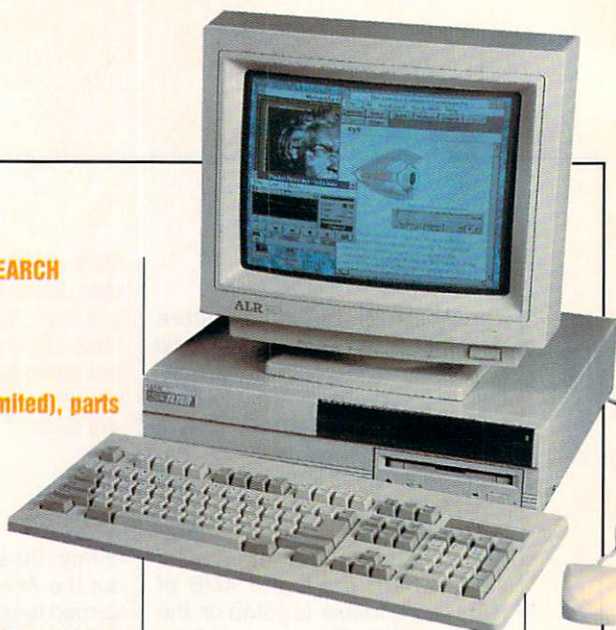
The Pro Mixer application, a mixing console, combines synthesizer, CD, microphone, and auxiliary

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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AST ADVANTAGE! 386SX/25 MULTIMEDIA

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

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List price: \$1,699
Warranty: one year, parts and labor

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

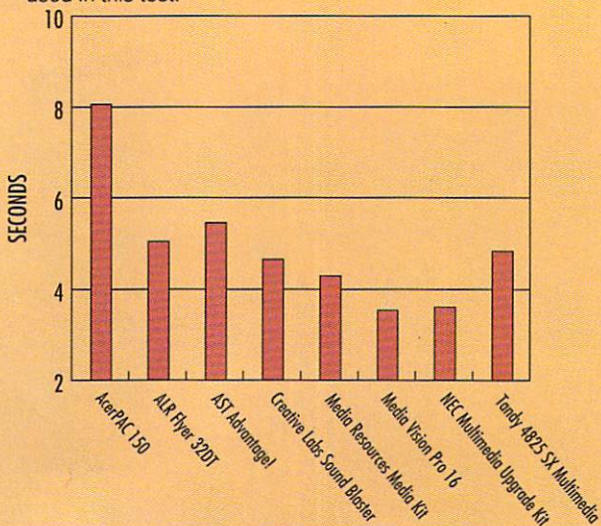
by a Super VGA adapter with 512K of video memory. Because AST integrates this 1024 x 768 resolution video adapter right into the motherboard itself, you have a valuable expansion slot available for other uses. Of the five full-size, 16-bit expansion slots on the motherboard, four are vacant and can accept 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

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)
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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.

Circle Reader Service Number 306

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

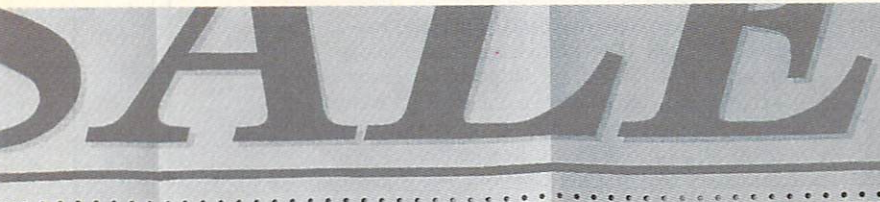


Multimedia Upgrade Kit is the company's flagship product, the Sound Blaster Pro audio card. This three-quarter-length card fits into a 16-bit slot and features stereo output utilizing the Yamaha YMF262 OPL-3 FM synthesizer chip to produce 20 voices of instrument sounds and effects. Jacks, mounted on 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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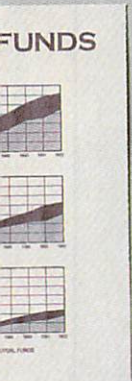
American League
 1982-1992

Keep inventory right off the bat.

1992 May Expenses

Account	Amount	% OF INCOME
Auto Bill	\$1,800.00	22%
Mrs's Auto Company	\$552.83	
Mrs's Accounting	\$200.00	
Total	\$2,552.83	
Expenses	Amount	
Rent	\$775.00	10%
Utilities	\$178.45	3%
Waste/Carriage	\$43.00	
Public Transport	\$10.00	
Auto Insurance	\$100.00	3%
Gas	\$49.74	
Car	\$10.00	
Phone	\$14.38	
Food	\$402.24	5%
Child	\$187.81	3%
Entertainment	\$1,140.00	14%
Gifts	\$96.15	
Med.	\$101.67	3%
New Washer	\$200.00	
Utilities	\$200.00	
Total	\$3,524.41	
Summary	\$411.99	5%
Travel/Transport	\$40.00	
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Total bill for checking	\$1,141.99	

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LOST

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She has a light blue collar with a small bell.

If found please call: 555-2904

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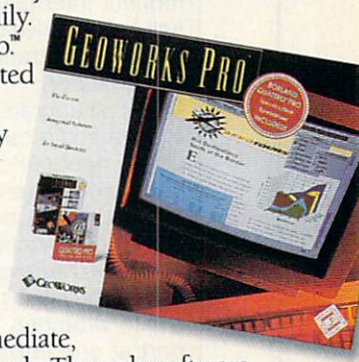
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System Requirements: IBM PC/XT, AT, PS/2 or 100% compatible • 512K memory • Hard disk with a minimum of 7MB free (9MB recommended) • graphics adapter and monitor.
 Printer support: Compatible with over 420 popular printers.
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Circle Reader Service Number 184

TEST LAB

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.

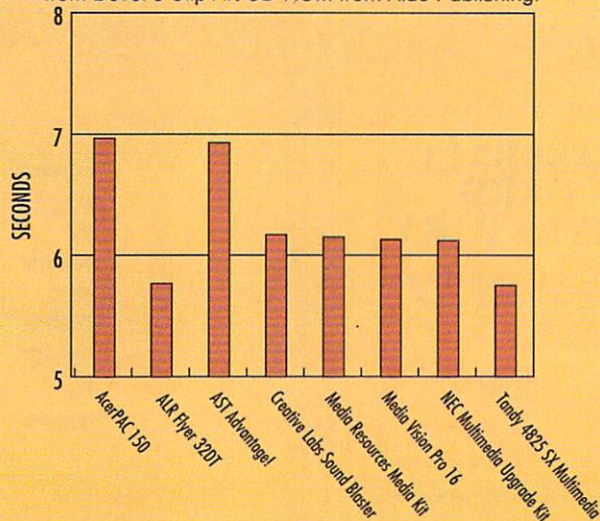
Not all upgrade kits permit using the audio card's MIDI capabilities right out of the box; most require the purchase of an additional MIDI accessory kit to access these functions. Such is not the case, however, with the Creative Labs kit; it includes a cable which attaches to the joystick port at one 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 Temptra, 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 multi-volume 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 produc-

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.



ing 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.

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 refer-

ence 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.

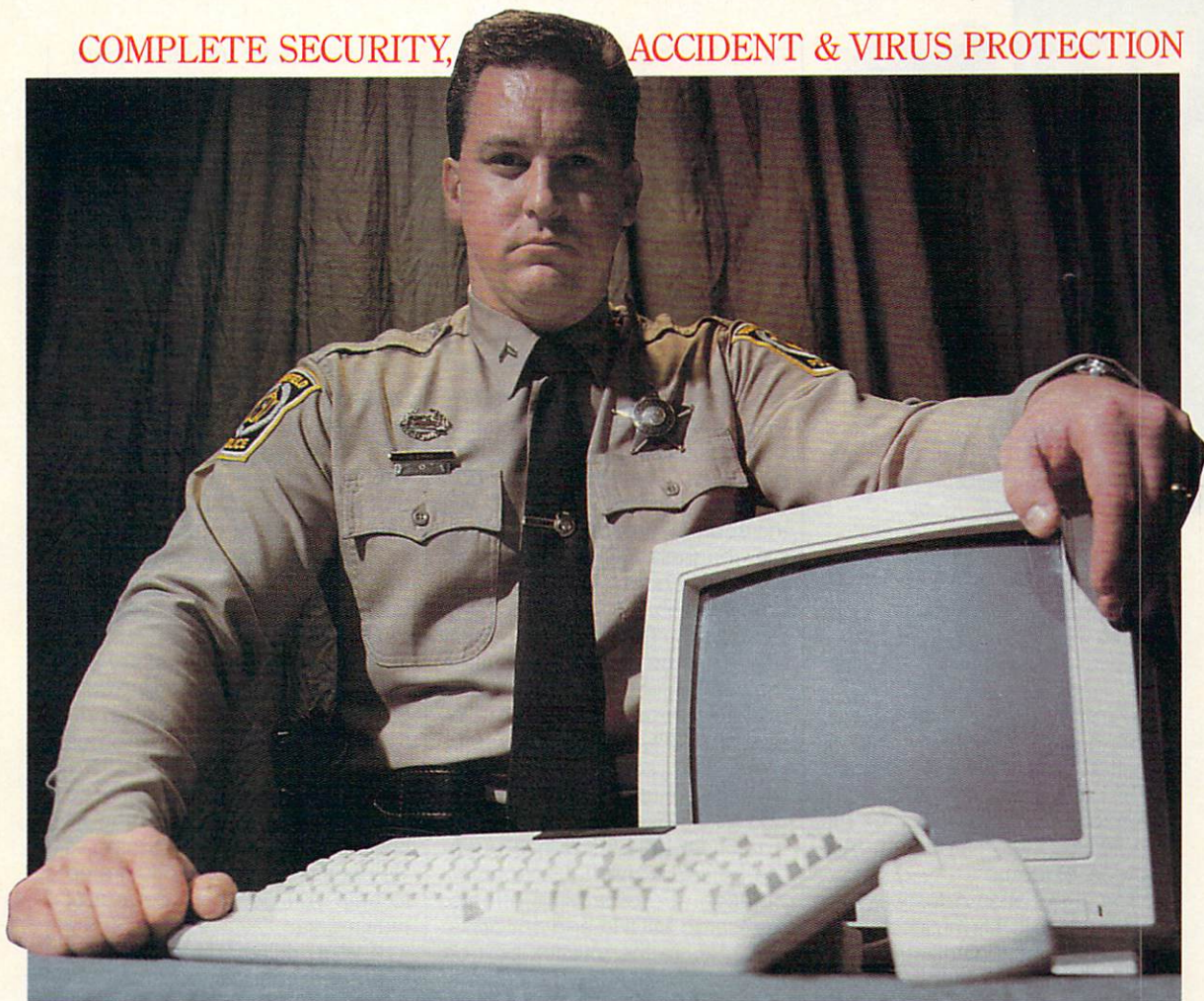
The Sound Blaster Multimedia Upgrade Kit packs lots of value and features into a single box. Just add speakers and a microphone, and you're off to explore the fascinating world of multimedia on your PC!

Circle Reader Service Number 307

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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MEDIA RESOURCES MEDIA KIT (ADVANCED MODEL)

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 blaz-

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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

ingly 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 reverb and chorus 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 Ro-

land Utilities for the MIDI board, both supplied on 3½-inch disks.

The optical media software is provided on two CD-ROMs. The first contains Midssoft'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.

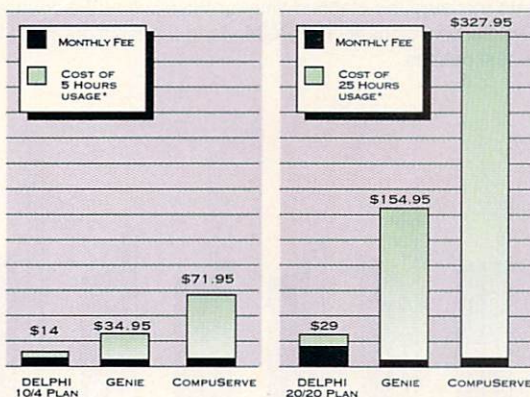
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MEDIA VISION PRO 16 SYSTEM

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.

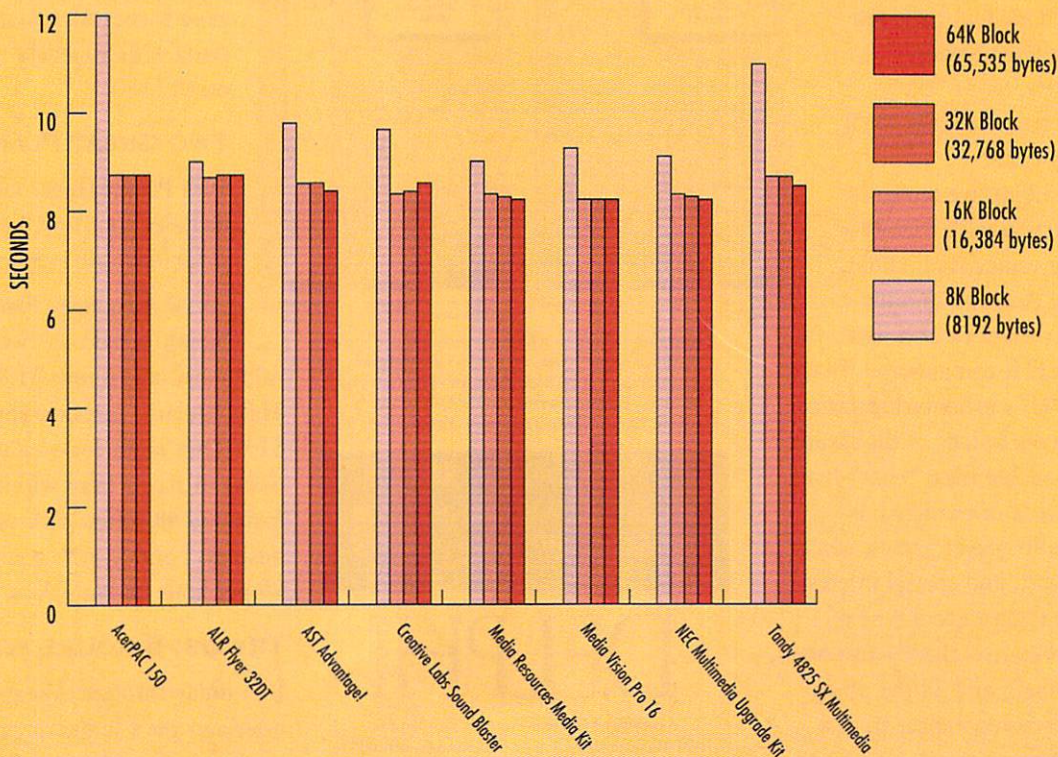
The Media Vision Pro AudioSpec-

trum 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 transfer of a source file (1,257,344 bytes) from Compton's MultiMedia 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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Garry Ray, writing for PC Week, said, “Of these alternative operating environments (OS/2, DesqView and Software Carousel), Carousel may be the best choice of the day.”

Barry Simon of PC Magazine concurred with, “...I find it difficult to imagine using my computer without Carousel.

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October 30, 1990
Software Carousel, Version 4.0



Software Carousel \$89⁹⁵

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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 2.2x (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).



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)

(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

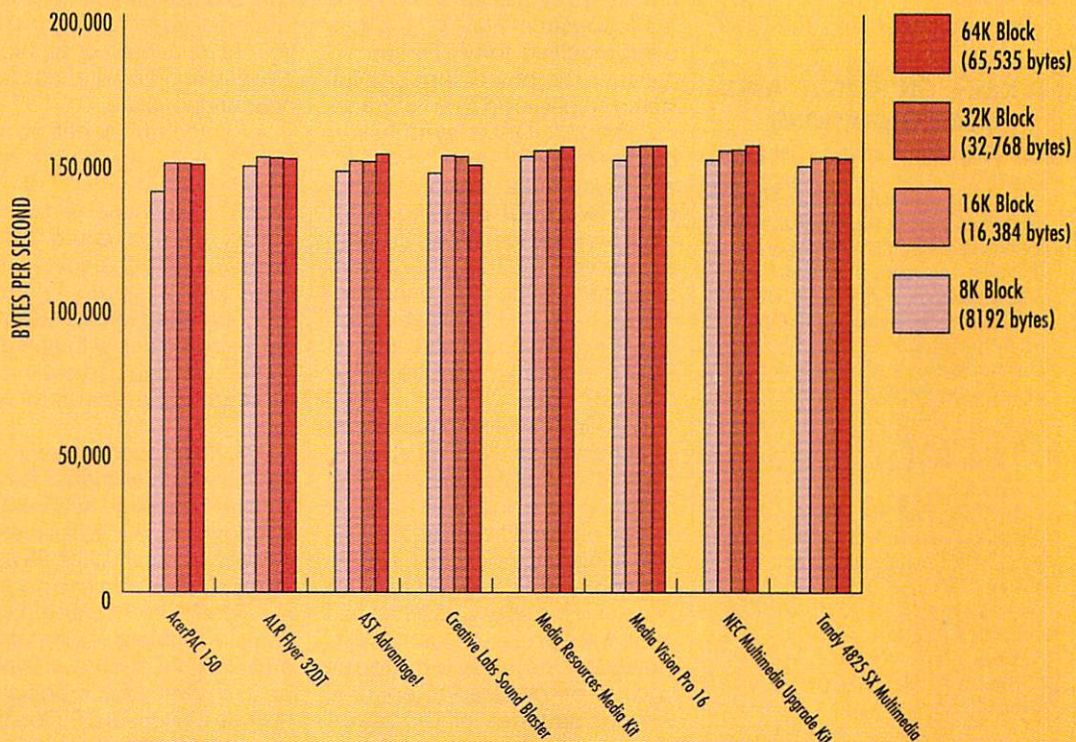
for users of all ages, King's Quest V provides recreational adventure for the whole family, and MacroMind Action! provides all the tools needed to create dazzling multimedia presentations easily. As a bonus, you also get an introductory "sample issue" of Nautilus, a multimedia "magazine" on CD-ROM with 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.

Circle Reader Service Number 309

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.



TEST LAB

NEC MULTIMEDIA UPGRADE KIT

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-

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

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



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 Labtec 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-

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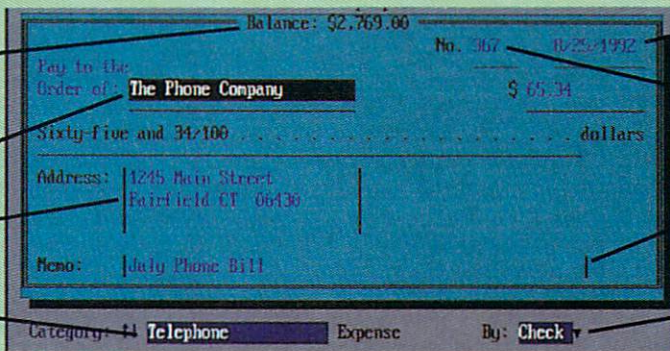
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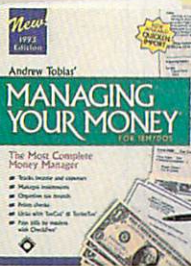


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TEST LAB

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 gener-

ous 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 guaran-

tees 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.

Circle Reader Service Number 310

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 on-board 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 repro-

duced 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

Do you use your PC for any of these tasks ?

Productivity

The workplace is a dynamic, multisensor environment. Decisions are made and actions are taken based on how clearly a person's meanings, actions and ideas are perceived. Using a Multi-media PC, you can enrich your business presentation with sound, music and high-quality images. And interactivity helps you customize your communication to each audience's specific interests. Need to train someone ? A Multimedia PC lets you show - and test trainees about - product demonstrations, diagnostic procedures or any other task. You can also extend it to control laserdisc players, digital video boards or virtually any other type of media device. And in standard productivity applications such as spreadsheets, word processors or electronic mail, multimedia annotations help convey quickly what text alone cannot.

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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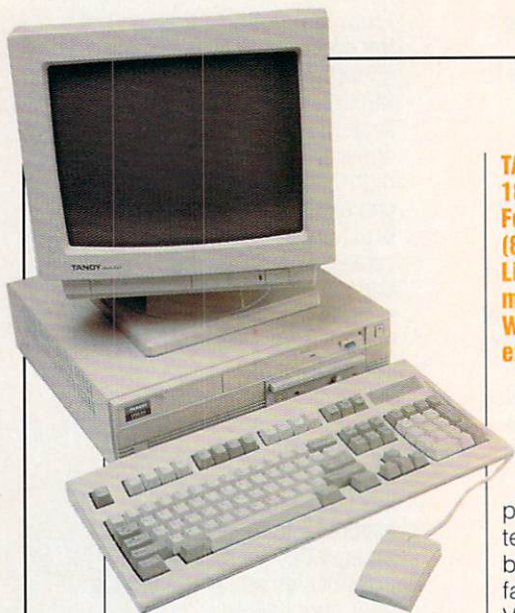
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COMP1292

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Circle Reader Service Number 227

TEST LAB



TANDY 4825 SX MULTIMEDIA

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 hap-

TANDY/RADIO SHACK
1800 One Tandy Ctr.
Fort Worth, TX 76102
(817) 390-3011

List price: \$2,188 without the monitor, \$2,500 with the monitor.
Warranty: one year, parts and labor; extended warranty available

pen 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.

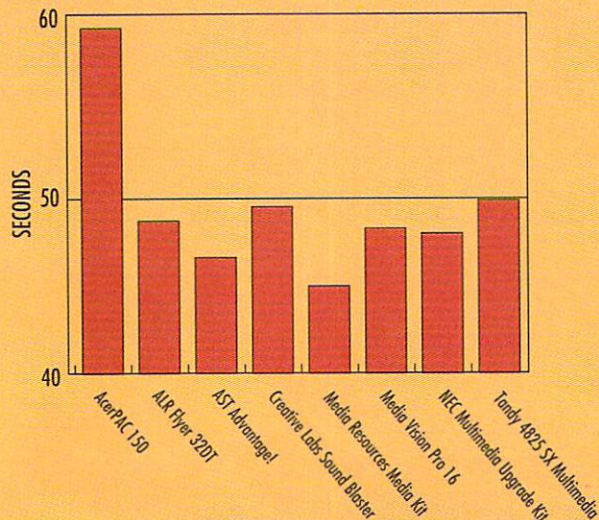
Since the audio board in the 4825 SX occupies one of the three 16-bit expansion slots, only two remain available to accept additional device cards. A single 3½-inch front-accessible drive bay is available for adding a second floppy or hard drive or a compact tape-backup unit.

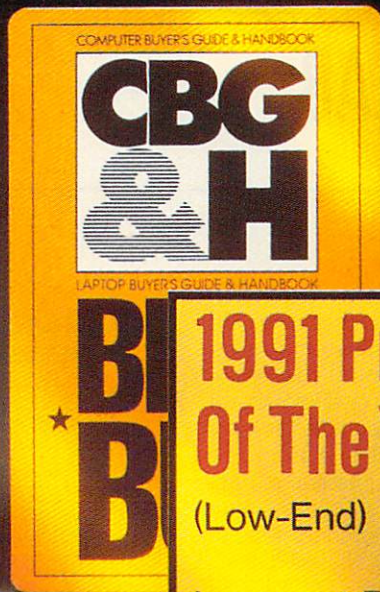
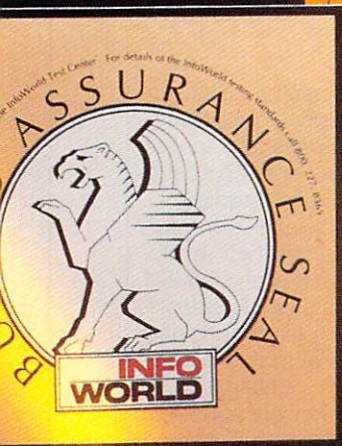
A Tandy VGM-441 14-inch color monitor supplied with the 4825 SX for the review provided crisp, comfortable viewing, even for very prolonged sessions exploring the MPC capabilities of the machine, as well as for extended text and number-crunching sessions.

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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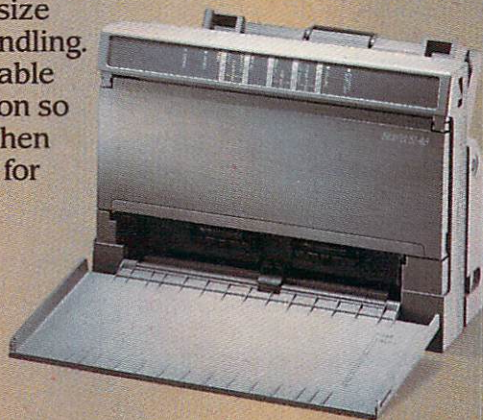
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THE COMPUTER PRINTER



TEST LAB

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 "log-on," subsequent access of the CD-ROM drive was almost instan-

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 Sennstron 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
COMPUTER PRODUCT TESTING SERVICES

taneous. 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

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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		na=information not available						
² with Creative Labs chips								

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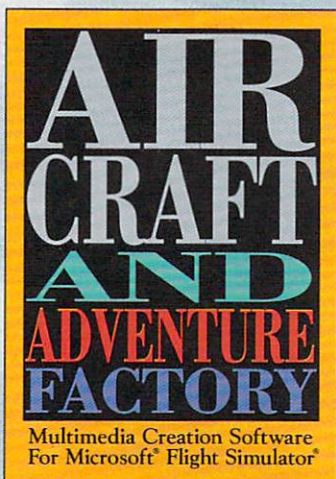
seas. Aircraft & Adventure Factory is from BAO, the creators of Microsoft Flight Simulator.

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Circle Reader Service Number 198

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 us-

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.

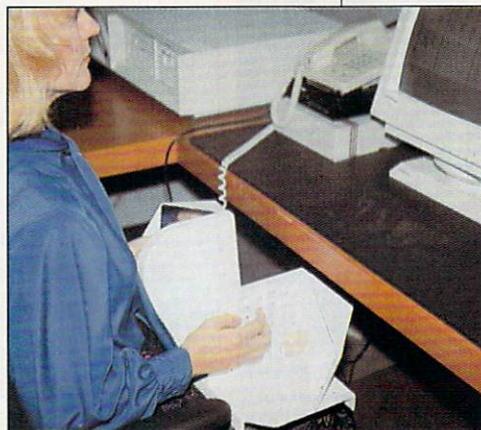
While The Vertical uses a QWERTY configuration, the right and left sides of the keyboard are split and mounted vertically. This design allows the keyboard to adjust to your torso width, which eliminates pronation (downward rotation of the hand and forearm), eliminates arm and shoulder extension, and 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-

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



ing 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.

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

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Flight Adventure No. 701

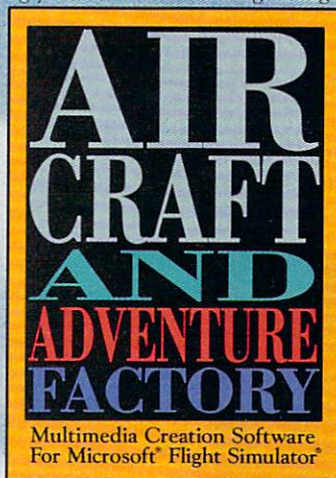
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NEWS & NOTES

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 infor-

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



mation on either system contact ZEOS, 530 Fifth Avenue NW, St. Paul, Minnesota 55112; (800) 423-5891.

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 or-

ganizers 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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basketball, football, hockey, tennis, the Olympics and their heroes at your fingertips.

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fork? Open an Interactive Book and you don't explore on explorer's boots. The stuff in books is here. But it's stored in Knowledge Space that can be millions of years wide, and thousands of miles deep. With your mouse (or cursor buttons) you get to chart your own

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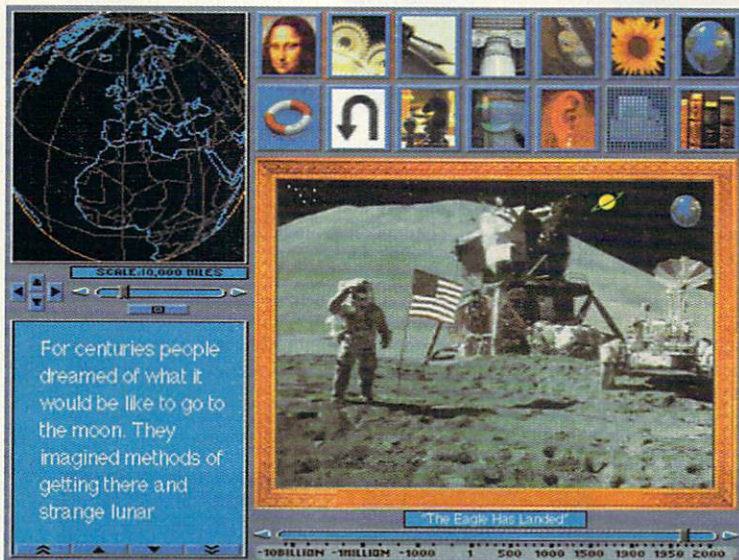
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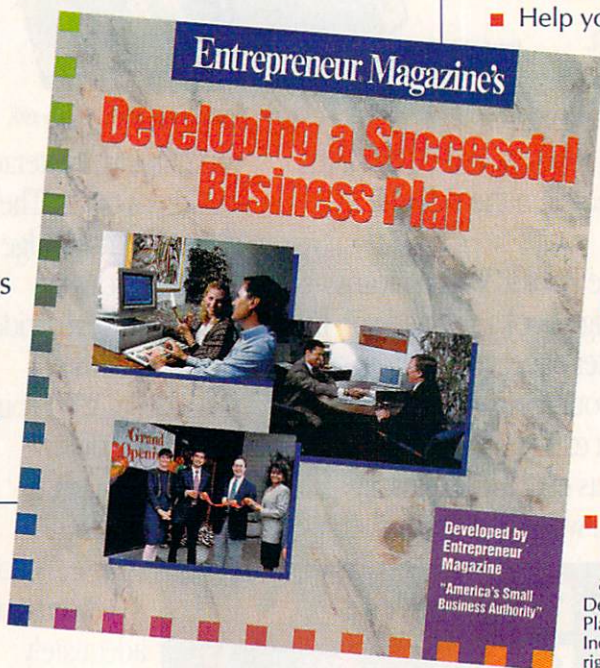
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FEEDBACK

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 "IntrodOS" 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 vari-

ous 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

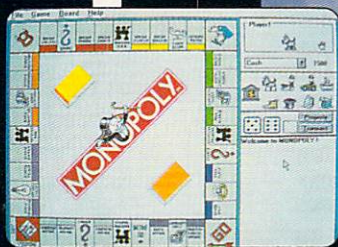
*It's not nearly as complicated as it might seem, and yet a review of the manuals for three kinds of BASIC and a dozen books turned up nothing helpful. The key is to create a long integer (a variable name followed by an ampersand is the mark of a long integer). The reason you need such a big variable 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
```

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

Trade Up!

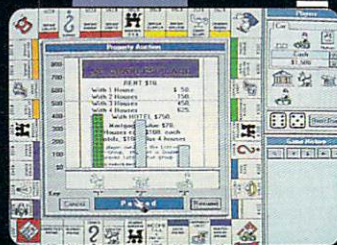
The Game You Grew Up With Has Grown Up Too!



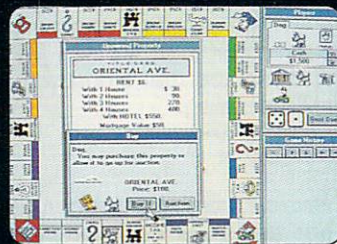
WINDOWS™ version



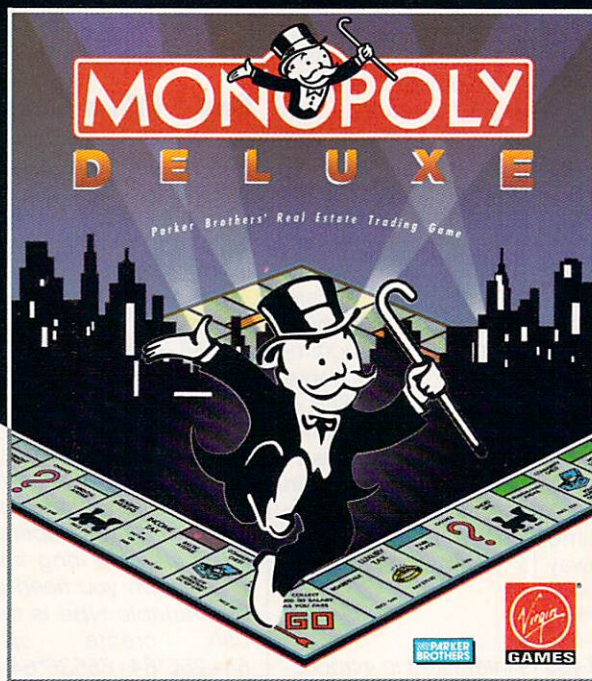
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IBM PC version



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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)

mi = mi + 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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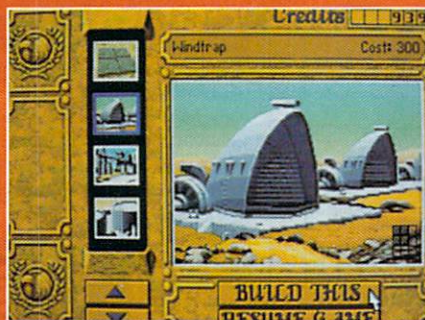
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FEEDBACK

```
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 Fast-Micro. 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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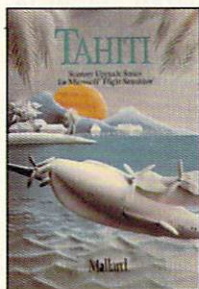
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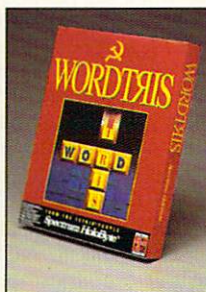
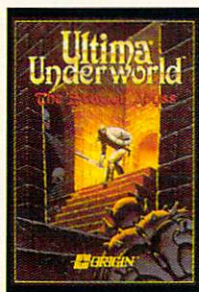
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Calls must be received by 1/29/93. The cost for the call is \$1.50 for the first minute, \$1.00 for each additional minute. Average call

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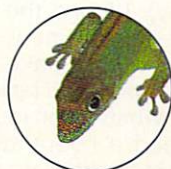
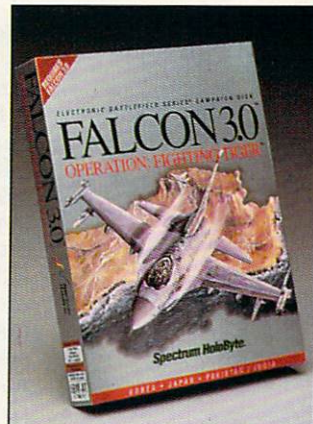
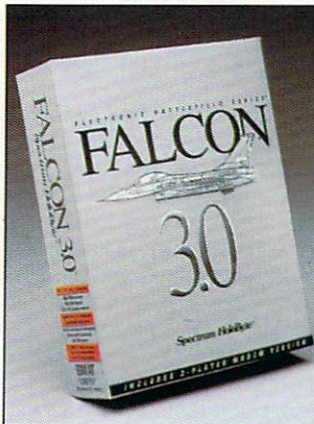


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Good luck!



WINDOWS WORKSHOP

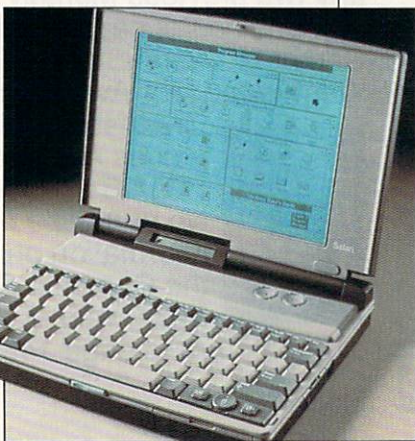
Clifton Karnes

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 a 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 prede-

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



cessor, but the 3170 is smaller, faster, lighter, and more powerful.

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 x 11 x 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 x 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 PC-MCIA 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.

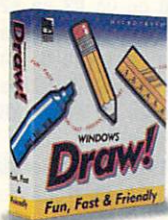
The 3170 comes with some useful bundled software, including DOS 5.0, Windows 3.1, Bit-Fax 2.0/SR, AT&T Mail Access PLUS, a 3170 Tour Guide, Microsoft Productivity Pack, some utilities, and the Windows User's Guide on disk in Write files. This last item is especially useful. You never carry manuals on 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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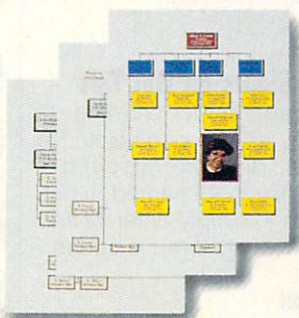


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TIPS & TOOLS

Edited by Richard C. Leinecker

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.

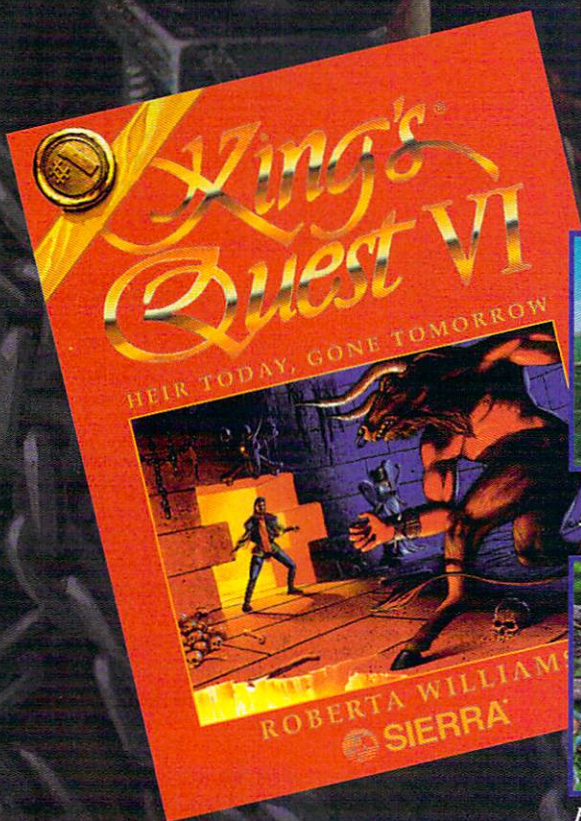
DENNIS SULLIVAN
DAYTON, OH

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 undocumented

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

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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

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 backup.itup.bat. To use it, type *backup 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 \$P\$G 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*.

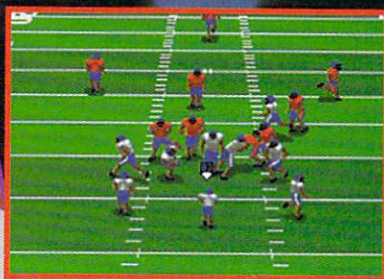
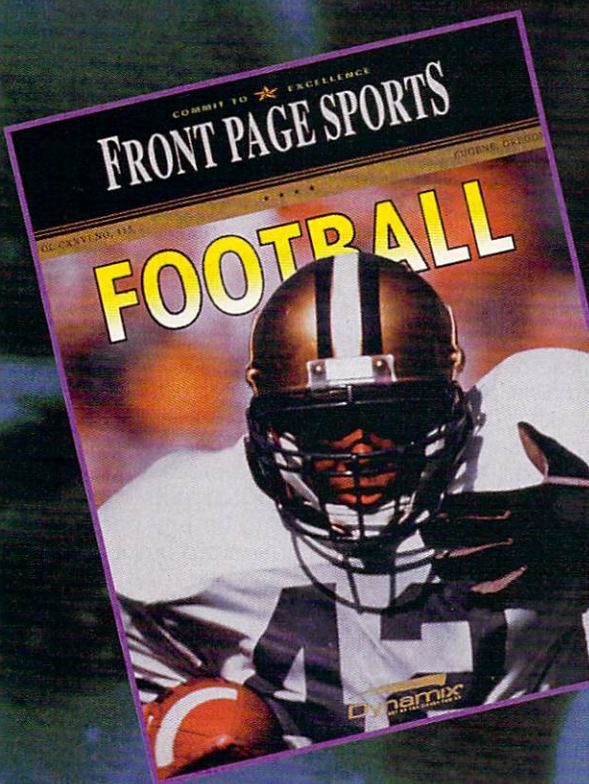
```
prompt $e[0;60;"dir";
13p$e[0;59;"type c:\auto-
exec.bat";13p$P$G
```

KEVIN LO
PALM BAY, FL

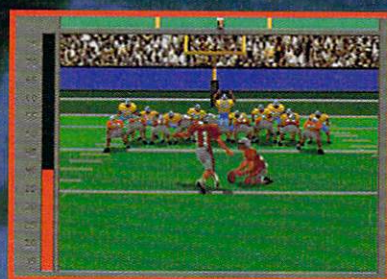
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Easy access to DOS from dBASE, directory of directories from a batch file, simplifying daily backups, and performing DOS commands from within WordPerfect

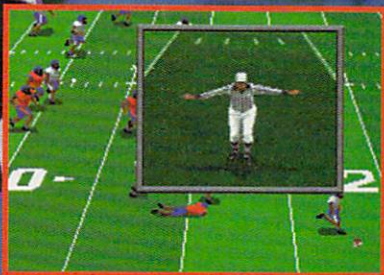
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BALTIMORE	9-5-0	ATLANTA	10-6-0
INDIANAPOLIS	8-6-0	MINNESOTA	9-7-0
MIAMI	7-7-0	NEW ENGLAND	8-8-0
NEW ENGLAND	6-8-0	NEW YORK	7-9-0
NEW YORK	5-9-0	PITTSBURGH	6-10-0
PITTSBURGH	4-10-0	WASH. STATE	5-11-0
WASH. STATE	3-11-0	WASH. STATE	4-12-0
WASH. STATE	2-12-0	WASH. STATE	3-13-0
WASH. STATE	1-13-0	WASH. STATE	2-14-0

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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.

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.

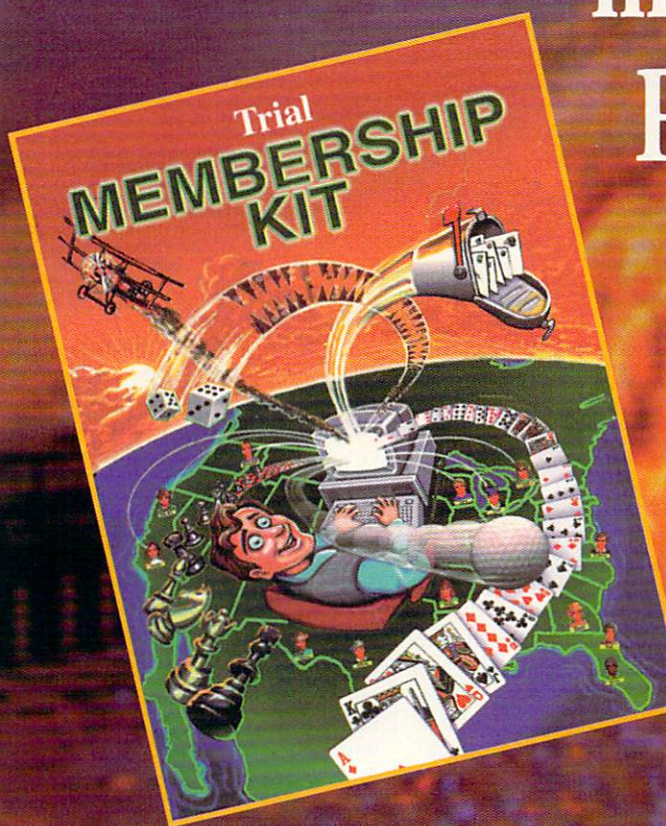
With all its file management and program management features, MS-DOS Shell is a little like a combination of Program Manager and File Manager in Microsoft Windows. In fact, MS-DOS Shell's menus, file selection conventions, and operating procedures are similar to those of Windows.

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. □

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

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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.

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 spanning 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.

GetCurrentDir\$ Returns the current working directory.

GetCurrentDrive\$ 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.

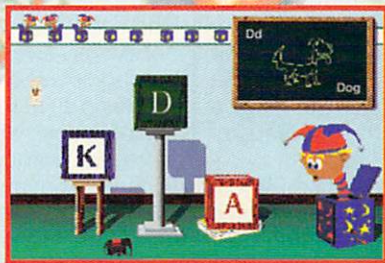
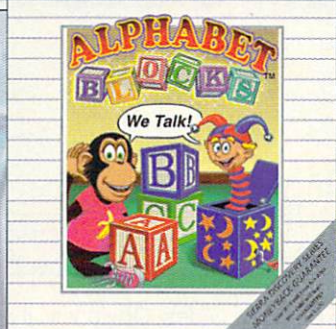
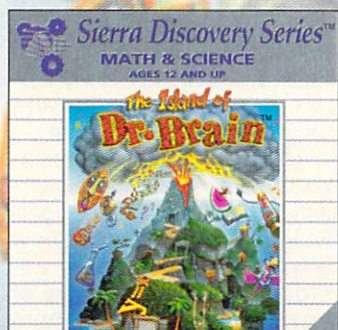
NumHardDisks% Returns the number of hard disks installed on the system.

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. □

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

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HARDWARE CLINIC

Mark Minasi

MORE ON BATTERIES

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

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-

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 pro-

Two new battery technologies have some real disadvantages.

Figure 1: Typical Battery

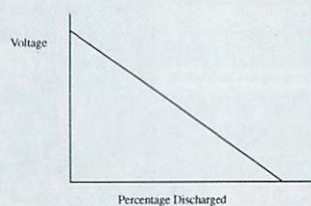


Figure 2: Rechargeable Battery

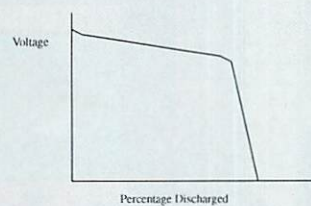
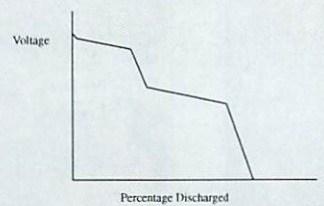


Figure 3: Damaged NiMH Battery



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

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.

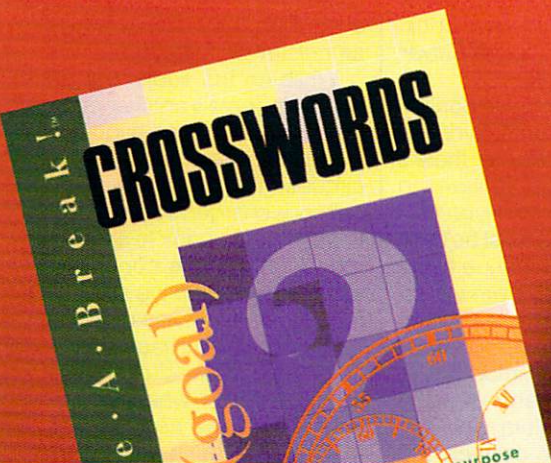
Obviously, if my battery could hold 6000 milliamp hours in one ounce, my laptop would be a lot lighter. That's where nickel metal hydride comes in . . . or so they say.

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.

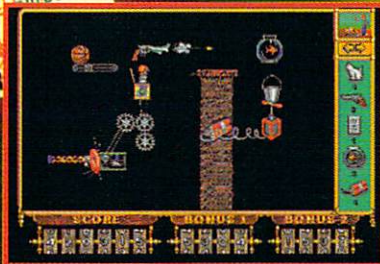
First, most makers of nicads underreport the capacities of their batteries by 20 percent or so. Nickel metal hydride, on the other hand, doesn't get underreported. (I don't know why. Perhaps because it's a new technology and needs some hyping?) As a result, nicads don't look as good as they would if 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.

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When a nickel-metal-hydrate 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.

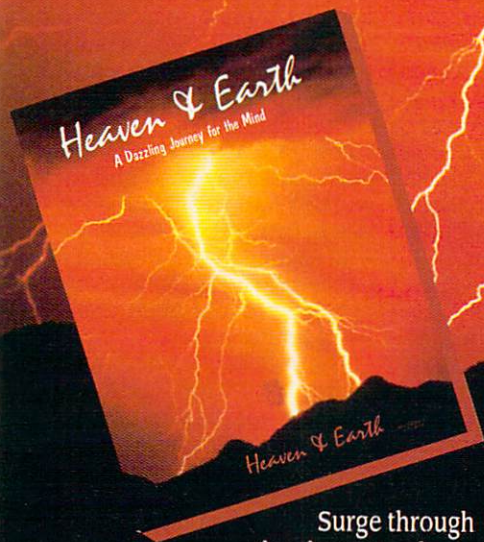
The third problem is outgassing. In plain English, that means the emission of gases by the battery when it's charging or discharging. If charged when hot, nickel metal hydrides outgas hydrogen gas—you know, the stuff that blew up the Hindenburg? I mean, I like a hot notebook as well as the next guy, 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.

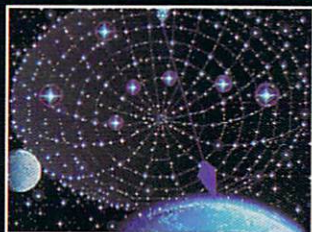
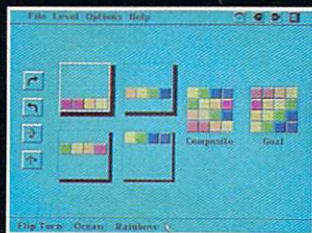
But what about making the laptops use less power? That's next month. □

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Circle Reader Service Number 110

COMPUTE/NET

Troy Tucker

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 x 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 equip-

ment 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.

COMPUTE/NET PowerVision is so different that you have to see it to believe it. Circle the reader service number 102 for more information or write us at COMPUTE/NET PowerVision, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408 for complete information and sign-up kit. I'll be seeing you online. □

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

Announcing
the All-New

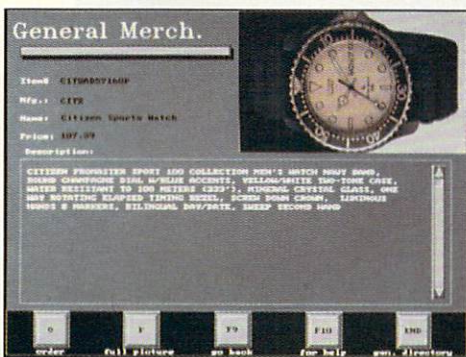
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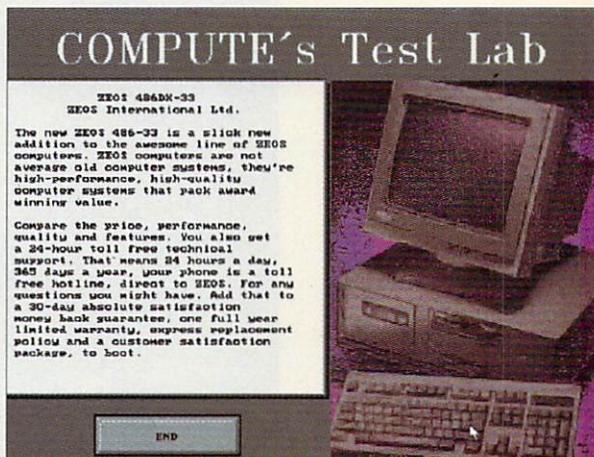
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PLUS, every new COMPUTE/NET membership includes a subscription to one of General Media's magazines, which include COMPUTE, *Omni*, *Longevity*, and *Four Wheeler*. Then, PowerVision™ kicks in \$20 per month in free grocery coupons and up to 900 FREE E-mail messages a month in the basic services area, FREE letters to Congress, 2 FREE hours a month in basic services, FREE access to the basic shareware library, and much more.



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CIRCLE THE READER SERVICE NUMBER BELOW FOR MORE INFORMATION ABOUT THE NEW COMPUTE/NET AND THIS EXCLUSIVE U.S. ROBOTICS MODEM OFFER, or write us at COMPUTE/NET, 324 W. Wendover Ave., Ste. 200, Greensboro, NC 27408, for complete information and our sign-up kit.



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.

Great Gift Ideas

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

compact 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 x 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 x 31 inches. \$7. See 2 for order information.

10. Antiglare filter: A 14-inch filter that

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gift suggestions
for the com-
puter enthusiast
who has
everything**

**By Tracy Mygrant
and
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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.

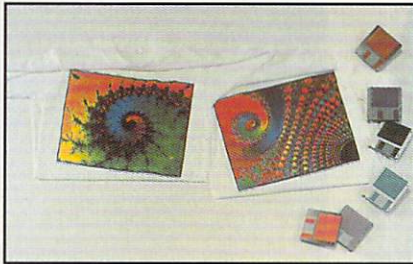
21. Discoasters: Coasters willing to entertain any glass you bring home. Look just like 3½-inch disks, except they're a lot more colorful. \$15 for a set of six. See 2 for order information.

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



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

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.

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, tweezers, 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 informa-

tion. But check around—you can get them almost anywhere computer supplies are sold.

31. Wave of the Future poster: A 23 x 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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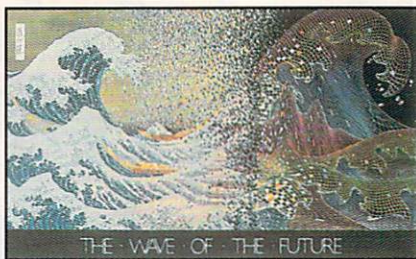
(508) 897-5560 (voice) or (508) 897-7332 (fax).

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

Rivald 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 capabilities 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!

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.

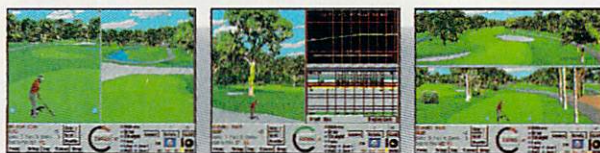
Over 345 combinations of Viewing Windows.

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!

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.



*Actual Links 386 Pro Super VGA Screens

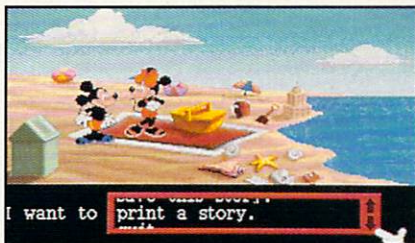
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695-4005. To sign on, dial (800) 695-4002 with your modem.

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

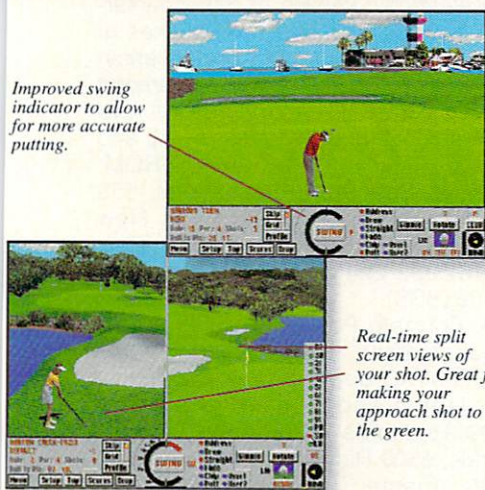
habitats: plains, tall grass, rain forest, and riverfront. Illustrates how animals interact with the environment. Uses text, sound, and animation. List prices are \$79 for multimedia CD version and \$59 for floppy disk version. Orange Cherry New Media, P.O. Box 390, Pound Ridge, New York 10576; (800)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



Improved swing indicator to allow for more accurate putting.

Real-time split screen views of your shot. Great for making your approach shot to the green.

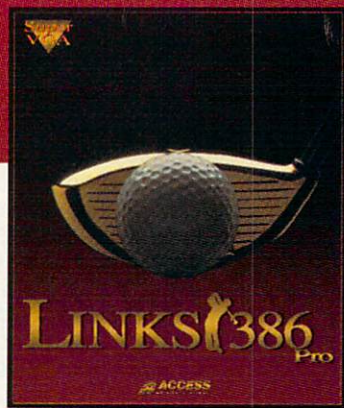
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"...if you're serious about golf simulations, treat yourself to LINKS 386 Pro. And if you don't own a 386 to run it on, you've finally got a real good reason to lay out the money for an upgrade."

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- 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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FOR NEW EXCITEMENT, T MICRO

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

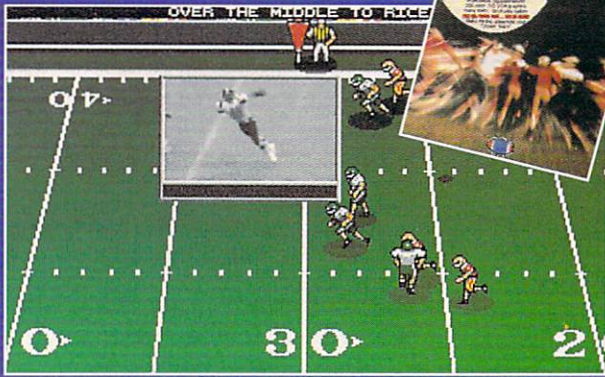
for the fastest, most scenic, or most convenient route with hundreds of up-to-date color maps. List price, \$99.95. See 58 for order information.

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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(800) 333-1395 or (312) 329-0700.

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,

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, auto-dialing, 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

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, 3 $\frac{1}{2}$ - or 5 $\frac{1}{4}$ -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

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.

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. Lighthouse 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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This year, over \$1.5 billion worth of digital electronic music instruments, from keyboards to drum machines, will be sold in the U.S. alone. Enthusiasts everywhere—professional musicians and recording technicians, even people who have never touched a musical instrument before—are discovering the excitement of today's electronic music technology.

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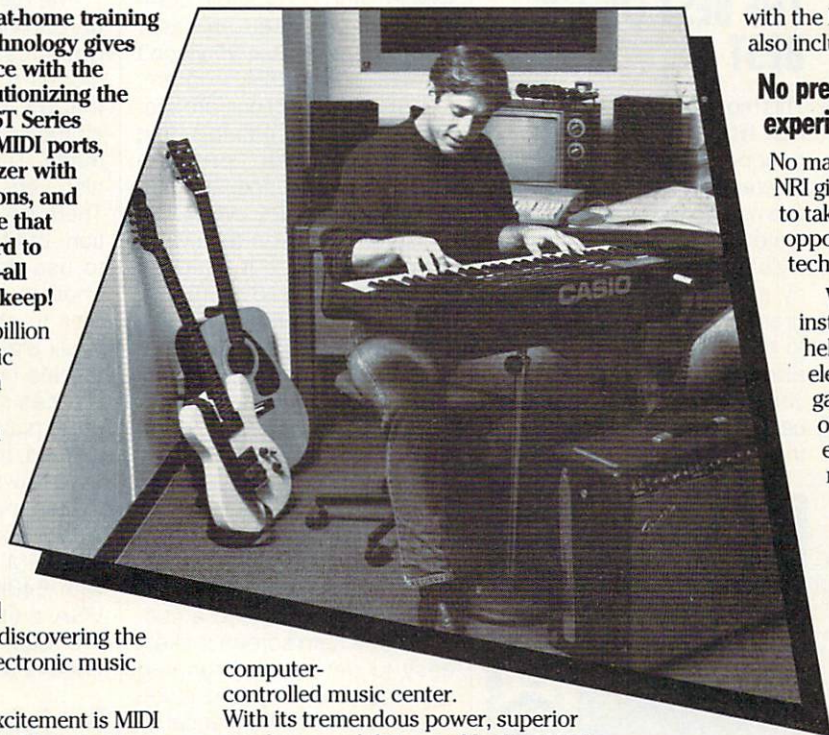
Now NRI's breakthrough Electronic Music Technology course puts you at the forefront of this booming new technology with exclusive training built around a MIDI-equipped computer, MIDI synthesizer, and MIDI software you keep.

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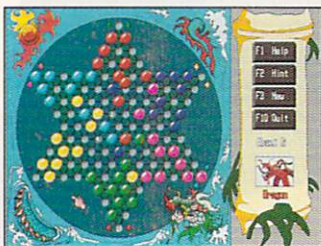
SHAREPAK

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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NOV 91: Popcorn, an arcade game with excellent graphics; Amortz, figure loan payments; CopyTree, easily backup large directories; Cunning Football, a great football simulation; Directory Enhancer, makes your directories much easier to read. (#CDSK1191)

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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 lan-

guage. 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 intuitively

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

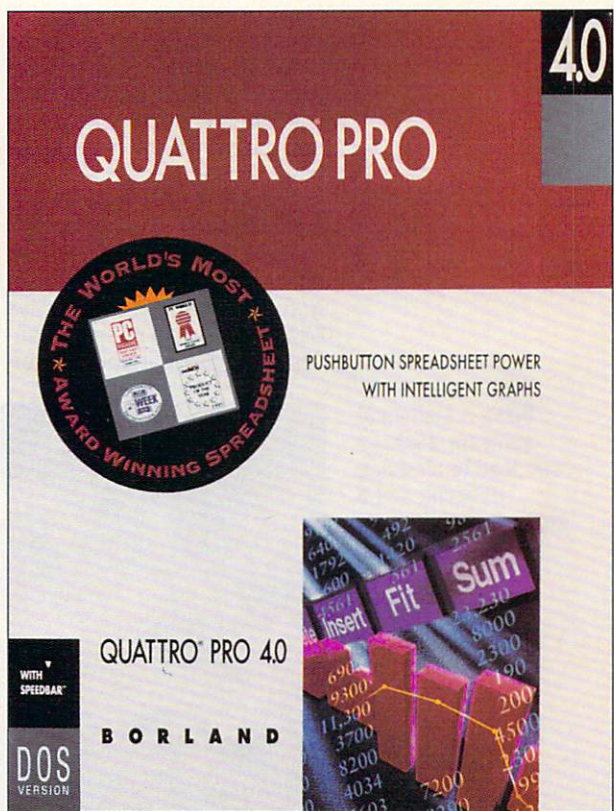
your own—another task that's easily accomplished.

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.



The advertisement features a dark red background with the product name 'QUATTRO PRO' in large white letters. A '4.0' badge is in the top right. A circular award seal on the left reads 'THE WORLD'S MOST AWARD WINNING SPREADSHEET' and contains icons for PC, WEEK, and other categories. Text on the right says 'PUSHBUTTON SPREADSHEET POWER WITH INTELLIGENT GRAPHS'. A central image shows a 3D bar chart with a line graph overlaid, with various data points and labels like 'Sum', 'Fit', and 'Insert'. At the bottom left, it says 'WITH SPEEDBAR' and 'DOS VERSION'. The product name 'QUATTRO PRO 4.0' and the 'BORLAND' logo are prominently displayed.

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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PERSONAL PRODUCTIVITY

David Abels

STATISTICALLY SIGNIFICANT

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 Univer-

sity in Fort Lauderdale, Florida. Johnson, who consults with small businesses, encourages proprietors to analyze business data more creatively. 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

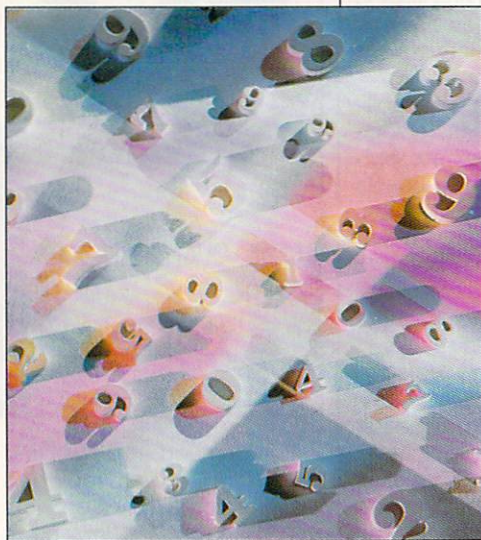
diagram based on customer ZIP codes showing your market penetration in various geographical areas. By pulling this information from your accounting database and importing it into a statistical package, you can determine whether, for example, advertising in more local periodicals would serve your needs 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. □

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



sity in Fort Lauderdale, Florida. Johnson, who consults with small businesses, encourages proprietors to analyze business data more creatively.

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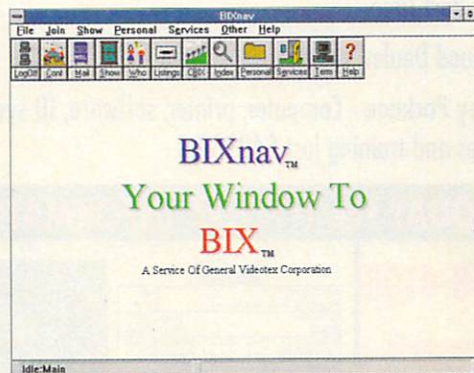
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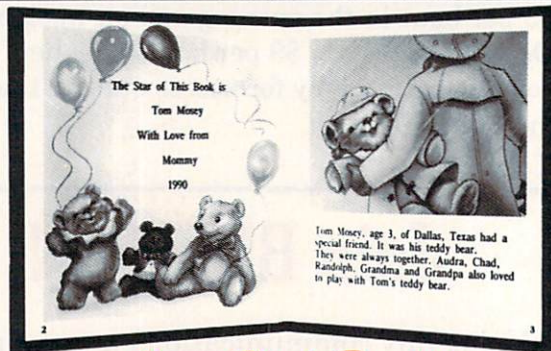
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You can play the game two ways: Either place your trade through the online service to which you already subscribe—PRODIGY, CompuServe, GEnie, America Online, and Dow Jones News/Retrieval all offer online brokerage capabilities—or invest in an off-the-shelf 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."

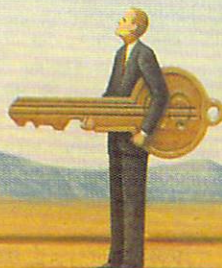
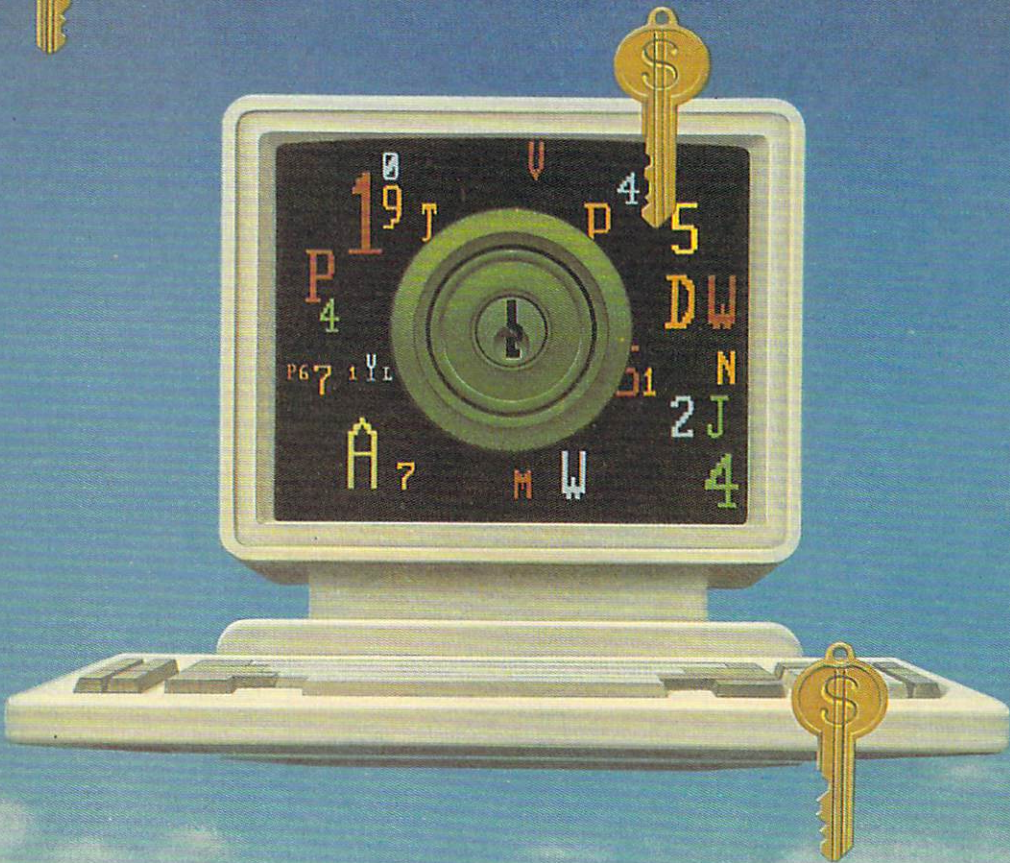
A good deal? You bet. But there's a catch. Though the online services often charge lower rates than telephone brokers, most of them tack on some sort of access fee—either to dial up the brokerage service, to log on to the online system

SERIAL PORTFOLIO

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By Rosalind Resnick

**Painting By
David Wilcox**



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 92 COMPUTE DECEMBER 1992

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

Products and Services

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8619 Westwood Center Dr.
Vienna, VA 22182
(703) 448-8700

CompuServe Information Services
5000 Arlington Centre Blvd.
P.O. Box 20212
Columbus, OH 43220
(800) 848-8199

Dow Jones News/Retrieval
P.O. Box 300
Princeton, NJ 08543-0300
(800) 522-3567, ext. 130

Fidelity On-line Xpress—\$89.95
MECA Software
55 Walls Dr.
P.O. Box 912
Fairfield, CT 06430
(203) 256-5000
Requires IBM PC or compatible
(8088 or faster), 640K RAM, hard drive, and Hayes-compatible modem (2400-bps recommended)

GENie
P.O. Box 6403
Rockville, MD 20850-1785
(800) 638-9636

PRODIGY
445 Hamilton Ave.
White Plains, NY 10601
(800) 776-3449

Smart Investor by Money Magazine—\$99.99
Reality Technologies
3624 Market St.
Philadelphia, PA 19104
(800) 346-2024
(215) 387-6055
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offers the convenience of over 110 branch offices nationwide, trading via modem lets you save time and money by accessing realtime quotes from the trading floor, checking trade confirmations online, and, best of all, reaping an additional 10-percent discount off Schwab's already low rates. America Online offers online trading through Quick & Reilly, a discount brokerage service also available on CompuServe.

- 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 real-time 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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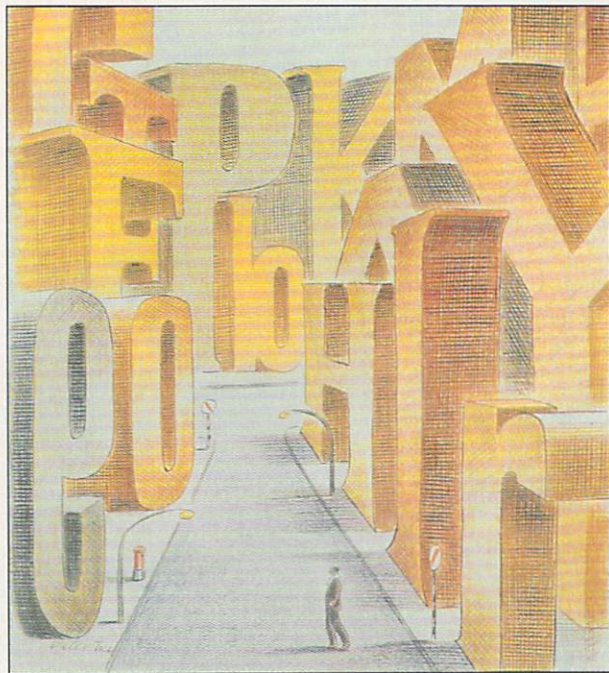
Robert Bixby

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,

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



your fonts are pure enjoyment.

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 it-

self "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.

The program offers several methods of navigation. In addition to the geographical and time-line approaches, there's a lovely image of an old-fashioned card catalog for those who prefer an alphabetical approach. Click on a letter, and you receive a breakdown of all the categories of information available under that letter.

This is very much a chronological program—and that's very much an Asimovian touch. We arrive at a survey of present knowledge only after thoroughly establishing and examining its background. Thus, an Asimov book ostensibly about quasars might begin thousands of years ago when humans first began looking at the sky.

The dilemma, if you can call it that, of the interactive approach to Asimov's material is that there's no single beginning place. While the material is linked and cross-referenced, those links could be made more overt. I'd like to see another window added to the screen, one that shows clearly the links, into past and future, of each advancement. In his books and essays, Asimov controlled both form and function: You read from beginning to end. Reading from software is more like reading by way of an index, making it easy to miss important points and congruences.

Asimov's text sections are superb. His prose is as clear and straightforward as ever. The miniessays in Science Adventure pack a great deal of information into the fewest possible words, always with an emphasis on clarity and insight. You could take any of the text sections as a model of how science writing

should be done.

Technically, Science Adventure is well produced and impressive. It occupies seven or so megabytes of hard disk space, yet it installs on a 386 in under ten minutes. I wouldn't want to run Science Adventure on anything less than a fast 386 system with VGA graphics, and even on such systems the program occasionally slows down.

Much of the storage space is used for an enormous and impressive database of illustrations and pictures. These are judiciously chosen, combining historical illustration, technical illustration, and superb scientific photography. Here, VGA pays off handsomely.

Sound support is well managed, accommodating all of the major boards. For the most part, the sounds, music, and spoken words enhance the program, although you have to wonder how Asimov would feel about the opening music. The overture for Science Adventure is, ironically, "Also Sprach Zarathustra," that anthem so closely associated with *2001: A Space Odyssey*, the masterwork of Asimov's beloved friend and friendly rival, Arthur C. Clarke.

The program can be operated from the keyboard, but I'd say that a mouse is essential. Keyboard control is slow and difficult, but navigating with a mouse is easy.

The program's documentation offers instructions for launching Science Adventure from Windows, but I found that an uneasy fit at best. Science Adventure is best run as a stand-alone program from the DOS prompt.

It's also best run as an adjunct to more traditional meth-



ods of learning about science. Asimov once wrote a marvelous little story, called "The Fun They Had," about the future of electronic education and the abandonment of older tools. You might look that story up as you play with Science Adventure.

While no home with a computer should be without Isaac Asimov's Science Adventure, no home should be without Asimov's *New Guide to Science*, *Asimov's Biographical History of Science and Technology*, *The Human Brain*, *The Human Body*, *Understanding Physics*, and as many more of the master's books as your shelves can support. Use the computer program as a springboard to launch you into the unequalled pleasures of reading Isaac Asimov. □

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Steven Anzovin

DIGITAL DEMOCRACY

"Don't forget. Voting is on after 'Simpsons: The Next Generation,'" remarked my wife as I recycled the dishes.

"Who's running tonight?" my daughter asked.

"Oh, it's for the presidency again, dear," said my wife. "You know that the first Tuesday of every month is president's night."

"Did they teach you in school yet about the 29th Amendment?" I asked, hoping to squeeze in a little American history lesson in the kitchen while the kids recharged the dog's batteries. "You know, the Declaration of Digital Independence, the Voters' Rebellion, and all that? When the American Patriotic Conglomerate—the Perot Data Party, Newvideo, Turner/Whittle, McDoulpia-Busch, and LottoNet—got together to create the world's first instant electronic voting network?"

My son chuckled. "Dad, please. They don't teach AmHist in school anymore."

After dinner we all trooped into the vidroom. We don't have much of a setup, just the standard 5- x 10-foot high-definition screen with a dozen ISDN feeds and an AppleCray controller. Bart's grandchild-

ren were up to their usual antics on center screen, but no one paid much attention. My daughter got on the right-hand screen with a few of her friends to play the latest Newvideo game, the one where Super Zeppo decides whether to run for the presidency while hungry PACs try to gobble him up. Along the way the kids answer questions about the weekly family expenditures; if your mom or dad has bought Newvideo products, you earn extra games. My son took the left-hand screen to browse through tonight's preteen voting roster. He seemed to be especially interested in the details of the National Skateboard and Sneaker Rights Act. My wife, meanwhile, was playing the Instant Law Lotto numbers according to a system she'd worked out involving our PIN numbers. Since the Cray could generate a billion or so PIN variations every second, she felt we stood a reasonable chance of winning at least a small prize. The winners don't get cash, like in the old days; they get votes instead. I could see that the jackpot was up to nearly 200 million votes, enough to determine the fate of every legislative action pending tonight. I remembered one night two years back, when a grand-prize winner forced through a law banning sex. Luckily, the next week's winner overturned that one.

At 9:00 sharp, center screen flashed a waving American flag. "Welcome to America's Electronic Town Meeting," said the simulated voice of Don Pardo, "brought to you by APC, the folks that say, 'It's up to you!'" That corny Rea-

gan simulation gave the opening monologue again. Everyone groaned, but it was all part of the ritual, and we really wouldn't have it any other way. After that came the text of all nine party platforms; the words scrolled by so fast that I simply captured them for later, knowing no one was likely to have the time to read any of it. Then the kids joysticked in their votes for video of the week, junk food of the week, and so on; as each vote was cast, eager product managers in stores from sea to shining sea rushed to fill their waiting shelves with cases of the winning products.

Finally, it was time for the main event. The nine presidential candidates flashed on the screen all at once, giving their 15-second spiels about what they would do for the country in the coming month. At the same moment, the phones began ringing with calls from pollsters, and all four fax machines began to spew reams of position papers, press releases, vote sweepstakes tickets, and direct mail asking us to open accounts in each party's name.

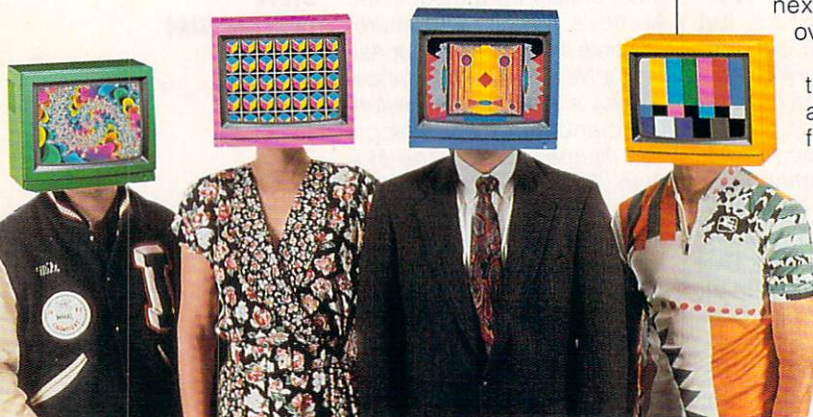
"Daddy!" the kids yelled. "You forgot to turn off the faxes again!"

"Sorry," I said. "I'll clean up later. Here comes the vote."

We all stood in anticipation with our infrared Vote Remotes at the ready. With one press of the button, we and 300 million other red-blooded Americans would determine the fate (and marketing plans) of the free world—for the next month, at least. No more Congress, Supreme Court, primaries, debates, conventions, campaigns, or any of that old, time-consuming, expensive, boring political rigmarole. As the choices again flashed on the screen, our thumbs did their patriotic duty.

Democracy in action. □

No more primaries, debates, conventions, campaigns, or any of that old, time-consuming, expensive, boring political rigmarole.



Paladin II



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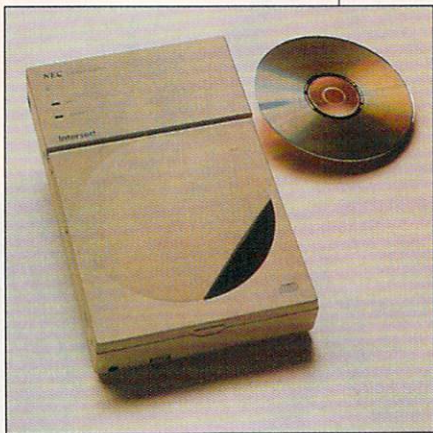
David English

CD-ROM TO GO

CD-ROM is finally catching on. Early returns from our most recent readership survey indicate that about 20 percent of our readers have CD-ROM drives. That's up from about 3 percent just a year ago.

That means a lot of you already know about the limitations of the technology. Foremost is the inability to use your new CD-ROM software on a PC without a CD-ROM drive. If your PC at work has a CD-

NEC's portable CD-ROM drive is fully MPC-compatible, but weighs only 2.2 pounds.



ROM drive but your PC at home doesn't, you can't use your CD-ROMs at home. Also, it's nearly impossible to use your CD-ROMs with a laptop or portable computer. Wouldn't it be great if you could use your CD-ROMs on any PC?

There is an option for laptops and other slotless PCs. SCSI adapters plug into your parallel port and give you both a SCSI port and a pass-through parallel port. Since most CD-ROM drives use a SCSI interface, you can plug most external or portable CD-ROM drives into a SCSI adapter. Unfortunately, if you have a standard parallel port, you'll only be able to read data at about two-thirds the standard data-transfer rate (about 100K

per second, rather than 150K per second).

If you have a bidirectional parallel port, like the ones found on many Toshiba laptops, you can pick up some extra speed with two new SCSI adapters: the T348 MiniSCSI Plus (Trantor Systems, 5415 Randall Place, Fremont, California 94538-3151; 510-770-1400; \$229) and the AL-1000 (Always Technology, 31336 Via Colinas, Suite 101, Westlake Village, California 91362; 818-597-1400; \$199). The same two models perform even better—in fact, about as fast as a card-based SCSI adapter—if you have a computer with the new EPP (Enhanced Parallel Port).

The best answer for laptops would be a built-in SCSI interface. Then you could easily add as many as seven SCSI devices to your laptop, including CD-ROM drives and additional hard drives. Currently, only NEC offers a laptop with a SCSI connector.

Now that you have a way to add a CD-ROM drive to your laptop, what about sound? There's the rub—you can't use the parallel port to do both at the same time. Media Vision offers the excellent Audioport, which plugs into the parallel port—in effect adding a sound card to any laptop. But it doesn't get along with the parallel-port SCSI adapters. If you could use both, you could convert your laptop into a multimedia PC (MPC). As it stands now, you'll have to choose one or the other—CD-ROM or sound—or resort to a bulky expansion unit.

You can still use the many CD-ROM applications that don't need sound, or you can

use your SCSI adapter as a quick way to move a CD-ROM drive from one desktop PC to another. If you have a sound card in your computer both at work and at home, you could buy a portable CD-ROM drive with a parallel-port SCSI adapter and set up both machines as MPCs.

One of the best designed and most versatile of the new portable CD-ROM drives is NEC's CDR-37 (NEC Technologies, 1255 Michael Drive, Wood Dale, Illinois 60191; 708-860-9500; \$449). It's fully MPC compliant with an average 450-millisecond access time, a 150K-per-second data-transfer rate, and 64K of cache memory. Best of all, it weighs only 2.2 pounds (or 3 pounds with the optional battery pack). It's small and can easily fit into many laptop cases along with the laptop. You can buy the drive with any of four interface kits (XT/AT card—\$539, PS/2 card—\$598, parallel-to-SCSI adapter—\$559, or Macintosh connector—\$485), or you can buy the drive and interface kits separately. You can equip all your computers with interface kits and move the drive from computer to computer.

I've spent several weeks carrying the CDR-37 between my home and office. While not as fast as NEC's new MultiSpin CD-ROM drives (these speed demons have a 280-millisecond access time and 300K-per-second data-transfer rate), the NEC portable handled well all but the most demanding data (we're talking full-motion video, which can choke even the fastest drives). I'd recommend it to anyone who needs a reliable and portable CD-ROM drive.

For now it's a real effort to bring multimedia to slotless computers. Maybe someday all computers will have the necessary SCSI and audio circuitry built right into the machine. □

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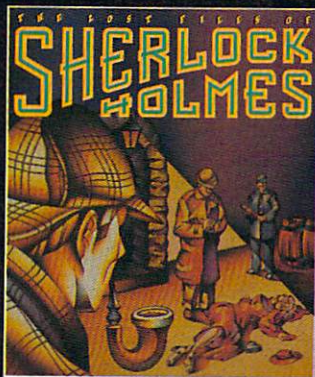
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GODS

Beads of sweat glisten on your bronzed, corded muscles as you make your way through the ancient City of Legends, once the playground of the gods. Now in decay, the city is overgrown by weeds and inhabited by the denizens of evil. You recall the challenge laid down by the gods for a champion to free their city from the grip of evil. A massive warrior, you favor quick wits and flashing weapons over the protective covering of armor. You know the price of failure is death. But you are no ordinary hero—your name is Hercules. And your mission is no ordinary quest: to attain godhood and immortality.

Gods, by Bitmap Brothers, is a game which combines many of the best aspects of adventure games in an arcade-game environment, including puzzles, shortcuts, secret rooms, treasure chests, and keys not seen in most other arcade games. All these plus communication, character interaction, hints, and a limited save-game utility combine to make Gods a very effective and enjoyable hybrid adventure-arcade game that must be played to be appreciated.

The side- and top-scrolling display of the City of Legends has a third-person perspective that shows your muscle-bound Hercules and the monsters within the stone Greco-Roman maze. At the bottom of the display are several windows which show the number of lives you have remaining, guardian and character energy levels, the item inventory, the point score, a message scroll box, and the amount



of gold you've collected. The amount of energy remaining in your current life is shown as the fullness of a beaker.

The city is divided into four sections: the city proper, the temple, the labyrinth, and the underworld. Each section is divided into three worlds, and each world may be composed of multiple levels. Success in traversing the levels involves a combination of throwing the correct switches and levers, collecting the correct artifacts, and killing off all of the monsters—all within the time allotted and with the least damage to your character. Extra lives, more powerful protection, and more powerful weaponry are the rewards of the correct sequence of play.

Within the city you must defeat many enemies, which can appear out of thin air, accompanied by a flash of light. The basic monster types come in many interesting and varied somatypes and weapons capabilities, making combat an interesting, ever-changing occupation. They are of four basic types: killers, fliers, thieves, and guardians.

Gods is a game of plan-

ning, not just a game of knee-jerk reflexes. You must locate switches and determine their functions via experimentation. The game's limited save-game resources require you to repeat portions of the maze over and over again, until you find the ultimate path through each city section.

Like an adventure game, Gods has progression and reward puzzles. Progression puzzles aid or hinder your advancement to the next level; reward puzzles provide you with better weapons, protection, and life power. To solve the puzzles, you'll have to get the right keys for the right doors and be able to select the correct path through the mazes.

A message scroll box at the bottom of the display announces the ultimate goal of a set of puzzles and offers hints to solving puzzles or explains the effects of artifacts. Determining the meaning of these messages is the source of another puzzle.

Gods has an inventory, another adventure-game feature. The three-item inventory holds items such as keys and other artifacts. Items in Gods

have an existence of their own. When they're dropped, they appear on the city floor. If a thief picks them up, they can be retrieved later when the thief is killed.

Over 30 distinct types of artifacts, including six different types of keys, are hidden in Gods. There are also many types of weapons, artifacts of protection, magic potions, and weapons' arcs, which control the trajectory of the thrown weapons. As with characters in other adventure games, Hercules needs to know what to discard and what to keep. Many items disappear when used and so don't take up room in the small three-item inventory. Most gems add to the gold counter. Food replaces lost energy.

A shop appears at the half-way point and the end of each level. Some weapons, armor, food, weapon arcs, and other artifacts will perform specific tasks better than others. Some weapons kill monsters effectively but do little damage to the breakable blocks. Your choice of weapons will ultimately affect your ability to successfully traverse the dangers that lie ahead.

Potions have many effects, such as increase in health, weapon potency, and defense effectiveness. Those acquired in shops act differently than ones found in the city, providing an additional set of strategic choices. Shop potions can be saved as inventory items that are dropped from the inventory when used; city potions take effect on contact with Hercules.

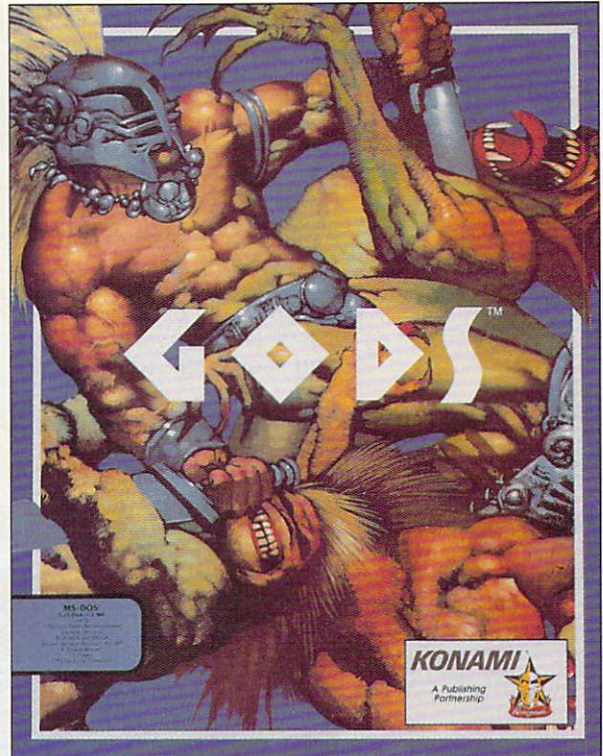
Gods incorporates a new system called the Player Monitor mode. This mode keeps track of your skill level, making the game easier for the un-

initiated and more difficult for the skillful. Clever solutions and skillful maneuvers reap higher rewards, while the inexperienced player is encouraged to improve in a less lethal environment. Player Monitor mode ensures that every game is different, since most of us don't perform with the precision of a computer.

Upon your successful completion of a world, the program constructs a personalized code for you. By inputting the code later, you can return to the beginning of the next world with the Player Monitor mode reactivated at exactly the same level as when you left the game. Gods is different from other code-based save games in that it remembers and lists the codes on the startup screen, thus eliminating the need for you to keep notes.

The interface can be most effectively controlled by a joystick, but it's also supported by a keyboard option. Joystick control is somewhat awkward and takes time to get used to. Keys allow you to pause or escape to the operating system. For selecting items in the shop or inputting alphabetical characters, the mouse and keyboard would've been a more effective combination, but the developers chose not to support it. The numeric keypad is active for inputting the copy-protection code, a four-digit number recovered from a nearly illegible red code card.

The graphics in Gods are crisp and tight, dazzling the eye and somehow seeming to squeeze out more than 16 colors from its 16-color VGA palette. Animation is incredibly smooth, with the monsters gliding along the screen without a



hitch. The theme music was composed by Nation XII's John Fox, a former member of the popular European band Ultravox. Renegade, which produced the game with Bitmap Brothers, is a founding partner with Rhythm King Records, which produced the music in its studios. Sound effects show the same professional origins and are used sparingly to great effect.

Gods is much more than just another arcade game. By combining some of the best elements of adventure games in an attractive arcade-game format, it transcends the fast-reflex arena and becomes a game of intellect. It joins other Bitmap Brothers award-winning games as an innovation that goes beyond earlier hits. You won't want to miss it. □

IBM PC or compatible (12-MHz 80286 or faster); 640K RAM; 16-color EGA, MCGA, or VGA; 1.2MB 5¼-inch or 1.44MB 3½-inch high-density floppy drive and hard drive; supports Ad Lib, Sound Blaster, Roland (Roland has special soundtrack), and compatible cards; joystick optional—\$39.95

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Circle Reader Service Number 303

GAMEPLAY

Paul C. Schuytema

UP AGAINST THE WALL

It's 3:00 a.m., and you've just rammed full speed into the brick wall that designers work so hard to build into their games: the unstoppable opponent or the unsolvable puzzle. After committing hours to the game, you've reached an obstruction that seems impossible to overcome.

Computer games are tough (they have to be to justify the cost), and as we get better and better at anticipating

and take another route. And if it's a simulation, you know it's just a matter of patience and learning the right skills before you put that F-16 down on the runway without crashing.

The best way to get past the wall is to arm yourself with as much information as possible. If you're playing a savable game, then play right up to your wall and save the game. Make a few copies of your saved game and settle down to experiment.

Search for resources beyond the game itself. Often, the game's manual contains a

wealth of information. It's a great place to start looking for your solution. Some manuals have their own hint sections, while others will give information in the narrative introduction or in the fictional background

material. It's worth a try.

Sometimes, the game itself will allow you to modify the parameters. Don't think of this as cheating, but as fact-finding. You're simply looking for the solution to a puzzle. If you change the parameters and solve your dilemma, you can set them back and recall for "honest" play a game you saved previously.

Often, the game is in real-time, and you only have a few precious seconds. So take a snapshot. A screen capture utility is also great for this. You can tell a lot from a screen shot, especially if the screen is crowded like the one in Falcon 3.0.

If your video card has an output jack, hook up your VCR and record the last minutes before you crumble. Think of yourself as a coach, evaluating the

gameplay. (Digital Vision and others make interfaces that convert VGA to composite video for videotaping.)

Another good tactic is to get the game up and running and then have a friend run through the difficult part while you watch. Maybe you'll see something new. But watch out. If your friend breezes past your wall, your ego may be hurting for a long time.

Often, if a game is popular enough, you can buy hint books that solve nearly all of your problems. Generally, the books are written with the frustrated gamer in mind and organized so that you can get the information you need without spoiling the game.

Check out online resources, too. Often, a local BBS will have a library of text file hints that you can download. Also, large networks such as GEnie and CompuServe have gamers' forums that provide the opportunity to ask for specific help from people who have been there. CompuServe will also provide its members with contact numbers for the major game publishers. GEnie has a general RoundTable for computer game enthusiasts.

Nowadays, it seems as if everybody's installing 900-number help lines. Electronic Arts has a 900 hint line which allows you to access any level of any game through a menu and your touch-tone phone. But don't forget that these help sessions can cost as much as a hint book. And at times the hints may be as cryptic as the puzzles themselves.

Remember that these games have solutions. Sometimes the answer is practice, and sometimes it's a little more complicated. If you need help, the resources are out there. Someone somewhere has run into the same problem. You only need to track that person down. □

Computer games are tough. Game publishers work hard building traps and obstacles to stop you in your tracks. But every game has a solution. There are ways to hurdle that wall.



what's coming, the game publishers work harder at creating more challenging puzzles and burlier opponents. And in this spiraling climb of difficulty, there has to be some friction. Don't hate the game. You wouldn't have bought it if you thought it was going to be easy. Every game has a solution (at least, I'd like to think so), no matter how cryptic or convoluted, and there are ways to hurdle that wall.

The first thing you should ask yourself when you hit the wall is, "Am I on track, or is this a dead end?"

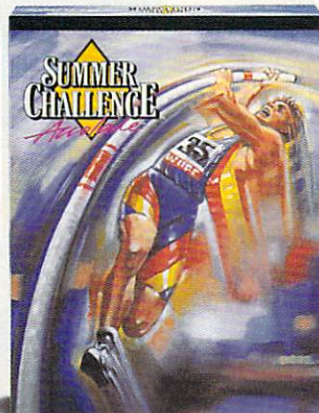
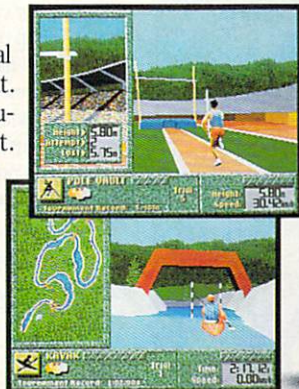
If the game is a linear shoot-'em-up, then you know you have to overcome that obstacle to get any further. If it's an adventure game, the answer is trickier; you might have wandered into a blind alley. If so, all you need to do is back up



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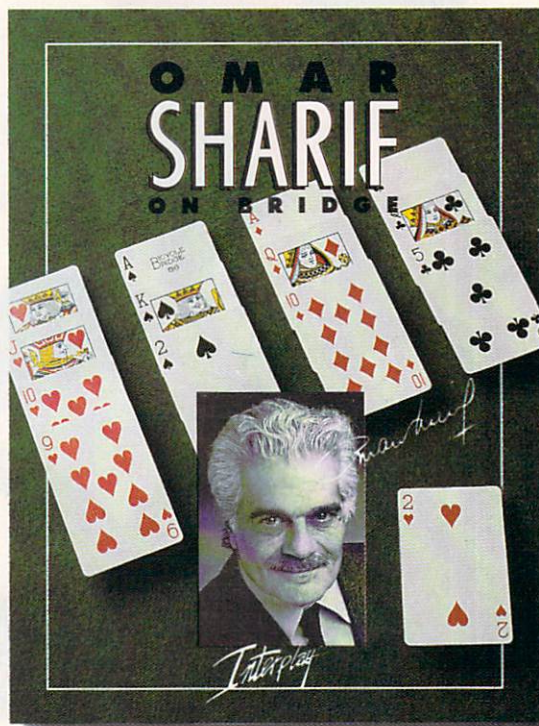
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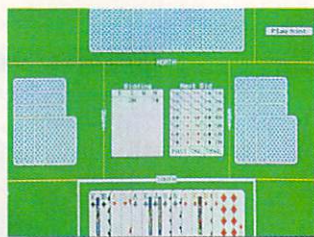
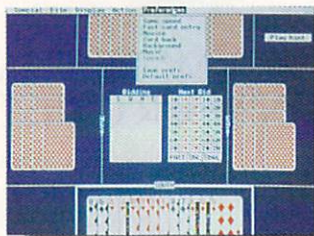
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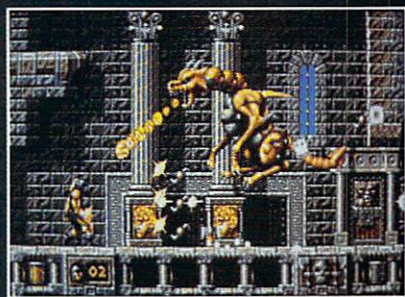
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TOP

THE

25



By David Sears

Winter—a time for glowing hearths and heirloom quilts and, for some of us, long evenings spent with mugs of cider and a cherished PC. This is most certainly the best time of year to play. Maybe you'll try a few games of *Populous* or *Star Control*, but if you're like most gamers, you look forward to Christmas and the frenetic activity of entertainment software houses. The must-have RPGs of summer and the hottest simulators of spring fade from memory now, lost in the swirl of new product announcements and the buzz of seasonal industry hype. But doubt remains. Did you miss something important this year?

Probably. Over the last 12 months, digital entertainment took some tentative steps forward. In spite of the dual threat and promise of CD-ROM products, disk-based games continued to grow, both in megabytes and range of play.

We stormed the stars and walked alternate earths; in most cases our journeys were limited only by the size of our hard drives. We played in tree forts, and we solved mysteries worthy of Sherlock Holmes himself. Simulations made a strong showing against the more traditional hack-and-slash dungeon exploitation ventures; the philosophers in us all secretly rejoiced. And then, the lemmings came back. For computer owners with a little time to kill, here's a look at the highlights of the last 12 months. With luck, some of these replayable beauties—though forgotten for the moment—still wait for you on the shelves of local software boutiques.

Dune

Better than the movie and somewhat shorter than the novel, *Dune* (from Virgin Games) proves that adaptations aren't always inferior to originals. As Paul Atreides, players mine life-prolonging spice, ride the wild sandworm, and reclaim the desert planet Arakis. A no-problem interface puts you instantly at the heart of play; haunting melodies and visionary images courtesy of the European design team Cryo put *Dune* near the top of a long list of ecomanagement world-conquest games.

Falcon 3.0

Flying a more realistic F-16 flight simulator could prove hazardous to your health. Once Spectrum HoloByte worked the kinks out of this military-inspired wonder, armchair pilots everywhere held their breath as they pulled multiple G's and fought the good fight in the days after Desert Storm. Thanks to Spectrum HoloByte for the reminder of how dangerous

modern warfare can be and for making a trip to the Middle East safer than the drive to work.

GODS

Sometimes the gods make a mistake, and this time, they've given you a shot at equality. Just defeat four nasty guardians and hordes of monsters, plus reclaim an inhospitable, unnamed city, and the big boys on Mt. Olympus will issue you a membership card, complete with requisite immortality. The Bitmap Brothers did another outstanding job for Konami.

DARK SEED

H. R. Giger makes his small-screen debut with *DARK SEED*, and players learn that smaller is no less fearsome. The designer for the movie *Alien* opened his disturbing portfolio for *CYBERDREAMS*, and together, they remade the world into a very menacing place. As Mike Dawson, you attempt to pierce the veil between light and shadow and uncover the threat of alien invasion. Poor Mike—you're victim number one. A moody soundtrack and simply gorgeous backgrounds unite in *DARK SEED* for a combination that's tough to beat and difficult to put away.

Wolfenstein 3-D

Didn't this one appear first on the 8-bit machines of the last decade? Maybe so, but the leap from simple sprites to dizzying, high-speed 3-D texture mapping more than updates this 1980s classic for the impending turn of the century. Trapped behind enemy lines, you possess the secrets the Allies so desperately need to win the war. Your duty? Escape! More than a bit on the violent side, *Wolfenstein 3-D* surprises not only with its bloody combat but with the idea that a game this good can be shareware. Apogee Software outdoes itself again.

Aces of the Pacific

Do the names *Zuikaku*, *Hiryu*, and *Akagi* mean anything to you? If not, you haven't flown for World War II Japan in *Aces of the Pacific*, Dynamix's realistic flight simulator. Anyone interested in alternative history can watch it unfold from the cockpit of a Zero; the more patriotic will fly American planes. Either way, you're out to earn commendations and come home in one piece. With plenty of history behind it, a nostalgic manual, and exhilarating bombing runs, *Aces* earns its wings among the very best flight simulators.

Star Trek: 25th Anniversary

Capturing the essence of the original series, down to the almost brotherly

antagonism between Mr. Spock and Dr. McCoy, Interplay's *Star Trek: 25th Anniversary* finally gives us the chance to take the helm of an Enterprise we can believe in. Jim's still overly dramatic; both the Klingons and the Romulans demand satisfaction; Harry Mudd's making trouble. Each episode presents the away team with stringent puzzles and a dose of humor that will only leave Trekkers ready for more.

Out of This World

Ripped from this planet by an atomic accelerator gone bad, you find yourself in a cool blue world. Polygon-based graphics lend surprising realism to this cinematic masterpiece, and as you fight your way through what seems a very believable continuum, you'll wonder what all the fuss over the disappearing lone-wolf designer was about. Based in France, programmer, artist, and designer Eric Chahi went against the grain to present us with a one-man show rivaling the megabudget wonders of California. Of course, Interplay *did* produce and distribute it.

Oh No, More Lemmings

Perhaps better described as a game extension rather than a new game, *Oh No, More Lemmings* seemed much like its predecessor, so the new levels caught us flatfooted. The sadists at Psygnosis thought up fresh, devious ways to grind, mince, and otherwise eradicate our favorite pack of rodents, with levels ranging in difficulty from tame to wicked. Each new microadventure requires more both from players and from our cute little brolly-toting, bridge-building friends—and saving vermin from certain death never before held such charm.

Hardball III

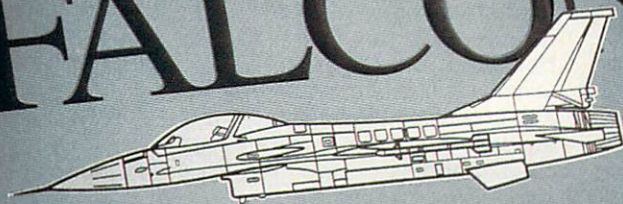
Even if you don't like baseball, you'll probably enjoy *Hardball III*. The closest thing to actually sliding for home plate, complete with the digitized announcing of noted commentator Al Michaels, *Accolade's* newest ringer can make you feel like it's the top of the ninth with bases loaded every time. From batting practice to league championships, this game has everything a sports fan could want except the peanuts and Cracker Jack.

SimAnt

Least serious of all the software toys from Maxis—and therefore probably the most fun—this simulation nonetheless shows us the darker side of life in the backyard. Alternately queen, worker, and soldier, you lead your arthropodal colony to victory or extinction. Unlike in *SimCity*, you actually try to run the

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"The visuals during flight are awesome." JIM DOUGLAS, ACE

"If you aren't in the armed services—and maybe even if you are—this is as close as you can come to flying the Falcon."

PETER OLAFSON, COMPUTE

"The graphics are stunning, the sound is incredible and the game play is a rush."

DAVID ETHEL, VIDEO GAMES & COMPUTER ENTERTAINMENT

"It's not so much a game system as it is a way of life."

EVAN BROOKS, COMPUTER GAMING WORLD

"Realistic, contoured terrain. Your view from the cockpit is the best in the flight simulator world. And Falcon's user interface is slick and easy to use."

PC GAMES EDITORS

"Be excited. Falcon 3.0 makes other efforts in this genre seem like test runs for the real thing."

STRATEGY PLUS EDITORS

"The most complete and accurate jet fighter simulation to be found this side of a security clearance. Period."

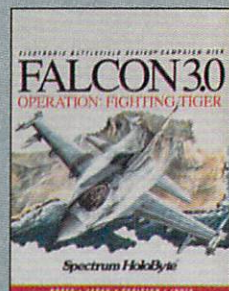
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"The most appealing aspect is the realism. This is as true to life as I've seen on a computer."

COMPUTER GAME REVIEW EDITORS



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Circle Reader Service Number 108

Available for IBM/compatibles

humans out of their house rather than make their lives more comfortable.

Crisis in the Kremlin

Who knew Gorbachev would need to hit the classifieds even before Gorbachev himself? Spectrum HoloByte and the programmers of Crisis in the Kremlin, that's who. Another one for the deep thinkers in the crowd, this simulation lets you play hard-liner, reformist, or nationalist, each with the best intentions for what was once the U.S.S.R. Who knows what will happen next? Take matters in your own hands, monitor the digitized newscasts, and hope you can feed your people this winter.

The Lost Files of Sherlock Holmes

A grisly London murder might mean a new modus operandi for Jack the Ripper, or it may bear the mark of an altogether new killer. Either way, Sherlock Holmes must eliminate a long list of the impossible to solve the case in this Electronic Arts interactive mystery. More than mere extraneous characters, Dr. Watson and the Baker Street Irregulars help bring a treasured literary figure to life, even if they can't resuscitate the hapless victims.

Gateway

Humanity never found evidence of life in our solar system—other than native earth flora and fauna, that is. Then it stumbled upon the abandoned Heechee Gateway, a platform to the stars. Someone else is out there, and there must certainly be something out there worth taking. Sign on for a potentially fatal mission, and you might return a wealthy explorer. Or maybe you'd rather remain planet-bound after all. Legend Entertainment's hybrid of parser and point-and-click interface turns out to be an asset to gameplay, and the hi-res color graphics seem fitting accompaniment to this adaptation of Frederick Pohl's popular science fiction work. Distributed by Accolade.

Eye of the Beholder II

An adventure inspired by D & D, Eye of the Beholder II: The Legend of Darkmoon didn't show much innovation plotwise, but SSI couldn't hope to improve on the interface. Distributed by Electronic Arts.

Tetris Classic

Spectrum HoloByte lifted the bandages to reveal a spiffier Tetris. Either this

attractive update or its beautiful cousin Super Tetris would make a fine gift.

The Adventures of Willy Beamish

To feel like a kid again, try Dynamix's The Adventures of Willy Beamish and thwart the despicable Leona Humpford's wicked plans.

Shuttle

Ever wonder what spaceflight in the 1980s was like? Strap yourself into Virgin Games' shuttle simulator, and discover all the joy and all the difficulty of leaving the earth behind.

Rules of Engagement

If you hanker for galactic conquest, there's no better space-combat simulator than Rules of Engagement from Mindcraft. Distributed by Electronic Arts.

Castles II

Perhaps you'd prefer to use catapults instead of energy weapons. The newest release of Interplay's Castles II lets you do just that, as well as build your own fortress of stone. Now politically correct, Castles even offers you the chance to play queen rather than king.

Ultima Underworld

Go back to the dungeons with Origin's Ultima Underworld, superior visually to all other spelunking hack-fests; texture mapping seems to be the hottest thing these days.

Global Effect

Global Effect makes clear how difficult world management can be if the other guy won't cooperate. This simulation from Electronic Arts makes you think twice about the future.

Links Pro 386

Anyone with a 386 or better can hit the greens with Links Pro 386 from Access. When it comes to golf, nobody does it better.

Ultima VII

For days of adventure, the belated but worth-the-wait Ultima VII brings back the Avatar for another tour of Britannia. Origin scores another hit.

Civilization

Nurture cultures or burn them; either way, mankind marches to your beat in Civilization from MicroProse.

Everything You Want

No matter where you look, you'll find excellent games for every taste. The lucky person who gets a great game gift will be ready to take on the new year with ambitions unleashed, skills whetted, and imagination stoked. □

GREAT GAMES

Links Pro 386—\$69.95
Access Software
4910 W. Amelia Earhart Dr.
Salt Lake City, UT
84116-2837
(800) 800-4880

Gateway—\$59.95
Hardball III—\$59.95
Accolade
c/o Starpak
237 22nd St.
Greeley, CO 80631
(800) 245-7744

Wolfenstein 3-D—\$50.00
Apogee
P.O. Box 476389
Garland, TX 75047
(800) 426-3123

DARK SEED—\$69.95
CYBERDREAMS
Distributed by Merit
Software
13635 Gamma Rd.
Dallas, TX 75244
(800) 238-4277

Aces of the Pacific—
\$69.95
The Adventures of Willy
Beamish—\$69.95
Dynamix
99 W. 10th, Ste. 224
Eugene, OR 97401
(800) 326-6654

Eye of the Beholder II—
\$59.95
Global Effect—\$49.95
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Holmes—\$69.95
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\$59.95
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1450 Fashion Island Blvd.
San Mateo, CA 94404
(415) 571-7171

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\$59.95
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Anniversary—\$59.95
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GODS—\$39.95
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Buffalo Grove, IL 60089
(708) 215-5111

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Two Theatre Square,
Ste. 230
Orinda, CA 94563-3346
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(800) 336-2947

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(410) 771-0440

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206 Wild Basin Rd.,
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Austin, TX 78746
(512) 328-0282

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Alameda, CA 94501
(510) 522-3584

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The Amiga 4000 gives you the ability to easily create real-time, colorful animations.

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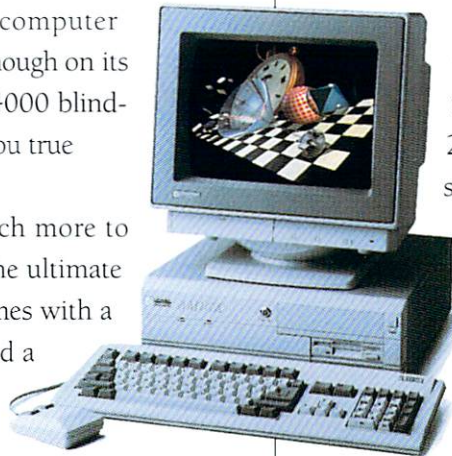


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68040 Chip (which other computer companies consider to be enough on its own) and not only is the A4000 blindingly quick, it literally gives you true workstation power.

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AMIGA

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- Hardware Scan Doubling for flicker-free display on 31 kHz monitors
- Upward compatibility with Amiga Enhanced Chip Set

More Power To Open Your Eyes To Multimedia.

Standard Amiga Features

Features integrated into the system architecture and supported by the system software.

- Advanced Custom Processors for DMA, Video, Graphics, Sound and I/O Control
- NTSC Video Horizontal Scan Rate Compatibility
- Multitasking Operating System
- Selectable Resolutions/True Overscan
- Standard File Format (IFF)

CPU

- Motorola® 68040 series 32-bit processor
- 25 MHz clock speed
- Removable processor module

Memory

- 2 MB 32-bit Chip RAM
- Up to 16 MB 32-bit Fast RAM
- Easily expandable via standard SIMM units
- Additional standard RAM is supported by the Amiga's proprietary AUTOCONFIG™ capability

Software

- 512 KB 32-bit ROM
- AmigaDOS™ 3.0 Multitasking Operating System
- Supports programmable resolutions
- Supports outline fonts
- Localized for multiple language/countries
- CrossDos MS-DOS® file transfer utility

Video Slot

- Extended 24-bit Video slot
- In line with standard 100-pin slot for easy integration of Amiga and video boards

Interfaces

- Keyboard
- Mouse/Joystick/Lightpen/Tablet ports (2)
- Serial (RS-232)
- Parallel (Centronics)
- Video (RGB analog or RGBI digital)
- Right and Left stereo channels
- Internal and External floppy disk drive ports
- Internal AT IDE port. Optional SCSI adapter

System Slots

- CPU slot (200-pin) supports high-speed memory and advanced processors
- Amiga system bus - Four 16/32-bit Amiga expansion slots (100-pin) with AUTOCONFIG™
- PC bus - Three PCAT™ slots

Keyboard

- Detachable
- 94 keys, including 10 function keys
- Separate numeric keypad
- Separate cursor keys (Inverted "T" layout)

Mouse

- Opto-mechanical
- 2-button design

Disk Drives

- Built-in 3.5-inch high density disk drive (880 KB/1.76 MB formatted)
- Hard Drive models pre-formatted and pre-loaded with system software and utilities
- 2 rear and 2 front 3.5-inch drive bays
- 1 front 5.25-inch drive bay

Graphic Modes

- AGA custom chipset produces resolutions ranging from 320x200 to 1280x400 (more with overscan), including 800x600
- NTSC and PAL video resolutions
- Color palette of 16.8 million colors
- 2 to 256,000 user definable colors displayable on-screen

Video Display Output

- Works with RGB analog VGA or multiscan monitors (not all modes supported with non-multiscan monitors)
- Horizontal scan rates 15 kHz - 31 kHz
- Vertical scan rates 50 Hz - 72 Hz

Sound

- Four channel stereo sound, capable of reproducing complex waveforms
- Built-in sound buffer up to 800 KB nominal
- 8-bit D/A converters
- 6-bit volume

Dimensions

- 15 1/4" deep x 15" wide x 5" high

Weight

- Approx. 20 lbs.

Power Requirements

- 110 volt/60 Hz 150 watt power supply



64/128 VIEW

The 64 has always been kind of a barnstorming computer—just plug it in and fly by the seat of your pants.

Tom Netsel

A few months ago in this column, I was lamenting the fact that the number of new releases for the 64 had slowed to a pitiful trickle. Gone are the days when dozens of new titles from major developers vied for space on our review shelf.

In that column I suggested that smaller companies might take advantage of this calm to submit copies of their programs for review. Now that the big houses have moved into the IBM camp, smaller operations with one or two 64 products have a better chance for coverage in Gazette.

I have contacted a number of programmers and small publishers, and several of them have taken me up on my offer. I'm happy to announce that we now have a number of products on their way to our independent reviewers for evaluation. So keep your eye on our review pages next year. We haven't run out of good programs after all.

One small company to respond was Creative Pixels Limited of Library, Pennsylvania. It's a small firm headed by Jim Hilty, who sent a review copy of a new game called *The Adventures of Eric Hawthorne, P.I.* Hilty has done work in the past for *Ahoy!*, *Commodore* magazine, and *Loadstar*, so he knows his way around a 64. In fact, he's been around long enough to have some insight into the way 64 software has evolved.

"It seems the software development for the 64 has gone full circle," he writes, "from the small independent developer to the big corpo-

rate image and now back to individuals. Maybe this is good. The 64 has always been kind of a barnstorming computer anyway—just plug it in and fly by the seat of your pants. It's a fun computer, a truly personal computer, a computer that an individual can enjoy programming, a welcome friend."

Hilty makes some good points. In a way, I suppose the 64 is something like a barnstormer's airplane of yesteryear. It's not too fast, not too fancy—but it's a solid little machine that can still coax an "Ooh!" or an "Ah!" out of onlookers. You can throw a couple of switches, hit a few keys, and dazzle your friends with what it can do. Oh, you may move on to something snazzier, fancier, and faster, but you'll always have fond memories of your first machine.

Creative Pixels is not the only company that still supports the 64. To help our readers track down Commodore products and service, Lisa Hayes, a 64 fan in Chicago, has compiled a buyer's guide of more than 100 such companies. This listing, which has been augmented by the Gazette staff, should prove to be a valuable resource for finding software, hardware, and service for your 64 or 128. You'll find the list on page G-3.

Naturally, in a listing such as this, we're bound to omit some valid companies. I'll apologize in advance if your favorite firm is missing. So if you know of some companies that we've missed or if your firm handles 64 products, contact me. We'll prepare an updated supplement in a future issue. □

GAZETTE

64/128 VIEW

G-1

Software development for the 64 comes full circle. By Tom Netsel.

A BUYER'S GUIDE TO COMMODORE SOFTWARE, HARDWARE, AND SERVICES

G-3

Here's a convenient list of mail-order companies that handle Commodore hardware and software. Edited by Lisa Hayes.

REVIEWS

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Videofox and Invoice Writer II.

WORLD VIEW

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The Commodore scene in Hungary. By Geza Lucz.

BEGINNER BASIC

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Examine ways users can enter data into your programs. By Larry Cotton.

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Try animation on a small scale by moving the pixels within a single character. By Jim Butterfield.

FEEDBACK

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Questions and answers.

GEOS

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Now that we've selected the ultimate in GEOS hardware, let's run some outstanding software. By Steve Vander Ark.

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Watch a character design itself—if you have the time. By Randy Thompson.

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A BUYER'S GUIDE TO COMMODORE SOFTWARE, HARDWARE, AND SERVICES

Since finding items for a Commodore 64 or 128 is not as easy as it once was, we've compiled this listing of manufacturers and of dealers, distributors, and service companies that handle the Commodore line. While this list is by no means definitive, it should make your shopping easier and help you locate some hard-to-find products.

Edited by Lisa Hayes

Software and Hardware Distributors

COMMODORE
1200 Wilson Ave.
West Chester, PA 19380
(215) 431-9100
Customer Support
(800) 448-9987
This is a 24-hour support line.

TENEX
P.O. Box 1813
South Bend, IN 46660-6578
(800) 352-2225
Hardware and software. Free catalog.

BRIWALL
P.O. Box 129
Kutztown, PA 19530
(800) 766-5757
Hardware and software. Free catalog.

SOFTWARE SUPPORT INTERNATIONAL
2700 NE Andresen Rd., Ste.A-10
Vancouver, WA 98661
(800) 356-1179
Hardware and software. Free catalog.

MONTGOMERY-GRANT
P.O. Box 50
Brooklyn, NY 11230
(800) 759-6565
Hardware.

COMPSULT
P.O. Box 3233
San Luis Obispo, CA 93403-3233
(800) 676-6616
Discontinued software at bargain prices.
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SOFTWARE DISCOUNTERS
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Pittsburgh, PA 15206
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New software. Free catalog.

TITUS SOFTWARE
20432 Corisco St.
Chatsworth, CA 91311
(818) 709-3692
New software, mainly European imports.

COSMI
431 N. Figueroa St.
Wilmington, CA 90744
(800) 765-5455
Top 20 Software Tools, Top 20 Solid
Gold Games—\$14.95 each.

CREATIVE MICRO DESIGNS
50 Industrial Dr.
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Hard drives, Jiffy DOS, gateWay,
RAMLink, RAMDOS, Swiftlink 232, SID
Symphony Stereo Cartridge, and more.

JASON-RANHEIM
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Auburn, CA 95603
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(916) 878-0785
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THE GRAPEVINE GROUP
3 Chestnut St.
Suffern, NY 10901
(800) 292-7445
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SKYLES ELECTRONIC WORKS
231-E S. Whisman Rd.
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GEOWORKS
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Berkeley, CA 94707
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CODEWARE
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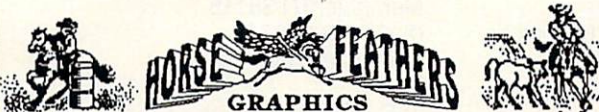
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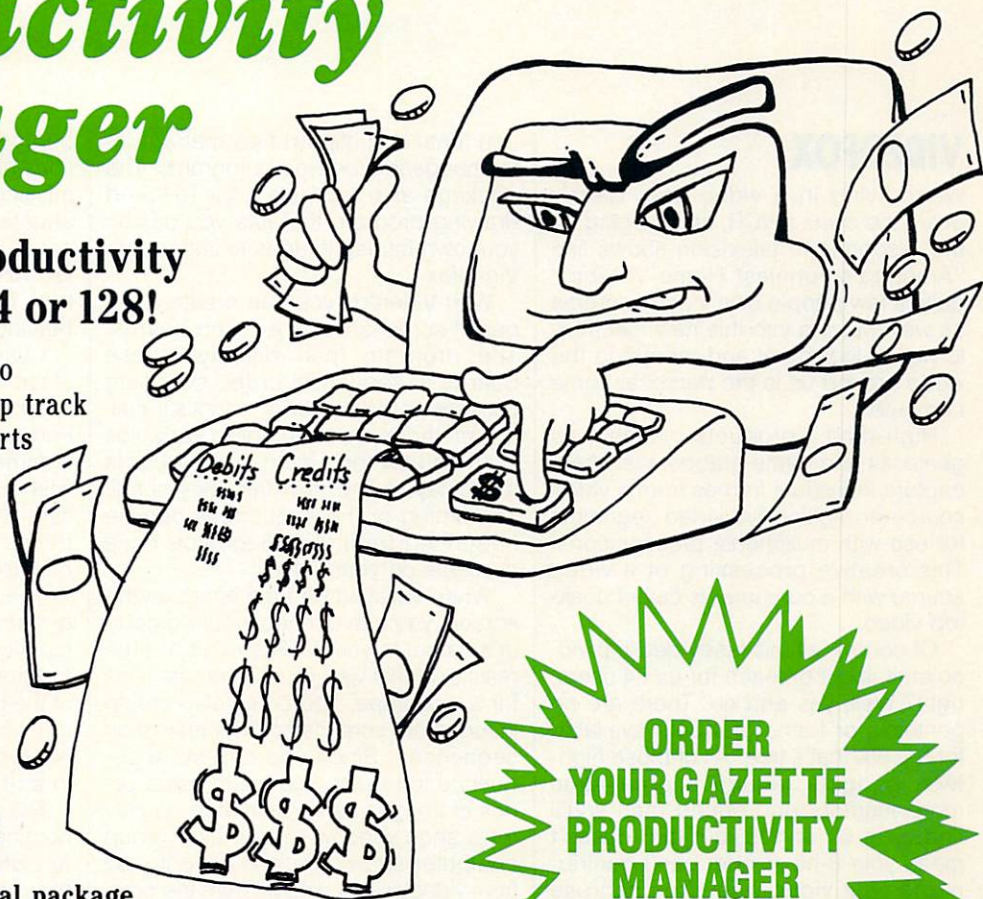
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VIDEOFOX

We're living in a video age. Nearly everyone owns a VCR, and judging by the response to television shows like "America's Funniest Home Videos," quite a few people own video cameras as well. Moving into this new electronic way of looking at and recording the world around us is the personal home computer.

High-tech products such as genlocks and frame grabbers let users capture individual frames from a video source or digitize live video segments for use with multimedia presentations. This creative processing of a video source with a computer is called desktop video.

Of course, all this fancy desktop video stuff is out of reach for us 64 users, right? Well, yes and no. There are no genlocks or frame grabbers available for the 64, that's true. All of those high-tech gadgets require a great deal more memory and speed than you'll find on a 64 or 128, but that doesn't mean your 8-bit wonder can't contribute to your video work. You can use the graphics capabilities of your 64 or 128 to create screens that can be copied onto videotape. The hookup is fairly simple, and the results can be every bit as impressive as graphics created on more sophisticated computers.

There are a number of fine programs that provide tools and effects to make your Commodore graphics fade and wipe with the best of them. Each of these packages is designed to take graphic images from your Commodore and run them in sequence while recording the output onto your videotape. Of course, you could create simple animated titles by filming your monitor as you type with a word processor or as your graphics program displays a screen or two. These software packages automate the process and add some nice screen effects, too.

Videofox, imported from Germany and distributed by RIO Computers, is a newcomer to the field of Commodore video software. Videofox is part of the Fox line of Commodore products, which includes the Pagefox cartridge. As a result, Videofox is designed to operate like other products in that line, using a similar point-and-click interface

and fonts and clip art files that are interchangeable between programs. The package also includes a full-featured drawing program that lets you design your own bitmap images to import into Videofox.

With Videofox you can create a series of screens that are called boards. The program then displays these boards in sequential order, switching from one to the next using various transition methods. You can adjust variables such as how long each of the boards is displayed and how fast they scroll. The timing of the sequences can be fine-tuned to fit the space you have available on your video.

When satisfied with the effect on the screen, you can connect your computer's output to your VCR and record the results. In this way you can create titles for a videotape. You could also create introductory screens or short animation sequences. Since you can set a sequence to repeat, you could use a series of images as an animated display for a shop window or at a user group computer show. You can have it play from videotape or straight from the computer itself.

Videofox includes a variety of transition options, including some that use the border in unexpected ways. The effects are smooth, professional, and often surprising. You can place text anywhere on the screen and import bitmap images to dress up a display. Any video-titling program offers a selection of fades and wipes between graphic screens, but Videofox does it better, and it gives you more. Transitions are quick and clean—quick enough for some honest-to-goodness page-flipping animation.

Videofox does have a few problems, however. The icons on the screen are somewhat confusing, and they give no indication, either by highlighting or flashing, when they are selected. It's too easy to forget which of the tools is selected, especially when you're not always sure what they're supposed to do. On top of that, some icons are letters of the alphabet. That would be fine if they didn't stand for German words. I had to look them up.

As soon as I did, I encountered another problem. The documentation, haphazardly arranged, is vague and

confusing. It also references illustrations and diagrams that apparently are missing from the English version. This situation is made all the worse because the translator obviously knew a lot more about German than about English. The resulting prose ranges from baffling to hilarious.

I have finally figured out what most of the icons do, although I still can't get used to pressing J for Yes at prompts. Fortunately, there is a list of keyboard commands that helps. I can't help but wish for a nice tutorial—in real English—that would nurse me through things like importing and placing a bitmap or turning on text mode.

The process of transferring your sequence to videotape is explained as murkily as everything else. This is unfortunate, since that's the whole point of the program. RIO Computers is working on an upgrade to the manual; I hope my registration card entitles me to a new copy.

Despite the documentation's shortcomings, I do like the program. There are plenty of great features here, although they're a bit hard to find at times. I like the continually updated readout of cursor position and the various text effects available. I appreciate the ability to set tab positions on the screen so I can place images in exactly the same spot on each board for smooth, fast animation. Videofox doesn't have the scripting capabilities that Screen F/X has, but its effects are unmatched. Seeing my titles hop, skip, and jump across the screen makes wandering through the foggy documentation worthwhile.

Videofox is amazingly fast. Boards can be displayed so quickly because they're not full-screen bitmaps. Instead, the editor limits you to a certain percentage of the screen, up to 255 cells (8 x 8 pixels each). You can highlight the cells that you've used as you place text and graphics, adjusting when necessary to keep your designs from taking more than the allowable area. This process restricts your creativity to some extent, but the resulting speed makes it worth the effort.

There are a lot of great programs coming from Europe these days. The Fox series is a good example, and Videofox is a decent addition to that col-

lection. Companies like RIO Computers should be commended and supported for importing and distributing these products for the United States market. The problem with translating the documentation is a major stumbling block, however, one which must be overcome before packages like Videofax will appeal to everyone.

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INVOICE WRITER II

OK, the Commodore isn't the business computer for the nineties. You won't find some guy in a gray suit powering up a 64 on a 747. The local supermarket won't be running its scanners from a 128 in the back room. Even Commodore itself doesn't use its 8-bit computers to do business.

But every business isn't the corporate equivalent of Mount Everest. There are many small businesses that don't really need a \$5,000 computer running \$500 software. Small stores and mail-order firms, hole-in-the-wall shops, and baseball card retailers can use what the 64 has to offer: low-cost, efficient computing, with enough features to do the job but not a thousand bells and whistles that boost the price into the stratosphere. All they need is a 64 and some good, solid small business software.

Invoice Writer II is that kind of software. It'll record customer purchases and total the bill, including tax. It then prints the invoice with the business name on top and a friendly note of thanks at the bottom. Invoice Writer II is a winner because it works. It works on a real sales counter with real products, real customers, and real part-time, know-nothing clerks who would crash the system if they could.

When you place your 64 (or 128 in 64 mode) on a counter, connect it to a printer, and run this software, you create an efficient system for handling customer purchases. The main screen uses windows to provide places for the user to enter the customer's name and



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particulars, the part numbers or short descriptions of the items being purchased, the cost per item, and whether the item is taxable or not. The program will create an invoice for those items, placing a header on top with your company name, address, and whatever else you'd like. An invoice can handle up to ten items, listing them and totaling the final price.

If you need multiple invoices for a purchase of over ten items, the program can add and display their totals. At the bottom of each invoice is a line detailing the transaction. It's all very simple and straightforward (remember that know-nothing part-timer?).

Invoice Writer II also lets you enter negative quantities to include returns or refunds. If the product is multiple-priced, say four for a dollar, and the customer is only buying three, you can enter the price of the full quantity and the quantity purchased as three out of four in the form 3/4, and the program will do the math.

While creating invoices is the heart of the program, Invoice Writer II doesn't stop there. Recordkeeping is another important part of running a business. As products are sold and invoices generated, the computer keeps a running total of sales. If a second disk drive is available, the program writes this information to a storage disk. Your sales figures are continually updated and recorded. This part of the program, called the Filing System, lets you access old sales records and invoices on any disk by entering a date or range of dates to be printed out. Multiple invoices are coded with a trailing digit so you can be sure of identifying them later.

Should the electrical power fail or that part-timer inadvertently introduce errors into your data, you can edit the saved invoices and figures as needed. As you use Invoice Writer II, you are assured of accurate records stored safely on a disk for review a week, a month, or even years later.

All this makes Invoice Writer II a winner, but the marks of a truly great program are the extra touches it offers. One feature that doesn't have to be there but which makes life easier is Invoice Writer II's ability to operate without a disk drive, once the program has been loaded. This not only frees up limited equipment but also makes the system run quicker. You don't lose your recording capabilities, though; the program simply updates everything later when your drive is available. That's a great touch.

Another example is the invoice-storing system, by which you can stash away up to three unfinished transac-

tions while you work on another. Yet another example is the capability of storing two different printer setups, one for invoices and another for records. This means that you don't need to have the same printer at home or in the back office that you use at the sales counter. It's features like these that make Invoice Writer II a real gem.

Let's get back to that know-nothing part-timer I've been grumbling about. A program that any computerphobic clerk can use must be user-friendly. It's not enough that the program lets you fix errors after they happen; the program must be so simple that anyone can use it. After all, as one offshoot of Murphy's Law so eloquently puts it, "It's impossible to make anything fool-proof because fools are so ingenious!" Invoice Writer II is ready for any fool you might have running it.

Aside from the required typing, the program is operated almost exclusively by pressing the unshifted function keys. This speeds up the transaction process. A menu of functions is always displayed on the screen. The manual is well written and concise, giving you not only the basics of operation but also a chapter of tips and tricks to help you get the most out of your 64 as a retail tool.

There is one drawback to the program, however. Each purchased item must be entered from the keyboard—there's no database of products for the invoicing system to access. If entering a part number would automatically generate the description, price, and tax status, that would have been great. Oh, well, I suppose you can't have everything for ten bucks.

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WORLD VIEW

Geza Lucz

VIEW FROM HUNGARY

Even if you don't know exactly where Hungary is, you've probably heard about paprika and Hungarian goulash. Hungary is about the size of Indiana, with a population of about 10 million people. About 20 percent of the population live in Budapest, the capital.

Being in the Carpathian Basin, a natural crossroads for Eastern and Western Europe, Hungary has always felt a strong pull toward Western Europe, even though it can feel Eastern at times. Around 1988, Hungary reacted to this pull, shifting from a socialist to a capitalist economy.

During the transition to a free-market economy, computers have become widely available and much more affordable, in spite of a still-low income level. A Commodore 64, for instance, now costs about 14,000 forints (\$180), and the price of a 1541 drive is about the same. For a little more than twice an average monthly salary (39,000 forints or \$500), you can purchase an Amiga 500 or an IBM-compatible computer.

Until the late 1980s, computers entering Hungary came primarily through private sales. There were shops in Austria, right across the border, that specialized in Hungarian customers. The big computer boom occurred about seven years ago when the first Hungarian company started selling Commodores, albeit at irrationally high prices.

Thanks to a special government program, elementary and high schools are now online, equipped mostly with Commodores. These computers have proven to be perfect for teaching children how to apply computers to useful purposes. In colleges and universi-

ties, IBMs are the standard. There are many in-school networks (Novell), but a linkup between schools is still missing.

Commodore software is usually not available in stores. In spite of this, there are several options by which to update your game pool. There are magazines describing the latest games and utilities. All you have to do is pick out the programs you're interested in and order them. Prices usually range between 200 forints and 400 forints (\$3-\$6).

You can also go to club meetings and swap programs. The best-known club is Commodore Egyesulet (Commodore Association). It has had its own monthly magazine since 1985. In it, you can find programming tips and software and hardware reviews. This club also collects short programs that are created by members. These help other members learn programming.

There are also workshops where you can have your old computer supercharged. For about 4000 forints (\$50), you can have a little electric circuit board added that can increase the speed of your 1541 at least fivefold. You can also get software and hardware that speed up datasets. Now you can buy four floppy disks for about the price of a good-quality audiotape, and they can store close to the same amount of data, as well.

Available hardware elements range from music digitizers and light pens to the Commodore mouse. In case you're not satisfied with your power supply, you can also buy certain kinds of kits. From these kits and with expertise, you can assemble any equipment in a couple of hours. Finally, for about the price of an IBM AT, you can purchase a bridge card that makes your Amiga 500 compatible with the IBM XT.

Servicing a computer in Hungary may be a difficult task if you don't live close to a major city, but there are many workshops all over the country. Still, sometimes when an expensive integrated circuit breaks down and needs to be exchanged, it's possible that the repair will cost more than a brand-new 64. When you're buying a new computer, some stores may give credit for an old operational or nonoperational computer. In this way they solve their component supply shortage, and you get a certain amount of money for a computer that you probably couldn't have sold otherwise.

Hungarians seem to love their Commodores, as their numbers still increase. It's also true, however, that 64s and 128s have been slowly losing ground to Amigas.

The 64 and 128 have always had the most diverse program pool, with the most games, at the lowest prices. Because of this, they've been the most popular game machines. Since the 64's introduction, children have always wanted it. Now these same children are in college or high school, and many are upgrading and entering the world of IBM.

Another challenge seems to be on the Commodore horizon. The new 10- to 15-year-old generation seems to be buying more Amigas. Flashy graphics, perfect music, and realtime motion seem to be the key words of the nineties. These features, combined with a huge quantity of good-quality programs, make the Amiga 500 a dream machine for Hungarian teenagers.

Basically, the situation in Hungary is a healthy one for Commodore and the business that goes with it. Being a small country with big computer needs, Hungary will probably be staying online with Commodore for years. □

During the transition to a free-market economy, computers in Hungary have become widely available and much more affordable.

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WE WANT TO HEAR FROM YOU!

Gazette will soon publish an up-to-date list of Commodore 64/128 user groups across the U.S., throughout Canada, and around the world. We are now in the process of updating this information. If your group did not appear in our last list and you wish to be included, send your club name, address, and bulletin board service telephone number to

Commodore 64/128 User Group Update
COMPUTE's Gazette
324 W. Wendover Ave., Ste. 200
Greensboro, NC 27408

BEGINNER BASIC

Larry Cotton

GATHERING INFORMATION

Suppose you're writing a BASIC program that requires the user to enter something. There are three BASIC commands that accept information from a program's user: GET, WAIT, and INPUT. So which one or ones should you use? Let's look at all three.

GET is probably the easiest and most flexible command to program. Its main disadvantages are that it lacks a blinking cursor and requires extra programming to accept more than one character. Here's GET at its simplest.

```
100 GETA$: IFA$="" THEN 100
```

GET (unlike INPUT) doesn't wait for something to be typed unless immediately followed by an IF-THEN statement similar to the above. A\$ is an empty (null) string variable until the user presses a key. In this simple execution, A\$ will be only one character: a letter, number, or even punctuation mark.

Enter the above line and run it. The computer seems to be frozen in its tracks. Actually it's in a loop within line 100, waiting for the user to press a key. If A\$ is empty (the user hasn't hit a key yet), the IF-THEN repeatedly sends control back to the beginning of the line at the rate of at least 100 attempts per second. (To find out how many times GET loops, add a counter in front of the GET. C=C+1 will do it. Run the program; then divide C by the number of seconds the program runs. This slows GET down, so the actual number of GETs is higher.)

GET commands are often followed by more IF-THEN statements which evaluate the entered characters. Here's one way to use GET to

form longer strings.

```
100 GETA$: IFA$="" THEN 100
110 IFA$="*" THEN 140
120 B$=B$+A$
130 GOTO 100
140 PRINT B$
```

Run the program; then hit a few keys. When finished, press the asterisk key. Whatever you typed—almost anything except the asterisk, including spaces and carriage returns—should be printed on the screen.

To rule out everything but one character, say, T, do something like this.

```
100 GETA$: IFA$ <> "T" THEN 100
```

The symbols <> mean "is not equal to." Multiple IF-THENS often follow GET.

```
90 PRINT "DO YOU WANT TO
CONTINUE (Y=YES N=NO)?"
100 GETA$: IFA$ <> "Y" THEN
IFA$ <> "N" THEN 100
```

The above routine waits for the user to type either Y for yes or N for no. It won't move on with any other response. After you present a menu of several numbered choices, you can use GET like this.

```
100 GETA$: IFA$ <> "1" AND A$ <>
"2" AND A$ <> "3" THEN 100
110 IFA$="1" THEN . . .
120 IFA$="2" THEN . . .
130 . . .
```

Notice that IF-THEN isn't needed in line 130. If 3 is typed, control falls through to that line, and another check isn't necessary. As used above, AND takes the place of THEN IF in the preceding example.

An alternative to the above approach is to take the value of A\$ (using VAL) and use ON-GOTO.

```
100 GETA$: IFA$ <> "1" AND A$ <>
"2" AND A$ <> "3" THEN 100
```

```
110 ON VAL(A$) GOTO 120, 130, 140
120 PRINT "YOU PRESSED 1!":
END
130 PRINT "YOU PRESSED 2!":
END
140 PRINT "YOU PRESSED 3!"
```

In this particular case, one can use A\$ itself to shorten the program.

```
100 GETA$: IFA$ <> "1" AND
A$ <> "2" AND
A$ <> "3" THEN 100
110 PRINT "YOU PRESSED "A$"!"
```

Suppose you just wanted the user to enter numbers. What's wrong with using a numeric variable like this?

```
100 GETA: IFA=0 THEN 100
110 PRINTA
```

Nothing—or is it? Enter these lines; then try pressing any number key. No problem! But try typing a letter. Zing! You're rewarded with an error! To minimize problems with numerals, always use GET for a string variable; then use VAL to change the input to a number. If you need numbers larger than a single digit, concatenate the string, as you did in the second example above, and then use VAL.

To finish up, here's a neat trick to eliminate everything but numbers or letters. First, here's the one for numbers.

```
100 GETA$: IFA$ <"0" OR
A$ > "9" THEN 100
110 PRINT VAL(A$)
```

Yes, greater-than and less-than symbols can be used with A\$. They evaluate the ASCII value of the character. Now, let's work with letters.

```
100 GETA$: IFA$ <"A" OR
A$ > "Z" THEN 100
110 PRINT A$
```

Next month, we'll take a look at the INPUT command. □

Let's look
at ways users
can enter
information into
your program.

MACHINE LANGUAGE

Jim Butterfield

ANIMATED CHARACTERS

Animation is always fun, and you can achieve it in a number of ways on your Commodore. You can create image movement by using sprites, turning pixels on and off on a high-resolution screen, or even using graphics characters to write new information to the screen. There's one more method that we'll investigate this month—animating the characters themselves.

That's what we'll do with Charzoom, a program for the 64 or the 128 in 64 mode. Charzoom has a conventional character screen, but it uses a custom character set rather than the standard ROM character base. To do our simple animation, we'll leave the screen data unchanged; instead, we'll modify the appearance of the letter *O* in the character set.

To define custom characters, we must place the whole character set somewhere in memory. I've chosen addresses 49152–51199 (\$C000–\$C7FF) for the character descriptions. We'll copy these characters from ROM, so you won't notice any difference until we animate one of them, the letter *O*.

All video—screen memory, characters, and sprites—must come from the same quadrant of memory in the 64. For screen memory, I selected 51200–52223 (\$C800–\$CBFF). You'll see the POKES to set all this up in the BASIC program; when the program ends, it puts everything back.

The program copies the character set found in ROM at \$D000 to our chosen spot in RAM at \$C000. Since we must copy 2048 bytes, that's a natural job for machine language. And ML also makes it easy to do another trick—make the

character ROM visible.

Here's the problem that we face: Addresses \$D000–\$D800, where the character ROM resides, are normally the ones used by the I/O chips, CIAs, VIC-2, and SID. To see the characters, we must make the I/O chips disappear. That's fairly easy. We do it by turning off bit 2 of address 1.

But there's another catch. If the I/O chips disappear, even for a moment, we must not allow the IRQ interrupt to strike! This interrupt normally occurs every $1/60$ second and does such jobs as checking the keyboard and updating the clock. It couldn't do its work if the I/O chips were gone; in fact, it would cause a system crash. So we lock out the interrupt with an SEI (Set Interrupt Disable), kick out the I/O chips, copy the ROM, and then put everything back and release the interrupt. Nothing to it, once you know how.

You'll find the code to do this in memory at addresses \$CC00–\$CC28. If you're used to the indirect, indexed addressing mode, there should be no surprises there.

Now let's have some fun. In screen PEEK and POKE terms, the letter *O* is represented by value 15. To find the character drawing, we multiply 15 by 8 (there are eight bytes for each character). Adding the result to our character base starting address, we find that the letter *O* is drawn in the bytes at \$C078–\$C07F. The first byte contains the pixels for the top of the character; the last byte, the pixels for the bottom.

Our objective, then, is to roll the letter *O* so that it appears to be moving upward. Each pixel line will replace the pixel line above it, except for the top one, which will flip to the bottom. In memory terms, that means each byte of the character description moves

down one position, with the bottom one moving to the top.

Machine language is too fast, however. Pixel moves need to be slowed to a rate of, say, ten per second. We achieve this slowdown by counting video raster scans and acting on every sixth scan. This reduction produces a very smooth scrolling effect on the screen.

If you wish to use your disassembler to view the code, you'll find it at \$CC29–\$CC59. The outermost loop repeats until it detects that a key has been pressed. The middle loop does eight pixel rolls on the *O* character. Two innermost loops are used, with one waiting six raster scans and the second moving the pixels.

There's an extra bonus in using the raster position as a timing control. It ensures that the character won't be modified at the same instant that it's being displayed. That way, we avoid screen jitter or tearing.

CHARZOOM

```
KX 100 DATA 169,208,162,192,16
0,0,132,34,132,36,133,3
5,134,37,120
CD 110 DATA 169,51,133,1,177,3
4,145,36,200,208,249,23
0,35,166,37,232
SQ 120 DATA 224,200,208,233,16
9,55,133,1,88,96
QH 130 DATA 162,0,160,6,173,17
,208,205,0,205,141,0,20
5,176,245,136
PX 140 DATA 208,242,173,120,19
2,72,185,121,192,153,12
0,192,200,192,8
HK 150 DATA 208,245,104,141,12
7,192,232,224,8,208,216
DK 160 DATA 32,228,255,168,240
,208,96
MF 200 FOR J=52224 TO 52313
EJ 210 READ X:T=T+X
BP 220 POKE J,X
AE 230 NEXT J
DC 240 IF T<>12735 THEN STOP
XC 300 SYS 52224
QH 310 POKE 56576,4
RX 320 POKE 53272,32
EX 330 POKE 648,200
GH 400 PRINT CHR$(147)
AJ 410 PRINT "COMPUTE MAGAZINE
"
FK 420 PRINT "{5 SPACES}FOR"
QK 430 PRINT "COMMODORE MAGIC!
"
MD 440 PRINT
FP 450 PRINT "PRESS ANY KEY TO
STOP!"
SA 460 SYS 52265
FF 500 POKE 56576,7
CG 510 POKE 53272,20
MP 520 POKE 648,4
```

Animate on a small scale by moving pixels within a single character.

Questions and answers about justified printing, and an enhancement to File Logger

Not Justified

I recently ordered the SpeedScript disk, and I am having trouble with the right-justification function.

I type a letter and print it to disk with Shift+Ctrl+P, as stated in the directions. I run SS Justified and enter the filename of my letter. Having assigned a left margin of 10 and a right margin of 70 on the original letter with **1**=10 and **2**=70, I enter 10,70 at the margin prompt as directed and press Return. All I get on my printout is one column of text running down the page. What's wrong?

LYLE PRUETT
HOLTON, KS

Your problem is with your margin settings. It's fortunate that you included a sample of how you set them instead of simply stating that you set the margins to 10 and 70.

The l and r are in reverse type since they were entered after you pressed Ctrl+3 or Ctrl+E. You're making a mistake by including equal signs when setting SpeedScript margins. Do not use the equal signs when setting margins. What you have done by using an equal sign is to make the L key equal CHR\$(10) and the R key equal CHR\$(70). You haven't changed the margins at all, and your SpeedScript default margins of 5 and 75 remain in effect. So when you tell SS Justified that your margins are 10 and 70, you get the garbled output.

SpeedScript Justified does require you to set the 1 key to CHR\$(1) and the 2 key to CHR\$(2). To do that, you do need the equal sign. To set the margins, however, omit the equal sign. At the top of a SpeedScript file that you plan to print justified with a left margin of 10 and a right margin of 70, you should have some-

thing like the following.

```
1=1
2=2
110r70
```

*Then be sure to put the **1** where you want your justification to begin and **2** where you want it to end.*

File Logger Revisited

I've just finished loading and testing Roger Bachelder's File Logger program (June 1992) and have come up with an enhancement that will allow the program to handle locked files, those that are protected from being scratched. They normally appear as XXX files, and the starting addresses are omitted. Try entering the following line.

```
425 IF ASC(K$)>191 THEN
K=ASC(K$+CHR$(0))-
192: GOTO 440
```

This line may cause the program to crash, however, if it encounters a splat file.

Scratched files also appear as XXX files in the original version. If you don't want deleted files to appear in the listing, enter the following line.

```
375 IF K$="" THEN 520
```

DAVID KLICH
MT. PROSPECT, IL

Saving Data

How can I save data or variables to disk? BASIC's SAVE command doesn't work.

J. S. SAMPLE
FT. PIERCE, FL

It might seem that the logical thing to do when saving variables to disk is to use a command like SAVE "A\$",8, but that would only save whatever program was in memory under the filename A\$. Unfortunately, variable storage is a bit more complicated than that, but it's very useful when

you know how to do it. For example, if you're building a custom database, it often makes sense to have a program for handling the database and a separate disk file for the actual data or information itself.

BASIC commands for manipulating programs don't work with variables. For example, once a program is in memory, you can put it onto the screen with LIST. But you can't list a variable; you must print it.

The SAVE command sends a program to tape or disk; LOAD recalls a saved program. But SAVE and LOAD, like LIST, don't work with variables. They're commands that apply to programs only. Take a look at this example.

```
10 A$ = "John Smith"
20 SAVE A$,8
```

When this program executes, it saves itself to disk under the filename John Smith! If you load and list John Smith, you'll see the above two lines of code.

To save a variable, you must open a file; print the variable, number, or string to the file with PRINT#; and then close the file. Here are a couple of ways to do it.

```
10 A$="THIS IS A TEST"
20 OPEN1,8,2,"TESTFILE,S,W"
30 PRINT#1,A$
40 PRINT#1,"END OF TEST"
50 CLOSE1
```

The first number after OPEN in line 20 is the logical file number, which can be any number from 0 to 127. This number is used later in the PRINT# and CLOSE statements. It's followed by a comma and the device number (a disk drive is device 8). The third number is the secondary address. For disk files, the secondary address specifies the

disk channel which will be used and which must be in the range 2-14. The filename is followed by ,S,W which means it is a sequential file and we are writing to it.

When a disk file is opened, the drive light turns on and stays on until the file is closed. Be sure to close a file when you've finished with it.

Line 30 uses PRINT# to print the A\$ variable to the disk, and line 40 illustrates another way to print a string. Line 50 closes the file.

To reverse the process, delete line 10. In line 20 change the S,W to S,R because now we want to read the sequential file rather than write to it. Since we now want to take information (A\$) from the disk, instead of PRINT#1, A\$ in line 30, we use INPUT#1,A\$. That loads A\$ into memory, and PRINT A\$ prints it onscreen. Since we have two strings on disk, we have to repeat this line to read the second one. Here's a simple routine that will do the job. You can make it more sophisticated, depending on your needs.

```
20 OPEN1,8,2,"TESTFILE,S,W"  
30 INPUT#1,A$: PRINT A$  
40 INPUT#1,A$: PRINT A$  
50 CLOSE1
```

Using INPUT# on strings longer than 80 characters will return a STRING TOO LONG error. In such a case, use GET# instead. It lets you read sequential files a character at a time. Use a FOR-NEXT loop or GOTO statement to read the entire file.

File Types

Can you explain the different file types I see whenever I list a disk directory?

TOM GAYNOR
HYDE PARK, NY

The 64's Disk Operating System (DOS) provides for five

types of disk files: program files, sequential files, user files, relative files, and deleted files. On a directory they usually appear as PRG, SEQ, USR, and REL. DEL is a deleted file, but it does not appear on a normal directory listing.

When you save a program, your computer has to read through program memory and send information through the cable to the disk drive. The drive could put the program anywhere on the disk, but you wouldn't want it to overwrite other programs or files. So DOS has to keep track of where the programs or other files are. It puts the name of the file into the disk directory, marks it as a program, looks at the Block Allocation Map (BAM) to find some free space on the disk, and then saves the program.

A program file (PRG) is just what the name implies. It's information that was saved as a program. In most cases it contains a BASIC or machine language program. It might contain a section of memory that's been transferred to disk using BASIC's SAVE routine. SpeedScript, for example, saves its text to disk as PRG files. To get the program back into the computer, you use the LOAD command. LOAD works only on PRG files.

A sequential file (SEQ) is most often used for storing information such as mailing lists, inventories, etc. Instead of SAVE, you use OPEN, PRINT#, and CLOSE to write to the file. To read it, use OPEN, INPUT# or GET#, and CLOSE. Information in such files is accessed sequentially starting from the first entry in the file. So to get to item number 319 in a sequential file, you must read through the 318 prior entries.

Relative files (REL) are also used to store information.

They're trickier to work with, but they can save a lot of time when you're working with many files. Such files are accessed with the OPEN command, but the data records are numbered. So before you read in the data, you have to position a pointer. This lets you home in on the desired record. To reach record number 319, for example, you just set the pointer to 319, and the disk drive goes straight to that record, rather than searching through all of the previous records. Relative files are faster than sequential files for individual records and don't require much of the computer's memory, because the entire file isn't read in.

USR files have a specialized purpose, and you'll rarely see them used outside of GEOS disks. You can open and write to them as if they were sequential files (replacing the S for sequential with a U for user). Since the VALIDATE command scratches random files, some programmers will create dummy USR files to protect data written to disk. There's also a machine language technique for writing PRG files to USR files.

A deleted file (DEL) is one which no longer exists in the directory and has no blocks reserved for it in BAM. When you scratch a program or file from the disk, it's not actually erased. The directory entry is marked as a deleted file, and the BAM is updated, freeing the space allocated by the program. The file still exists on the disk until you save or write new information to the blocks occupied by that file. By using a disk editor, you can change the byte in the directory which indicates a deleted file to its original value. Now validate the disk with OPEN15,8,15: PRINT#15, "V0": CLOSE15 to update the BAM and restore the deleted file. □

Problems with saving variables to disk, and an explanation of file types

GEOS

Steve Vander Ark

ULTIMATE GEOS (PART 2)

In last month's column I put together what I consider to be the ultimate GEOS hardware configuration. If you'll recall, it consisted of a flat 128 with the following: a 1571, a CMD FD-4000 high-density 3½-inch drive, a RAMLink loaded with a brain-numbing 16 megs of memory, a CMD 200-meg hard drive, two monitors, and a mouse. I figured I wouldn't need the 64K video RAM that you get with the 128D, since no GEOS program that I knew of made use of it. At the time I made that list, I wasn't sure how I was going to access four drives from GEOS.

Since then, New Horizon Software has released its Landmark Series disk. As a result, I've had to add the extra video RAM since several excellent programs on that disk require it. Landmark Series also presents a possible solution to my four-drive problem with DualTop, a file manager program to replace the deskTop.

Great as this may be, that solution only compounds the difficulties in selecting software for my ultimate GEOS system, which is what I'll do this month. Before I get into that, however, I'll state the obvious and note that we'll be using the 128 GEOS version 2.0.

That part is easy. Now comes the hard part: selecting the file manager software. Why not stick with the deskTop? After all, it's probably the best-known file manager. With the GEOS utilities now available from Creative Micro Designs, the deskTop can handle the various CMD devices that we want to plug into our system. I am sorely tempted to stick with the deskTop, since I'm so familiar with it. But the deskTop can only access CMD devices like RAMLink in

1581-sized chunks, and I'm planning to set up a larger native mode partition rather than chop up that 16 megs. (When I create a bunch of partitions, I always end up placing a lot of duplicate files in each partition, which really wastes space.) On top of that, the deskTop drivers can only access the FD-4000 super drive as 1581 partitions. No, for all its ease of use and cute little icons, the deskTop simply isn't powerful enough to handle the high-tech equipment in our ultimate GEOS system.

So what about DualTop 3.0? It can certainly handle CMD RAM devices, and as I mentioned, it lets you access up to four disk drives. The unique display, showing the directories of two drives simultaneously, is a nice touch, and no file manager software for GEOS can match its speed, especially as it scrolls through a directory.

I realize that icon fans decry the trend away from pictures toward simple lists of filenames, but frankly, you waste a lot of time waiting for the deskTop to draw its little pictures. With DualTop, you can scroll through the alphabetical list of names almost faster than you can read them. DualTop also features a RAM drive priority system. This means that whenever you double-click on a file or document to open it, the system first checks the RAM drives or drives for the application, regardless of where the document is stored, since applications run much faster from the RAM drive.

As to its look and feel, DualTop loses a little ground when we compare it to the deskTop or to Gateway, which we'll talk about in a moment. The screen is a bit busy with the two directories showing (a nice feature, but one I seldom need), and operation isn't as intuitive as it is with the

deskTop, even with the file operation buttons constantly displayed. And DualTop, like the deskTop, sees RAM devices as drive-emulating partitions only. Even so, DualTop's four-drive support and its RAM drive priority system make it a very strong contender.

Gateway fully supports CMD RAM devices in either drive-emulating or native mode. Drivers written for Gateway allow it to access the FD-4000 drive the way it's supposed to be accessed, as a 3.2-meg wonder, not as two or more 1581 drives. Until recently, however, I wouldn't have been able to recommend Gateway because of the number of bugs still plaguing it, but the program has been reworked by Jim Collette, and it's now bug-free. Gateway has always been intuitive and a joy to use—except when one of those notorious bugs jumped out at you. Now that it's safe, Gateway might just be the way to go. Unfortunately, Gateway won't support four drives, a very big minus for my ultimate system.

Another contender is geoShell, the DOS-style command line interface for GEOS. GeoShell will access four drives, but again only as 1581 partitions. And when it comes to look and feel, well, what can I say? GeoShell isn't a graphics interface at all, and this *is* GEOS, after all.

Do you start to see the problems I had picking this software? I figured I'd just rattle off a few names and be done with it. So where do I turn? I suppose the only way to go is Gateway, since handling three drives completely is better than incompletely handling four. That leaves us with a few more decisions to make, but I've run out of room this month. I guess this ultimate GEOS series will skip along for yet another issue. □

The ultimate GEOS hardware that I selected last month now needs the ultimate in GEOS software.

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PROGRAMMER'S PAGE

Randy Thompson

TO FILL A CELL

Consider the character—a simple 8 × 8 cell. It's the basic building block of almost any 64 or 128 screen.

Being somewhat unoccupied, I, while pondering the graphical magnitude of the unassuming character, wrote the following 64 program. Believe it or not, this program generates every possible character that can be created in an 8 × 8 cell, and it does so without any human assistance.

The inner workings of this program are really quite simple. Considering that a character is defined by the values stored in eight consecutive bytes, a character definition can be treated as one large 64-bit (eight-byte) number. So to generate every possible character, you simply start at \$0000000000000000 and count up by 1. By the time you reach \$FFFFFFFFFFFFFFF, the 64 will have calculated and displayed every possible character.

With a program such as this, you don't need to be artistic. Whenever you want an impressive Gothic font or cool alien shape, just run this program and sit around until you see the image you like best. Let the computer do the work. Simple, right?

Wrong!

To be honest, this program is absolutely ludicrous. While \$FFFFFFFFFFFFFFF may look like a fairly manageable number in hexadecimal, consider its phenomenal base-ten representation. It equals 18,446,744,073,709,551,616. (I don't even know how to pronounce this number.) Don't try converting this number on your home calculator, folks. It won't work. In fact, I had to hand-calculate this number, so please forgive me if you discover any misplaced digits.

Silly as it is, I found my char-

acter-generating program to be quite intriguing. It makes one think: Shouldn't a computer be able to effortlessly compute and display every possible Commodore 64 character—a small graphic blob confined within a simple 8 × 8 grid? The fact is that it can't.

Computers are fast, but they're simply not up to the task of computing every possible character, no matter how small and insignificant a character cell might appear. First of all, the maximum speed at which the computer can switch between displaying one character and another is approximately 1/60 of a second. That's the scan rate of your TV and most computer monitors, unless you live in the U.K., where scan rates are only 50 frames per second. Even if your monitor could handle faster screen updates, your eyes couldn't. So due to both human and computer limitations, the best your 64 or 128 (or any other computer, for that matter) can hope to display is 60 different characters in a second.

So how long would it take? Since an eight-byte number is practically unfathomable, let's cut the size of the character in half for illustration purposes. For example, let's make the character half as tall (8 × 4) so that the character definition is only four bytes in size. (This much more than halves the number of possible characters since a four-byte number can hold a value only 1/4,294,967,296 as large as an eight-byte number.)

A four-byte number can hold a value between \$00000000 and \$FFFFFFFF. This works out to be 4,294,967,296 different character patterns. At 60 characters per second, it would take over two years for the computer to finish displaying all possible 8 × 4 characters. That means

that with an 8 × 8 character, it would take over two years before any pixels in the top half of the character would even begin to change.

If you understand binary numbering, it's easier to understand the order in which my program cycles through each character definition. Each pixel is being treated as a separate bit in an ever-increasing binary number. Observe the program in progress, and you'll see the pattern. The lowest byte affects the character's lowest line of pixels while the least significant bit of each byte affects the character's rightmost pixels. As a result, pixels are twiddled (for lack of a better word) in right-to-left, bottom-to-top order.

While the program runs, see if you can locate the pixel situated in the character's third row, second column. Gloomy as it may sound, you will die before this pixel comes to life. See the first pixel sitting on the top line? The sun will burn out about the time this sucker lights up. Mind-boggling, isn't it?

So what's the final result? To complete the entire set of 8 × 8 characters, it would take 9,749,040,289 years. In words, that's nine billion, seven hundred forty-nine million, forty thousand, two hundred eighty-nine years. That's give or take 90 days or so.

Now, consider the sprite . . . !

```
EB 100 POKE 53280,0:POKE 53281
      ,0:PRINT "[CLR]"
BR 110 FOR I=12288 TO 12295:PO
KE I,0:POKE I+40,0:NEXT
KG 120 FOR I=828 TO 854:READ D
:POKE I,D:C=C+D:NEXT
DX 130 IF C<>3100 THEN PRINT "
ERROR IN DATA STATEMENT
S":END
CD 140 POKE 53272,(PEEK(53272)
AND 240) OR 12:POKE 15
23,0:POKE 55795,13:SYS
{SPACE}828
BE 150 DATA 162,7,173,17,208,4
8,251,173
BH 160 DATA 17,208,16,251,189,
0,48,024
RX 170 DATA 105,1,157,0,048,20
8,233,202
DE 180 DATA 16,242,96
```

Warning!
The sun may burn
out before
this program comes
to an end.

PROGRAMS

DEMON

By Vaughan Bardell

Just as you were ready to pull your hair out in frustration, here is the ultimate in disk monitors to ease the pain. If ever there was a tool for delving into files, this is it.

DeMON is an enhanced disk monitor for the 64 that fills the gap between a memory resident and a cartridge-based monitor. It enables the user to view and edit files on disk using powerful commands, without directly loading the file into memory.

The main advantage of a disk monitor is its ability to view a large file on disk without the need to load it into memory. This overcomes the problem encountered when the file takes up most of the memory, leaving little, if any, for the monitor.

To get the most out of DeMON, an understanding of Commodore 64 assembly language and experience with machine language monitors is necessary. Novices can use it to view text in a file, among other features.

Typing in DeMON

DeMON is a large program written entirely in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following.

Starting address: 8000

Ending address: 9967

When you've finished typing, save several copies to disk before leaving MLX.

Using DeMON

Load DeMON with ,8,1 and then press the Restore key. The screen will turn dark blue, and a startup message will appear. After exiting DeMON the Restore key can be used to restart the program as long as it hasn't been overwritten by another program.

Restore also returns you to the command entry mode. This can be used in the event of a crash or to stop the Load or Hunt operations. Many of the commands are exited simply by using the Run/Stop key.

Use the space bar to pause listings. Press it again to let the listing continue. On some commands other features

can be accessed while the listing is paused.

All addresses in DeMON are hexadecimal. No dollar sign is required before hex values. If one is included, an error will result. Track and sector numbers, however, are in decimal and are expected to be entered in decimal. The ending address of a file using DeMON is the last byte of a file, not the ending address plus 1 as is common with many monitors. This is important since some commands list the ending address of a file.

If you call a file that isn't on the current disk, you'll get an error message. Insert the correct disk and press Return again to continue.

The Commands

When DeMON is in command entry mode, you'll see a line prompt (>) and a flashing cursor. The commands are represented by a one- or two-letter abbreviation, followed by appropriate parameters. Below is a description followed by a summary of all the 13 main DeMON commands.

Load (L). To set up a file for use with DeMON, you must first load it. The load command constructs a table of the link track and sectors in memory. A file in the directory can be loaded, or the starting track and sector of a file can be entered. DeMON will load the file starting at that track and sector. Please note that if the latter option is used, then the first two bytes of the sector are expected to be the link track and sector, and the next two, the starting address of the file.

To load a file, type L with the filename in quotes (L'filename'). As with a normal load from the disk drive, all forms of pattern matching are acceptable. The ,8 isn't required.

To load a file using the starting track and sector, type the load command followed by a comma, the track, another comma, and then the sector. For example, L,19,5 will load a file starting at track 19, sector 5.

After loading, the file's starting and ending addresses will be displayed.

Find address (FA). This command is very handy for finding the position of a specified address from the current file

on the disk. The command will list the track, sector, and position in the sector of an address in the file. The command is followed with an address that is between the starting and ending addresses of the current file, inclusive—for example, FA 6F01.

Relocate (RL). If the load address of the current file needs to be changed, use the relocate command. Follow the command with the new starting address. This command also clears the current offset. More about that later.

Offset (OF). The offset command is similar to relocate but allows more flexibility with the changing of addresses. It allows an offset to be set which is added to the addresses in the file. This is particularly helpful when the file moves part of itself once in memory. After using offset, any JMPs or JSRs to the transferred portion can be viewed.

The offset command is followed by the new address, an equal sign, and then the old address. The new address now equals the old address—for example, OF 2000=0900.

The command is like a soft relocate since the offset can be cleared by entering OF without the addresses.

List address (LA). The list address command is used for listing the starting and ending addresses of the current file. It can also calculate new starting and ending addresses from an input starting or ending address for the file. It doesn't change addresses.

Type the command without parameters to list the starting and ending addresses of the current file. If an address is included after the command, then the ending address of the current file, if it were to be loaded at this address, would be calculated and printed along with the starting address.

If a comma precedes the input address, then this address will be interpreted as the ending address. The starting address, if the file ends at this address, will be calculated and printed.

Exit DeMON (X). Use this command to exit DeMON back to BASIC. A BASIC program can be typed in without fear of its overwriting DeMON since the end of the BASIC storage area is moved

down in memory. Be sure to type *NEW* before entering a BASIC program.

Disassemble (D). Disassemble is one of the major commands and is the crux of DeMON. It is different from most monitors but has features that allow flexible disassembly of machine language programs.

Two modes are accessible in disassemble. These are interrupted and continuous modes. In continuous mode, the file is listed on the screen, like listing a BASIC program. The screen scrolls up as more data is printed. Press the space bar to halt the listing.

In interrupted mode, the file listing is printed page by page. At the end of each page DeMON waits for keyboard input from the user. The space bar will continue disassemble with the next page. Other keys can be pressed at this stage to access other advanced features.

One advantage of interrupted mode is that at the end of the file, the message *THE END* will be printed. Other features can then be used to jump elsewhere in the file instead of ending disassemble by pressing the space bar. More features will be detailed later.

The disassemble mode can be toggled while the listing is paused, either in interrupted or continuous mode, by pressing f8.

If only *D* is entered, disassemble commences at the beginning of the file. If an address follows the command, then disassemble starts at that address. Modes can be preset by including the suffix ,*C* for continuous mode or ,*I* for interrupted mode. When started, DeMON is in interrupted mode.

The screen display in disassemble consists of the memory address, the assembly language code (followed by the bytes of that command), the ASCII, and then the screen code representations of these bytes. The screen codes are the characters that would appear if these bytes were placed directly into screen memory.

To exit disassemble, press Run/Stop. This returns you to command entry mode. Before examining the other features available with disassemble, let's take a look at the rest of DeMON's primary commands.

Interrogate (I). Interrogate is used to view simultaneously the hex bytes in the file and their ASCII/screen code representations. The display scrolls upward as data is printed. On the far left is the address of the first byte on that line. Eight hex bytes follow and then their representations are shown. These are preceded by an apostrophe. Place ,*S* after the address to view screen codes; omit the suffix for normal ASCII display. During viewing, the mode can be toggled by using the f3 key once the listing is paused.

The f4 key toggles between interrogate and disassemble. It can be used with text list, interrogate, or disassemble in interrupted or continuous mode while the listing is paused. Like the disassemble command, the interrogate command can be used with the default address function if no address is entered—for example, *I*; *I* 5000; *I* 5000,*S*; or *I*,*S*.

Text list (TL). This command rapidly scans a file for any text or messages. It will simultaneously print the ASCII and screen code of the bytes in the file in two columns, with ASCII on the left and screen codes on the right. A black hyphen separates the two columns. To use the command, either enter an address after the command or leave it blank for the default starting address.

To toggle between text list and interrogate, press f1 while the listing is paused. Run/Stop will exit the text list.

Change (C). Use this command to alter bytes in a file. It allows character strings, byte strings, and assembly code to be entered anywhere in a file. The entry must, however, fit in the file. It cannot extend beyond the end of the file.

The entry is performed line by line. A period (.) at the start of the line indicates that DeMON expects the next change-line entry. At the beginning of a line is the address at which the bytes in that line will be stored. This address can be anywhere in the file, and entries don't have to be in ascending address order.

After the address comes the actual data that is to be stored in the file. Only one type of entry can be on any sin-

gle line. The first character distinguishes what type of entry it is: assembly, string, byte, or no entry.

To enter assembly language, no such character is required. Just simply type in a valid assembly statement, making sure any branches are in range, and press Return. When entering LSR, ASL, ROL or ROR commands that use the accumulator addressing mode, no *A* needs to follow the command. All hex numbers must be preceded by a dollar sign when typing in an assembly line. No other number base can be used to enter numbers. No spaces between the command and the addressing mode code are needed.

Here are some examples.

```
.5000 LDA$7000,X
.1209 BNE$1250
.31FF LDY#$91
.49F0 "Mary had a little lamb."
```

To enter a character string on a line, enclose the string in double quotes. Spaces inside quotes will be recognized.

A byte string may be entered by preceding the 8-bit hex numbers with a colon. Spaces between the bytes are not necessary, but they make the entry easier to read.

```
.F000 :01 FF 41 20 50 49 47
```

To finish the entry, press Return on a blank line. DeMON will then ask you to confirm that you want the changes sent to disk. If you do, press *Y* and Return. If not, press *N* or just Return. When you press Return at the end of a data entry line, DeMON checks the line, enters it into memory, and then prints the address that follows the last byte in the previous line. You can edit this address if you like.

DeMON stores the entered changes in RAM under BASIC ROM at \$A000. It doesn't limit the number of bytes to change, but it does limit the number of lines to be changed at one time to 255.

Hunt (H). This command enables you to search the file for a character or byte string. Follow the hunt command with a character string enclosed in double quotes or a byte string. Follow this with the optional parameters for setting the search block. To hunt from a spe-

cific address to the end of a file, include a comma and the address after the string. To hunt from the beginning of a file to a certain address, include two commas and the address after the string. Finally, to hunt between two addresses in a file, follow the string with a comma, the hunt starting address, another comma, and the hunt ending address. At the end of the hunt, DeMON will output all the addresses at which the string was found.

The hunt command is reasonably fast, hunting through a 200-block file in less than 25 seconds. DeMON will stop after it locates the first 127 finds. If this happens, *BUFFER FULL* will appear on the screen. To search the rest of the file, simply specify the last address found as the starting address for the next hunt.

Here are some examples.

H "food"
H 01 02 03 20
H "great",2300 (Search from \$2300 to end of file.)
H FF 00 00,,1000 (Search from start of file to \$1000.)
H "ball",2000,4000 (Search between \$2000 and \$4000.)

Directory (\$). Entering this character and pressing Return loads the directory of the disk in the drive. The listing can be paused, as with other listings, by pressing the space bar. Run/Stop exits the listing.

Pattern matching is supported with the directory listing so only files matching the pattern entered will be displayed. Follow the dollar sign with a colon and the pattern, such as \$:FAD*.

Disk drive status (@). This command allows you to read the disk drive error channel for an error that may have occurred.

Disk command (@). To send a disk command, precede it with the at symbol (@). No quotes are needed—for example, @ R:RAISIN=SULTANA.

Command Summary

Here is a summary of DeMon's 13 main commands.

Load (L). Load a file.

Find address (FA). List track, sector, and position of an address in a file.

Relocate (RL). Set new starting address for a file.

Offset (OF). Set an offset which is added to absolute addresses output.

List address (LA). List starting and ending addresses of a file.

Exit (X). Exit DeMON.

Disassemble (D). Disassemble code from a file.

Interrogate (I). Examine bytes in a file.

Text list (TL). List text found in a file.

Change (C) Change data in a file.

Hunt (H). Hunt through a file for a specified character or byte string.

Directory (\$). Display disk directory.

Drive status or disk command (@).

Other Disassemble Features

When the disassemble display is paused in the interrupted mode, f5 and f1 can be used to access two advanced commands that expand the versatility of DeMON. Jump investigation enables a JSR or JMP command or any manually entered address to be investigated.

When f5 is pressed, DeMON checks to see if there are any jumps on the screen that are in range of the file. If so, DeMON highlights the first of these valid jumps on the screen. The cursor up/down key can be used to move the highlight line onto another jump. To jump to the highlighted jump, press the space bar.

If there are no jumps, or none in range on the screen, then DeMON replaces the top line of the screen with an address entry line where an address can be entered manually. If the address entered is not in range, then DeMON will continue disassemble on the following page.

If there are any valid jumps on the screen, subsequent presses of f5 will toggle between manual entry and

jump selection. If you press Run/Stop to exit jump investigation mode, DeMON will continue with the next page of disassemble.

When investigating a jump, other jumps can be accessed by the same method. To return to where the jump originated, press the Return key. With nested jumps, each press of the Return key will return you to the previous jump command until the first jump is reached.

To clear the return addresses for jumps that have taken place, press f6. The screen will flash yellow, indicating that the table has been cleared. This command will also clear the Backward-Jump table. (See below.)

Pressing Shift/Return returns you to either the start of disassemble, the last place where f6 was pressed, or where the disassemble mode was changed from continuous to interrupted mode.

Back Screen. When in the interrupted mode, disassemble can either proceed or move backward. Press f1 to move backward at the end of the page, and DeMON will display the previous page. The listing will stop at the beginning of disassemble, at the point where the disassemble mode was changed from continuous to interrupted, at the beginning of a jump investigation section, or at the point where f6 was pressed.

Back Screen allows easy access to previous screens, enabling the user to go back and check the disassembly after looking forward in the file.

Special Key Summary

Here is a summary of DeMon's various key commands.

f1. In disassemble, used to jump back in the listing. In interrogate or text list, f1 toggles between these two displays.

f3. In interrogate, used to toggle between ASCII and screen code representation of data.

f4. In disassemble, text list, or interrogate, used to toggle between interrogate and disassemble display.

f5. In interrupted mode disassemble,

PROGRAMS

used to enter a jump investigation address (manually or automatically) and look at the code referred to by a JMP, JSR, or any other code in the file.

f6. In interrupted mode disassemble, used to clear the current Back Screen table and the Jump Investigation table, making the current screen the first screen. This is as if disassemble started at this address. Using f1 displays back screens only up to this screen.

f8. In disassemble this is used to toggle the current disassemble mode between interrupted and continuous.

Space. Used to pause listings to the screen. In the jump investigation, automatic-jump selection, it is used to jump to a JSR or JMP. In interrupted disassemble mode, it will display the next screen of the listing.

Return. Used to return from a jump investigation to the previous address.

Shift/Return. Returns to the first address in the Jump Investigation table when disassemble is in the interrupted mode.

Run/Stop. Exits most commands and functions.

Restore. When in DeMON, this will return you to command entry mode. It is particularly handy when you're hunting or loading if you need to exit partway through. Exiting from a load, however, will leave the File table and variables corrupted. Use the load command to load another file.

Mastering DeMON

As you continue to use DeMON, you will get better at using the commands and viewing and changing files, and you will be able to get the most out of it and realize its true potential. However, this may take a while, but practice makes perfect! Many happy hours of hunting through files.

DEMON

```
8000:F2 FC 09 80 C3 C2 CD 38 DF
8008:30 A9 06 8D 20 D0 8D 21 A5
8010:D0 A2 18 86 D6 20 D7 AA 1F
8018:CA 10 FA A9 D5 8D 18 03 94
```

```
8020:A9 80 8D 19 03 A9 80 85 9E
8028:38 E8 86 37 AD D4 96 D0 82
8030:05 EE D4 96 86 96 E8 8E 62
8038:86 02 20 44 E5 A9 44 A0 44
8040:99 20 1E AB 20 D7 AA 20 6A
8048:43 82 A0 00 84 3C 20 CF C4
8050:FF C9 0D F0 0D C9 3E F0 71
8058:F5 C9 20 F0 07 A2 80 86 24
8060:3C FC A9 00 99 00 02 AA 6F
8068:F0 03 C8 D0 E1 98 F0 D4 F0
8070:24 3C 10 D0 A9 FF 85 7A 74
8078:A9 01 85 7B 84 11 20 C2 62
8080:80 A0 00 D9 9F 96 F0 0A CA
8088:C8 C8 BE 9F 96 D0 F4 4C 20
8090:F8 80 48 20 C2 80 C8 BE A1
8098:9F 96 D0 06 20 B9 80 4C BE
80A0:AE 80 D9 9F 96 F0 07 20 F4
80A8:B9 80 68 4C 89 80 68 88 20
80B0:B9 BB 96 48 B9 BA 96 48 03
80B8:60 A5 7A D0 02 C6 7B C6 98
80C0:7A 60 20 73 00 C9 00 60 D9
80C8:84 FB A0 01 B1 7A 08 A4 5B
80D0:FB E6 7A 28 60 20 42 F6 5A
80D8:20 E7 FF A2 FF 9A E8 86 D0
80E0:C6 86 3B 8E 33 99 F0 86 9F
80E8:20 D7 AA A9 47 8D 18 03 83
80F0:A9 FE 8D 19 03 4C 74 A4 A0
80F8:20 45 AB 4C D5 80 68 85 9C
8100:62 68 85 63 84 64 86 65 5D
8108:A0 00 20 37 81 08 29 7F D0
8110:C9 01 F0 11 20 D2 FF 28 DB
8118:10 EE A5 63 48 A5 62 48 AF
8120:A6 65 A4 64 60 20 37 81 1E
8128:AA 20 37 81 20 D2 FF CA 9E
8130:D0 FA 28 10 D3 30 E3 E6 6E
8138:62 D0 02 E6 63 B1 62 60 56
8140:20 57 81 20 D7 AA 20 C2 C7
8148:80 F0 2A C9 2C F0 7E 20 EB
8150:FE 82 90 77 4C F8 80 A5 E9
8158:96 D0 C9 20 FE 80 0D 20 4A
8160:02 3F 20 4E 4F 20 46 49 ED
8168:4C 45 20 4C 4F 41 44 45 F8
8170:44 8D 4C D5 80 A5 BE 05 FC
8178:BF F0 05 A9 FC 8D A3 81 B9
8180:A5 B0 18 65 9E 48 A5 B1 EE
8188:65 9F 48 20 3A 82 A6 B1 0C
8190:A5 B0 20 9A 8A A9 2D 20 75
8198:D2 FF 20 3A 82 68 AA 68 20
81A0:20 9A 82 4C D5 80 20 FE 5F
81A8:80 20 4F 46 46 53 45 54 A0
81B0:3A A4 20 6A 86 AA A5 C3 92
81B8:18 65 9E 48 A5 C4 65 9F 24
81C0:48 A9 4C 8D A3 81 A5 C3 E6
81C8:4C 92 81 90 17 20 D8 82 3D
81D0:48 20 3A 82 68 48 38 E5 2A
81D8:9E A8 A5 FD 48 E5 9F AA AD
81E0:98 4C 92 81 C6 7A 20 D8 E6
81E8:82 48 20 3A 82 68 85 C4 6C
81F0:18 65 9E 48 A5 FD 65 9F 41
81F8:48 A6 FD A5 C4 4C 92 81 E1
8200:20 57 81 20 D8 82 AA 20 63
8208:D7 AA A4 FD 20 4A 86 86 D5
8210:FA 85 F8 98 AA 20 A8 85 49
8218:20 46 82 A6 FA 20 A8 85 A8
8220:20 46 82 20 3A 82 A5 F8 39
8228:20 A0 82 4C D5 80 20 D8 44
8230:82 85 B0 A5 FD 85 B1 4C FD
8238:62 82 A9 24 FC A9 23 FC 58
8240:A9 2C FC A9 3E FC A9 2F C7
8248:FC A9 93 FC A9 20 4C D2 B1
```

```
8250:FF 20 C2 80 48 20 B9 80 74
8258:68 60 20 57 81 20 51 82 D4
8260:D0 0C 20 67 82 F0 30 A9 2D
8268:00 85 BE 85 BF 60 20 D8 97
8270:82 85 C1 A5 FD 85 C2 20 56
8278:C2 80 C9 3D F0 03 4C F8 31
8280:80 20 D8 82 85 C3 A5 FD 95
8288:85 C4 38 A5 C1 E5 C3 85 95
8290:BE A5 C2 E5 C4 85 BF 4C 1D
8298:D5 80 48 8A 20 A0 82 68 4B
82A0:48 20 AE 82 20 D2 FF 68 84
82A8:20 BE 82 4C D2 FF 29 F0 5C
82B0:4A 4A 4A 4A 18 69 30 C9 EB
82B8:3A 90 02 69 06 60 29 0F E8
82C0:4C B4 82 48 20 AE 82 85 34
82C8:FD 68 4C BE 82 20 A6 AD EB
82D0:20 F7 B7 A6 14 A4 15 60 03
82D8:20 DD 82 85 FD 20 EC 82 DA
82E0:0A 0A 0A 0A 85 FE 20 EC A4
82E8:82 05 FE 60 20 C2 80 20 83
82F0:FE 82 B0 1E 38 E9 30 C9 A1
82F8:0A 90 02 E9 07 60 C9 30 83
8300:90 0E C9 3A 90 08 C9 41 29
8308:90 06 C9 47 B0 02 18 60 A4
8310:38 60 4C F8 80 20 67 82 3A
8318:85 B3 85 F7 85 3B 85 A6 C9
8320:8D 3A 99 A8 20 C2 80 C9 11
8328:2C D0 19 20 51 82 F0 14 29
8330:20 6C 90 A5 AA 8D 35 99 5E
8338:48 A5 AB 48 8D 36 99 A0 DF
8340:00 A2 00 FC A2 0A 8E 33 4D
8348:99 F0 15 C9 22 D0 C3 20 93
8350:C8 80 C9 22 F0 08 99 40 52
8358:01 C8 C0 10 90 F1 84 FB 7C
8360:A9 9A 85 A7 20 AD 85 20 F0
8368:63 85 20 CF FF 85 C1 20 3D
8370:CF FF 85 C2 20 CC FF AD 1E
8378:33 99 F0 33 A5 FB A2 40 73
8380:A0 01 20 BD FF A9 03 A0 45
8388:00 20 00 86 A2 03 20 C6 28
8390:FF 20 CF FF 85 C3 20 CF E4
8398:FF 85 C4 20 CC FF A9 03 58
83A0:20 C3 FF A5 90 4A 4A 90 D5
83A8:17 20 CC FF 4C 11 86 68 F8
83B0:85 AB 68 85 AA A9 02 20 EA
83B8:B7 85 20 63 85 4C 91 83 3B
83C0:A5 C1 85 03 A5 C2 85 04 33
83C8:A5 C3 85 B0 A5 C4 85 B1 4C
83D0:A0 49 20 2F F1 E6 96 A9 73
83D8:06 8D 34 99 A2 D9 A0 84 A8
83E0:20 7E 84 20 6C 84 A0 00 E0
83E8:88 D0 FD 2C 00 DD 50 FB FE
83F0:A9 04 8D 3B 99 A9 80 8D 35
83F8:3C 99 20 73 84 20 60 85 AA
8400:A0 00 20 CF FF 91 A6 C8 B6
8408:C0 80 D0 F6 98 18 65 A6 B1
8410:85 A6 90 02 E6 A7 20 5C 2A
8418:84 A5 A7 C9 9C D0 DB A9 E7
8420:03 8D 3C 99 A9 B7 8D 3A B0
8428:99 A9 00 8D 3B 99 20 73 35
8430:84 20 60 85 20 CF FF 85 AD
8438:9E 20 CF FF 85 9F 20 CF 4D
8440:FF 85 9C 20 CC FF A5 9E 90
8448:05 9F F0 06 20 D7 AA 4C 3C
8450:75 81 A9 00 85 96 20 45 B5
8458:AB 4C 11 86 98 18 6D 3A 0F
8460:99 8D 3A 99 90 03 EE 3B 24
8468:99 4C CC FF 20 68 85 A2 3B
8470:00 F0 05 20 68 85 A2 07 FD
8478:20 CC 84 4C CC FF 85 C4 50
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8480:86 C1 84 C2 A0 00 B1 C1 24
8488:E6 C1 85 3C 98 85 C3 20 6C
8490:68 85 A5 C3 A4 C4 8D 41 B4
8498:99 8C 42 99 A2 0E 20 C9 CA
84A0:84 A0 00 B1 C1 20 A8 FF 0F
84A8:C8 C0 20 D0 F6 20 CC FF 29
84B0:A5 C1 18 69 20 85 C1 90 C1
84B8:02 E6 C2 A5 C3 18 69 20 A0
84C0:90 02 E6 C4 C6 3C 10 C5 C8
84C8:60 A0 05 FC A0 0B BD 30 63
84D0:99 20 D2 FF E8 88 10 F6 89
84D8:60 05 AD 05 02 85 18 AD 5D
84E0:06 02 85 19 20 00 C1 20 54
84E8:B7 E9 A9 00 85 B5 85 B7 43
84F0:85 B8 85 B9 A9 04 85 B6 56
84F8:A5 18 8D 00 04 A4 19 8C FD
8500:01 04 A2 FC 85 06 84 07 05
8508:A9 A0 85 00 A5 00 30 FC 43
8510:C9 01 D0 43 A0 02 AD 00 F6
8518:03 48 08 20 6A 06 AD 01 81
8520:03 20 6A 06 A8 E6 B9 28 DE
8528:F0 09 8A 20 73 06 68 A2 68
8530:FE D0 D1 68 A6 B9 CA D0 32
8538:02 88 88 88 88 98 20 73 5A
8540:06 4C 83 06 91 B5 E6 B5 19
8548:D0 02 E6 B6 60 18 65 B7 6A
8550:85 B7 90 02 E6 B8 60 A9 C2
8558:00 85 B7 85 B8 4C AE E9 52
8560:A2 0F FC A2 02 4C C6 FF 19
8568:A2 0F FC A2 02 4C C9 FF 27
8570:A9 31 FC A9 32 8D 7F 85 23
8578:20 68 85 20 FE 80 55 31 36
8580:3A 32 C0 3C AC A6 A4 20 33
8588:A8 85 A9 2C 20 D2 FF A6 34
8590:AB 20 A8 85 4C CC FF 20 9C
8598:68 85 20 FE 80 42 2D 50 E4
85A0:3A 32 AC A6 9B 4C 91 85 0C
85A8:A9 00 4C CD BD A9 12 85 2D
85B0:AA A9 00 85 AB A9 A2 85 A2
85B8:9B 20 C8 85 20 F8 85 20 1B
85C0:70 85 20 97 85 4C 26 86 13
85C8:A9 01 A2 3A A0 A0 20 BD 66
85D0:FF A9 02 4C FF 85 20 51 F2
85D8:82 F0 30 20 F8 85 20 68 EF
85E0:85 20 C8 80 F0 06 20 D2 8A
85E8:FF 4C E1 85 20 D7 AA 20 71
85F0:CC FF 4C 0B 86 4C D5 80 2E
85F8:A9 00 20 BD FF A9 0F A8 26
8600:20 06 86 4C C0 FF A2 08 87
8608:4C BA FF 20 CC FF 20 F8 8B
8610:85 20 D7 AA 20 60 85 20 3B
8618:CF FF 20 D2 FF C9 0D F0 70
8620:03 AA D0 F3 F0 41 A5 90 1B
8628:29 6F D0 DF 60 86 C1 84 E2
8630:C2 20 6A 86 38 A5 C1 E5 1E
8638:C3 85 C3 A5 C2 E5 C4 85 18
8640:C4 A5 9E C5 C3 A5 9F E5 23
8648:C4 60 20 2D 86 B0 29 F0 E0
8650:27 20 FE 80 0D 3F 20 49 CF
8658:4E 56 41 4C 49 44 20 41 EB
8660:44 44 52 45 53 8D 4C 8E
8668:D5 80 A5 B0 18 65 BE 85 99
8670:C3 A5 B1 65 BF 85 C4 60 53
8678:A9 FC 8D A6 86 A9 9C 85 4F
8680:A9 A2 00 A5 C3 C9 FC B0 55
8688:18 A5 C4 D0 14 AE 01 9A A8
8690:A9 9A 85 A7 A9 00 85 F7 94
8698:A5 C3 18 69 04 AC 00 9A 70
86A0:60 E8 A5 C3 38 E9 FC A0 0D
86A8:FE 8C A6 86 85 C3 B0 02 34

86B0:C6 C4 A5 C4 D0 EB A5 C3 98
86B8:C9 FE B0 E5 8A C5 9C 90 14
86C0:02 D0 8E 0A AA A0 9A 90 13
86C8:01 C8 84 C2 8A 85 C1 85 B8
86D0:F7 A5 C2 85 A7 A0 01 B1 67
86D8:C1 AA 88 B1 C1 A8 A5 C3 5D
86E0:18 69 02 60 20 4A 86 86 58
86E8:AB 84 AA 85 9B 60 A9 01 4D
86F0:A0 60 20 06 86 A2 00 A0 2A
86F8:02 A5 11 20 BD FF 20 D5 98
8700:F3 A5 BA 20 49 87 20 13 87
8708:EE A6 90 F0 03 4C 0B 86 3F
8710:20 13 EE 20 D7 AA 20 13 90
8718:EE 20 13 EE F0 25 20 13 67
8720:EE AA 20 13 EE 20 CD BD D7
8728:20 4C 82 20 13 EE F0 E3 C6
8730:20 D2 FF 20 EA 88 F0 0B 6C
8738:90 F1 20 EA 88 B0 EC F0 90
8740:02 90 F7 20 EF ED 4C D5 1B
8748:80 20 09 ED A5 B9 4C C7 14
8750:ED 8A 38 E5 B0 AA 98 E5 A5
8758:B1 A8 60 A5 C1 38 E5 C3 4F
8760:85 3C A5 C2 E5 C4 05 3C AA
8768:60 20 6C 87 A0 00 C6 B4 FC
8770:38 F1 B4 B0 02 C6 40 60 C5
8778:A5 D6 A2 FF C9 16 90 DA 07
8780:20 FE 80 0D 01 0D 20 12 CE
8788:20 50 52 45 53 53 20 53 D5
8790:50 41 43 45 A0 A9 00 85 06
8798:C7 A4 B4 38 A5 3F E5 3D 02
87A0:99 00 9D E6 B4 20 03 89 54
87A8:C5 C6 F0 FC 20 E4 FF 85 54
87B0:B2 C9 85 D0 72 A5 B4 C9 A6
87B8:02 90 EA A5 3F 48 A5 40 4B
87C0:48 A0 00 A5 3F 20 69 87 4B
87C8:85 3F A4 3B F0 30 B9 00 6E
87D0:9F AA B9 01 9F A8 20 51 D2
87D8:87 84 C2 86 C1 A6 3F A4 59
87E0:40 20 51 87 EA EA 84 C4 8B
87E8:86 C3 20 5B 87 F0 0F 90 94
87F0:0D 68 85 40 68 85 3F E6 14
87F8:B4 E6 B4 4C A5 87 68 68 FB
8800:A4 A0 A6 3F 20 4A 86 85 F8
8808:9B 85 A8 A9 00 85 FE E4 F0
8810:AB D0 04 C4 AA F0 0A 86 AB
8818:AB 84 AA 20 70 85 20 DF 31
8820:8F 20 97 85 4C E5 88 C9 21
8828:87 D0 06 20 73 94 4C E5 60
8830:88 C9 8D D0 16 A0 00 84 6E
8838:3B 84 B4 AE 00 9F 86 3F 54
8840:AC 01 9F 84 40 20 B7 95 AB
8848:4C E5 88 C9 0D D0 32 A5 8C
8850:3B F0 A8 A5 3F 20 6C 87 5C
8858:85 3F A4 3B B9 00 9F C5 17
8860:3F D0 EC B9 01 9F C5 40 D0
8868:D0 E5 C6 B4 C6 3B C6 B6
8870:A4 3B B9 00 9E 85 3F AA 0E
8878:B9 01 9E 85 40 A8 4C 45 55
8880:88 C9 8C D0 14 A9 01 85 B5
8888:3B A9 91 20 D2 FF 20 D2 BB
8890:FF 20 FD 88 A2 00 4C D7 77
8898:AA C9 8A D0 05 A2 01 4C D0
88A0:77 96 C9 8B D0 34 A9 00 AF
88A8:85 3B A5 3F A6 40 38 E5 80
88B0:3D B0 01 CA A5 3D 8D 00 96
88B8:9F 8E 01 9F A4 B4 88 B9 1A
88C0:00 9D 8D 00 9D A9 01 85 06
88C8:B4 EE 20 D0 A5 A2 69 18 A3
88D0:C5 A2 D0 FC CE 20 D0 4C 3C
88D8:A5 87 C9 03 D0 03 4C D5 09

88E0:80 C9 20 D0 F2 A2 01 A4 7E
88E8:B2 60 20 03 89 A5 C5 C9 D7
88F0:3C D0 06 C5 C5 F0 FC 38 95
88F8:60 C9 3F 18 60 A5 C5 C9 05
8900:40 D0 FA A9 00 85 C6 60 65
8908:A9 90 FC A9 08 85 12 20 E8
8910:57 81 20 2B 90 20 51 82 10
8918:F0 04 C9 2C D0 09 20 6A F5
8920:86 A8 A5 C3 4C 2C 89 20 D7
8928:D8 82 A4 FD 85 3F AA 84 BF
8930:40 20 E4 86 24 12 30 1A 54
8938:20 C2 80 F0 0E C9 2C D0 EB
8940:07 20 C2 80 C9 53 F0 06 C2
8948:4C F8 80 A9 00 FC A9 01 B2
8950:85 F8 20 5C 8A 20 D7 AA 5D
8958:20 63 85 A6 40 A5 3F 20 A6
8960:9A 82 24 12 10 07 20 4C 30
8968:82 A0 10 D0 09 A0 08 24 F2
8970:12 30 03 20 4C 82 20 CF 77
8978:FF 99 3C 03 24 12 30 03 76
8980:20 A0 C2 80 88 08 E6 9B F0 A8
8988:64 28 D0 E3 24 12 10 22 DB
8990:A0 10 B9 3C 03 20 65 8A E0
8998:88 D0 F7 A9 90 20 D2 FF 68
89A0:20 FE 80 2D 85 A0 10 B9 EE
89A8:3C 03 20 4E 8A 88 D0 F7 93
89B0:F0 1A A9 27 20 D2 FF A0 57
89B8:08 B9 3C 03 A6 F8 F0 06 F6
89C0:20 4E 8A 8A 4C C9 89 20 65 A7
89C8:8A 88 D0 ED 20 EA 88 F0 EA
89D0:5D 90 46 20 EA 88 F0 56 33
89D8:B0 3F AE 77 02 E0 86 D0 D2
89E0:0E 24 12 30 0A A5 F8 49 6B
89E8:01 85 F8 10 2C F0 42 E0 88
89F0:8A D0 17 A2 00 86 3B A5 C0
89F8:3F 8D 00 9F A5 40 8D 01 53
8A00:9F 20 D7 AA 20 D7 AA 4C 94
8A08:2F 8D E0 85 D0 C5 A5 12 87
8A10:30 03 A9 90 FC A9 08 85 60
8A18:12 18 A5 12 29 1F 65 3F E1
8A20:85 3F 90 02 E6 40 20 DA 4D
8A28:8C B0 03 4C 55 89 4C D5 14
8A30:80 98 48 A4 F7 B1 A6 85 88
8A38:AA C8 B1 A6 85 AB C8 A9 8B
8A40:02 85 9B 20 5C 8A 20 63 DD
8A48:48 68 A8 4C 89 89 AA 98 74
8A50:48 A4 D3 8A 91 D1 C8 84 BF
8A58:D3 68 A8 60 20 B9 85 20 9F
8A60:0F 90 84 F7 60 C9 20 90 2C
8A68:0C C9 22 F0 08 C9 80 90 42
8A70:06 C9 A0 B0 02 A9 2E 4C 79
8A78:D2 FF 20 57 81 20 2B 90 E3
8A80:20 51 82 A0 00 C9 22 F0 B0
8A88:1E 20 FE 82 90 03 4C F8 DE
8A90:80 20 DD 82 99 3C 03 C8 5E
8A98:C0 14 B0 F2 20 51 82 F0 94
8AA0:19 C9 2C D0 EC F0 13 E6 7F
8AA8:7A 20 C8 80 C9 22 F0 0A E6
8AB0:99 3C 03 C8 C0 14 90 F1 F7
8AB8:B0 D4 8C 3B 03 98 18 69 B4
8AC0:08 85 F9 20 C2 80 C9 2C 54
8AC8:D0 31 20 51 82 C9 2C D0 10
8AD0:0E 20 6A 86 85 FA A5 C3 D1
8AD8:85 3C 20 C2 80 D0 10 20 77
8AE0:D8 82 85 3C A5 FD 85 FA A2
8AE8:20 C2 80 C9 2C D0 15 20 5A
8AF0:D8 82 85 FF A5 FD 85 FC F0
8AF8:4C 14 8B 20 6A 86 85 FA 20
8B00:A5 C3 85 3C 20 6A 86 A5 AC
8B08:C3 18 65 9E 85 FF A5 C4 D9

PROGRAMS

8B10:65	9F	85	FC	A6	3C	8E	37	BC	8D40:20	C3	8D	A6	3F	A4	40	20	A5	8F70:18	65	FC	85	FC	A5	FD	69	D0
8B18:03	A4	FA	8C	38	03	20	4A	5A	8D48:E4	86	85	A8	A0	9C	84	A9	DC	8F78:00	85	FD	4C	90	8F	49	FF	D2
8B20:86	8C	34	03	8E	35	03	38	DB	8D50:4C	79	8D	A5	F7	18	69	02	F0	8F80:A8	A5	FC	84	FC	18	E5	FC	56
8B28:E9	02	8D	36	03	A6	FF	A4	21	8D58:85	F7	90	02	E6	A7	A9	02	91	8F88:85	FC	A5	FD	E9	00	85	FD	96
8B30:FC	8E	39	03	8C	3A	03	20	34	8D60:85	9B	A4	F7	B1	A6	AA	C8	7F	8F90:A6	FD	A5	FC	20	9A	82	4C	C3
8B38:4A	86	A9	03	8D	34	99	A2	8E	8D68:B1	A6	85	AB	86	AA	A9	02	A5	8F98:1D	8F	A5	B3	D0	03	4C	78	BD
8B40:D8	A0	8B	20	7E	84	20	68	0E	8D70:38	E5	FE	85	A8	A9	9C	85	04	8FA0:87	20	EA	88	F0	36	90	28	1B
8B48:85	A0	04	A2	00	20	CE	84	97	8D78:A9	20	B9	85	20	DF	8F	A0	40	8FA8:20	EA	88	F0	2F	B0	21	AE	DF
8B50:A4	F9	A2	00	BD	34	03	20	71	8D80:00	B1	A8	20	59	8E	90	03	48	8FB0:77	02	E0	8C	D0	1D	A2	00	31
8B58:D2	FF	E8	88	D0	F6	20	CC	ED	8D88:4C	53	8D	20	F5	8D	20	DA	53	8FB8:86	3B	86	B3	CA	86	B4	A2	72
8B60:FF	C8	D0	FD	2C	00	DD	70	31	8D90:8C	B0	0D	20	9A	8F	8A	F0	DA	8FC0:9D	86	B5	A5	3F	8D	00	9F	31
8B68:FB	20	D7	AA	A9	05	A0	02	CF	8D98:E6	30	E4	20	C3	8D	F0	DF	E7	8FC8:A5	40	8D	01	9F	A2	01	60	76
8B70:A2	00	8D	3B	99	8C	3C	99	4F	8DA0:20	FE	80	0D	01	0F	20	12	03	8FD0:A2	00	60	E0	8A	D0	D1	A2	39
8B78:8E	3A	99	20	73	84	20	C6	4F	8DA8:20	54	48	45	20	45	4E	44	3D	8FD8:00	4C	77	96	4C	D5	80	A5	C3
8B80:8B	A4	C3	F0	3E	84	FB	C0	CA	8DB0:20	8D	A5	B3	D0	0A	20	FD	1C	8FE0:9B	48	A9	02	85	9B	20	97	A7
8B88:FF	D0	01	C8	98	38	E9	02	FB	8DB8:88	20	99	87	C0	20	D0	DB	CF	8FE8:85	20	63	85	68	85	9B	A0	C8
8B90:85	C1	F0	16	20	73	84	20	52	8DC0:4C	D5	80	20	49	82	A5	3F	68	8FF0:02	20	CF	FF	99	00	9C	C8	E1
8B98:C6	8B	A6	C4	A5	C3	20	9A	2E	8DC8:85	3D	20	FE	80	13	12	05	63	8FF8:D0	F7	AD	01	9C	85	B6	4C	F8
8BA0:82	20	4C	82	C6	C1	C6	C1	3F	8DD0:41	44	44	52	20	20	43	4F	A2	9000:CC	FF	18	AD	CA	02	0A	6D	45
8BA8:D0	EA	E6	FB	D0	12	20	FE	8D	8DD8:44	45	01	09	20	56	41	4C	41	9008:CA	02	AA	BD	65	98	60	A4	33
8BB0:80	0D	0D	42	55	46	46	45	A6	8DE0:55	45	01	05	20	41	53	43	58	9010:F7	20	14	90	C8	D0	02	E6	35
8BB8:52	20	46	55	4C	4C	21	8D	82	8DE8:49	49	20	20	53	43	52	CE	1C	9018:A7	60	08	A6	A7	E0	9A	F0	77
8BC0:4C	D5	80	4C	F8	80	20	60	B2	8DF0:A9	00	85	C7	60	A2	00	BD	59	9020:08	A6	F7	E0	FE	D0	02	C6	02
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8BD0:FF	85	C4	A0	02	4C	5C	84	6A	8E00:E8	EC	C9	02	D0	F1	BC	A4	C2	9030:85	A0	00	20	CF	FF	D9	03	73
8BD8:08	20	B7	E9	A0	00	84	B5	55	8E08:96	20	4C	82	88	D0	FA	D2	4A	9038:00	D0	08	C8	C0	02	D0	F3	BE
8BE0:A9	02	85	BB	AD	08	02	85	D0	8E10:00	BD	CB	02	20	65	8A	E8	CA	9040:4C	CC	FF	20	E7	FF	20	42	7E
8BE8:B7	AD	09	02	85	B8	AD	06	F8	8E18:EC	C9	02	D0	F4	38	A9	06	4D	9048:F6	20	FE	80	0D	20	3F	20	5C
8BF0:02	85	09	AD	05	82	85	08	A9	8E20:ED	C9	02	AA	20	4C	82	CA	93	9050:F7	52	4F	4E	47	20	44	49	0D
8BF8:A2	04	86	BA	E8	86	B6	AD	5B	8E28:D0	FA	A2	00	A4	D3	BD	CB	7C	9058:53	4B	2E	2E	2E	8D	20	E4	6B
8C00:07	02	4C	F1	03	A9	00	85	0A	8E30:02	91	D1	A9	01	91	F3	C8	86	9060:FF	C9	0D	F0	C6	C9	03	D0	D8
8C08:B9	A0	00	A2	05	A9	80	85	A5	8E38:E8	EC	C9	02	D0	F0	4C	D7	19	9068:F5	4C	D5	80	20	CD	82	E0	78
8C10:0A	A5	01	30	FC	C9	02	90	D9	8E40:AA	A8	8D	CB	02	B9	E5	96	A4	9070:24	B0	1F	86	AA	20	51	82	17
8C18:0A	CA	D0	F1	A9	00	85	BB	36	8E48:48	18	2A	2A	2A	29	03	8D	01	9078:C9	2C	F0	2B	20	CD	82	86	1E
8C20:4C	A5	03	AD	00	04	85	08	27	8E50:C9	02	68	29	3F	8D	CA	02	3A	9080:AB	A2	04	A5	AA	DD	0F	99	7F
8C28:AD	01	04	85	09	A2	02	BD	C5	8E58:60	20	41	8E	AC	C9	02	88	D7	9088:CA	B0	FA	BD	14	99	C5	AB	B4
8C30:00	04	9D	FE	03	E8	D0	F7	43	8E60:A2	00	A5	A9	C9	9C	D0	2C	AC	9090:B0	87	20	FE	80	0D	3F	20	B6
8C38:B1	B9	D9	0D	02	F0	1F	A0	57	8E68:A5	A8	C9	FE	90	2A	C9	FF	6C	9098:49	4E	56	41	4C	49	44	20	01
8C40:00	E6	B7	D0	02	E6	B8	E6	1B	8E70:D0	06	C0	00	F0	22	D0	08	49	90A0:54	2F	53	8D	4C	D5	80	4C	02
8C48:B9	D0	02	E6	BA	20	90	03	9B	8E78:C0	02	30	1C	C0	01	D0	06	EF	90A8:F8	80	20	57	81	20	2B	90	53
8C50:A5	BA	C9	04	D0	E2	A5	B9	7B	8E80:A2	01	A9	00	F0	05	A2	02	47	90B0:20	D7	AA	A2	00	86	71	86	DA
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8C60:0C	02	F0	4E	20	86	03	98	BC	8E90:9C	8D	01	9C	86	FE	38	60	4A	90C0:DC	91	20	D8	82	8D	39	03	06
8C68:18	65	B9	C9	FE	D0	C9	A5	2F	8E98:A9	00	8D	00	9C	8D	01	9C	F5	90C8:A5	FD	8D	3A	03	A2	00	20	54
8C70:BA	C9	04	D0	C3	A2	E0	BD	0F	8EA0:A6	40	A5	3F	20	9A	82	20	5A	90D0:C2	80	C9	3A	F0	04	C9	22	9D
8C78:00	04	9D	02	03	E8	E0	FE	E2	8EA8:4C	82	20	50	8F	20	02	90	27	90D8:D0	06	4C	01	93	20	C2	80	A0
8C80:D0	F5	C6	BA	E6	B9	E6	B9	A9	8EB0:A0	03	BD	65	98	20	D2	FF	D7	90E0:C9	00	D0	03	4C	CB	92	9D	85
8C88:4C	06	03	98	A6	B8	18	65	E0	8EB8:E8	88	D0	F6	20	4C	82	AD	DA	90E8:34	03	E8	E0	03	D0	EE	A2	EB
8C90:B7	90	04	E8	FC	A5	B7	CD	74	8EC0:CB	02	20	2A	8F	85	C1	C9	CA	90F0:00	20	C2	80	F0	12	9D	3B	C0
8C98:0A	02	D0	2D	98	F0	02	8A	3B	8EC8:02	90	52	AA	BD	1F	99	85	23	90F8:03	20	FE	82	B0	02	A9	30	BC
8CA0:FC	A5	B8	CD	0B	02	D0	21	B8	8ED0:C3	A0	00	20	3D	8F	C0	03	A6	9100:9D	44	03	E8	E0	08	D0	E9	A4
8CA8:68	68	A4	BB	8C	00	05	4C	1B	8ED8:D0	F9	85	C2	A5	C1	C9	08	89	9108:A9	00	9D	3B	03	AA	86	3C	73
8CB0:AE	E9	A4	BB	A5	B7	91	B5	D0	8EE0:F0	7B	A2	01	20	4C	8F	9D	A8	9110:A0	00	BD	65	98	DA	34	03	29
8CB8:CE	A5	B8	91	B5	C8	84	BB	65	8EE8:CB	02	E8	EC	C9	02	D0	F4	45	9118:D0	08	E8	C8	C0	03	D0	F2	F5
8CC0:D0	04	C6	BB	D0	E4	4C	3A	C4	8EF0:CA	BD	CB	02	20	A0	82	CA	CF	9120:F0	E0	E8	C8	C0	03	D0	FA	97
8CC8:03	60	48	B9	2C	03	99	00	C0	8EF8:D0	F7	A5	C3	0A	A0	03	A5	EB	9128:E6	3C	E0	AB	D0	E2	F0	13	AB
8CD0:03	C8	C0	C5	D0	F5	68	4C	8D	8F00:C4	90	13	C8	4A	20	3D	8F	71	9130:A6	3C	86	C1	A2	00	BD	E5	19
8CD8:02	03	A6	3F	A4	40	20	2D	10	8F08:C0	07	D0	F9	A0	03	A5	C2	22	9138:96	A8	29	3F	C5	C1	F0	09	0A
8CE0:86	B0	04	F0	02	38	60	18	C2	8F10:20	3D	8F	4C	1D	8F	20	3D	E9	9140:E8	D0	F3	20	45	AB	4C	C1	BF
8CE8:60	20	57	81	02	A2	00	86	3B	8F18:8F	C0	07	D0	F9	A6	C1	BC	C7	9148:92	98	29	C0	18	2A	2A	2A	F3
8CF0:E8	20	D7	AA	20	51	82	F0	68	8F20:D8	96	20	4C	82	88	D0	FA	EC	9150:8D	C9	02	8E	CB	02	86	C2	0C
8CF8:04	C9	2C	D0	09	20	6A	86	3D	8F28:18	60	18	4A	08	AA	BD	E5	5F	9158:8A	20	2A	8F	C9	02	90	75	F3
8D00:A8	A5	C3	4C	0B	8D	20	D8	BD	8F30:97	28	90	04	29	0F												

91A0:B9 18 99 DD 44 03 D0 EC 74	93D0:92 20 2B 90 A0 00 A9 36 46	9600:07 F0 05 A4 FC 4C 1D 96 C1
91A8:E8 C8 A5 C4 60 A5 FB 0A 0F	93D8:85 01 B1 3F AA C8 B1 3F 48	9608:20 46 96 98 A4 3C 99 53 CF
91B0:A5 C4 A0 03 90 31 C8 4A 41	93E0:84 FA A8 A9 37 85 01 20 AA	9610:03 8A 99 52 03 C8 C8 C8 4F
91B8:48 08 68 85 C3 68 20 CD 35	93E8:4A 86 48 A5 3C F0 13 E4 EA	9618:C8 84 3C D0 08 C0 02 B0 57
91C0:91 A0 03 A5 C3 48 71 20 D1	93F0:AB D0 04 C4 AA F0 16 98 CC	9620:04 A0 02 D0 B0 AD D8 95 48
91C8:9C 91 4C EA 91 20 9B 91 AC	93F8:48 8A 48 20 73 85 68 AA 1F	9628:18 69 28 8D D8 95 90 03 DA
91D0:C0 07 D0 F9 60 AD 3B 03 03	9400:68 A8 84 AA 86 AB 68 20 96	9630:EE D9 95 E6 FA A5 FA C9 9A
91D8:D0 BC F0 38 A2 19 A9 00 02	9408:B7 85 4C 13 94 68 85 9B 16	9638:16 90 98 A9 FF A4 3C 99 E6
91E0:9D 34 03 CA 10 FA 60 20 3A	9410:20 97 85 20 6B 85 A4 FA 97	9640:50 03 60 20 87 94 A2 0A 42
91E8:CD 91 BD 3B 03 D0 A7 A6 14	9418:C8 A9 36 85 01 B1 3F AA 27	9648:A4 3C B9 50 03 8D 59 96 AA
91F0:FA AC C9 02 88 98 0A 85 56	9420:C8 A9 36 85 01 B1 3F 48 CC	9650:B9 51 03 8D 5A 96 A0 01 57
91F8:FC A0 01 BD 3B 03 91 7A 42	9428:A9 37 85 01 68 20 D2 FF 1E	9658:BD FF FF C9 30 B0 02 09 52
9200:E8 C8 C6 FC D0 F5 AE C9 F9	9430:CA F0 2E E6 9B F0 07 C8 A6	9660:40 91 7A C8 E8 E0 0E D0 A5
9208:02 D0 06 20 DD 82 9D CB 25	9438:D0 E7 E6 40 D0 E3 98 48 34	9668:EF 20 D8 82 AA A4 FD A5 62
9210:02 CA D0 F7 A5 71 C9 08 11	9440:8A 48 20 73 85 20 97 85 5D	9670:7A 38 E9 04 85 7A 60 A9 E6
9218:D0 35 CE C9 02 AD CC 02 CB	9448:20 63 85 20 CF FF 85 AA 41	9678:00 85 B4 85 3B 85 F8 8A 62
9220:38 E9 02 B0 03 CE CD 02 18	9450:20 CF FF 85 AB A9 02 20 FD	9680:F0 03 20 89 88 20 D7 AA A2
9228:38 ED 39 03 85 FF AD CD 91	9458:B7 85 68 AA 68 A8 4C 37 2C	9688:68 68 A5 A8 85 9B 20 5C 7A
9230:02 ED 3A 03 A8 05 FF 90 33	9460:94 C6 F9 F0 08 C8 A9 01 8B	9690:8A 20 63 85 A9 08 85 12 5A
9238:09 98 D0 0D A6 FF 30 09 91	9468:85 3C 4C D6 93 20 73 85 E3	9698:A6 40 A5 3F 4C 5F 89 4F 14
9240:10 0A C8 D0 04 A6 FF 30 01	9470:4C D5 80 A2 00 86 10 20 C9	96A0:46 4C 41 52 4C 46 41 54 A3
9248:03 4C 43 91 8E CC 02 20 4F	9478:C2 95 A5 3C D0 57 A9 80 98	96A8:4C 4C 00 44 00 49 00 48 C0
9250:8D 93 90 03 4C 5D 93 AD 10	9480:85 10 D0 77 20 03 89 A4 C6	96B0:00 40 00 43 00 58 00 24 A7
9258:39 03 AE 3A 03 20 AC 92 D8	9488:3C B9 50 03 8D 9E 94 8D 16	96B8:00 00 59 82 3F 81 2D 82 16
9260:AD C9 02 C9 02 08 AE CB 05	9490:A3 94 B9 51 03 8D 9F 94 1F	96C0:FF 81 07 89 14 83 E8 8C D4
9268:02 20 AC 92 28 90 0E FE E5	9498:8D A4 94 A2 27 BD FF FF 9E	96C8:0A 89 79 8A D5 85 A9 90 DD
9270:02 18 80 38 AE CD 02 AD 8E	94A0:49 80 9D FF FF CA 10 F5 83	96D0:E7 80 ED 86 00 08 05 02 64
9278:CC 02 20 AD 92 A9 2E 20 1B	94A8:60 A4 3C B9 54 03 C9 FF 90	96D8:0A 0A 07 05 05 06 03 03 08
9280:D2 FF AD C9 02 20 F2 92 6A	94B0:F0 2A 20 87 94 A5 3C 18 25	96E0:05 05 03 03 03 41 A1 40 03
9288:A9 43 8D 77 02 A9 20 8D 01	94B8:69 04 85 3C D0 1B A5 3C 86	96E8:40 40 A1 A7 40 49 A1 67 C6
9290:78 02 A2 02 A9 07 20 6B FB	94C0:F0 1A 20 87 94 A5 3C 38 51	96F0:40 40 E1 E7 40 AE A1 40 49
9298:93 20 60 A5 20 DC 91 A9 37	94C8:E9 04 85 3C AC D9 94 4C 9B	96F8:40 40 A1 A7 40 A4 E1 40 3D
92A0:00 85 71 85 7A E6 F9 4C 5D	94D0:78 95 20 CA 8D A9 00 85 E4	9700:40 40 E1 E7 40 F6 A2 40 74
92A8:C2 90 38 80 18 A0 00 91 37	94D8:3C 20 87 94 20 03 89 20 A2	9708:40 AB A2 A8 40 46 A2 68 E9
92B0:49 B0 07 C8 8A 91 49 20 61	94E0:E4 FF F0 FB C9 03 F0 9C 33	9710:40 EB E8 E8 40 AF A2 40 4C
92B8:BA 92 E6 49 D0 02 E6 4A F7	94E8:C9 20 F0 E3 C9 91 F0 CE A0	9718:40 40 A2 A8 40 4B E2 40 8B
92C0:60 C6 F9 A9 00 8D C9 02 6D	94F0:C9 11 F0 B5 C9 87 D0 E7 B2	9720:40 40 E2 E8 40 42 A3 40 FC
92C8:4C 82 92 A5 49 F0 20 4C FB	94F8:20 87 94 A2 27 A9 A0 9D 8F	9728:40 40 A3 A9 40 47 A3 69 66
92D0:C4 93 20 FE 80 4F 55 54 71	9500:00 04 CA 10 FA 20 FE 80 5D	9730:40 F7 E3 E9 40 B0 A3 40 E4
92D8:50 55 54 28 59 2F 4E 29 D5	9508:12 13 41 44 44 52 45 53 B6	9738:40 40 A3 A9 40 45 E3 40 C5
92E0:20 BF 20 CF FF C9 0D F0 39	9510:53 BA A0 00 84 FB 20 E4 E0	9740:40 40 E3 E9 40 43 A4 40 53
92E8:04 C9 59 F0 D3 68 68 4C 1A	9518:FF F0 FB A4 FB C9 87 D0 30	9748:40 40 A4 AA 40 48 A4 6A BD
92F0:D5 80 18 6D 39 03 85 C1 9D	9520:04 24 10 10 AD 20 FE 82 C7	9750:40 F7 E4 EA 40 B1 A4 40 3B
92F8:AA A9 00 6D 3A 03 85 C2 60	9528:B0 DD C0 04 F0 E8 C8 91 95	9758:40 40 A4 AA 40 44 E4 40 14
9300:60 A0 00 AE 39 03 8E 40 9D	9530:7A 20 D2 FF 98 D0 DD C9 88	9760:40 40 E4 EA 40 40 A0 40 8F
9308:03 AE 3A 03 8E 41 03 C9 1D	9538:14 D0 13 88 30 D4 84 FB 66	9768:40 97 A0 98 40 5B 40 51 7C
9310:22 F0 16 20 51 82 D0 03 82	9540:A0 95 A9 4A 20 1E AB 4C 18	9770:40 D7 E0 D8 40 B2 A0 40 AD
9318:4C C4 93 20 51 82 F0 16 97	9548:16 95 9D 20 9D 00 C9 0D 27	9778:40 97 A0 98 40 4F E0 53 9F
9320:20 DD 82 99 43 03 C8 D0 41	9550:D0 21 C0 04 D0 C0 20 D8 27	9780:40 40 E0 40 40 50 9F 96 2E
9328:F2 20 C8 80 C9 22 F0 06 B0	9558:82 48 A4 FD AA 20 2D 86 02	9788:40 95 9F 96 40 50 9F 52 6F
9330:99 43 03 C8 D0 F3 98 F0 5A	9560:B0 04 F0 02 68 60 20 8F B7	9790:40 D5 DF D6 40 B3 9F 40 0F
9338:DF 8C 42 03 98 8C C9 02 77	9568:95 68 85 3F A5 FD 85 40 8D	9798:40 95 9F 96 40 4C DF 54 F1
9340:C8 C8 C8 8A FA 20 F2 92 30	9570:4C A9 95 C9 03 D0 9F 60 76	97A0:40 D5 DF D6 40 99 A5 40 C2
9348:20 8D 93 B0 10 A2 00 BD 29	9578:20 8F 95 A4 3C B9 52 03 05	97A8:40 99 A5 AC 40 5D A5 5C FC
9350:40 03 20 AA 92 E8 E4 FA 04	9580:AA B9 53 03 AB 86 3F 84 6C	97B0:40 D9 E5 EC 40 B4 A5 40 62
9358:D0 F5 4C 7D 92 20 6A 86 37	9588:40 20 87 94 4C A9 95 A5 EF	97B8:40 40 A5 AC 40 4D E5 40 DA
9360:8D 3A 03 A5 C3 8D 39 03 61	9590:3F A6 40 38 E5 3D B0 01 17	97C0:40 40 E5 EC 40 9A A6 40 A5
9368:4C 43 91 85 C6 A5 C2 20 83	9598:CA A4 3B A5 3D 99 00 9E 03	97C8:40 9A A6 AD 40 5E A6 78 AF
9370:C3 82 9D 78 02 A5 FD 9D 95	95A0:C8 8A 99 00 9E C8 84 3B 62	97D0:40 DA E6 ED 40 B5 A6 40 F8
9378:77 02 A5 C1 20 C3 82 9D 5F	95A8:60 A4 3B A6 3F 8A 99 00 56	97D8:40 40 A6 AD 40 4E E6 40 31
9380:7A 02 A5 FD 9D 79 02 A9 7A	95B0:9F A5 40 99 01 9F A8 20 AE	97E0:40 40 E6 ED 40 06 00 02 18
9388:20 9D 7B 02 60 84 FB AC 70	95B8:EA 86 85 A8 20 B9 85 4C 72	97E8:20 05 10 09 90 87 00 03 A1
9390:3A 03 AD C9 02 18 6D 39 6C	95C0:DF 8F A0 01 84 FA 88 84 89	97F0:30 0C 00 0A A0 96 00 22 5D
9398:03 AA 90 01 C8 8A D0 01 21	95C8:3C A9 04 8D D9 95 A9 28 76	97F8:20 05 10 99 90 87 00 03 BA
93A0:88 CA 20 2D 86 90 0D AE D4	95D0:8F D8 95 A0 00 A2 13 BD 24	9800:30 0C 00 0A A0 06 00 02 0C
93A8:39 03 AC 3A 03 2D 2D 86 DF	95D8:FF FF E8 D9 2C 99 D0 3D 65	9808:20 05 10 99 90 87 00 03 CB
93B0:B0 0E F0 0C AD 39 03 85 70	95E0:C8 C0 02 F0 04 C0 04 D0 EB	9810:30 0C 00 0A A0 06 00 02 1C
93B8:C1 AD 3A 03 85 C2 38 80 CB	95E8:EE 84 FC A4 3C AD D8 95 76	9818:20 05 10 B9 90 87 00 03 DD
93C0:18 A4 FB 60 A0 A0 A2 00 6F	95F0:99 50 03 AD D9 95 99 51 E1	9820:30 0C 00 0A A0 06 00 22 4C
93C8:86 3F 84 40 86 3C 20 D2 CF	95F8:03 20 46 96 20 2D 86 B0 53	9828:20 00 00 99 90 87 00 33 D8

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9830:40 0C 00 0A 00 56 50 22 41
9838:20 05 00 99 90 87 00 33 2A
9840:40 0C 00 AA C0 56 00 22 C0
9848:20 05 00 99 90 87 00 03 0A
9850:30 0C 00 0A A0 56 00 22 BD
9858:20 05 00 99 90 87 00 03 1A
9860:30 0C 00 0A A0 3F 3F 3F 0D
9868:42 52 4B 52 54 49 52 54 9E
9870:53 53 45 49 43 4C 49 50 8B
9878:4C 50 50 48 41 50 4C 41 97
9880:50 48 50 43 4C 43 53 45 85
9888:43 43 4C 56 43 4C 44 53 42
9890:45 44 54 59 41 54 41 59 CC
9898:54 58 41 54 41 58 54 58 E3
98A0:53 54 53 58 4C 44 59 4C F2
98A8:44 58 53 54 59 53 54 58 DA
98B0:43 50 59 43 50 58 44 45 A8
98B8:59 44 45 58 49 4E 59 49 55
98C0:4E 58 4C 44 41 53 54 41 3E
98C8:4F 52 41 41 4E 44 45 4F CF
98D0:52 41 44 43 43 4D 50 53 7B
98D8:42 43 41 53 4C 52 4F 4C EF
98E0:4C 53 52 52 4F 52 42 49 0E
98E8:54 44 45 43 49 4E 43 42 7E
98F0:50 4C 42 4D 49 42 56 43 BD
98F8:42 56 53 42 43 43 42 43 5E
9900:53 42 4E 45 42 45 51 4A 9F
9908:53 52 4A 4D 50 4E 4F 50 42
9910:24 1F 19 12 11 12 13 15 6D
9918:23 28 24 29 2C 58 59 00 73
9920:00 04 34 54 05 BE 5E 04 04
9928:04 34 8E 54 32 30 34 03 3F
9930:4D 2D 45 00 06 00 00 4D 7B
9938:2D 52 00 04 80 00 4D 2D A2
9940:57 00 06 20 11 20 20 12 3D
9948:20 20 44 45 4D 4F 4E 20 D4
9950:56 31 2E 30 20 20 0D 20 7F
9958:20 20 42 59 20 56 2E 42 7A
9960:41 52 44 45 4C 4C 0D 00 53
    
```

Vaughan Bardell said he had other features planned for DeMON, but space limitations prevented their inclusion. He lives in Hastings, New Zealand.

GEOS TEXT SCRAP MAKER

By Charles Kunz

Have you ever wanted to convert a SpeedScript document to geoWrite format? I can't tell you how many times I've wanted to do this. Gazette published geoWrite Converter (April 1990), but it only converts geoWrite documents to SpeedScript or ASCII. I needed something that would convert the other way around. Enter GEOS Text Scrap Maker.

I am the proud owner of geoWrite 1.1 and GEOS 1.2. (That's no typo folks; I've owned it since December 1986.) Probably many of you also have this early version of GEOS and are aware that it provides no utility for such conversions.

GEOS Text Scrap Maker runs like (and has many of its routines modified from) the Print Shop To GEOS converter (April 1987 Gazette).

Entering the Program

GEOS Text Scrap Maker is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Before exiting Proofreader, be sure to save a copy of the program to disk. I like to keep Scrap Maker on my GEOS work disk with geoWrite and my geoWrite documents.

Scrap Maker writes to disk, so make sure it has been entered properly before you use it with important files. A syntax error could be fatal to your precious files. Caution: Scrap Maker creates a temporary file called S on your GEOS work disk. So if you already have a file on the disk with that name, be sure to rename it.

Converting

Before using Scrap Maker, make sure there's a Text Scrap file on your work disk; otherwise the conversion will not be complete. Create a Text Scrap if you don't have one. To do this, double-click the geoWrite icon and then cut or copy any text from a geoWrite file. Once you have a Text Scrap on disk, you can use Scrap Maker.

Load and run Scrap Maker as you would any BASIC program. If you are within the GEOS environment, just double-click on the Scrap Maker icon.

Scrap Maker first asks you to insert the disk that contains the file that you want to convert and then asks for the conversion type you want to execute. You have three conversion options: SpeedScript to GEOS, Commodore ASCII to GEOS, and true ASCII to GEOS. Next, Scrap Maker requests the name of the file to be converted. If the file is too large—the maximum size is about 6K—you'll get an overflow error, and Scrap Maker will restart.

After the file loads, Scrap Maker translates the file in memory, reporting on the status as it converts and on how large the text will be. Scrap Maker then asks for a GEOS work disk (the one with the Text Scrap already on it), and it writes the new Text Scrap on it. Finally, Scrap Maker requests the

GEOS master or boot disk. After GEOS boots up, you can paste the new Text Scrap into a Text Album or geoWrite file. The text you just pasted will be in the BSW font, so if you want a different font, make the change within geoWrite.

Helpful Hints

Since Scrap Maker can convert only 6K at a time, large documents will have to be broken down and saved as smaller ones. Convert each of these small documents one at a time, and after each conversion, paste the document into a geoWrite file. After all the conversions have been done, the end product will be in one geoWrite file.

Scrap Maker is written entirely in BASIC, so it is quite easy to modify. I have assumed that Commodore ASCII files and true ASCII files will be SEQ files, which covers most cases. You can change this to suit your needs if you have true ASCII files saved as PRG files. You can also add conversion options if you like, such as converting PaperClip III files.

Compatibility

I have tested this program with GEOS 1.2 and geoWrite 1.1. This is the only version of geoWrite available to me. Experiment with whatever version you have, but be sure to back up your disk just in case something goes awry.

SCRAP MAKER

```

EE 5 REM COPYRIGHT 1992 COMPUT
    E PUBLICATIONS INTL LTD -
    ALL RIGHTS RESERVED
PG 10 POKE52,32:POKE56,32:CLR:
    PRINT"{CLR}{7}{N}{H}";:P
    OKE53281,6:POKE53280,14:
    AD=8192
KJ 20 HDS="{CLR}{RVS} GEOS TEX
    T SCRAP MAKER (FILE CONV
    ERTER) "-MC=6000
QJ 30 PRINTHDS$
DR 40 GOTO200
BH 50 REM ---- SEARCH DIR FOR
    {SPACE}TRACK AND SECTOR
SD 60 FF=0:PRINT#15,"U1:2 0"+S
    TR$(T)+STR$(S)
SS 70 GET#2,A$:TN=ASC(A$+CHR$(
    0)):GET#2,A$:SN=ASC(A$+C
    HR$(0))
DC 80 FORN=0TO7:PRINT#15,"B-P:
    2,"+STR$(32*N+2)
RQ 90 GET#2,A$:IFAS<>CHR$(131)
    THEN160
RP 100 GET#2,A$:TP=ASC(A$+CHR$
    
```

```

(0):GET#2,A$:SP=ASC(A$
+CHR$(0)):H$=""
GB 110 GET#2,A$:IFAS<>CHR$(160
)THENH$=H$+A$:GOTO110
SD 120 IFH$>DI$THEN160
FR 130 FF=1:KP=N:N=7
MQ 140 PRINT#15,"B-P:2,"+STR$(
32*KP+30)
ER 150 GET#2,A$:SL=ASC(A$+CHR$(
0)):GET#2,A$:SH=ASC(A$
+CHR$(0))
DX 160 NEXT:IFTN=0THENRETURN
SC 170 IFFF=1THENRETURN
CB 180 T=TN:S=SN:GOTO60
EF 190 REM ---- REQUEST FOR CO
NVERSION TYPE
DH 200 PRINT"{DOWN}INSERT DISK
WITH FILE TO BE CONVER
TED."
DP 210 PRINT"{DOWN}SELECT CONV
ERSION:{DOWN}"
FS 220 PRINT"1) SPEEDSCRIPT T
O GEOS"
HD 230 PRINT"2) COMMODORE ASC
II TO GEOS"
CD 240 PRINT"3) TRUE ASCII TO
GEOS{4 UP}"
DS 250 GETZ$:IFZ$<"1"ORZ$>"3"
HEN250
FA 260 IFZ$="1"THENX$="P,R"
AR 270 IFZ$="2"THENX$="S,R"
SS 280 IFZ$="3"THENX$="S,R"
AC 290 FORN=1TOVAL(Z$):PRINT:N
EXT:PRINT"*";:FORN=1TO4
-VAL(Z$):PRINT:NEXT
FS 300 REM ---- READ FILE INTO
MEMORY
MQ 310 N$="":INPUT"{DOWN}FILEN
AME";N$:IFN$=""THEN310
HB 320 OPEN15,8,15:OPEN8,8,0,N
$+X$:INPUT#15,EN,EB$,ET
,ES
MX 330 IFEN<>0THENCLOSE8:CLOSE
15:PRINT"{DOWN}";EB$:N$
="":GOTO210
DS 340 PRINTHD$:PRINT"{DOWN}LO
ADING {CYN}";N$
CG 350 POKE185,0:POKE780,0:POK
E781,0:POKE782,32:SYS65
493:CLOSE8:CLOSE15:SI=0
DP 360 EA=PEEK(781)+PEEK(782)*
256:IF(EA-AD)>MCTHEN970
PH 370 PRINT"{DOWN}{7}PLEASE W
AIT, TRANSLATING":PRINT
"{CYN}";N$;"{7} ...
{DOWN}"
EP 380 PRINT"0%{3 SPACES}COMP
LETE{UP}":FORN=ADTOEA-1
:C=PEEK(N):ONVAL(Z$)GOT
0390,470,520
QK 390 IFC=0THENC=64:GOTO520
BJ 400 IFC=1ANDC<=26THENC=C+9
6:GOTO520
GM 410 IFC=27THENC=91:GOTO520
HG 420 IFC=29THENC=93:GOTO520
PF 430 IFC=30THENC=94:GOTO520
SR 440 IFC=31THENC=13:GOTO520
FM 450 IF(C>=32ANDC<=63)OR(C>=
65ANDC<=90)THEN520
QA 460 GOTO530:REM SPEEDSCRIPT
CONTROL CODES CAN'T TR
ANSLATE
AQ 470 IFC=13OR(C>=32ANDC<=64)
OR(C>=91ANDC<=95)THEN52
0
CS 480 IFC>=65ANDC<=90THENC=C+
32:GOTO520
RD 490 IFC>=97ANDC<=122THENC=C
-32:GOTO520
MJ 500 IFC>=193ANDC<=218THENC=
C-128:GOTO520
RD 510 GOTO530:REM WEIRD COMMO
DORE ASCII CAN'T TRANSL
ATE
AP 520 POKEAD+SI,C:SI=SI+1
KJ 530 PRINTINT((N-AD)/(EA-1-A
D)*100)"{LEFT}%{UP}":NE
XT:SI=SI+4
FJ 540 PRINT"{DOWN}{CYN}TEXT
{SPACE}SCRAP WILL BE"IN
T(SI/1024+.5)"{LEFT}K"
AH 550 REM ---- REQUEST FOR GE
OS WORK DISK WITH TEXT
{SPACE}SCRAP FILE
BB 560 PRINT"{DOWN}{7}INSERT G
EOS WORK DISK IN DRIVE,
HIT"
CE 570 PRINT"{RVS}RETURN{OFF}
{SPACE}WHEN READY."
QG 580 GETAS:IFAS<>CHR$(13)THE
N580
CG 590 PRINT"{DOWN}SAVING
{CYN}TEXT SCRAP{7} FILE
...{DOWN}":PRINT"0%
{3 SPACES}COMPLETE{UP}"
DS 600 REM ---- WRITE FILE CAL
LED 'S'
JJ 610 OPEN15,8,15,"I0":INPUT#
15,EN,EB$,ET,ES:IFEN<>0
THEN940
FG 620 OPEN2,8,2,"S,U,W":INPUT
#15,EN,EB$,ET,ES:IFEN<>
0THEN940
BE 630 HS=INT(SI/256):LS=SI-HS
*256:SF=HS
SP 640 PRINT#2,CHR$(LS)CHR$(HS
)CHR$(23)CHR$(9)CHR$(0)
CHR$(0);
KR 650 FORN=0TOSI-5:PRINT#2,CH
R$(PEEK(AD+N));:PRINTIN
T(N/(SI-5)*100)"{LEFT}%
{UP}"
DE 660 NEXT:CLOSE2
BQ 670 DATA84,101,120,116,32,3
2,83,99,114,97,112
CD 680 P$="":FORN=0TO10:READX:
P$=P$+CHR$(X):NEXT
FF 690 OPEN2,8,2,"#":T=18:S=1:
DI$=P$:GOSUB60
RR 700 IFFF=0THENPRINT"{DOWN}
{RVS}NO TEXT SCRAP FILE
":GOTO870
BE 710 T1=T:S1=S:FS=256*SH+SL-
1:T2=TP:S2=SP:K1=KP
JD 720 REM ---- SWAP T/S POINT
ERS AND DELETE 'S' FILE
QS 730 T=18:S=1:DI$="S":GOSUB6
0
DK 740 PRINT#15,"B-P:2,"+STR$(
32*KP+30)
CX 750 PRINT#2,CHR$(T2)CHR$(S2
);
CD 760 PRINT#15,"B-P:2,"+STR$(
32*KP+30)
EF 770 FH=INT(FS/256):FL=FS-25
6*FH
XQ 780 PRINT#2,CHR$(FL)CHR$(FH
);
GC 790 PRINT#15,"U2:2 0"+STR$(
T)+STR$(S)
QX 800 PRINT#15,"U1:2 0"+STR$(
T1)+STR$(S1)
HB 810 PRINT#15,"B-P:2,"+STR$(
32*K1+30)
DH 820 PRINT#2,CHR$(TP)CHR$(SP
);
XP 830 PRINT#15,"B-P:2,"+STR$(
32*K1+30)
JC 840 PRINT#2,CHR$(SF+1)CHR$(
0);
KA 850 PRINT#15,"U2:2 0"+STR$(
T1)+STR$(S1)
AR 860 PRINT#15,"S0:S"
EC 870 CLOSE2:CLOSE15
QK 880 PRINT"{2 DOWN}{7}DONE..
INSERT GEOS MASTER DI
SK IN"
FS 890 PRINT"DRIVE THEN HIT
{RVS}RETURN{OFF} TO BOO
T."
AR 900 GETAS:IFAS<>CHR$(13)THE
N900
HE 910 PRINT"{CLR}"CHR$(142):L
OAD"GEOS",8,1
XX 920 END
QK 930 REM ---- IN CASE OF DIS
K ERROR...
KQ 940 PRINT"{CLR}";:SPC(20-LEN
(EB$/2))"{DOWN}{YEL}"+E
B$
GG 950 PRINT"{DOWN}{GRN}
{11 SPACES}RESETTING DR
IVE...{7}"
MC 960 PRINT#15,"UJ":FORN=1TO1
500:NEXT:CLOSE15:CLOSE2
:GOTO590
AQ 970 PRINT"{DOWN}"SPC(8)"
{YEL}** OVERFLOW ERROR
{SPACE}**{7}{DOWN}"
SD 980 PRINT"THE REQUESTED FIL
E EXCEEDS THE"MC
KD 990 PRINT"CHARACTER MAXIMUM
.{2 SPACES}PRESS {RVS}R
ETURN{OFF} TO":PRINT"RE
TRY."
CC 1000 GETAS:IFAS<>CHR$(13)TH
EN1000
DK 1010 GOTO30

```

Charles Kunz, 23, has a B.S. in computer science. He enjoys rock-'n'-roll, writing to pen pals, and comedy. He lives in Holbrook, New York.

TACK TRUCK

By Scott Gifford

In the year 2000, the economy is in worse shape than it is now. Competition in the thumbtack delivery business is especially fierce. Drivers go to any length to be the first to deliver their tacks.

In this two-player arcade-style game for the 64, drivers duel to be the first out of the parking lot of an office supply store. In an attempt to gain an advantage, the drivers open the rear doors of their trucks, allowing a steady stream of thumbtacks to pour onto the pavement. Watch where you steer your truck; even the best tires can't survive passing over these tacks.

Typing It In

Tack Truck is written entirely in machine language. To enter it, you'll have to use MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

Starting address: C000

Ending address: C9F7

Be sure to save a copy of the program before you exit MLX.

Start Your Engines

Load Tack Truck with the ,8,1 extension, and then type `SYS 49152`. Before the game begins, you'll have a chance to change various options. You can select the number of games that must be won before a winner is declared. You can select the speed of the trucks (1 is very fast), and you can decide on the number of obstacles. These latter items are the remnants of previous duels.

Both players can use their joysticks to select truck colors. Both must press their fire buttons simultaneously to start the game.

At the beginning of each round, player 1's truck appears in the upper left corner; player 2's truck appears in the lower right. Trucks are moving as soon as the game starts, so be ready. Avoid the border of the parking lot, avoid your opponent's truck, and avoid the trails of tacks that litter the parking lot. The player who survives the long-

est wins the round and collects points. If both drivers crash at the same time, no points are awarded. Press both fire buttons to restart a game.

TACK TRUCK

```

C000:AD 0E DC 29 FE 8D 0E DC 31
C008:A5 01 29 FB 85 01 A9 00 05
C010:85 FB A9 38 85 FC A9 00 7F
C018:85 FD A9 D0 85 FE A2 04 8F
C020:A0 00 B1 FD 91 FB C8 D0 E6
C028:F9 CA F0 07 E6 FC E6 FE DF
C030:4C 22 C0 A5 01 09 04 85 8C
C038:01 AD 0E DC 09 01 8D 0E AA
C040:DC AD 18 D0 29 F0 18 09 F1
C048:0E 8D 18 D0 A9 D7 85 FB F7
C050:A9 38 85 FC A9 BC 85 FD 7E
C058:A9 C5 85 FE A0 28 B1 FD C7
C060:91 FB 88 D0 F9 A9 00 8D CB
C068:20 D0 8D 21 D0 8D B3 C5 DB
C070:8D B4 C5 A9 93 20 D2 FF FB
C078:A9 FF 85 9E A9 D7 85 9F C0
C080:A2 06 A9 07 8D 70 C9 20 5C
C088:55 C9 A9 18 85 9E A9 D9 B1
C090:85 9F A2 06 A9 02 8D 70 52
C098:C9 20 55 C9 A9 FF 85 FB A2
C0A0:A9 03 85 FC A9 E4 85 FD 22
C0A8:A9 C5 85 FE A2 0D A0 28 C3
C0B0:B1 FD 91 FB 88 D0 F9 18 10
C0B8:A5 FB 69 28 85 FB A5 FC 20
C0C0:69 00 85 FC 18 A5 FD 69 34
C0C8:28 85 FD A5 FE 69 00 85 FC
C0D0:FE CA D0 DA A9 99 20 D2 13
C0D8:FF 18 A0 0B A2 0F 20 F0 A7
C0E0:FF A0 00 B9 ED C7 20 D2 C7
C0E8:FF C8 C0 18 D0 F5 18 A0 65
C0F0:07 A2 11 20 F0 FF A0 00 8B
C0F8:B9 05 C8 20 D2 FF C8 C0 9C
C100:1C D0 F5 18 A0 02 A2 13 6B
C108:20 F0 FF A0 00 B9 21 C8 D3
C110:20 D2 FF C8 C0 21 D0 F5 07
C118:18 A0 02 A2 14 20 F0 FF 3D
C120:A0 00 B9 42 C8 20 D2 FF BB
C128:C8 C0 21 D0 F5 18 A0 09 CB
C130:A2 16 20 F0 FF A0 00 B9 D9
C138:63 C8 20 D2 FF C8 C0 1A 8F
C140:D0 F5 18 A0 06 A2 18 20 C1
C148:F0 FF A0 00 B9 7D C8 20 CD
C150:D2 FF C8 C0 1B D0 F5 20 8A
C158:7E C9 20 95 C9 20 AC C9 DC
C160:20 B3 C9 20 BA C9 A5 C5 2A
C168:C9 04 D0 2D AD 8D 02 F0 57
C170:06 CE B7 C5 4C 7A C1 EE BC
C178:B7 C5 AD B7 C5 C9 00 D0 A0
C180:05 A9 14 8D B7 C5 C9 15 C9
C188:D0 05 A9 01 8D B7 C5 20 F1
C190:7E C9 A9 08 20 D1 C9 A9 01
C198:00 C9 05 D0 2D AD 8D 02 79
C1A0:F0 06 CE B8 C5 4C AB C1 FB
C1A8:EE B8 C5 AD B8 C5 C9 33 09
C1B0:D0 05 A9 00 8D B8 C5 C9 B7
C1B8:FF D0 05 A9 32 8D B8 C5 AA
C1C0:20 95 C9 A9 08 20 D1 C9 BB
C1C8:A9 00 C9 03 D0 2B AD 8D A6
C1D0:02 F0 B6 CE B9 C5 4C DC 99
C1D8:01 EE B9 C5 AD B9 C5 C9 36
C1E0:15 D0 05 A9 01 8D B9 C5 D5
C1E8:C9 00 D0 05 A9 14 8D B9 2E

```

```

C1F0:C5 20 BA C9 A9 08 20 D1 D2
C1F8:C9 AD 00 DC 20 D4 C8 E0 61
C200:03 D0 19 CE B5 C5 AD B5 21
C208:C5 C9 00 D0 05 A9 0F 8D 6A
C210:B5 C5 20 AC C9 A9 10 20 E5
C218:D1 C9 A2 00 E0 04 D0 17 1D
C220:EE B5 C5 AD B5 C5 C9 10 86
C228:D0 05 A9 01 8D B5 C5 20 8B
C230:AC C9 A9 08 20 D1 C9 AD BD
C238:01 DC 20 D4 C8 E0 03 D0 67
C240:19 CE B6 C5 AD B6 C5 C9 D6
C248:00 D0 05 A9 0F 8D B6 C5 1F
C250:20 B3 C9 A9 08 20 D1 C9 D4
C258:A2 00 E0 04 D0 17 EE B6 03
C260:C5 AD B6 C5 C9 10 D0 05 9C
C268:A9 01 8D B6 C5 20 B3 C9 FF
C270:A9 10 20 D1 C9 AD 00 DC D1
C278:0D 01 DC 29 10 F0 03 4C 89
C280:66 C1 A9 93 20 D2 FF A9 0E
C288:04 8D B1 C5 A9 03 8D B2 2D
C290:C5 A9 00 8D 20 D0 8D BC 58
C298:C5 A9 FF 85 9E A9 D7 85 94
C2A0:9F A2 19 A9 07 8D 70 C9 75
C2A8:20 55 C9 A9 00 85 FC A9 21
C2B0:04 85 FD 20 A8 C8 A9 C0 D7
C2B8:85 FC A9 07 85 FD 20 A8 F2
C2C0:C8 A9 28 85 FC A9 04 85 8E
C2C8:FD 20 B2 C8 A9 4F 85 FC CA
C2D0:A9 04 85 FD 20 B2 C8 AD C7
C2D8:B8 C5 D0 03 4C 3E C3 8D E6
C2E0:BB C5 A9 9E 20 D2 FF A9 CA
C2E8:00 8D 18 D4 A0 00 B9 A1 3C
C2F0:C8 99 0E D4 C8 C0 06 D0 76
C2F8:F5 38 AD 1B D4 E9 15 B0 18
C300:FC 69 17 AA 38 AD 1B D4 71
C308:E9 25 B0 FC 69 27 A8 8A 77
C310:38 E9 0B B0 09 98 38 E9 9F
C318:0B B0 03 4C F9 C2 8A 18 7E
C320:69 F2 90 09 98 18 69 E3 97
C328:90 03 4C F9 C2 18 20 F0 89
C330:FF A9 5F 20 D2 FF CE BB FF
C338:C5 F0 03 4C F9 C2 A9 CE 01
C340:85 FB A9 04 85 FC A9 19 8B
C348:85 FD A9 07 85 FE 20 CB EB
C350:C8 AD 00 DC 20 D4 C8 E0 3C
C358:05 F0 03 8E B1 C5 A9 1F FE
C360:A0 00 91 FB 18 A5 FB 69 E2
C368:00 85 9E A5 FC 69 D4 85 3C
C370:9F A9 07 A0 00 91 9E A9 4A
C378:FB 85 9E A9 00 85 9F AD C0
C380:B1 C5 20 F5 C8 A0 00 B1 30
C388:FB C9 20 F0 05 A9 01 8D F1
C390:BC C5 8A A0 00 91 FB 18 99
C398:A5 FB 69 00 85 9E A5 FC 0E
C3A0:69 D4 85 9F AD B5 C5 A0 2D
C3A8:00 91 9E AD 01 DC 20 D4 D3
C3B0:C8 E0 05 F0 03 8E B2 C5 02
C3B8:A9 1F A0 00 91 FD 18 A5 4B
C3C0:FD 69 00 85 9E A5 FE 69 EC
C3C8:D4 85 9F A9 07 A0 00 91 F6
C3D0:9E A9 FD 85 9E A9 00 85 4B
C3D8:9F AD B2 C5 20 F5 C8 A0 59
C3E0:00 B1 FD C9 20 F0 08 AD B3
C3E8:BC C5 09 02 8D BC C5 8A F6
C3F0:A0 00 91 FD 18 A5 FD 69 97
C3F8:00 85 9E A5 FE 69 D4 85 DC
C400:9F AD B6 C5 A5 F0 00 91 9E BE
C408:AD BC C5 F0 03 4C 19 C4 9F
C410:AD B7 C5 20 D1 C9 4C 51 B8
C418:C3 AD BC C5 C9 03 D0 33 12

```


C420:18 A5 FB 69 00 85 9E A5 2E
C428:FC 69 D4 85 9F AD B5 C5 62
C430:A0 00 91 9E A9 56 91 FB EB
C438:18 A5 FD 69 00 85 9E A5 86
C440:FE 69 D4 85 9F AD B6 C5 7D
C448:A0 00 91 9E A9 56 91 FD 06
C450:4C 9F C4 C9 01 D0 23 18 C6
C458:A5 FB 69 00 85 9E A5 FC CF
C460:69 D4 85 9F AD B5 C5 A0 EE
C468:00 91 9E A9 56 91 FB AD 63
C470:B6 C5 8D 20 D0 EE B4 C5 EB
C478:A9 00 C9 02 D0 21 18 A5 11
C480:FD 69 00 85 9E A5 EE 69 AE
C488:D4 85 9F AD B6 C5 A0 00 BA
C490:91 9E A9 56 91 FD AD B5 BA
C498:C5 8D 20 D0 EE B3 C5 A9 F4
C4A0:40 20 D1 C9 AD B3 C5 CD BE
C4A8:B9 C5 D0 09 AD B5 C5 8D 88
C4B0:70 C9 4C 70 C5 AD B4 C5 89
C4B8:CD B9 C5 D0 09 AD B6 C5 8F
C4C0:8D 70 C9 4C 70 C5 A0 10 17
C4C8:A2 09 18 20 F0 FF 20 ED A0
C4D0:C9 A0 10 A2 0A 18 20 F0 75
C4D8:FF 20 ED C9 A9 99 20 D2 8B
C4E0:FF A0 10 A2 0B 18 20 F0 A8
C4E8:FF A9 20 20 D2 FF 20 D2 8C
C4F0:FF A9 5E 20 D2 FF A9 20 BC
C4F8:20 D2 FF AD B3 C5 20 71 88
C500:C9 8A 20 D2 FF 98 20 D2 B9
C508:FF A9 20 20 D2 FF 20 D2 AD
C510:FF A0 10 A2 0C 18 20 F0 E1
C518:FF A9 20 20 D2 FF 20 D2 BD
C520:FF A9 5E 20 D2 FF A9 20 ED
C528:20 D2 FF AD B4 C5 20 71 C1
C530:C9 8A 20 D2 FF 98 20 D2 E9
C538:FF A9 20 20 D2 FF 20 D2 DD
C540:FF A0 10 A2 0D 18 20 F0 1A
C548:FF 20 ED C9 A0 10 A2 0E CE
C550:18 20 F0 FF 20 ED C9 AD 08
C558:B5 C5 8D CA D9 AD B6 C5 47
C560:8D F2 D9 AD 00 DC 0D 01 14
C568:DC 29 10 D0 F6 4C 82 C2 6C
C570:A9 93 20 D2 FF A9 90 20 CE
C578:D2 FF AD 20 D0 8D 21 D0 F4
C580:A0 00 A2 0C 18 20 F0 FF 58
C588:A0 00 B9 98 C8 20 D2 FF 91
C590:C8 C0 09 D0 F5 AD 70 C9 EF
C598:CD B5 C5 D0 0A AD 00 DC 22
C5A0:29 10 D0 F9 4C 65 C0 AD A5
C5A8:01 DC 29 10 D0 F9 4C 65 7E
C5B0:C0 04 03 00 00 02 06 05 17
C5B8:00 01 40 00 00 00 3C 5A 5F
C5C0:7E 7E 3C 3C 3C 00 3C 0D
C5C8:3C 7E 7E 5A 3C 00 10 5D E6
C5D0:EF E3 FF 36 00 00 08 3A FA
C5D8:F7 C7 FF 36 00 71 27 21 EA
C5E0:02 AE 42 20 04 20 20 64
C5E8:20 20 20 20 20 1F 1F 71
C5F0:1F 1F 1F 20 20 1F 20 99
C5F8:20 20 20 1F 1F 1F 20 66
C600:20 1F 20 20 1F 20 20 45
C608:20 20 20 20 20 20 20 95
C610:20 20 20 20 20 20 20 9D
C618:1F 20 20 20 20 1F 20 20
C620:20 20 1F 20 20 20 1F 8C
C628:20 1F 20 1F 20 20 20 65
C630:20 20 20 20 20 20 20 BD
C638:20 20 20 20 20 20 20 C5
C640:1F 20 20 20 1F 20 20 45
C648:1F 20 1F 20 20 20 20 35

C650:20 1F 1F 20 20 20 20 7D
C658:20 20 20 20 20 20 20 E5
C660:20 20 20 20 20 20 20 ED
C668:1F 20 20 20 1F 1F 1F 66
C670:1F 20 1F 20 20 20 20 5D
C678:20 1F 1F 1F 20 20 20 95
C680:20 20 20 20 20 20 20 0E
C688:20 20 20 20 20 20 20 16
C690:1F 20 20 20 1F 20 20 95
C698:1F 20 1F 20 20 20 1F 84
C6A0:20 1F 20 1F 20 20 20 DD
C6A8:20 20 20 20 20 20 20 36
C6B0:20 20 20 20 20 20 20 3E
C6B8:1F 20 20 20 1F 20 20 BD
C6C0:1F 20 20 1F 1F 1F 1F AF
C6C8:20 1F 20 20 1F 20 20 0E
C6D0:20 20 20 20 20 20 20 5E
C6D8:20 20 20 20 20 20 20 66
C6E0:20 20 20 20 20 20 20 6E
C6E8:20 20 20 20 20 20 20 76
C6F0:20 20 20 20 20 20 20 7E
C6F8:20 20 20 20 20 20 20 86
C700:20 20 20 1E 1E 1E 1E 51
C708:20 1B 1E 1E 1E 20 1C E1
C710:20 20 20 1B 20 20 1D 1D 46
C718:1D 1D 20 20 1C 20 20 1E 43
C720:20 20 20 20 20 20 20 AF
C728:20 20 20 20 20 1B 20 A3
C730:20 1B 20 20 20 1C 20 1C 6A
C738:20 20 20 1B 20 1C 20 67
C740:20 20 1D 20 1C 20 1E 20 4B
C748:20 20 20 20 20 20 20 D7
C750:20 20 20 20 20 1B 20 CB
C758:20 1B 20 20 20 1C 20 1C 92
C760:20 20 20 1B 20 1C 20 8F
C768:20 20 20 20 1C 1E 20 CF
C770:20 20 20 20 20 20 20 FF
C778:20 20 20 20 20 1B 20 F3
C780:20 1B 1D 1D 1D 1C 20 1C 12
C788:20 20 20 1B 20 1C 20 B7
C790:20 20 20 20 1C 1E 20 F3
C798:20 20 20 20 20 20 20 28
C7A0:20 20 20 20 20 1B 20 20 1C
C7A8:20 1B 20 20 1C 20 20 1C D2
C7B0:20 20 20 1B 20 1C 20 DF
C7B8:20 20 1D 20 1C 20 1E 20 C3
C7C0:20 20 20 20 20 20 20 50
C7C8:20 20 20 20 20 1B 20 44
C7D0:20 1B 20 20 20 1C 20 20 0F
C7D8:1E 1E 1E 20 20 20 1E 1E A0
C7E0:1E 1E 20 20 1C 20 20 1E CC
C7E8:20 20 20 20 20 53 50 45 CA
C7F0:45 44 20 3A 20 20 20 BD
C7F8:20 20 20 20 20 20 20 88
C800:20 28 46 31 29 4F 42 53 E5
C808:54 41 43 4C 45 53 20 3A 33
C810:20 20 20 20 20 20 20 A1
C818:20 20 20 20 20 28 46 33 29
C820:29 50 4C 41 59 45 52 20 9C
C828:31 20 43 4F 4C 4F 52 20 1C
C830:3A 20 5E 20 20 20 20 96
C838:20 20 20 20 20 20 28 A4 04
C840:31 29 50 4C 41 59 45 52 CF
C848:20 32 20 43 4F 4C 4F 52 4B
C850:20 3A 20 5E 20 20 20 4C
C858:20 20 20 20 20 20 28 F1
C860:4A 32 29 50 4C 41 59 20 08
C868:54 4F 20 3A 20 20 20 81
C870:20 20 20 20 20 20 20 02
C878:20 28 46 37 29 50 52 45 D4

C880:53 53 20 42 4F 54 48 20 35
C888:42 55 54 54 4F 4E 53 20 DA
C890:54 4F 20 53 54 41 52 54 F9
C898:47 41 4D 45 20 4F 56 45 4C
C8A0:52 64 19 00 00 81 09 81 31
C8A8:A0 28 A9 1F 88 91 FC D0 11
C8B0:FB 60 A0 00 A2 17 A9 1F 50
C8B8:91 FC A5 FC 18 69 28 85 13
C8C0:FC A5 FD 69 00 85 FD CA 6D
C8C8:D0 EC 60 A9 1F A0 00 91 B1
C8D0:FB 91 FD 60 A2 00 38 E8 F8
C8D8:6A 90 04 E0 05 D0 F8 60 10
C8E0:A0 00 A2 00 B1 FB C9 1F 47
C8E8:D0 02 A2 06 B1 FD C9 1F 50
C8F0:D0 02 A2 06 60 A8 18 69 5F
C8F8:1A AA 98 C9 01 D0 13 38 9B
C900:A0 00 B1 9E E9 28 91 9E B5
C908:C8 B1 9E E9 00 91 9E 4C AE
C910:54 C9 C9 02 D0 13 18 A0 3D
C918:00 B1 9E 69 28 91 9E C8 10
C920:B1 9E 69 00 91 9E 4C 54 55
C928:C9 C9 03 D0 13 38 A0 00 3B
C930:B1 9E E9 01 91 9E C8 B1 DB
C938:9E E9 00 91 9E 4C 54 C9 47
C940:C9 04 D0 10 18 A0 00 B1 C9
C948:9E 69 01 91 9E C8 B1 9E D8
C950:69 00 91 9E 60 A0 28 AD 38
C958:70 C9 91 9E 88 D0 FB 18 4A
C960:A5 9E 69 28 85 9E A5 9F AF
C968:69 00 85 9F CA D0 E6 60 23
C970:07 A2 30 38 E8 E9 0A B0 6D
C978:FB CA 69 3A A8 60 18 A2 27
C980:0F A0 13 20 F0 FF AD B7 C2
C988:C5 20 71 C9 8A 20 D2 FF 4C
C990:98 20 D2 FF 60 18 A2 11 8C
C998:A0 13 20 F0 FF AD B8 C5 52
C9A0:20 71 C9 8A 20 D2 FF 98 67
C9A8:20 D2 FF 60 AD B5 C5 8D 64
C9B0:0B DB 60 AD B6 C5 8D 33 C2
C9B8:DB 60 18 A2 16 A0 13 20 F8
C9C0:F0 FF AD B9 C5 20 71 C9 79
C9C8:8A 20 D2 FF 98 20 D2 FF EE
C9D0:60 8D BB C5 A0 08 A2 00 36
C9D8:A5 C5 C9 06 D0 03 4C 65 DA
C9E0:C0 CA D0 F4 88 D0 F1 CE 2B
C9E8:BB C5 D0 E8 60 A2 07 A9 B9
C9F0:20 20 D2 FF CA D0 FA 60 E6

Scott Gifford is a GEOS fan who lives in Flushing, Michigan.

HAM ANTENNAS

By Clifford Hudson
Designing antennas can be a complex yet important part of receiving and transmitting radio frequency signals for ham radio operators and shortwave listeners. This article won't go into the theory of antenna design, but it will help hams and SWLs when it comes to constructing a variety of popular antenna types.

Entering the Program
Ham Antennas is a menu-driven program for six different antenna designs.

PROGRAMS

It is written entirely in BASIC. To help avoid typing errors, use The Automatic Proofreader; see "Typing Aids" elsewhere in this section.

Note that lines 3032 and 3034 contain more than 80 characters. To enter these lines, use the BASIC shorthand ?TAB instead of PRINTTAB and omit spaces following the line number. List the line, place your cursor anywhere on the line, and then press Return to get the correct Proofreader checksum. Be sure to save a copy of the program before exiting Proofreader.

A Few Terms

Before we get into the program itself, let's clarify a few abbreviations that are used in Ham Antennas.

REF = Reflector. The longest element on quads or Yagis.

DE = Driven Element. The element where coax is attached.

DR# = Directors 1-4. DR#1 is the element directly ahead of the driven element.

Z = Impedance. Refers to the impedance at the feed point.

RF = Radio Frequency. The power out of the final network.

FMHZ = Frequency in megahertz.

The Menu

When you load and run Ham Antennas, you'll be presented with the following menu. Press the number next to the type that you want to construct.

1. Quad
2. Yagi
3. Spacing
4. Dipole
5. Folded Dipole
6. Long Wire
 - A. Number of 1/2 wavelengths in antenna.
 - B. Length of 1/2 wave coax at design frequency.

After you select any antenna type, you'll be asked for the desired operating frequency (FMHZ). Enter the frequency in megahertz and press Return. Ham Antennas will take the calculations from there and print the results.

Antenna Tips

Here's a brief rundown of each antenna. For more detailed information, con-

sult the *American Radio Relay League (ARRL) Antenna Handbook*. It is available through the ARRL at 225 Main Street, Newington, Connecticut 06111.

The driven element for a quad antenna can be used for loop calculations. The impedance (Z) of a loop is about 100 ohms, so you could use 75-ohm coax for feedline and have a transfer of 1.5 : 1—not bad. The antenna can be mounted either vertically or horizontally. Feed at the side is vertical polarization; feed at the bottom is horizontal. Use at least 13-gauge wire or larger to compensate for skin effect. Larger wire also broad-bands the antenna.

When designing quads or Yagis, use the Spacing selection for all your element spacing needs. The program handles only one input calculation at a time. Here are some figures to use as a reference.

From the reflector to the driven element (REF to DE), the spacing should be .15 to .25 wavelengths. From the driven element to the first director (DE to DR#1), correct spacing is .1 wavelengths. From the second director to the fourth director (DR#2 to DR#4), spacing should be .2 wavelengths, with .4 for every additional director. These values appear onscreen when you run the program. For reference purposes, Ham Antennas uses 984 times the wavelength divided by the frequency.

The dipole is the easiest and most simple antenna to build. Using 468 divided by the frequency gives us a half wavelength. Cut that figure in half and attach coax; now jump to selection 6 (use the B section) to figure the half-wave of coax feedline for your dipole. Use even numbers of half-wavelengths to connect to your radio. It's convenient to insert coils on each side and make a dipole a dual-bander. I recommend Gazette's CoilCalc (June 1991) as an excellent program for making coils. I've used it to extend my 75-meter loop for the 160-meter band.

Folded dipoles are full-wavelength antennas. These are monoband antennas only, usually cut from 300-ohm television lead or 75- or 50-ohm coax for impedance matching.

For the long wire antenna selection, two inputs are required. The first is the odd half-waves followed by the frequen-

cy. Enter them and press Return. Ham Antennas will also give you the half-wavelengths in phase at the design frequency.

In closing, keep in mind that what looks good on paper isn't always what works exactly best in the real world. Ham Antennas calculations will be close, but you should then fine-tune your actual lengths with a standing wave ratio bridge. Have fun and 73 (best regards).

HAM ANTENNAS

```
ME 0 REM COPYRIGHT 1992 COMPUT
E PUBLICATIONSINTL LTD -
{SPACE}ALL RIGHTS RESERVE
D
BB 1 GOSUB2075:GOTO900
MM 2 PRINT"{CLR}":GOSUB2070:GO
SUB4091
JQ 3 PRINTTAB(14)"{3 DOWN}<<-Q
UAD->>"
GG 4 PRINT:PRINT:PRINT:PRINT:P
RINT:PRINT
RB 10 INPUT"{RVS}{6}CENTER FRE
Q. DE";F
DA 20 W=1005/F
QH 25 PRINT"{DOWN}ONE WAVELENG
TH DE":GOSUB4092
AS 30 X=W/4
ED 40 GOSUB4094:GOSUB4093
XF 45 GOSUB4095:GOSUB4096
AK 75 INPUT"{2 DOWN}CENTER FRE
Q. REF.";F
KH 85 W=1035/F
QS 90 PRINT"{DOWN}ONE WAVELENG
TH REF.":GOSUB4092
AA 100 X=W/4
DJ 110 GOSUB4094:GOSUB4093
JC 120 GOSUB4095:GOSUB4096
XJ 200 INPUT"{4 DOWN}CENTER FR
EQ. DR#1";F
SH 210 W=995/F
XJ 215 PRINT"{DOWN}ONE WAVELEN
GTH DR#1":GOSUB4092
XJ 220 X=W/4
FA 230 GOSUB4094:GOSUB4093
PM 240 GOSUB4095:GOSUB4096
GB 300 INPUT"{2 DOWN}CENTER FR
EQ.DR#2";F
XR 310 W=895/F
KA 315 PRINT"{DOWN}ONE WAVELEN
GTH DR#2":GOSUB4092
CS 320 X=W/4
AM 330 GOSUB4094:GOSUB4093
GQ 340 GOSUB4095:GOSUB4096
AB 364 INPUT:PRINT"{CLR}"
GR 380 GOSUB4098:PRINT"
{5 DOWN}CHOOSE 1,2"
DQ 381 GETAS:IFAS=""THEN381
FM 382 Q=VAL(AS):IFQ<10RQ>2THE
N381
XH 383 ONQGOTO2,900
AF 386 IFQ=2THEN ONVGO0900
XC 600 REM ELM SPACING
```

PH 601 PRINT "{CLR}":PRINTTAB(1 1)"{DOWN}<- ANT. ELM SP ACING ->"	QA 780 GETA\$:IFA\$=""THEN780 KG 785 X=VAL(A\$) GP 790 ONXGOTO700,900	SC 2015 POKE 53281,PEEK(53281) OR 7:PRINT "{BLK}":RETU RN
QB 602 PRINT "{DOWN}1.YAGI REF TO DE USE .15 OR .25": PRINT "{DOWN}2.DE-DR#1 {SPACE}USE .1"	AQ 800 GOSUB2015:PRINT "{CLR}": GOSUB4091	DB 2040 POKE 53281,PEEK(53281) AND 328 OR 233:PRINT " {WHT}":RETURN
AP 603 PRINT "{DOWN}3.DR'S 2,3 ,4, USE .2":PRINT " {DOWN}4.EA ADD DR'S, US E .4"	QB 820 PRINTTAB(13)"{3 DOWN}<- DIPOLE ->"	FR 2050 POKE 53280,14:POKE5328 1,14:PRINT "{CLR}{WHT}" :RETURN
HQ 604 PRINT "{DOWN}5.EA ADD D R'S 1% LESS THAN PRECEE DING DIRECTOR"	AK 824 INPUT "{5 DOWN}CENTER FR EQ MHZ:";F	FJ 2070 POKE53280,PEEK(53281)A ND248OR233:PRINT "{6}": RETURN
SG 610 INPUT "{3 DOWN}CHOICE OF SPACING";A	KR 825 W=468/F HH 830 PRINT "{DOWN}ONE HALF WA VE DIPOLE:";GOSUB4092	CF 2075 POKE 53281,PEEK(53281) AND402 OR 160:RETURN
RB 620 INPUT "{DOWN}DESIGN FREQ MHZ.=";F	FA 835 PRINT "{DOWN}1/4 WAVE EA SIDE:";PRINTW/2"FEET": PRINTW*12"INCHES"	SP 3000 GOSUB2040:GOSUB4091 XP 3005 PRINT "{CLR}":PRINTTAB(11)"{2 DOWN}<<<-WIRE A NTENNAS->>>"
HH 630 K=984 KJ 640 W=(K/F)*A	HS 840 X=W/2 GX 845 GOSUB4097:INPUT:PRINT " {CLR}"	GR 3006 PRINTTAB(9)"{3 DOWN}<- FOLDED DIPOLE ->"
SX 650 PRINT W"FEET":PRINT W*1 2"INCHES"	CD 860 GOSUB4098:GOSUB4099 MG 875 GETA\$:IFA\$=""THEN875	MS 3009 INPUT "{5 DOWN}CENTER F REQ MHZ:";F
MR 655 FORT=1TO1000:NEXT JG 660 GOSUB4097 MF 665 INPUT	MR 880 X=VAL(A\$) XC 885 ONXGOTO800,900 HQ 900 GOSUB 2050 SB 905 PRINT "{CLR}":PRINTTAB(1 2)"{BLK}{DOWN}< MAIN ME NU > ":PRINTTAB(10)" {DOWN} ANTENNA BUILDER {2 SPACES}"	DP 3010 W=1005/F HK 3015 PRINT "{DOWN}ONE WAVE L ENGTH OVER ALL":GOSUB4 092
AJ 670 GOSUB 4098 AM 675 GOSUB4099 HK 680 GETA\$:IFA\$=""THEN680	CK 910 PRINTTAB(11)"{DOWN}PROG RAM CHOICES":PRINTTAB(5)"{8}{DOWN}1.QUAD":PRIN TTAB(5)"2.YAGI"	KK 3020 PRINT "{DOWN}1/4 WAVE E A SIDE:";PRINTW/2"FEET ":PRINTW/2*12"INCHES"
QA 685 X=VAL(A\$) GA 690 ONXGOTO600,900 JQ 700 GOSUB 2010 AJ 705 PRINT "{CLR}":GOSUB04091 DP 710 PRINTTAB(11)"{1} {3 DOWN}<- YAGI ELEMENT S ->"	HP 915 PRINTTAB(5)"3.SPACING": PRINTTAB(5)"4.DIPOLE":P RINTTAB(5)"5.FOLDED DIP OLE"	RG 3021 X=W/2 FX 3024 GOSUB 4097 MP 3030 INPUT:PRINT "{CLR}" FD 3032 PRINTTAB(2)"{DOWN}1.WI RE ANT WORK WELL AT 30 FT. BEST AT{4 SPACES} THEIR RESONANT FREQ.
EJ 715 INPUT "{3 DOWN}CENTER FR EQ REF:";F	KP 917 PRINTTAB(5)"6.LONG WIRE "	PK 3033 PRINTTAB(4)"1/2 WAVE A BOVE GROUND."
XA 720 W=510/F BQ 725 PRINT "{2 DOWN}LENGTH OF REF ELM:";PRINTW"FEET" :PRINTW*12"INCHES"	GG 918 PRINTTAB(6)"A.# 1/2 WAV ES IN PHASE"	PQ 3034 PRINTTAB(2)"{DOWN}2. M ULTIBAND ANT'S 1/2 WAV E AT LOWEST{4 SPACES}F REQ. OPEN WIRE FEED"
GD 730 PRINT "{2 DOWN}FROM CENT ER OF BOOM:";PRINTW"FEET" :PRINTW*12/2"INCHES"	MJ 919 PRINTTAB(6)"B.LENGTH OF 1/2 WAVE COAX"	GR 3036 GOSUB4097:INPUT:PRINT " {CLR}"
SP 735 X=W AA 740 INPUT "{3 DOWN}CENTER FR EQ DE:";F	BK 920 PRINTTAB(6)"{DOWN}USE # 3 FOR ALL ANT"	EQ 3040 GOSUB4098:GOSUB4099 SA 3055 GETA\$:IFA\$=""THEN3055 RB 3060 X=VAL(A\$) FA 3065 ONXGOTO3000,900
HG 745 W=473/F DP 750 PRINT "{2 DOWN}LENGTH OF DE:";PRINTW"FEET":PRIN TW*12"INCHES"	FA 921 PRINTTAB(6)"SPACING CAL ULATIONS"	RG 4000 GOSUB 2075:GOSUB4091 DH 4005 V=2:PRINT "{CLR}":PRIN TAB(10)"{DOWN} - WIRE {SPACE}ANTENNAS -"
AD 752 PRINT "{2 DOWN}FROM CENT ER OF BOOM:";PRINTW/2"FE ET":PRINTW*12/2"INCHES "	MH 925 PRINT "{3 DOWN}CHOOSE 1, 2,3,4,5,6"	EE 4006 PRINTTAB(11)"{DOWN} {3 SPACES}-LONG WIRE {SPACE}-{3 SPACES}"
GQ 755 X=W PQ 765 INPUT "{3 DOWN}CENTER FR EQ DR#1:";F	RF 926 GETA\$:IFA\$=""THEN926 DH 927 X=VAL(A\$):IFX<1ORX>6THE N926	QA 4007 PRINTTAB(7)"{DOWN} {2 SPACES}- HARMONIC A NTENNAS -{2 SPACES}"
QH 770 W=445/F HH 771 PRINT "{DOWN}LENGTH OF D R#1:";PRINTW"FEET":PRIN TW*12"INCHES"	PQ 928 ONXGOTO2,700,600,800,30 00,4000	HG 4010 PRINT "{DOWN}1.CUT WIR E ODD 1/2 WAVES AT LOW EST{8 SPACES}FREQ YOU {SPACE}WILL WORK"
KK 772 PRINT "{DOWN}FROM CENTER OF BOOM:";PRINTW"FEET" :PRINTW*12/2"INCHES"	BF 930 IFX=1 GOTO 2{3 SPACES}: REM QUAD	EC 4013 PRINT "{DOWN}2.HAVE GO OD EARTH GND AND A 4:1 BALUM{5 SPACES}IN TUN ER"
PS 774 GOSUB4097 FQ 775 INPUT BH 777 GOSUB4098:GOSUB4099	KC 935 IFX=2 GOTO 700 :REM YAG I	KS 4015 PRINT "{DOWN}3.ELECTRI CAL LENGTH OF HARMONIC
	JR 940 IFX=3 GOTO 600 :REM SPA CING	
	RK 945 IFX=4 GOTO 800 :REM DIP OLE	
	JJ 950 IFX=5 GOTO 3000:REM FOL D DIPOLE	
	PB 955 IFX=6 GOTO 4000:REM LON G WIRE	
	HF 2010 POKE 53281,PEEK(53281) AND248 OR 233:PRINT " {BLK}":RETURN	

```

{SPACE}ANTENNAS"
EK 4020 PRINT"{DOWN}1/2 WAVELE
NGTH COAX"
QD 4023 PRINT"{DOWN}1.ALL BAND
INVERTED VEE'S.".PRIN
T"{DOWN}2.LONG WIRES,
{SPACE}HAVE VERY HI Z.
"
JQ 4024 PRINT"{DOWN}WHERE Z IS
IN REFERENCE TO IMPED
ANCE"
GM 4025 PRINT"THE LOAD GIVES T
O THE FEEDLINE AT A FR
EQ"
PA 4027 GOSUB4097:INPUT:PRINT"
{CLR}"
KP 4028 INPUT"{RVS}{CYN}
{3 DOWN}NUMBER OF ODD
{SPACE}1/2 WAVELENGTH=
{2 SPACES}";N
PB 4029 INPUT"{RVS}{GRN}{DOWN}
LOWEST FREQ IN MHZ.
{2 SPACES}";F
XK 4030 K=492
GC 4035 W=(K/F)*N-.05
XQ 4037 PRINT"{RVS}{YEL}{DOWN}
LENGTH OF LONG WIRE":G
OSUB4092
KE 4045 PRINT"{RED}{RVS}{DOWN}
FREQ IN MHZ. " F
MX 4047 K=984
QD 4048 L=W
PJ 4049 X=F*(L)+.025
AC 4050 PRINT"{RVS}{1}{DOWN}LE
NGTH OF WIRE IN FEET"
{SPACE}W
FX 4058 PRINTX/936"NUMBER OF W
AVELENGTHS":PRINTX/468
"NUMBER OF 1/2 WAVELE
NGTHS"
BG 4059 INPUT"{RVS}{6}COAX VEL
OCITY FACTOR"; V
EC 4060 PRINT"{DOWN}"492/F*V/1
2"{10 LEFT}{DOWN}=1/2
{SPACE}WAVE COAX AT DE
SIGN FREQ IN FEET"
GC 4062 GOSUB4097:INPUT:PRINT"
{CLR}"
ES 4065 GOSUB4098:GOSUB4099
MG 4080 GETA$:IFAS$=""THEN4080
PG 4085 V=VAL(A$)
MH 4090 ONVGOTO4000,900:END
SE 4091 PRINT"{CLR}":RETURN
JE 4092 PRINTW"FEET":PRINTW*12
" INCHES":RETURN
XR 4093 PRINT"{DOWN}1/4 WAVE E
A SIDE":PRINT W/4"FEET
":PRINT W*12/4"INCHES"
:RETURN
ES 4094 L=SQR((X*X)+(X*X)/X*X)
:RETURN
DQ 4095 PRINT"{DOWN}TOTAL WIDT
H ACROSS SPREADERS":PR
INTL"FEET":PRINTL*12"IN
CHES":RETURN
MF 4096 PRINT"{DOWN}DRILL HOLE
FRM CNTR BOOM":PRINTL
/2"FEET":PRINTL*12/2"IN

```

```

NCHES":RETURN
RF 4097 PRINT {DOWN}{RVS} {6}
PRESS RETURN ":RETURN
XA 4098 PRINT"{CLR}":PRINTTAB(
8)"{DOWN}1.CALC AGAIN?
":PRINTTAB(8)"{DOWN}2.
MAIN MENU":RETURN
FX 4099 PRINT"{4 DOWN}CHOOSE 1
OR 2":RETURN
KK 5010 END

```

Clifford Hudson, KG6PD, is a ham radio operator in Hesperia, California.

BATTLESHIP 128

By Donald G. Klich

Probably every schoolchild has played the game Battleship using grids drawn on a piece of paper. The object of the game is to place four ships secretly on your grid while your opponent does the same. Then by alternately calling out salvos of three grid locations, you try to sink your opponent's navy.

Problems with the paper version can occur when an opponent sneaks a look at the other's grid. Another problem comes when an opponent scores a hit and the other person winces, unintentionally giving away a ship's location. Battleship 128 is a computerized version for the 128 that updates the old pencil-and-paper favorite.

Typing It In

Battleship 128 is written entirely in BASIC 7.0. To help avoid typing errors, enter the program with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. REM instructions starting with line 180 are included for those readers who enjoy program analysis. These remarks can be omitted if desired.

Battleship 128 remembers where the players locate their ships and produces separate screens depicting each player's progress. When a hit is scored, the program doesn't reveal exactly where it occurred, but displays the entire salvo as possible hits. This makes the game more interesting. When a ship is sunk, it is identified and displayed in red.

Some simple sounds and colors have been added to make the computer version more appealing. As an aid to your gunnery, listen carefully to the sounds of your hits and use them with

some basic reasoning to gain a slight advantage over your opponent.

BATTLESHIP 128

```

FK 10 REM COPYRIGHT 1992 - COM
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AQ 20 REM BY DONALD G. KLICH
SP 30 GRAPHIC0,1:PRINTSPC(12)"
{5 DOWN}SETTING UP"
BS 40 DIM B1(2,2),B2(2,2,2),B3
(2,3,2),B4(2,4,2),S$(2,4
5,2),SH(3),G(2,4),T(45,4
):ENVELOPE9,0,4,4,10,3:V
OL9
QS 50 FORI=1TO2:FORJ=1TO45:S$(
I,J,1)=" ":S$(I,J,2)=" "
:NEXT:NEXT
PA 60 FORI=0TO4:FORJ=1TO9:T(I*
9+J,1)=1+4*J:T(I*9+J,2)=
4*I+4:T(I*9+J,3)=6+16*J:
T(I*9+J,4)=32*I+36:NEXT:
NEXT
DP 70 GRAPHIC0,1:PLAY"V102T0HC
QEG.AIEQAR03HCQD02G03HCR
":VOL0:VOL10:FORP=1TO2
KS 80 GRAPHIC0,1:COLOR0,1:COLO
R1,2:COLOR2,4:COLOR3,3:CO
LOR4,1
CA 90 PRINT"{DOWN}{GRN}
{13 SPACES}BATTLESHIP 12
8{2 DOWN}"
FK 100 PRINT"{WHT}PLAYER{YEL}"
P"{WHT}ENTER YOUR BOAT
{SPACE}POSITIONS.":PRIN
T"{2 DOWN}EXAMPLES.":PR
INTSPC(9)"BOAT 1 = D,4
{5 SPACES}OR":PRINTSPC(
9)"BOAT 3 = C,3,D,4,E,5
"
MA 110 PRINT"{DOWN}USE RETURN
{SPACE}AFTER ENTERING E
ACH BOAT":PRINT"EVEN TH
OUGH ENTRIES ARE BLANKE
D OUT":PRINT"{DOWN}BOAT
S ARE LENGTHS 1 TO 4 AN
D CAN BE"
MX 120 PRINT"VERTICAL, HORIZON
TAL, OR DIAGONAL":PRIN
T"SHOTS ARE MADE S
IMILAR TO BOAT3 ABOVE."
QC 130 PRINT"THOSE THAT ALL MI
SS ARE SHOWN AS {RVS}WH
ITE{OFF}":PRINT"IF ANY
{SPACE}ARE HITS, ALL AR
E SHOWN AS {RVS}{CYN}BL
UE{OFF}{WHT}"
FR 140 PRINT"SUNK BOATS ARE SH
OWN IN {RVS}{RED}RED
{WHT}{OFF}"
RG 150 PRINT"{3 DOWN}
{3 SPACES}HIT ANY KEY W
HEN READY TO START"
XG 160 GETA$:IFAS$=""THEN160
QS 170 GOSUB590
SF 180 REM LOAD BOAT LOCATIONS
FOR EACH PLAYER

```

```

AK 190 INPUT "{WHT}ENTER LOCATI
ON OF BOAT 1{BLK}";HS,V
:GOSUB500:IFE=1THEN190:
ELSEB1(P,1)=L
HJ 200 PRINTSPC(18){WHT}BOAT
{SPACE}2{BLK}":INPUTS$,
V,B$,B,C$:GOSUB500:IFE=1TH
EN200:ELSEB2(P,1,1)=L:H
$=B$:V=B:GOSUB500:IFE=1
THEN200:ELSEB2(P,2,1)=L
GC 210 PRINTSPC(18){WHT}BOAT
{SPACE}3{BLK}":INPUTS$,
V,B$,B,C$:GOSUB500:IFE=1
THEN210:ELSEB3(P,1,1)
)=L:H$=B$:V=B
MP 220 GOSUB500:IFE=1THEN210:E
LSEB3(P,2,1)=L:H$=C$:V=
C:GOSUB500:IFE=1THEN210
:ELSEB3(P,3,1)=L
HJ 230 PRINTSPC(18){WHT}BOAT
{SPACE}4{BLK}":INPUTS$,
V,B$,B,C$,C,D$,D:GOSUB5
00:IFE=1THEN230:ELSE:B4
(P,1,1)=L:H$=B$:V=B:GOS
UB500
MF 240 IFE=1THEN230:ELSEB4(P,2
,1)=L:H$=C$:V=C:GOSUB50
0:IFE=1THEN230:ELSEB4(P
,3,1)=L:H$=D$:V=D:GOSUB
500:IFE=1THEN230
SM 250 B4(P,4,1)=L:NEXTP:P=1:Q
=2:PRINT "{WHT}"
CP 260 REM ACCEPT 3 SHOTS AND
{SPACE}STORE IN TEMP AR
EA "SH(3)"
MQ 270 GOSUB590:GOSUB530:CHAR1
,14,0,CHR$(48+P)
FF 280 PRINT"PLAYER "+CHR$(48+
P)+", TAKE 3 SHOTS";:IN
PUTS$,V,B$,B,C$,C:GOSUB
500:IFE=1THEN280:ELSESH
(1)=L:H$=B$:V=B:GOSUB50
0:IFE=1THEN280
RX 290 SH(2)=L:H$=C$:V=C:GOSUB
500:IFE=1THEN280:ELSESH
(3)=L
CC 300 REM CHECK BOATS FOR HIT
S
SH 310 HT=0:FORI=1TO3:IFSH(I)=
B1(Q,1)THENB1(Q,2)=1:HT
=1:PLAY"TG9G"
FB 320 NEXT:FORI=1TO3:FORJ=1TO
2:IFSH(I)=B2(Q,J,1)THEN
B2(Q,J,2)=1:HT=1:PLAY"TG
9G"
XF 330 NEXT:NEXT:FORI=1TO3:FOR
J=1TO3:IFSH(I)=B3(Q,J,1
)THENB3(Q,J,2)=1:HT=1:P
LAY"TG9G"
QQ 340 NEXT:NEXT:FORI=1TO3:FOR
J=1TO4:IFSH(I)=B4(Q,J,1
)THENB4(Q,J,2)=1:HT=1:P
LAY"TG9G"
MS 350 REM CHANGE SHOTS TO POS
SIBLE HIT COLOR IFA HIT
RECORDED
MR 360 NEXT:NEXT:IFHT=1THENFOR
I=1TO3:SS(P,SH(I),1)="2

```

```

":SS(P,SH(I),2)="?:NEX
T

```

```

XB 370 IFHT=0THENFORI=1TO3:SS(
P,SH(I),1)="1":SS(P,SH(
I),2)="-":NEXT
KD 380 REM CHECK IF ANY BOAT C
OMPLETLY SUNK, TURN BO
AT SQUARES RED
AJ 390 IFB1(Q,2)=1THENS$(P,B1(
Q,1),1)="3":SS(P,B1(Q,1
),2)="1":G(Q,1)=1
MB 400 IFB2(Q,1,2)=1ANDB2(Q,2
,2)=1THENFORI=1TO2:SS(P
,B2(Q,I,1),1)="3":SS(P,B
2(Q,I,1),2)="2":NEXT:G(
Q,2)=1
DG 410 IFB3(Q,1,2)=1ANDB3(Q,2
,2)=1ANDB3(Q,3,2)=1THENF
ORI=1TO3:SS(P,B3(Q,I,1
),1)="3":SS(P,B3(Q,I,1
),2)="3":NEXT:G(Q,3)=1
CE 420 IFB4(Q,1,2)=1ANDB4(Q,2
,2)=1ANDB4(Q,3,2)=1ANDB4
(Q,4,2)=1THENFORI=1TO4:
SS(P,B4(Q,I,1),1)="3":S
$(P,B4(Q,I,1),2)="4":NE
XT:G(Q,4)=1
GJ 430 REM CHECK IF ALL BOATS
{SPACE}SUNK
HP 440 GOSUB530:IFG(Q,1)+G(Q,2
)+G(Q,3)+G(Q,4)>4THEN4
60
KX 450 PLAY"V103T8ICCCDCQDWE":
PRINT"PLAYER "+CHR$(48+
P)+" HAS WON THE WAR!..
..AGAIN?":GETKEY$:IFAS
="Y"THENRUN:ELSEEND
MQ 460 PRINT"{6 SPACES}PRESS A
NY KEY TO CONTINUE"
SX 470 GETA$:IFAS=""THEN470
FQ 480 IFP=1THENP=2:Q=1:GOTO27
0:ELSEP=1:Q=2:GOTO270
AJ 490 REM CONVERT HOR AND VER
T TO SQUARE #
QQ 500 E=0:IFHS>"I"ORH$<"A"ORV
<1ORV>5THENE=1:SOUND1,4
000,10:RETURN
KG 510 L=((V-1)*9)+ASC(H$)-64:
RETURN
JC 520 REM PRINT GAME RECORD I
N GRID
DC 530 FORI=1TO45
DD 540 IFSS(P,I,1)=" "THEN570
KF 550 CHAR1,T(I,1),T(I,2),S$(
P,I,2)
DF 560 CIRCLEVAL(SS(P,I,1)),T(
I,3),T(I,4),5,,,,,90
FS 570 NEXT:RETURN
FH 580 REM DRAW GRID
MD 590 GRAPHIC4,1,23:FORI=0TO8
:CHAR1,5+(I*4),1,CHR$(6
5+I):NEXT:BOX1,14,20,15
8,180:FORI=0TO4:CHAR1,1
,4+(I*4),CHR$(49+I):NEX
T
HG 600 FORI=52TO148STEP32:DRAW
1,14,IT0158,I:NEXT:FORI
=30TO142STEP16:DRAW1,I,

```

```

20TOI,180:NEXT:CHAR1,6,
0,"PLAYER #"+CHR$(48+P)
+" 'S SCREEN":RETURN

```

Donald G. Klich, the author of Railroad Solitaire (Gazette Disk bonus, July 1992) lives in Mt. Prospect, Illinois.

SPEEDRAM-64

By Frank Gordon

Wouldn't it be convenient if you could use SpeedScript with the 1764 RAM expansion unit (REU) or two drives? Well, you can with Speedram-64.

This BASIC utility converts COMPUTE's word processor into Speedram-64, allowing you to change the drive number from within the program to either 8 or 9. You can also customize the program to run SpeedScript with your favorite background and text colors already loaded.

Typing It In

To help avoid typing errors, enter the BASIC loader with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Numerous REM statements help explain the program, but they may be omitted if you prefer. Be sure to save a copy of the converter (Speedram.cvt) before you exit Proofreader.

Creating Speedram-64

In order to modify your version of SpeedScript, follow these steps.

1. Load and run SpeedScript.
2. Select your favorite background and text colors with Ctrl+B and Ctrl+L.
3. Exit SpeedScript by tapping the Restore key and responding to the prompt by pressing Y.
4. Type POKE44,40: POKE10240,0: NEW and press Return. This will protect SpeedScript's BASIC area.
5. Load but don't run Speedram.cvt with a .8 extension.
6. Insert a work disk onto which you want to store Speedram-64. Enter RUN and press Return.

The converter will run and save the modified version of SpeedScript to disk with the filename Speedram-64. When the utility finishes saving the program, turn your computer off and then back on before using Speedram.

PROGRAMS

Using Speedram-64

If you have a 1764 REU, install it and initialize it as drive 9. At this point you may also wish to copy any SpeedScript programs to the 1764. If not, return to the 1764 menu and quit. Now load and run Speedram-64 like any BASIC program. Your familiar SpeedScript screen should appear in the colors that you selected.

You can test Speedram-64 by pressing Ctrl+N (for drive 9) and then Ctrl+4 for a directory. You should get a rapid listing of any files stored in the REU (or on drive 9, if you have two drives). Press Ctrl+Y (for drive 8), and Ctrl+4 will list programs from that drive. Also, when you press Ctrl+N or Ctrl+Y, the drive number appears on the command line. Shift from one drive to the other in this rapid manner to load or save SpeedScript files.

How Speedram-64 Works

You may be interested in knowing how Speedram-64 works. I used the list of pokes that change the drive number in "Modifying SpeedScript" (July 1992) and followed Jonathan Bell's machine language notes in his Word Count program on COMPUTE's SpeedScript disk.

Bell describes how to create new SpeedScript utilities that rely on unimplemented Ctrl+key combinations. POKE2854,114: POKE 2855,36 will shift control to 9330 (\$2472) for unused Ctrl+key combinations, and here the ASCII value of the accumulator can be compared to the new Ctrl+key.

For example, 14 and 25 in line 60 are the ASCII values of Ctrl+N and Ctrl+Y. You can replace these with your own Ctrl+key combinations if these are not used by SpeedScript.

It is important that any section of a new routine end with JMP 2665 (\$0A69) to return control to SpeedScript. To keep the drive number on the command line, however, I inserted another wedge from 2665 to 2670 (JMP 9395:NOP:NOP) into SpeedScript's main loop and ended each new section with a JMP back to 2670 (\$0A6E).

SPEEDRAM.CVT

```
EQ 10 REM COPYRIGHT 1992 - COMPUTE PUBLICATIONS INTL L
```

G-40 COMPUTE DECEMBER 1992

```
TD - ALL RIGHTS RESERVED
BS 15 FOR I=9330 TO 9411:READA
:POKEI,A:B=B+A:NEXTI
PA 20 IFB<>7836 THEN PRINT"ERR
OR IN DATA STATEMENTS":S
TOP
DQ 25 REM - INSERT JMP 9330 ($
2472) -
AK 30 POKE2854,114:POKE2855,36
:POKE9070,0
BX 35 REM - INSERT WEDGE AT 26
65-2670 ($0A69-$0A6E) -
CE 40 POKE2665,76:POKE2666,179
:POKE2667,36:POKE2668,23
4:POKE2669,234
AJ 45 REM - RETURN TO BASIC AR
EA AND SAVE MODIFIED SPE
EDSCRIPT -
AS 50 POKE43,1:POKE44,8:POKE45
,196:POKE46,36:SAVE"SPEE
DRAM-64",8
CP 55 REM - COMPARE ACC TO CTR
L-KEY VALUES AND BRANCH
{SPACE}TO EIGHT OR NINE
EF 60 DATA 201,25,240,7,201,14
,240,16
AQ 65 REM - IF NO MATCH JUMP T
O WEDGE
DP 70 DATA 76,187,36
RR 75 REM - IF EIGHT, LDA #8 A
ND JSR TO STORE, PRINT 8
THEN JUMP TO WEDGE -
QC 80 DATA 169,8,32,151,36,169
,56
DR 85 DATA 141,39,4,76,187,36
AF 90 REM - IF NINE, LDA #9 AN
D JSR TO STORE, PRINT 9
{SPACE}THEN JUMP TO WEDG
E -
MS 95 DATA 169,9,32,151,36,169
EF 100 DATA 57,141,39,4,76,187
,36
EG 105 REM - STORE VALUES OF E
IGHT OR NINE -
JB 110 DATA 141,235,18,141,44
GM 115 DATA 19,141,154,20,141,
241
CP 120 DATA 22,141,79,23,141,2
23
JC 125 DATA 24,141,227,26,141,
91
CG 130 DATA 27,141,161,27,96
FK 135 REM - GET LAST DEVICE A
ND PUT ON COMMAND LINE
{SPACE}-
PE 140 DATA 165,186,24,105,48,
141,39,4
EH 145 REM - WEDGE, INSERT COM
MANDS REPLACED AT 2665-
2670 AND RETURN TO 2670 -
FC 150 DATA 160,0,140,113,36
PJ 155 DATA 76,110,10,0
```

Frank Gordon is the author of Graphos (April 1992). He used MetaBASIC to help develop Speedram-64, and he lives in Orono, Maine. □

ONLY ON DISK

Here are the bonus programs that you'll find on this month's Gazette Disk.

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By Robert Quinn
Wagga Wagga, NSW
Australia

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By Randy Clemmons
San Diego, CA

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REVIEWS

TANDY 4860HD NOTEBOOK

If I were asked to describe the Tandy 4860HD Notebook computer in only two words, I would call it a mighty mite. That really sums up what this nifty little machine is all about: lots of power in an incredibly small package.

Featuring an Intel 80486DX CPU running at a crisp 33 MHz as its heart and soul, the 4860HD gives up nothing in the way of performance to similarly equipped, full-size PCs. The real beauty of this machine is the compact size in which it delivers all this computing power; the diminutive machine is only 8¾ inches deep by 11 inches wide by 1½ inches thick when closed. It weighs only five pounds and seven ounces when the battery's in place and it's ready for work—truly a miniature marvel.

Viewing text or graphics on the 4860HD's hi-res backlit LCD screen is a pleasure, thanks to a 10-inch nonglare display which delivers 9½ inches of viewable area (measured diagonally). The standard resolution for the display is 640 × 480, and slider controls for adjusting contrast and brightness are conveniently located just under the display itself on the left side of the unit.

The hinge that connects the main body of the computer to the lid with the VGA display also provides a nestling place for the illuminated indicators which monitor the system status. Illuminated icons are used to signify Caps Lock, Num Lock, Scroll Lock, hard and floppy drive activity, power on, and other system conditions. The power switch is flush mounted

on the body of the computer itself, just below the hinge, and its design and placement make it virtually impossible to turn the system off accidentally. While this might seem like a minor point, it's surprising how many other notebook computers put the power switch

MS-DOS 5.0 and Windows 3.1 preinstalled (the floppy disks are also included, along with the manuals). A high-density 1.44MB 3½-inch floppy drive is mounted at the right side of the machine toward the front of the unit. Twin panel doors at the rear of the machine conceal



The Tandy 4860HD Notebook offers fine graphics, blazing speed, and excellent battery life in a very small package.

in a jeopardizing position for such accidents, so it's refreshing to see it so well protected in the 4860HD.

The machine's standard configuration is 4MB of RAM. This can be boosted to either 8MB or 20MB depending on your needs. Performance of the 4860HD supplied for review (with 4MB of RAM) can best be summed up with the words *blazing speed*. The 33-MHz 486DX CPU, coupled with 4MB of RAM and aided by the instantaneous refresh speed of the VGA LCD, makes this one of the fastest notebooks I've ever used.

A 60MB hard drive is the standard bill of fare on this machine, and it comes with

the I/O connectors. A proprietary expansion connector is provided for adding Tandy peripherals, while the other panel houses a parallel port, a single 9-pin serial port, and a 15-pin D connector for using an external monitor. A mini-DIN port is also provided for attaching an external keyboard. You'll find the connector for attaching the AC power adapter and battery charger to the notebook between these two panels.

Battery life is excellent, yielding usable times of three to four hours on the average between charges. The battery recharge time is only about two hours, so there's plenty of power to

keep you computing between charges. Of course, the 4860HD can be used while it's recharging, so there's no interruption of your productivity.

An optional minitrackball is available in case you don't wish to use an external device, and a 2400-bps modem with 9600-bps fax capability can be mounted internally in the 4860HD.

The Tandy 4860HD Notebook computer is an excellent choice for any user who wants maximum productivity in a case that's smaller than the average three-ring binder. This mighty mite proves that good things can indeed come in small packages.

TOM BENFORD

Tandy 4860HD Notebook—\$2,999

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NORTON DESKTOP FOR WINDOWS

Norton Desktop for Windows is a comprehensive file management and utilities package that greatly enhances and expands the capabilities of Windows.

NDW replaces Windows' Program Manager as the default shell and, upon installation, automatically converts all Program Manager groups to Quick Access groups. NDW then allows you to create new groups and add group items to them simply by dragging files from the directory tree to the newly created group window. Nested subgroups are also easily created under NDW, and group items can be dropped directly onto the desktop where

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REVIEWS

they're available for easy access.

This system is quite flexible. It allows you to group applications and files into whatever configuration you feel most comfortable working with. Each group can be viewed in three ways—as a collection of labeled icons, as a vertical list of icons, and as a toolbox. In the toolbox view, group items are displayed as unlabeled icons neatly packed together to save space. Custom menus and dialog boxes can be added using NDW's Batch Builder and Macro Builder tools. On a smaller scale, NDW comes with a powerful icon editor that lets you create custom icons from scratch for your non-Windows applications. If you prefer, you can modify any of the 150 icons that are included with the program.

With NDW as your shell, you can launch applications simply by dropping one icon onto another. The first icon need not be related to the application you are launching. However, if you launch an application—a word processor, for example—by dropping an associated document onto it, the document will automatically be opened along with the word processor so you can begin editing that document right away. In addition, several types of files can be printed directly by dragging them onto any printer icon.

Text and system files such as autoexec.bat can be edited using NDW's powerful Desktop Editor. Although Desktop Editor won't substitute for a comprehensive word-processing package, it does offer several useful features, including the ability to edit multiple files at one time, a file comparison option that alerts you to differences between similar text files, global search across multiple files, the ability to create macros to automate repetitive editing tasks, and automatic saving of your documents at regular intervals (based on time or number of characters) that you specify.

If you just want to view the contents of a file without editing it or opening its associated application, you can use NDW's File Viewer. More than 45 file types from various popular applications are supported, including those created by Microsoft Word, WordPerfect, Lotus 1-2-3, Excel, Paradox, Quattro, and dBASE. CompuServe TIF and BMP graphic files, as well as ZIP, ZOO, and ARC compressed files, are also supported. Again, the file viewer can be activated simply by dropping onto it any file you wish to view.

If after viewing a file you decide you want to trash it, you can either drag its

icon over to SmartErase or put it through the Shredder. Files deleted with SmartErase are easily recovered, while shredded files are gone for good. According to Symantec, Shredder meets Department of Defense security standards for data destruction.

Another of NDW's useful accessories is Sleeper, a screen saver that displays moving graphics to keep the



Add power to your desktop with Norton Desktop for Windows.

screen image from burning itself into your monitor while you're away from the computer for extended periods. Sleeper comes with several animated images and even recognizes image files from Windows 3.1, Intermission, and After Dark.

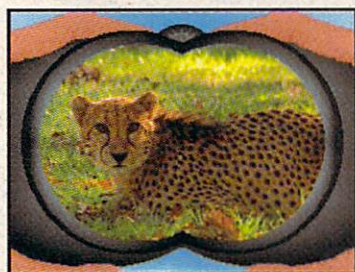
With NDW's SuperFind, you can quickly scan your entire system for a specific file or all files matching a specific criterion, such as all ARC files. If what you're looking for is a special character to include in a text document, KeyFinder shows you at a glance the complete character sets of any fonts installed on your system. NDW also gives you instant access to 14 screens full of system information describing your CPU speed, hardware interrupts, memory allocation, graphics and printer setups, and a lot more.

To complete the package, Symantec throws in two first-rate utility packages—the complete Norton Backup and Norton AntiVirus. Backup makes quick work of the very necessary task of backing up your hard drive and can even perform automated backups when used in conjunction with Scheduler (another NDW goody that can be used simply as a reminder program or to perform specific computing tasks at regular intervals). Finally, Norton AntiVirus is included to monitor your system and to keep it free from data-damaging computer viruses.

Norton Desktop for Windows is, perhaps, the most complete file management and utilities package available for Windows. It's stuffed with nearly every tool and utility program you'll ever need to make the most efficient and productive use of your PC. NDW even

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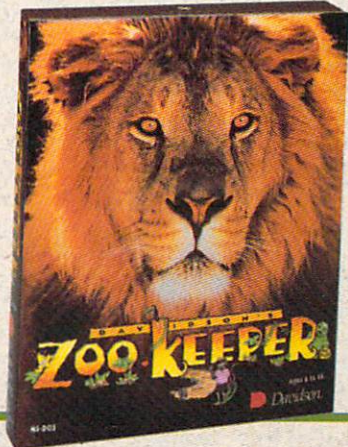
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scenarios. You can start off with a single rail line running through a rural area or multiple lines already encircling a large city.

On a more superficial level, A-Train simply looks better than Railroad Tycoon. You view your geographical area from an oblique angle rather than from the side or directly overhead, giving you a better perspective. A-Train



Take the A-Train to corporate success—if you can keep your empire on track.

has easily accessible pull-down menus in a frame around the playing field, allowing you to check with your broker about buying stock, build an amusement park, or obtain a satellite view to survey other areas of your burgeoning empire.

There are plenty of nice graphic touches, from the darkness-to-daylight change that washes over the screen every few minutes as a new day comes and goes, to the figure of Santa Claus flying over on Christmas Eve. The sound effects are pleasant but nothing special.

The ribbon rails and crossies were awash in red ink about a month into my game of A-Train, which goes a long way toward explaining why I'm a freelance writer instead of a railroad CEO. I found A-Train's hardcore economic emphasis awfully tedious, to be honest; I suspect CEO wannabes or diversion-seeking business devotees will enjoy it a lot more than I did. And while there are some elements of A-Train that will appeal to diehard railfans—you can set switches and buy better engines, for instance—you'll spend more time dealing with cold economic reality, such as determining whether to risk borrowing a few hundred thousand dollars for a new factory to be built along your latest spur track.

Ironically, there's more for railfans in the user manual than in the game itself: Not only does it include trivia and examples of railroad slang, but it also

comes with an uninstall program should you ever want to remove NDW from your system. I can't imagine that you will ever need it!

BOB GUERRA

IBM PC or compatible, 2MB RAM (3MB recommended); EGA, VGA, SVGA, or XGA; hard drive with 9MB free (for full installation); Windows 3.0 or higher; Microsoft or compatible mouse recommended—\$179 (upgrade from version 1.0—\$49)

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A-TRAIN

When you hear the lonesome whistle of a freight train, do you (a) start humming "New River Train" or (b) speculate on how long railroad freight carriers will be able to compete economically with their counterparts in the trucking industry?

If you answered (a), chances are A-Train isn't the train game for you. If you answered (b), on the other hand, A-Train could be the diesel engine that pulls the profit-making train of your dreams.

Presented by Maxis, the company that created SimCity, A-Train is actual-

ly the second sequel to an "award-winning, number-one selling game in Japan," according to a blurb on its box. (The only previous U.S. release was a version of A-Train II called Railroad Empire.) If A-Train is half as popular in Japan as Maxis claims, it's no wonder Japan consistently wipes the floor with America economically. This is a highly complex, intensely challenging game that requires you to be railroad CEO, urban planner, stock speculator, and major contractor all at once.

At this point, gamers familiar with Sid Meier's Railroad Tycoon may be wondering whether there's any difference between that game and A-Train. On a fundamental level, there are many similarities. Both games employ railroads as a means to economic expansion, allowing you to rake in (or bleed out) large sums of money as you build an empire. A-Train lacks both the broad geographical and historical scope of Railroad Tycoon and the computer-generated competition, however, making it more focused.

Instead of taking your railroad and its environs cross-country over the course of decades, A-Train moves along a day at a time, staying focused on a predetermined geographical area set by selecting one of the game's six

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FROM THE MAKERS OF AFTER DARK

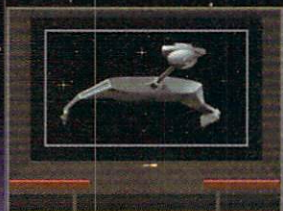
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REVIEWS

offers a concise, well-written history of railroading around the world.

If you're looking for a break from landscaping your model railroad layout, you'd be much better off with something like Abracadata's Design Your Own Railroad. But A-Train could provide you with a perfect coupling if you think you'd enjoy running an expanding railroad as a substantial challenge to your corporate skills.

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NEC SILENTWRITER MODEL 95

PostScript Level II and HP LaserJet III emulations are just two of the long list of features that make the NEC Silentwriter Model 95 a truly outstanding laser printer. Besides being easy to operate, it offers plenty of RAM memory and internal fonts.

Many features which are options on other comparably priced laser printers are standard on the Silentwriter. Standard RAM memory, for example, is 2MB—a "real-world" amount for most graphics and PostScript work. Additional RAM can be added up to a maximum of 5MB total. The unit I tried was outfitted with the standard 2MB of RAM.

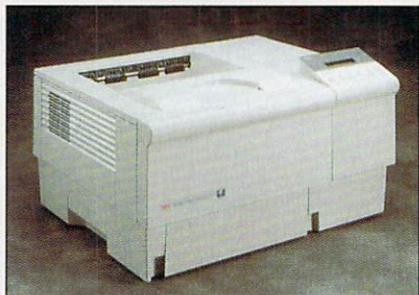
Internal fonts are abundant in the Silentwriter, with 35 PostScript typefaces augmenting the LJ III mode's 8 scalable and 14 bitmap fonts. If that isn't enough, you can also add HP-compatible downloadable soft fonts or cartridge fonts, as well.

The Silentwriter weighs about 37.5 pounds and measures 18.6 x 15 x 9.5 inches, so it can nestle on a desktop as well as on a printer stand. As much as it weighs, however, it isn't a printer you'd like to carry around the workplace frequently. If you desire mobility, a rolling printer stand would be a useful accessory.

The Silentwriter can output up to six pages of 16- to 24-pound paper per minute when feeding from its 250-sheet cassette; it can also handle paper and cardstocks in the 16- to 41-pound weight range when they're fed in manually. The multipurpose tray sup-

plied can also accommodate up to 15 envelopes at a time. Finished output is delivered facedown to the stacker, which can hold up to 150 sheets of 20-pound bond at a time. An optional faceup accessory stacker can hold up to 50 sheets.

Interfacing on the Silentwriter covers all bases, with Centronics parallel, RS-232C serial, RS-422 serial, and Local-



The NEC Silentwriter Model 95: Impressive emulations, easy operations.

Talk (AppleTalk) all featured as standard equipment on the unit. The Local-Talk interface is only available in PostScript mode, and the active interface setting can be selected via the control panel.

The control panel is easy to understand and very simple to operate. Six push buttons control the printer's functions and step you through the menu selections, while a 16-character LCD provides prompts as well as status indications.

A thorough user's guide more than 200 pages thick provides detailed information on using, maintaining, and upgrading the printer, in addition to accessing all of its features. The manual's excellent organization makes finding any desired topic a very simple task, and the clear writing style and generous use of illustrations, diagrams, and tables aids comprehension of the material about the printer.

It should be noted, though, that most people probably won't need to refer to the manual at all after the initial installation, since the control panel's menu options are easy to understand and logically arranged.

PostScript and HP LJ III emulations, 6-ppm print speed, and rich interfacing flexibility all combine with the printer's aforementioned attributes to make the NEC Silentwriter Model 95 a uniformly excellent laser printer.

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JACK NICKLAUS GOLF & COURSE DESIGN—SIGNATURE EDITION

There's an old pro on the fairway, flaunting a brand-new image. Accolade's premier sports simulation gets a 256-color facelift with the Signature Edition of Jack Nicklaus Golf & Course Design. The Golden Bear has never looked better.

Few entertainment products have enjoyed the player admiration and corporate support of Ned Martin's long-running golf series. Backed by thoughtful revisions, numerous data disks, and the kind of publicity money can't buy—freely accessible user-designed courses—Jack Nicklaus Golf & Course Design ranks among the best in its genre.

The growing high-end market, as well as competition from such games as Access Software's Links, has prompted a complete overhaul of Accolade's best-selling product. The results are phenomenal. Created expressly for fast VGA systems, this latest incarnation features almost completely digitized courses, golfer animation, and full sound board support. The package

also includes the first 256-color course designer, and the course designer itself has been redesigned for even greater flexibility. For many fans, this feature alone is worth the price of admission.

Graphic improvements are immediately apparent in the game's slick new front-end system. Dithered 3-D selection buttons almost seem to jump off the screen, and they're set against colorful, full-sized background photos. This clean, sharp quality of the images extends throughout the program.

Human players must first register as club members, designating gender, golfer animation, tee designation, and skill level. The club also contains a well-stocked roster of computer players, each boasting unique abilities. You can now create customized opponents, fine-tuning such attributes as swing, distance, and accuracy.

Up to four club members—human or computer-controlled—can compete in either Skins or Stroke play. The Skins game has been enhanced to allow players to change the total prize money and cash amounts for individual holes. Stroke play now features a one-to-five-game tournament option. Up to 72 golfers, including a maximum of four club members, may participate. Al-

though the program maintains detailed scorecards and statistics, there's still no provision for hardcopy printouts. Maybe next time.

The package includes two 18-hole courses based on real-life Nicklaus designs. Sherwood Country Club in Thousand Oaks, California, is a favorite on the PGA Tour. The scenic fairways stretch along the base of the Santa



The Signature Edition of Jack Nicklaus Golf & Course Design is the best yet.

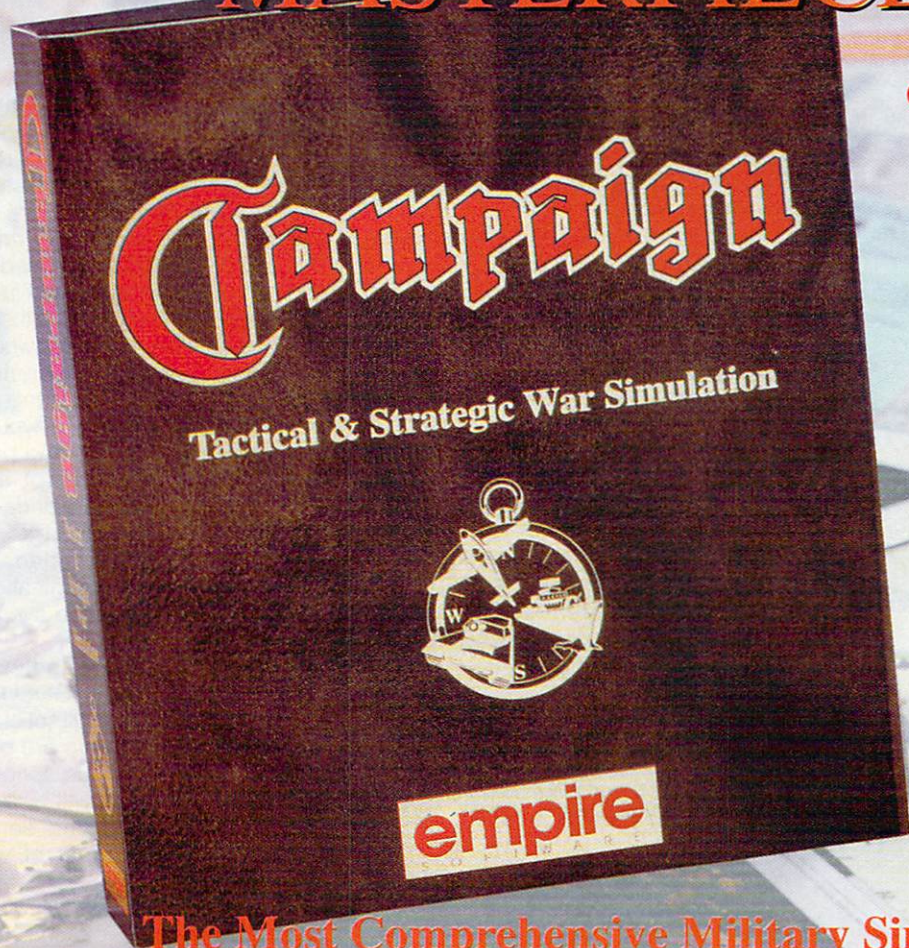
Monica Mountains and are dotted with waterfalls, streams, and rock-lined pools. Don't let the course's beauty fool you, though—this one's a killer. Keeping dry is a major concern at New Orleans's English Turn Golf & Country Club, a unique course completely surrounded by water. The holes are tough but fair, assuring equal challenge to players of all skill levels.

Two new courses are available for the game through Jack Nicklaus Signature Tour, Volume 1. It features The Links of Muirfield in Scotland, which recently hosted the British Open, and Muirfield Village Golf Club in Ohio, which hosts Nicklaus's annual Memorial Tournament. The Signature Tour package retails for \$24.95.

Martin's aptly named Sculptured Software continues to perfect the art of contoured course mapping, including mounds, slopes, bunkers, and multitiered greens. Almost all terrain features are now digitized, from foreground objects (trees, shrubs, and boulders) to the 360-degree scrolling backdrops. Of special note are the fully animated golfers, captured from videotaped images. Even the water moves, thanks to rudimentary color cycling.

Despite all this attention to detail, the graphics still suffer from "chunky" low-resolution VGA. Considering the program's already high system requirements, bumping the resolution up to 800 x 600 would seem only reasonable. The game allows minor adjustments of graphic detail to speed screen redraws on slower machines. On a 25-MHz 386 at the highest resolution, each screen update takes 15 seconds. Although this isn't blindingly fast, if you perceive it to be slow, per-

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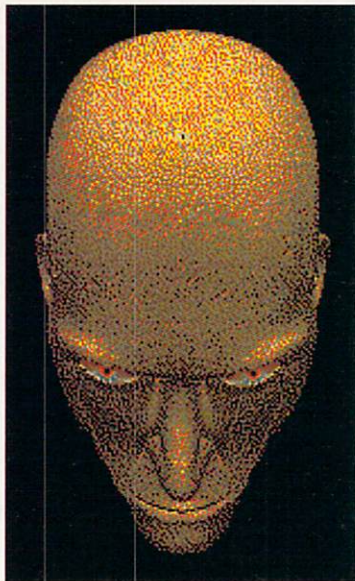
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REVIEWS

haps golf isn't your game.

Short of converting 16-color to 256-color palettes, the program is completely compatible with courses created for all previous versions—good news for players sitting on a virtual gold mine of commercial and public domain courses. Given Accolade's track record with the Jack Nicklaus series, additional course disks are probably already in development.

The icing on the cake is a completely revamped course designer—the first of its kind to utilize a full color spectrum. One of the best new features of this stand-alone program is the ability to plot and play a hole instantly, without having to exit and reload the game. Another new feature allows you to import PCX or LBM art files into the object editor. This option opens untold possibilities for personalized course design.

Hampered only by low-end video limitations, Jack Nicklaus Golf & Course Design—Signature Edition represents the continuing evolutionary progress of a remarkable product.

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UNICOM 3.0G

As an avid BBS-er, I find that one of the most-used applications on my system is my communications program. I've used the same one for the last four years, but when I started using Microsoft Windows, it didn't feel like it belonged anymore.

My first instinct was to try Windows' Terminal. It works well as a phone dialer, but it's sorely lacking in many of the features to which I've grown accustomed—namely, good scripting language, host mode, terminal emulations, and, most important, my favorite file transfer protocols.

So I began to look for a new communications program. As usual, I started looking on BBSs for a good shareware program. To my surprise, I found very few, but in these few I found a gem: Unicom 3.0g.

Unicom is a full-featured, Windows-based terminal and communications program. It supports ten different trans-

fer protocols, including ZMODEM and CompuServe Quick B. It has a well-developed, easy-to-use script language. It allows you to change all colors and font sizes. It also has a speed bar menu and a function key menu. It has batch dialing, timed redialing, and call-waiting protection. It will fully multitask in the spirit of Windows, and it has a configurable utility feature that can launch any Windows application.

I installed and set up the program in about ten minutes. I then installed the phone numbers of all my favorite BBSs. The only problem I had was on one particular BBS, where reading messages produced overrun and framing errors. I turned off reporting of these errors and had no more problems whatsoever.

Unicom comes with some script files that are really great starting points for writing some of your own. I just replaced the name and password in the CompuServe script and was able to log on. The manual devotes 57 pages to the script language. This language is packed with Windows power beyond your wildest imagination. It will manipulate Windows and even access the GDI.

It has full implementations of WHILE, IF, GOTO, GOSUB, and SWITCH constructs. A full set of arithmetic and logical operators are provided, as well, making it a true scripting language! Of course, it will also wait for an expected string and send a response, which is most of what my script writing does.

Unicom supports the following protocols: XMODEM Checksum, XMODEM CRC, XMODEM 1K, YMODEM Batch, YMODEM G, ZMODEM, ZMODEM Resume, CompuServe B, CompuServe Quick B, Kermit, and ASCII. Although officially they're "not recommended or guaranteed," Unicom can also be scripted to use external protocols. ZMODEM and CompuServe Quick B transfer protocols will do automatic downloading. ZMODEM Resume provides for recovery after an interrupted download.

Speaking of interruptions: One of the neatest features on the dialing options is call-waiting protection. It protects the session from being interrupted. The terminal itself is fully configurable. It provides for changing both foreground and background colors, and it offers destructive backspace and carriage return line-feed controls. It will emulate VT-102, ANSI-BBS, VT-52, or TTY terminals.

One of the problems that should be noted here is that Windows has a different character set than DOS. Some of the ANSI graphics done on BBSs will be missing certain characters. This is not a fault specifically of Unicom, but rather a

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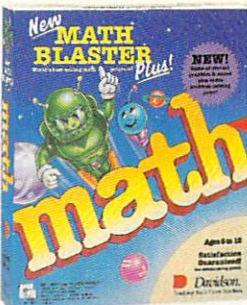
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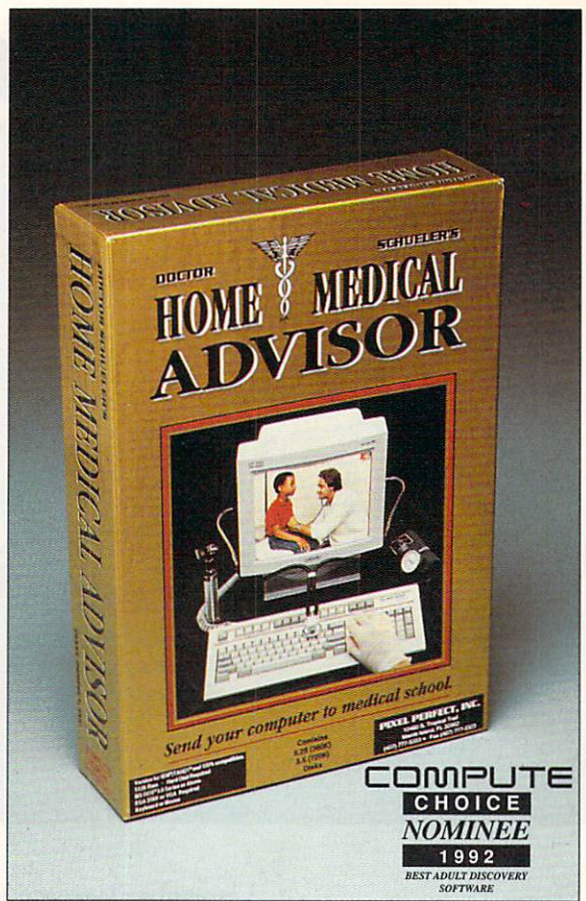
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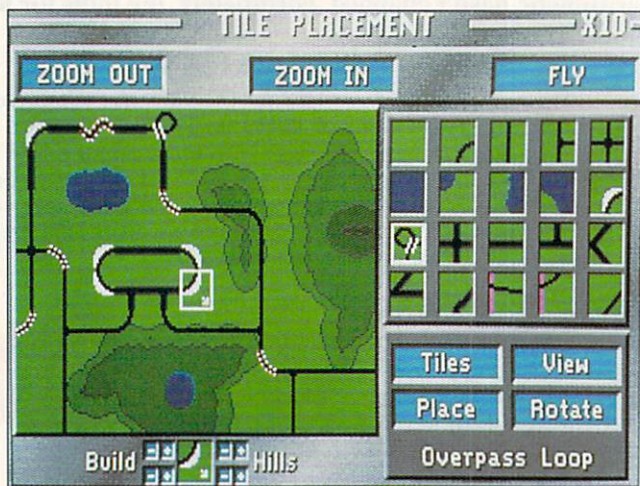
shortcoming of working with in the Windows environment.

In addition to the terminal, the function key menu is also configurable. You can change the labels on the keys, assign them to any function, or assign them to run scripts. They can even be used as hot keys for Windows programs listed in your utility menu.

The utility menu can be set up to contain any programs that you have on your hard drive. It should be noted that running any other applications during downloads or uploads will slow down the process and may cause errors. But I've had no problem whatsoever using Windows' File Manager to locate a file that I wanted to ASCII upload into a message.

On the downside, the unregistered version has a very irritating, timed random pop-up registration screen. This, of course, is easily resolved by registering the package.

BRADLEY M. SMALL



Grand Prix Unlimited is another fine simulation from Accolade—if only the sound effects didn't resemble radios and hamsters.

IBMPC or compatible (80386DX compatible recommended), 2MB RAM available to Windows after SmartDrive and RAMDrive, Hayes or compatible modem, serial communications port (if using an external modem)—\$69.95 (shareware registration fee)

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GRAND PRIX UNLIMITED

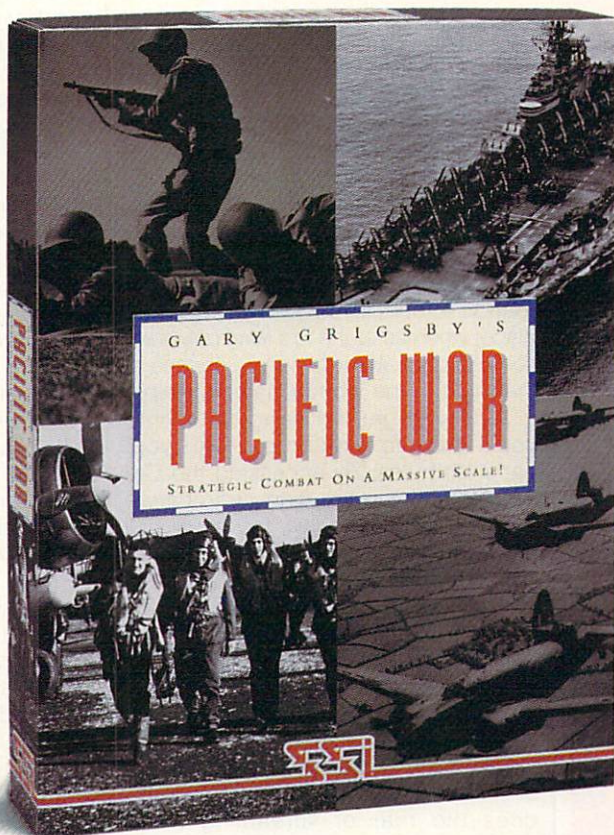
If Accolade is conspiring to put together the most impressive collection of high-quality sports simulations on the planet, it's well on its way to achieving that goal. One thing's for sure: With titles like Mike Ditka Ultimate Foot-

ball, Winter Challenge, and Hard Ball II already under its belt, the quality of Grand Prix Unlimited will be no surprise to Accolade's fans.

As with most of Accolade's sports simulations, Grand Prix Unlimited offers virtually complete control over the sporting experience, which in this case is Formula One racing. On the macro scale, you can choose a practice session or a single race, or you can take to the road in a battle for the World Championship. As you dig deeper into the game, however, you'll discover a plethora of options, including the ability to modify your car's attributes, the track's weather conditions, and your skill level. There's even a built-in track architect program for constructing your dream racing environment, piece by piece.

Because Grand Prix Unlimited is a fairly complicated simulation, you'll need to spend time in the practice or single-race mode before

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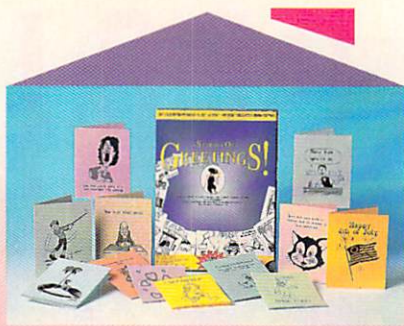
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REVIEWS

joining the circuit for the World Championship. In these modes, you start by selecting your car and track, and then move to the starting line for your first-person-perspective race. For each race, you can set the number of laps, the weather conditions, and the number of opponents.

During a race, the game controls are sensitive and quick to react. It takes skill on the joystick or keyboard to keep your car screaming down the blacktop. Luckily, novice drivers have a number of helpful options from which to choose, including automatic shifting and steering. You can also set the skill level to one of five levels, which determine the speed and aggressiveness of the other drivers. On the Novice level, just keeping your car on the road is all that's required to take first place, whereas at the Pro level only awesome joystick wizards have a chance of making it to the World Championship.

After you get the hang of driving, you'll want to experiment with your car's attributes. By accessing the Car Adjustments screen, you can change the height of your view, the sensitivity of your brakes and steering, tire types, and more. These options allow you to fine-tune your car's performance to a specific track, a skill that must be mastered by any Grand Prix champion.

If Grand Prix Unlimited has a failing, it's the program's cheesy sound effects. Even on a Sound Blaster card, the car's engine sounds more like someone tuning a shortwave radio than it does the roar of screaming steel. Worse, the screeching-tire sound effect is not unlike the squealing of a distressed hamster. The music, too, is so intrusive that you'll turn it off before you even finish your first race.

Bad sound effects aside, Grand Prix Unlimited is a solid—albeit not groundbreaking—racing simulation. With its fully configurable cars, tracks, and racing circuits, it certainly has more features than can be described in a short review. (I didn't even mention the wonderful, VCR-like instant-replay feature.) If nothing else, all those options will keep race fans happily burning up the track.

CLAYTON WALNUM

IBM PC or compatible; 640K RAM; MCGA or VGA; hard disk; joystick recommended; supports Ad Lib, Sound Blaster, and Roland sound—\$59.95

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WINDOW PHONE

Call me a gadget freak, but I just love caller ID. As soon as my local phone company offered the caller ID service, I signed right up. And it's been useful, too: A psycho ex-girlfriend started making middle-of-the-night hang-up calls, but my caller ID box told me who had called, so I was able to resolve the problem immediately. On the lighter side, when my friend Rob calls me, I see his number on the caller ID box before I pick up the phone. I answer, "Hi, Rob," and he wonders how I know. "You just have a distinctive ring," I tell him.

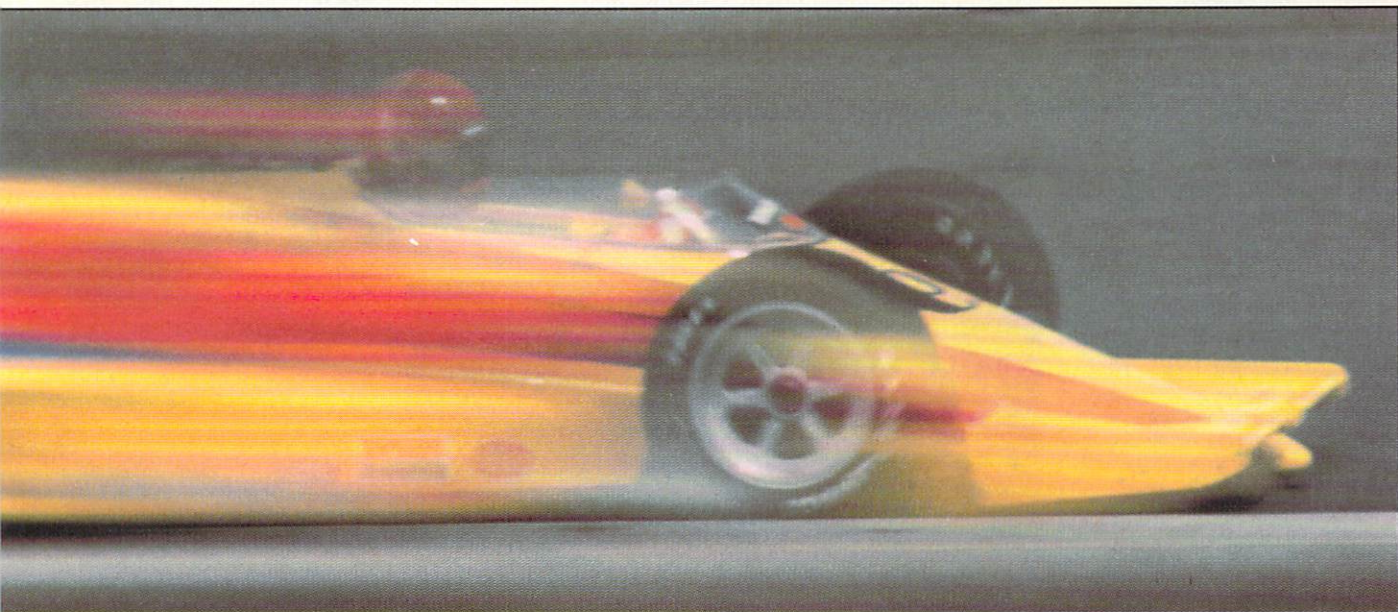
For a while, I fiddled around with my caller ID box, trying to figure out how to get the information from the box into some kind of format that my PC could use—a serial port or something like that. My idea was that when the phone would ring, a little box would appear on my Windows screen saying *Joe Smith is calling*. I never got far with the project.

Imagine my delight, then, when AG Communications Systems came out with Window Phone, the answer to my prayers. This \$495 package is a combination circuit board and software that basically does all that I wanted—and more. You pop the board into your PC, connect it to your phone, and install the software.

When you run Window Phone, it shows you a screen with a speed dialer and a Who Has Called window. The speed dialer looks like the one that's on many phones; you have a bunch of buttons with names next to them, and you just click on one of the buttons to make Window Phone dial that number from your telephone (it works on any touch-tone phone). The window on the right side of the screen shows the phone numbers from which you've received calls recently and, if the numbers are in your on-disk phone directory, the names of the incoming callers. For example, you might see *Susan Stathoplos—unanswered call* or *Andy Kydes—20 minutes*. Window Phone can tell you not only which calls were not answered but also how long you talked. This is, then, a database that consultants could use for billing clients.

Window Phone will also pop up a box in front of any Windows application when the phone rings, telling you who's calling. It supports a database of information about callers, so I might see *Gerry Manginelli is calling*. I could then open up the Gerry Manginelli record on my database, where I would see Gerry's birthday, topics of last conversation, hobbies, or whatever I'd put in the database. If I had a scanned picture of Gerry, I could even put

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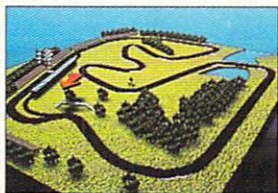
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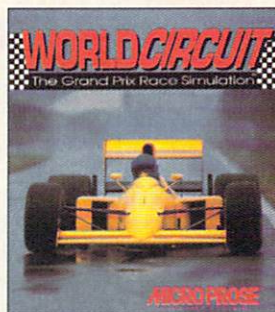


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GAH

that in the record.

Window Phone is nearly perfect. If it has a flaw, it's the price tag: nearly 500 bucks. That's way too much. The price should be more in line with that of phones that display caller ID information—in the \$150 range, with another \$100 for the software itself.

MARK MINASI

IBM PC or compatible (80286 compatible), 2MB RAM, EGA or better, hard drive, 5¼- or 3½-inch floppy drive, Windows 3.0 and higher, available expansion slot, Windows-compatible pointing device, standard analog phone line—\$495

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THE COMPLETE COMMUNICATOR

If I didn't have a PC, I'd buy one just so I'd have something to plug The Complete Communicator into. Talk about a perfect communications solution for home businesses: In one package you get a modem, a fax machine, and a voice mail system. At a reasonable price—\$499 list—the software that drives it adds features with which dedicated machines can't compete. And it runs in the background so you can use your computer, even while it's busy working.

While you don't have to be a technician to install the hardware and software, a little practical experience will come in handy. I tried it on three different systems: a 286, a 386, and a 486. Only my 486 wouldn't cooperate. That's because The Complete Communicator needs to be set to COM1 or COM2. The 486, a newer computer, has two serial

ports built into the motherboard, and they can't be disabled or changed. If you've got a newer model computer, this might be a problem that only a technician can solve. Fortunately, there's an included program called COMCHECK, which looks at your system and tells you

times more professional than an answering machine, in my opinion. After I figured out how to make it work, I set up mailboxes for my wife and two kids. They had a blast. For about two hours they called from our second phone, left each other messages, and then went to the



If you run a small business or a home office, you'll probably find that The Complete Communicator lives up to its name.

which ports are taken. That takes the guesswork out of the installation.

There are two versions of the software, DOS and Windows. In my opinion, they're a study in contrasts. They have all the same stuff; even the structure of menus and program flow are the same. But the DOS version uses function and cursor key menus and dialogs. That kind of interface went out five years ago. It beeps at you and flashes messages when you do something wrong.

The Windows version of the software is slick and state-of-the-art. Everything takes advantage of what Windows is good at—making user interfaces seem natural. All you do is pull down a menu or click on a button for almost every selection.

I loved setting up voice mail. It's about a million

computer and listened.

You can set up as many mailboxes as you need. They're configurable for a variety of situations. They can have password protection and can be limited to a fixed number of messages and greetings so that you don't run out of storage space if you've got a lot of mailboxes.

Beyond all of the basics, there's some real power. Any of the mailboxes can forward messages to another number. The mailboxes can also be accessed from remote locations—not just to listen to messages, but to update greetings, too.

If your company board meeting is next week, you can set the voice mail for outbound reminders to the members. Using the phone book option, you can enter the names and numbers, then

set the date and time. The software will call everyone in your phone book group and deliver your message.

The Complete Communicator significantly simplified my fax work. Every time I send a fax at work, I have to go through several steps. First, I write a document with a word processor. Then, I print it on my printer. Finally, I walk upstairs and fax it to its destination. Well, those days are over. Using RapidFAX from inside Windows rolls all of those steps into one. I simply write documents with Microsoft Write (any Windows word processor will do) and configure the printer for the fax board. Then, every time I print, it's sent out over the fax board.

One nice thing about RapidFAX is that I didn't need the manual to figure out how to use it. I did, however, have to read the manual to find out about the advanced features. Just as with voice mail, you can send groups of faxes automatically. This is a telemarketer's dream.

Incoming faxes are received automatically. You might hear some noises from the board; otherwise, it works in the background. It does occasionally slow things down during disk access. Once the fax has been received, it can be viewed on the screen to save trees or printed on your printer for a hardcopy.

There's nothing remarkable about the modem feature, except that it's part of the package. That means you won't have to occupy another slot in your computer or worry about another COM port. I'm online almost every night, so this part of the board gets a real workout. It performs flawlessly.

The Complete PC recently introduced a separate ver-

It makes J-8s cry and MiGs fighting mad.

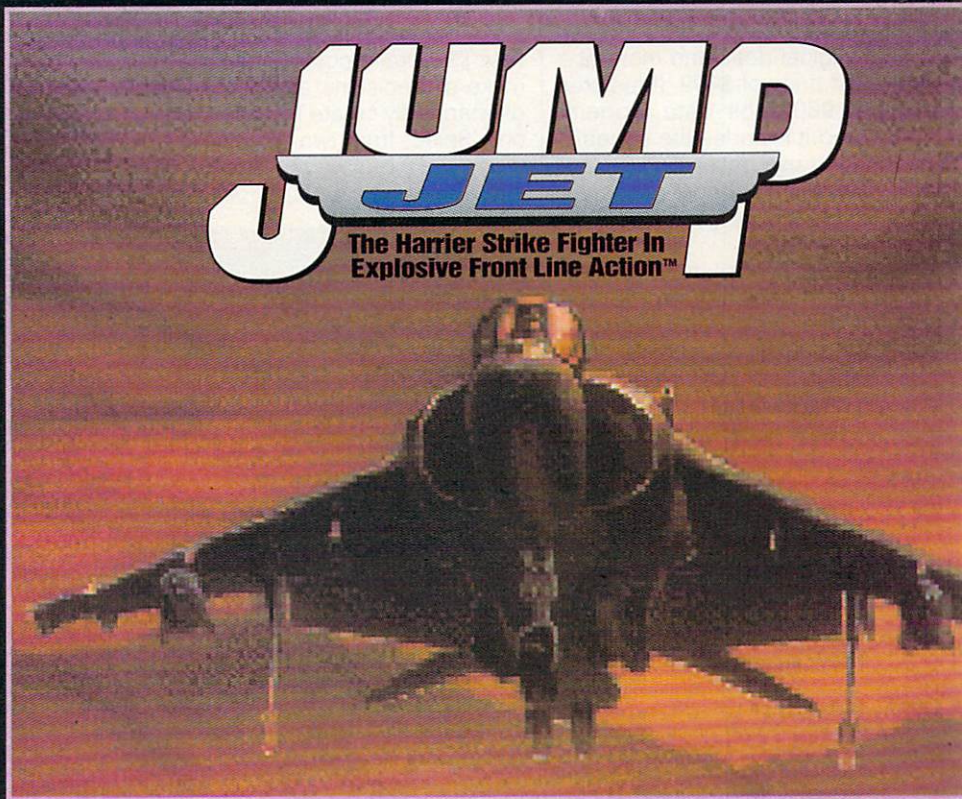
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sion of The Complete Communicator called The Complete Communicator Gold, which does everything the original does and more at a list price of \$699. It features a 9600-bps data modem, and it includes the capability to use caller ID, displaying the number of an incoming caller on your computer screen.

The Complete Communicator has an appropriate name. It's a comprehensive package for home and small business communications. If you're trying to run a business out of your home or your business is growing, seriously consider this small piece of hardware for a big-time boost.

RICHARD C. LEINECKER

IBM PC or compatible; 640K RAM; CGA, EGA, VGA, or Hercules; hard drive with 2MB free; 5¼-inch high-capacity floppy drive; standard analog telephone line (Windows version requires 80386 compatible, 2MB RAM, Windows 3.0-compatible monitor, hard drive with 4MB free, 5¼-inch high-capacity floppy drive, Windows 3.0 or higher)—\$499 (package includes DOS and Windows versions)

THE COMPLETE PC
1983 Concourse Dr.
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(408) 434-0145

Circle Reader Service Number 351

UTOPIA

When you first see Utopia's main screen, you're likely to say, "Look! It's a combination of SimCity and Populous!" You won't be far wrong.

Add SimCity's creative city-building charm to the challenge of manufacturing and deploying weapons for an unavoidable war. Then present it onscreen in the Populous-style, one-square-at-a-time elevated view, and you have Utopia. Using proven principles from those two

games, Utopia then carries the simulation several steps further.

As the administrator of a new planetary colony, you make all decisions and single-handedly create the colony. Select from two dozen types of buildings and place them on the map, one



Controlling a planet in Utopia can be an administrative nightmare, but it's a rewarding administrative nightmare.

by one. It's already more complex than SimCity—on a new planet, you need life-support systems, hydroponics labs, mines, and refineries, as well as weapon emplacements and tank and spaceship factories.

Once the buildings are up, you staff them by setting employment quotas for the mines, labs, and factories. If you put too many into technical work, general construction slows. Throughout the game, you're balancing resources and needs.

If you lose the balance, all kinds of things go wrong. Your objective is twofold: Avoid destruction by the enemy and sustain a Quality of Life (QOL) of 80 percent or better. You need defense spending to avoid annihilation, but without social spending your QOL hits the skids, crime skyrockets, and, if things get bad enough, you may even face assassination.

Oops, the oxygen level is low, and citizens are dying. Build more life-support

units. Food levels are low; build hydroponics domes. Morale is low. Build hospitals and hire medics, put in a sports complex and hold a few sporting events, and be sure to have enough living quarters for everyone. (They hate doubling up in their apartments.) And

through it all, keep the tax rate down.

You get the idea. You must skillfully balance these and many other factors. As the colony grows, the citizen's demands come faster and faster. Eventually, you're doing nothing but responding to emergencies, building apartments willy-nilly on the nearest plot of empty land, and losing control in the rush to keep things from falling irretrievably apart.

Imagine your consternation when, in the midst of all this, the enemy attacks. If you've prepared well, you can handle it.

The number of factors to control seems overwhelming. (Did I mention setting research grant levels, trading commodities in interstellar markets, spying on the enemy, and keeping your mobile defenses in constant motion?) Surprisingly, it doesn't take long to achieve a satisfying degree of control. Once you gain control, it's exhilarating to master the planetary administrator's job.

This well-balanced challenge takes only about 1MB of hard disk space, a welcome change in a field dominated by 10- to 15MB monsters. Konami did this by resisting the temptation to provide unnecessary state-of-the-art graphics and sound. Instead, graphics and sound are simple but effective.

You won't build a true utopia—a place of ideal perfection in law, government, and social conditions—the first time out, but you may eventually get tantalizingly close. If so, move up to the next of the ten increasingly difficult scenarios. Utopia's challenge will bring you back again and again, seeking to make each new colony a little better than the last one.

RICHARD O. MANN

IBM PC or compatible (16-MHz 80286 or faster), 640K RAM, mouse; hard disk recommended, supports all major sound cards—\$49.95

KONAMI
900 Deerfield Pkwy.
Buffalo Grove, IL 60089-4510
(708) 215-5100

Circle Reader Service Number 352

dBASE IV 1.5

Which is the better car, a Mazda Miata or a Volvo four-door? Who was the more important baseball player, Hank Aaron or Babe Ruth? Whose music is better, Crowded House's or Philip Glass's? And, towering in importance over the aforementioned trivia—is dBASE IV better than FoxPro?

The answer, he hedged, is that it depends on what you're looking for. If FoxPro is the Miata of databases—fast, new, and flashy—then dBASE IV 1.5 is the Volvo sedan: built for reliability, more comprehensive in some ways but less nimble in others, and a solid if con-

Before you play **Special Forces**, you'd better put on your game face.

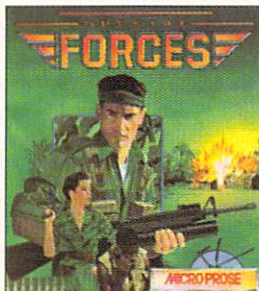


When your drop-point is smack in the middle of fierce enemy forces, you'd better dress for the occasion.

That's why, in *Special Forces*, you're equipped with high-powered rockets. Rapid-fire pistols. Rifles. Grenades. And whatever it takes to secure your objective quickly.

Your objective? Today it could be rescuing a POW. Tomorrow, sabotage or cutting off enemy supply lines.

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servative choice by anyone's standards.

Installing dBASE IV 1.5 is easy and swift. It runs in a lean 450K of RAM and weighs in at a svelte 4.5MB of disk space with all example files loaded. It begins by showing you the Control Center, a deceptively simple screen from which you can create or modify any of the following: database files, queries, data entry forms, reports, labels, or applications (which manage combinations of the aforementioned objects).

Borland's manuals stress the use of the applications generator, and it's no wonder. Not very sexy but written in an accessible and well-documented template language, it's an extremely powerful applications generator and able to do a tremendous amount of work for you. FoxPro's is a glittering bauble by comparison—prettier but far less capable.

The report writer that comes with dBASE IV 1.5 doesn't appear to have changed since 1.1, but it didn't need to. The 1.1 report writer was immediately, justly famous, and the tradition continues. (If you have version 1.0 but not 1.1 and are thinking of upgrading, note that PostScript support is finally here.)

If you're a dBASE III Plus user who has avoided upgrading to version IV until Borland got hold of the product, now's the time to move up. Indeed, dBASE IV is rock-solid and a huge improvement from version III. You've probably guessed already that the Control Center is an industrial-strength replacement for the wimpy Assist. Other giant-step improvements include (but are by no means limited to) multiple-tag index files that

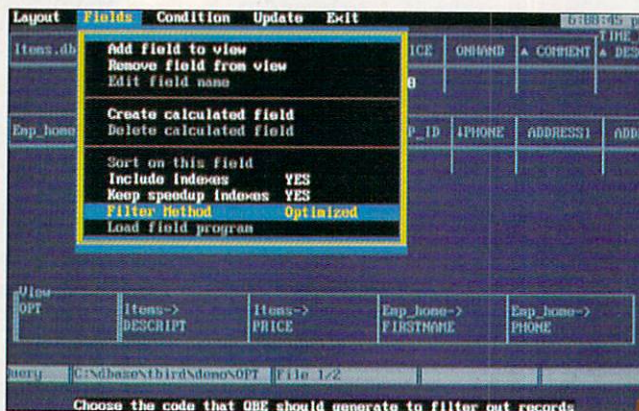
speed file I/O by orders of magnitude, much better support for arrays, 254 fields per record (but still only 4000 bytes total), support of more than one printer, data encryption, keyboard macros, international currency and date support, and—at long last—a full set of user-interface controls.

along but were just too embarrassed to ask.

The other new routines give you the size, date, and time of a file. Although these have always been fairly easy to implement in bin files, it required knowledge of 8088 assembly and MS-DOS system internals that most dBASE programmers

been written for III Plus and ignores such fundamental issues as user interface. You should expect to spend several weeks on Using dBASE IV, which has extensive tutorials on the Control Center's applications. You can save a tremendous amount of time using the Control Center, and many job descriptions for dBASE programmers require that they know it—for good reason. I'm not convinced that generating dBASE applications without resorting to coding is as easy as it should be to learn, but once you know how, you can crank out impressive turnkey applications with almost no handcoding at all. One manual I miss dearly from 1.1 was a tutorial that took you step by step through the creation of a substantial application using relational databases, the applications generator, and a touch of handcoding. I'm not sure why it was left out, but I'd like to see it reappear in a later version.

If you're sure you want to stay with dBASE, upgrading from II or III Plus is a mere \$175. The choice between dBASE IV and FoxPro, however, might be a bit tougher. There are certain applications for dBASE IV that the celebrated FoxPro simply cannot handle, and if your needs lie in this area, there's no contest. First, dBASE supports Commit and Rollback. These are mainframe-style commands that ensure you can save or restore the state of the database at will. While disk-intensive and not to be used casually, they are the only way you can guarantee data integrity—and FoxPro doesn't support them. Second, dBASE IV's applications generator is less attractive than FoxPro's, but it can create



dBASE IV 1.5 is the Volvo sedan of databases, combining lean, solid, and practical aspects with innovative new features.

The dBASE IV language has menu and window control in spades, implemented in a very dBASE-like fashion. It's very easy to pick up and really fun to use in your applications.

Language improvements since version 1.1 are rather few in number, but they'll warm the cockles of any C programmer's heart. Eleven functions for low-level file access let you do what dBASE should have done five years ago and were added only perhaps because Clipper has already done it. Functions that mimic the file I/O routines provided with ANSI C include FCREATE(), FOPEN(), FREAD(), FWRITE(), and others. This means that for the first time, you can create text files from a dBASE application! It's one of those things that's so obvious, you assumed it was possible all

would rather not have to know. Another relief is the inclusion of procedure libraries—you can now have more than one procedure in a file. A Set Library command supplements Set Procedure, which can now be reserved for local operations.

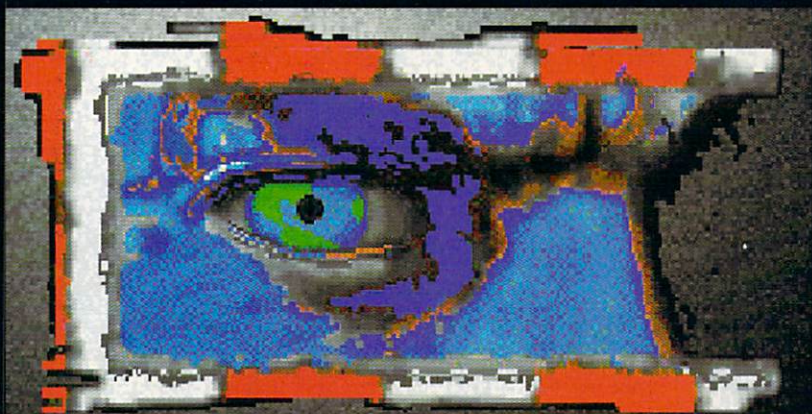
And if you were worried about how the language would deal with multiuser environments after fiddling with network kludges in III Plus, you can breathe a sigh of relief: Everything is well designed and well documented; this is one of the few database products with documentation that doesn't seem to assume you've been a network administrator for years and know exactly what to look for in the reference section.

However, the Getting Started manual just doesn't go far enough. The dBASE language tutorial could've

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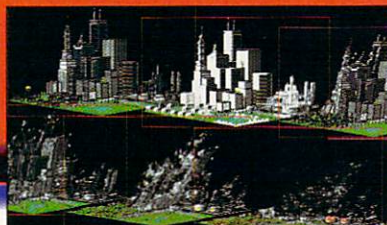
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applications that use several databases at once; FoxPro's can handle only one. Since virtually all serious applications require more than one database to be opened simultaneously, it's worth your time and money to get dBASE IV just for that. Finally, it's guaranteed dBASE compatible—and in these days of fragmenting language standards, that's not a bad thing at all.

TOM CAMPBELL

IBM PC or compatible, 640K RAM, hard drive with 3.5MB free (5MB recommended), 1.2MB 5¼-inch or 720K 3½-inch floppy drive—\$795.00; upgrade from dBASE III—\$99.95 plus \$9.00 shipping and handling

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1800 Green Hills Rd.
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Circle Reader Service Number 353

SOLITAIRE'S JOURNEY

Some I enjoy; some I don't. Some are easy to learn; others more difficult. Some are challenging; others are nearly impossible. But with 105 different versions of solitaire, Quantum Quality Productions' Solitaire's Journey includes solitaire games for everyone.

Solitaire's Journey is a straightforward approach to electronic solitaire. If you play a variety of traditional solitaire games, you'll probably find an electronic version of each of them included. And if you enjoy exploring and mastering new and different games of solitaire, you'll find hours of enjoyment here.

Solitaire's Journey includes not only 105 games but also instructions for each built right into the program. Simply select the game you want to play and

pick Rules from the pull-down menu or hit the R key, and you'll see a summary of rules on an easy-to-follow layout of the game board. If you need more detailed instruction for any of the games (and beginners to Solitaire's Journey will almost certainly need more details),

Quest alternatives are mere attempts to unnecessarily add new dimensions to an already complete package.

In Journey, the player must move across a map of North America between predetermined starting and ending cities. As the player moves from city to city, he

neither doesn't do is explain the strategy needed for any of the games, although there are some general tips in the manual. You'll just have to master each game by experience—a challenge that enhances the value and appeal of this collection of games.

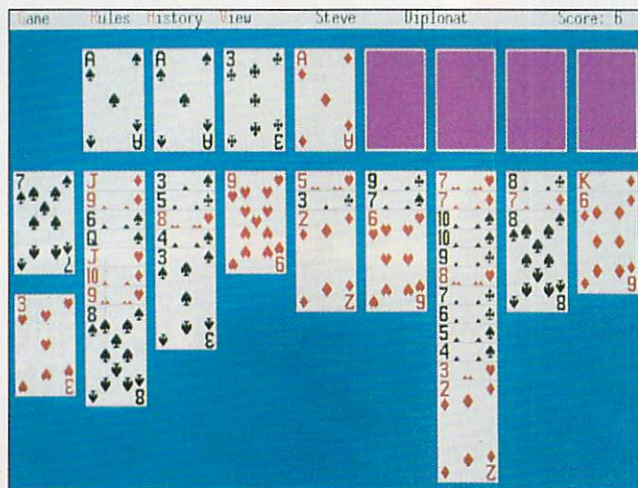
Although the manual is complete, you'll find the on-screen instructions more functional. The manual does contain an overview of each game. But what's most helpful is the list of games by category—a good way to find out which games are easiest to win! You'll also need the manual for the off-disk copy protection.

Although many players will want to turn off the sound, Solitaire's Journey does support the Ad Lib and Sound Blaster sound cards. For me, the music is more of a distraction than an enhancement.

One improvement I'd like to see in future releases is the ability to use either keyboard or mouse at any time. As it stands, if you have a mouse driver installed, you must use a mouse to play any of the games. Although the games are quicker if you have a mouse, keyboard players will have no trouble controlling play.

If you like solitaire and enjoy a variety of games, you'll find Solitaire's Journey to be a well-designed game pack that will fill your needs and offer challenge and fun.

STEPHEN LEVY



Solitaire fans should get their fill with the games in Solitaire's Journey, although the journey itself can be tedious.

they're available also.

Don't like the backs of your cards and want a different style? Or maybe the screen background color is not to your liking? Changing either is simple enough, because Solitaire's Journey offers ten different decks and 240 backgrounds.

Another interesting feature of Solitaire's Journey is its history function. Here the program keeps track of your average score for each specific game you've played, graphs your scores so you can see your improvement, and tells you the standard average score, which serves as a benchmark for comparison.

Although solitaire players will enjoy the plethora of games and find the simple, friendly interface easy to use, the built-in Journey and

or she must select which of three solitaire games to play. An amount of money is received or given up depending on the score achieved. Quest is similar, except that the player moves from room to room in a house. These attempts at adding a new objective strike me as tedious at best, since they require that I play solitaire games I don't particularly enjoy. Solitaire's Journey also includes a tournament scenario that suffers from the same monotonous problem.

The strength of Solitaire's Journey is its variety of games and its clear and concise instructions. If you've ever tried to learn new solitaire games from a book, you'll be impressed with the ability of Solitaire's Journey to explain the rules of each game. What Solitaire's Jour-

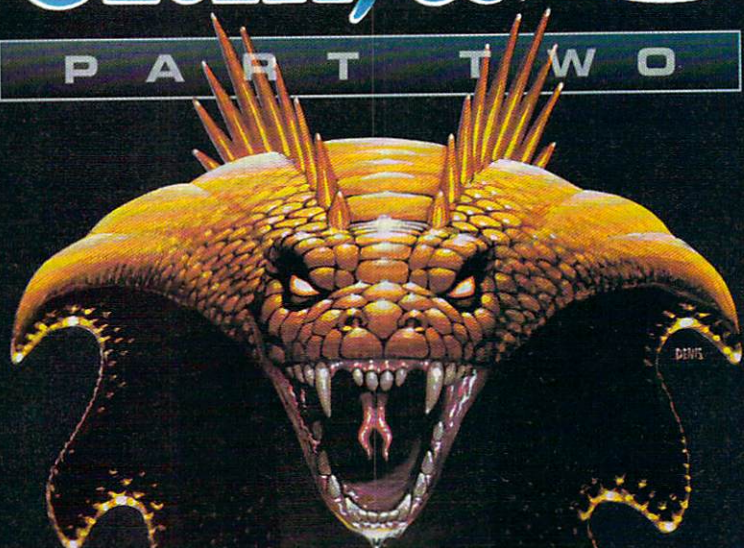
IBM PC or compatible, 640K RAM, EGA or VGA, hard drive; mouse recommended, supports Ad Lib and Sound Blaster—\$59.95

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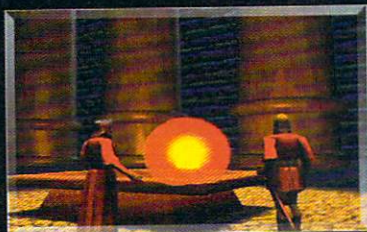
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Circle Reader Service Number 250

NEWPOINT

Boy, you just can't beat competition. Microsoft releases the BallPoint mouse (which is actually a trackball, but let's not get picky) for laptops, and I think it's the greatest thing since sliced bread. Sure, it has problems: I can't close the laptop's cover with it attached, and the cord is so long that it often gets in my way. It sure beats using the arrow and Tab keys, though. I'm happy, right?

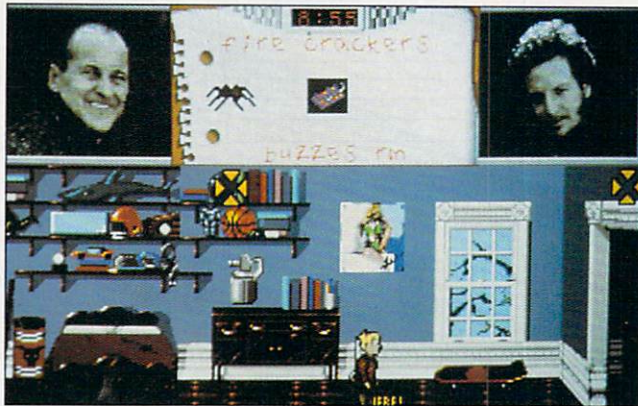
I thought so, until I saw Mouse Systems' NewPoint trackball, which turns out to be the greatest thing since hot cinnamon rolls. If you're looking for a pointing device for your portable computer, you'd be hard-pressed to find a better choice. Shaped like a 1/4-pie wedge, this little trackball has one wraparound button on the outer edge and a second button on top, next to the ball itself. The control panel software, included in both DOS and Windows versions, lets you select which button will be used as the primary button, equivalent to the left button of a two-button mouse. It also offers adjustable sensitivity and four acceleration speeds: Docking, Cruising, Warp Speed, and Hyperspace. Lefties will be happy to know that you can adjust the orientation—which way is up—so the Newpoint can be used on either side of the laptop.

You can hold the NewPoint in your hand or clamp it to your keyboard. The clamp is a work of genius. You simply slide back a small section, place the lip over the edge of your keyboard, and let the sliding section go. There are no little screws to adjust. Also, the lip that secures the clamp to

the keyboard is flat, so you can close your laptop's cover without removing the clamp. This feature alone was enough to make me switch permanently to the NewPoint. The trackball slides easily on and off the clamp; however, unlike with the BallPoint, you can't ad-

even more troublesome than the BallPoint's coiled cord.

The NewPoint I tested was fully compatible with a Microsoft serial mouse. Mouse Systems doesn't include a bus mouse adapter, so you can't attach it to a PS/2-style bus mouse port. It



Home Alone (the game) bring Home Alone (the movie) to the small monitor, offering many ways for Kevin to foil the bad guys.

just the angle of the trackball. (I never used this feature anyway—why would anyone want a trackball sitting at a 90-degree angle to the keyboard?)

The NewPoint only misses in one area: The cord is too short. I thought I'd like the shorter cord, as the BallPoint's longer one constantly got in my way. The built-in cord is only about 9 inches long, however, and most laptop computers are about 11 inches wide. You'll be able to use the built-in cord with laptops that have their serial ports on the back. It wasn't long enough, though, to use with the Gateway Nomad or my Texas Instruments TravelMate 2000, which have their serial ports on the left side. If Mouse Systems had only made the cord 2 or 3 inches longer, it would've been perfect. Now I'm forced to use its three-foot extension cord, which is

does come with a nice wallet-style carrying case.

Even with my few complaints, I still think the NewPoint is a winner. Probably the best evidence of this is the fact that my BallPoint and Thumbelina trackballs haven't left my desk drawer since the day I unpacked the NewPoint.

DENNY ATKIN

Newpoint—\$99.95

MOUSE SYSTEMS
47505 Seabridge Dr.
Fremont, CA 94538
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Circle Reader Service Number 355

HOME ALONE

Your name is Kevin. You're eight years old. Your family went on a trip, and you got left behind. To top it all off, there are two bumbling burglars named Harry and Marv hovering outside of the house . . . and you're home

alone. You've probably seen the movie by now, but let's go over this just one more time.

Your mission is to keep yourself and your house safe—by any means necessary—until the family gets back to protect you.

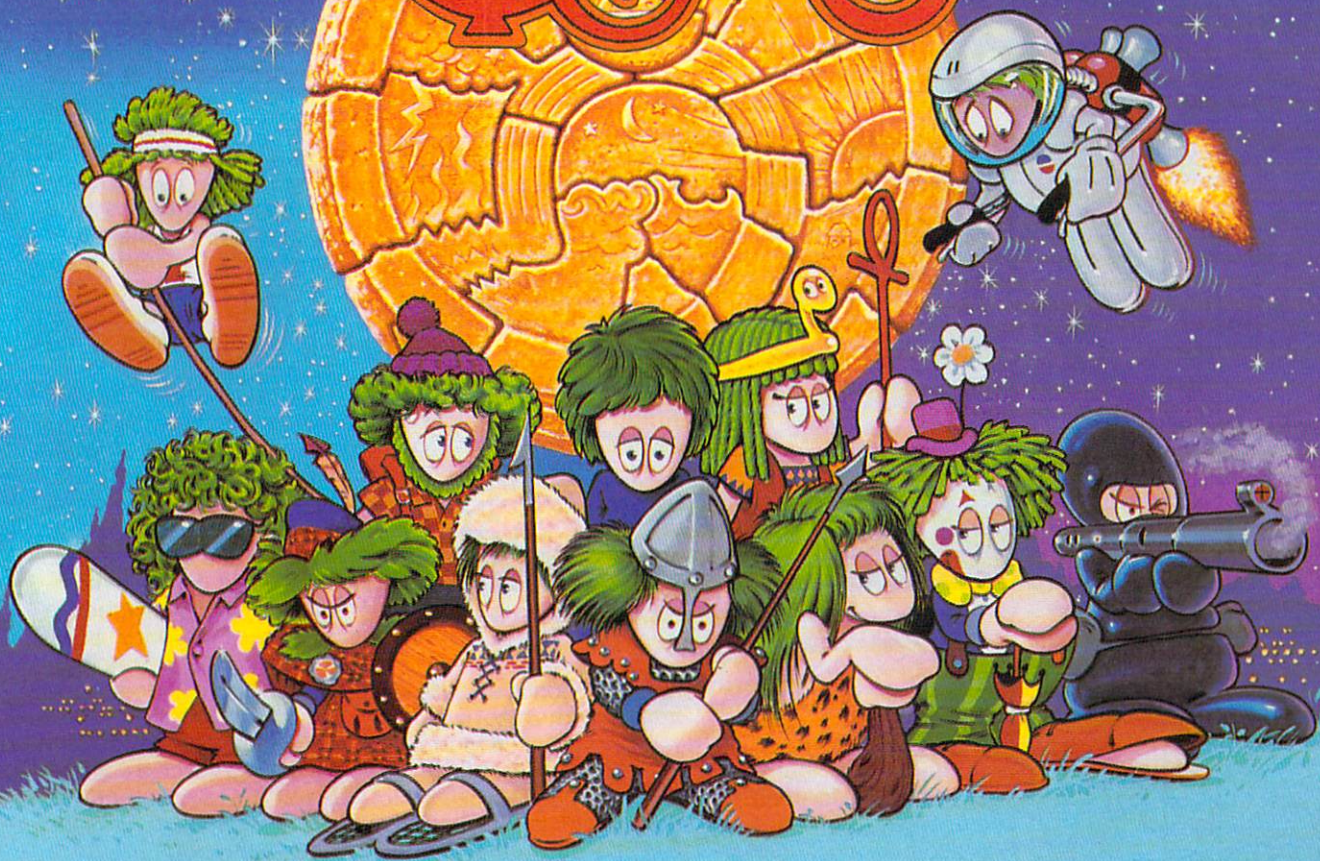
Although the designers probably had children in mind when they turned *Home Alone* into a video-game, adults can get a kick or two out of it, as well. The concept is fairly simple: You know that Harry and Marv plan to break in at nine o'clock. In an imaginary hour, you, as little Kevin, run around the house setting traps which, you hope, will foil the robbery, stop the robbers from catching you, and keep you safe until the family comes home.

After Kevin's traps are complete or when he runs out of time (whichever comes first), in come Marv and Harry. You then guide the burglars throughout the house, making sure that they fall into the traps. The more Harry and Marv trip on marbles, slip on banana peels, and fall over bags of flour, the more points you earn. And if you're wise enough to add Kevin's BB gun to his arsenal, you can release traps that can only be set off by BB gun shots.

The game is easy to play once you learn your way around the house, but it's not so easy that it becomes boring. I had a heck of a time trying to find Kevin's room, where he hid his BB gun. After a day or two, I found the gun, but I still haven't figured out how to shoot the traps. As a result, my games always end with Harry and Marv saying, "We gotcha, ya little squirt!!!"

Home Alone sports graphics and sound effects that

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definitely add to the game's playability. The graphics are more cute than anything else, which I'm sure will have kids eyeballing the screen with enjoyment. They'll especially like the tarantula, because as soon as it's set down, it starts crawling across the floor. The sound effects aren't extravagant, but they get the job done. You can hear Kevin picking up and setting down objects, and you get an earful when Harry and Marv encounter his traps.

Regardless of the game's technological capabilities, the bottom line is that if you liked the movie, you'll probably like the game, too. It's a good family-oriented game that everyone from Grandma to Junior can enjoy. It might take a little while to learn your way around, but after you do you won't have a hard time playing Home Alone.

DANIELLE BEST

IBM PC or compatible; 640K RAM; EGA, MCGA, VGA, or Tandy 16-color; joystick optional; supports Ad Lib, Sound Blaster, Sound Master, and Roland LAPC-1—\$39.95

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Circle Reader Service Number 356

IBM PS/1

IBM designed the PS/1 as therapy for the computerphobic. Two years later, PS/1 purchasers talk like computer scientists on Prodigy's PS/1 User's Club bulletin boards. With their increased knowledge, many are venturing into areas the PS/1 wasn't designed to handle.

Many want faster speeds and more memory. So IBM introduced a new PS/1: a 386SX 16 MHz (up from a

286 10 MHz) with 2MB RAM expandable to 6MB or 16MB with an additional adapter unit (up from 1MB expandable to 2.5MB or 7MB) and a 40MB or 80MB hard disk, depending on your style number, expandable to more than 200MB (up from 30MB with no room to

some and limited. Unfortunately, the PS/1 doesn't come with a DOS manual, making it even more difficult to do anything outside of the shell if you don't know the commands or even the options you have.

In fact, my biggest complaint about the machine is



The IBM PS/1 represents a step up from its predecessor, but don't expect it to be more than a good starter machine.

grow). Other original PS/1 features remain the same.

A muscular child could probably set up the compact system faster than he could build a Lego house, with about as much instruction required.

The colorful Startup System menu shows off one of the machine's best features—its crisp, bright video screen. Beneath the system menu sits an introductory world of computing: preloaded software programs, including Microsoft Works (word-processing, spreadsheet, database, and communications software all in one), DOS 4.1 (5.0 with some machines), the Prodigy and Promenade online networks, and, with my model B82, Windows 3.0.

The DOS Shell program, while less frightening than the C prompt, is very cumber-

some and limited. At first, you may not want to wade through technical mumbo jumbo. But after you know the basics, it's hard to go further.

Apparently, the slightly sluggish mouse can't have settings changed to better operate games and applications, because there's no mention of it anywhere.

The modem section of the technical reference guide (only 138 pages for the entire system, software and adding hardware!) took up barely five pages. That makes it difficult to fully use the modem with any other communication software or to connect to anything other than IBM's prepackaged Prodigy or Promenade.

The tightness of the keyboard makes you feel like you're doing something, but the Caps Lock key sits dan-

gerously close to the left Shift key. With my long fingernails, I typed in all caps half the time and muttered about time wasted retyping the other half of the time.

The new basic 2MB RAM gives enough room for most home and small business programs, as well as Windows applications. Once your needs exceed the machine's initial capabilities, it's best to graduate to a build-your-own system, because while the PS/1 is expandable to a certain degree, it has its limitations. After all, it's meant to be that way.

All in all, IBM delivers what it promises: a small package with enough power and room for moderate expansion. Sure, there are other things I would've liked, but it's a starter machine. Think of it as a mother teaching her youngsters the ways of the world: She'll let them try out new things, but not too much too soon.

If you outgrow the PS/1, you'll know enough to venture out into the cold computer world and put together your own package. Pass the PS/1 experience on to a younger sibling, instead of trying to make it fit. As Thomas Wolfe said, "You can't go home again."

AUTUMN MILLER

IBM PS/1 386SX C42: 386SX-16 MHz, 2MB RAM, 3½-inch 1.44MB disk drive, 40MB (21-ms) hard disk, 12-inch VGA IBM Photo Graphic Display, IBM mouse (two-button), 2400-bps modem, preloaded software including DOS and Microsoft Works—\$1,699

PS/1 386SX B82: all of the above plus 80MB hard disk, Microsoft Windows 3.0, and Productivity Pack for Windows—\$2,199

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Dragon's Lair III: The Curse of Mordread brings the classical animation style of Don Bluth to your computer featuring full-screen animation, digitized sound and new animations not included in the original laser disc arcade game.

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LABELS UNLIMITED

This program's title might convey the impression that it's just another program to produce mailing labels. Not so! In fact, using this program just for mailing labels would be like killing a fly with a baseball bat. Actually, Labels Unlimited is a powerful and versatile program that allows you to create a wide variety of professional-looking disk labels, name tags, tickets, coupons, product or inventory labels, binder covers, and labels for audio- and videocassettes, as well as plain or fancy mailing labels.

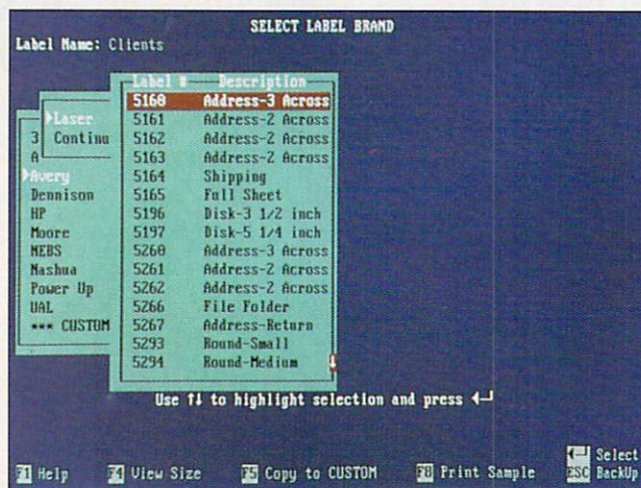
Instead of being limited to the few fonts provided by typical printers, you can choose from two different typefaces, point sizes from 4 to 144, and regular, bold, italic, and bold-italic styles. Further variety can be added with horizontal, vertical, and even upside-down text! If that isn't enough, additional typefaces (the same used with Power Up's popular Express Publisher program) are available.

Labels Unlimited lets you add PCX graphic clip art, and more than 40 such images are included. An on-screen preview before printing is available if you have a graphic (CGA, EGA, VGA, or Hercules) display. The printing can be up to 300 dots per inch on laser, ink-jet, and most dot-matrix printers.

You can create product tags and sequentially numbered admission tickets or coupons. Enhancements include boxes, borders, shading, and dingbats. In effect, Labels Unlimited is a desktop publishing program designed to produce multiple copies of the same or similar layout and copy.

To make things simple, you can print directly on label stock from Avery, 3M, Moore, Dennison, and others, since templates for their most popular stock labels are provided in the program. If you choose, you can customize to any size from 1/4 x 1/4 inch to 11 x

11 inches. A tutorial takes you through creating and printing a videocassette label with two fonts and a graphic. A handy two-sided quick-reference card summarizes the instructions, the keyboard shortcuts, and the most important commands. This card will be all you'll



True to its name, Labels Unlimited lets you print many different kinds of labels enhanced by plenty of fonts and graphics.

13 inches. If you select a standard label, the dimensions and number on a page are defined.

Each label can be divided into up to six printing areas called zones, with 18 zone layouts provided within the program. You really don't need imagination as much as the ability to make a choice and follow program prompts.

Labels Unlimited lets you create templates to import data from ASCII text files, as well as delimited or fixed file structures. Similarly, you can export all the data from an existing Labels Unlimited file to a comma-delimited ASCII text file, which can then be imported by most database programs.

The program's 150+-page manual is very detailed, well indexed, and lib-

erally illustrated. A tutorial takes you through creating and printing a videocassette label with two fonts and a graphic. A handy two-sided quick-reference card summarizes the instructions, the keyboard shortcuts, and the most important commands. This card will be all you'll

need after a couple of hours of practice, with the manual as backup for further details. Labels Unlimited is very powerful and versatile, with so many features that you can easily get confused. If you only need to print out labels from a mailing list, get a mailing-list program. For special labels of all sorts with jazzy printing and graphics, however, it will be worth a few hours of practice to use Labels Unlimited.

FRED BLECHMAN

IBM PC and compatibles, graphics card (required only for optional previewing), hard drive or two floppy drives; supports most graphic printers—\$89.95

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Circle Reader Service Number 358

LOGICAL

It would challenge Mr. Spock. It could test Mother Teresa's patience. It could be the leading cause of mouse abuse.

It is Logical, an arcade game with a deceptively simple premise. The action takes place in a mechanical ant farm that contains tunnels with four-pod wheels blocking every intersection. You coax and force little colored balls into matching groups to explode the pods. If you blow up all the pods before the hourglass drains, you receive a password to the next level.

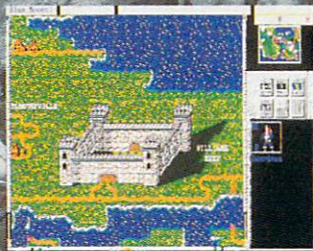
While you methodically sort balls, Logical fiendishly floods more balls into the bottleneck entries, fatally clogging initial pods. Color-stoppers block conflicting hues. Color-changers tint others into conformity. Direction-switchers repel everything. Spock's favorites—the teleporters—transport balls into the nether regions.

One minute mistake or brief pause for panic has lethal results. Logical can be quite unforgiving. Close doesn't count, even if one failure uses more energy than ten wins.

If you don't have a darn good mouse, don't bother with the frustration. Beyond the rudimentary levels, winning is improbable for the mouseless. The crisp, vibrant graphics with four choices of marbled backgrounds encourage staring at the screen for hours. I couldn't get the monochrome option to work on the mono screen I tried, although it did work on color screens. Odd. Sound cards are supported but not essential. Logical creates wonderfully interesting sound effects and tunes for the PC

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The "Conquered Kingdoms" computer game is IBM PC and soon to be Amiga compatible. It can be obtained through your favorite retailer or ordered direct by calling:

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speaker, including a little "Nyeah, nyeah, nyeah" ditty to accompany the frequent YOU FAILED screens.

Masters of all 99 hair-tearing designs crafted by Logical's German programming wizards are rewarded with the final password. It provides the key to the secret development tools allowing victims to design their own torture chambers. Logical is the perfect game for masochists, in more ways than one.

Infinite possibilities await the easily addicted. When my mouse hand became a cramped contortion, I still found myself playing Logical in my dreams at night.

AUTUMN MILLER

IBM PC or compatible, 512K RAM, EGA or VGA, 5¼-inch floppy drive; joystick and mouse optional, supports Ad Lib—\$30

RAINBOW ARTS
SoftGold GmbH
Daimlerstrasse 10
Kaarst, Germany 4044
49-2131-66020

Circle Reader Service Number 359



The new Windows version of PGA Tour Golf includes several challenging courses, functional graphics, and clean simulation.

PGA TOUR GOLF FOR WINDOWS

As if there weren't enough distractions from the daily grind, Electronic Arts fans the flames of procrastination with the best-selling PGA Tour Golf, newly revised for Windows. Productivity might never be the same.

The game opens into a window of fixed proportions,

slightly smaller than a full screen. Allowed memory to spare, the program multi-tasks with ease. The game window's reduced size helps deliver the program's seven-second screen update, the fastest of any 256-color golf simulation.

Visit the Pro Shop to enlist golfers from the user-defined member list. Each player can choose his or her favorite club configuration

and animated onscreen alter ego. You can practice technique on the driving range and putting green and then play through a single hole or an entire round.

Tournament play allows up to four golfers—human or computer-controlled—to compete against a leader board modeled after 60 nationally ranked contenders. Finish in the top 48 to advance to the second round and in the top 32 for the third and fourth rounds. As a member of the PGA entourage, your vital statistics—performance, standings, and winnings—are continually tracked, updated, and saved to disk. Major changes in the leader board are reported with optional onscreen, TV-style coverage.

The basic package offers three of the Tournament Players Club's best links, designed from original course blueprints. Sawgrass (Ponte Vedra, Florida) is home to the Players Championship and PGA Tour headquarter-

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REVIEWS

ters. Veteran players coined the term *target golf* to describe the pinpoint accuracy needed to survive this exquisite array of narrow fairways, wide bunkers, and merciless water hazards. PGA West Stadium Course (La Quinta, California), current site of the Skins Game, features enough challenging terrain—valleys, mounds, potholes, water, and sand—to fill a dozen minor courses. The gently rolling hills of Avenel (Potomac, Maryland) play host to the Kemper Open, the country's longest-running corporate-sponsored sporting event. A fourth fantasy course, Sterling Shores, was designed especially for the program.

Also available, and highly recommended, is the supplement course disk, featuring three additional TPC locales: Southwind (Federal Express St. Jude Open), Eagle Trace (Honda Classic), and Scottsdale (Phoenix Open).

Artist and animator Cynthia Hamilton's outstanding blend of polygon and bitmapped graphics lends the game its distinct personality. While other products sacrifice speed and gameplay for increasingly garish photorealism, Hamilton's high-resolution images are functional to a fault—almost architectural in design. On the downside, the solid-fill fairways lack the depth and character of textured terrain.

The simulation plays as clean as it looks, accurately portraying the cumulative effects on your performance of wind, ball lie, and swing. Several shot styles are available to rescue you from horrible lies: chip shots, punches, and blasts. Each club's distance potential can also be adjusted to fine-tune your swing.

The game's few shortcomings have no impact on gameplay, such as the inability to print golfer's stats or tournament outcomes. Another disappointment is the absence of the original's fly-by hole preview, replaced by the slow, virtually useless Hole Browser. There's also no course designer, although most users will hardly notice.

Electronic Arts picked a winner for its first foray into Windows entertainment. Let's hope it isn't the last.

SCOTT A. MAY

IBM PC or compatible (286 compatible); 2MB RAM for 16-color VGA, 4MB RAM for 256-color VGA; hard drive; Windows 3.0 or higher in Standard or Enhanced mode; supports Sound Blaster, Sound Blaster Pro, Ad Lib, Roland MT-32, Pro AudioSpectrum, and compatible sound boards—\$59.95

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Circle Reader Service Number 360

MAYNARD ARCHIVEXL 80

For computer users with large hard drives, a tape backup system has become the next must-have peripheral purchase. The Maynard ArchiveXL 80 is a tape backup unit that pulls its weight in making sure your data files are safely backed up.

The ArchiveXL 80 is designed as a low-cost backup device for personal use. It can pack up to 120MB of data (up to 250MB if you use compression) on a single extended-length tape. Several backups can be stored on the same tape, and when necessary, it's possible for your backups to span multiple tapes.

The ArchiveXL system uses what's become the industry standard: the quarter-inch cartridge (QIC). The device can read both QIC-80 and QIC-40 tapes.

I tried an external unit, dubbed the 5580e. Other drives in the series include the 5540e, a lower-capacity external unit, and the 5580i and 5540i, comparable internal drives. These drives are designed for AT or compatible computers. ArchiveXL models 5240i and 5240e are available for XT-class machines.

The 5580e measures 8½ inches long, 4½ inches wide, and 2¼ inches high. It can sit flat, or if desktop real estate is at a premium, it can be turned on its side like a tower case PC and inserted into a pedestal base provided for that purpose.

The system includes an interface card, which is placed in an empty slot in the computer, and all the cables necessary to hook the unit up to your computer.

The system comes packed with a copy of QICstream backup software, which is an adequate, but not flashy, performer. Although QICstream is compatible with DOS 5.0, it's not compatible with Microsoft Windows.

It can back up and restore full disks, changed files, or selected files. QICstream includes a macro capability and a scheduler to permit automated backups, but, unfortunately, it's not easy to figure out how to use these advanced features.

Both the written documentation and online help are cryptic and difficult to follow. Thankfully, though, the ArchiveXL 80 works well with other software, such as Central Point Backup, which scores much higher in the ease-of-use category.

With CP Backup configured to use QIC formatting, QICstream and CP Backup could be used interchangeably.

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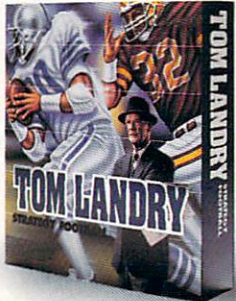


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IBM PC and Compatibles 5.25" (1.2 MB) and 3.5" (1.44 MB) disks enclosed. Requires: DOS 3.3 or higher, 286 or higher, 640K RAM, VGA Graphics, Hard Disk, and Mouse. Recommended: DOS 5.0 and 12 MHz or faster. Sound Support: Ad Lib, Sound Blaster, PC speaker and more. Circle Reader Service Number 262

bly for backups and restores. The ArchiveXL 80 drive also backed up and restored flawlessly using Central Point's proprietary CPS tape format, but tapes stored in that format lose their compatibility with the QICstream software.

By default, QICstream performs a backup with a verify. In more than 600MB of backups, only one file failed to verify.

The verification performed by QICstream checks the tape to make sure the data recorded there is readable. On the other hand, CP Backup and other specialized backup programs can perform a full file-by-file comparison of the files on tape and on disk.

Whether you verify a backup or do a full comparison, it adds significantly to the time required for the backup. But since you're not feeding floppies during the whole process, it doesn't really matter. The ArchiveXL 80 can do its work while you're out to lunch or after you've finished working for the day.

Backup speed varies from about 500K per minute to about 3MB per minute, depending on the speed of the machine being used and the type of data being backed up. Backup times also can be affected by the presence of another device—such as a scanner—on the same DMA channel as the ArchiveXL 80.

Although the manual provides no information about which DMA channel is used by the tape drive, experimentation showed that backups ran much more quickly once DMA conflicts were eliminated.

With a top tape capacity of 250MB, the ArchiveXL 80 has proved to be a solid con-

tributor to data safety for both individual workstations and small networks. Backups across a network worked just as well, though a little more slowly, than backups of local drives.

In cases where a network is not available, the ArchiveLX 80 external unit can

PAPERBOY 2

Admit it. When you were a kid, you dreamed of that noble calling . . . that ultimate challenge . . . the thrill of being a paperboy!

Didn't you? I did. I dreamed of riding my bike through the neighborhood,



With *Paperboy 2*, you get points not only for delivering papers successfully but also for breaking windows.

still be used for multisystem backups. Simply add an interface card to each of your computers, move the tape drive from computer to computer, plug in the data cable, and go.

I've always recommended daily backups of important data, but until I installed the Maynard ArchiveXL 80 system, I wasn't very good at taking my own advice. Now there are no excuses. With this system, it's no problem whatsoever to maintain full weekly backups along with a series of incremental daily backups.

TONY ROBERTS

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Circle Reader Service Number 361

launching papers with tactical precision toward each front porch. Now and then (heh-heh-heh!) I'd target a mud puddle or a roof—or (dare I say it?) maybe Mr. McGillicuddie's window!

But I never realized the dream. Just didn't have the right stuff, I guess. And I certainly lacked the nerve to launch one through Mr. M's front panes, whether he deserved it or not.

Till this morning.

Yes! This morning I cracked. Went absolutely nuts, I did. I splashed papers into Mr. Smithers' pool! And I blasted the news through McGillicuddie's window over and over again!

And thanks to Paperboy 2, new for PCs and compatibles, I was able to get away with it scot-free.

Paperboy 2, unlike its

predecessor, is politically correct and lets you specify paperboy or papergirl. The object is simple: Deliver papers. Your BMX bike speeds up, slows down, and goes left, right, and straight ahead. That's fortunate, since the neighborhood is full of treacherous obstacles and bike-eating vehicles that must be jumped, dodged, or otherwise avoided. It's all under joystick or keyboard control for either one or two players.

Your basic score is tied to how many papers you deliver. But it's extra points that give this game its wholesome appeal. For example, using a paper to stop a runaway baby stroller earns 1000 extra points, while beaming the fat lady at the fair brings 250. You can also lay one on zombies, ghosts, and mummies at various theme houses, albeit for a paltry 50 points each.

The biggest thrill comes when you go for the breakage bonus. Wow—extra points for breaking things! You can break windows, of course, but beyond that the idea is interpreted pretty loosely. For example, breaking—and, in the process, freeing—a barbecuing pig earns 300 points (and the pig's undying gratitude), while breaking the garbage man only earns 200. You can also break baseball players, a waiter in a trendy restaurant, and a sunbather (with startling results). The list goes on and on.

At the end of your route, you can earn still more points on a bonus course complete with jumps, fancy turns, and all sorts of bicyclic derring-do. Who knows? Your initials might even make it to the coveted Top Ten.

Paperboy 2 is instantly



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playable. It'll take you all of five minutes to master the interface. Sound effects are effective even on the tiny PC speaker; with Ad Lib or Sound Blaster, they're great.

Is it fun? Yes! I found it vicariously thrilling. My nine-year-old, ordinarily well behaved, got a gleam in her eye as her papergirl roared through the neighborhood. Interestingly, though, some of the paperboy's all-in-fun destructiveness genuinely bothered my three-year-old—and I found it hard to explain to him why I was laughing so hard at something he really shouldn't find funny at all. Ah, parenting.

Child-rearing questions aside, Paperboy 2 is unexpectedly appealing. It's not educational or socially relevant or anything like that. But that's OK. Paperboys just want to have fun.

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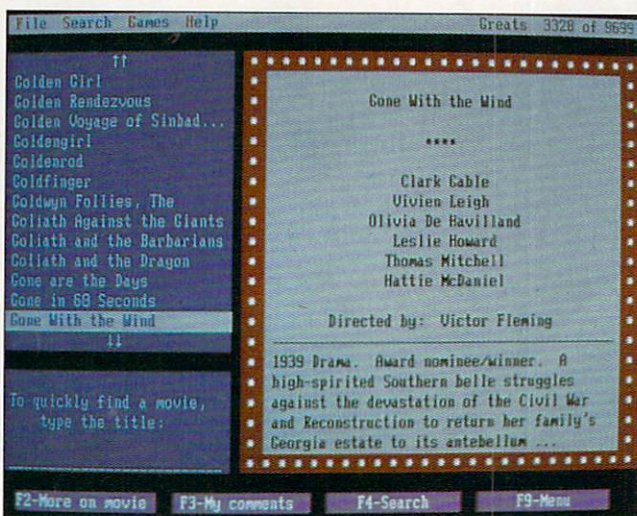
BANNER BLUE MOVIE GUIDE

Picture your last trip to the video store. You thought you knew what you wanted—action, let's say. You agonized over the teeming racks of movies (most of which you felt certain you'd seen before) and read the blurbs on scores of boxes, only to select the very worst movie of Mel Gibson's career. How can this happen to an otherwise intelligent shopper? Banner Blue

wants to play surrogate usher for your next video store outing and offers its Banner Blue Movie Guide, indispensable software for the true movie buff.

Thanks to data compression, more than 9000 movie profiles fit comfortably on your hard drive—that's

no sexual situations. Movie Guide puts together a list in seconds, ready for you to print. You might also use hot links to jump from movie profile to profile. Click on any item displayed—director, for instance. Movie Guide proceeds to display a list of all the films directed by the di-



Before your next trip to the video store, consult the Banner Blue Movie Guide to help you decide what to rent.

more titles than most mom-and-pop stores carry. Floppy users can optionally install Movie Guide on two high-density disks; access time increases but remains tolerable. Within each profile you'll find the movie's director and stars, a rating, and a brief plot summary. Details available from a submenu include critics' opinions, the level of box-office success, country of origin, length, awards won, and video availability. Periodic updates will add the latest movies.

To find any movie, you need know only the title. You may choose other approaches, however, and track down only megahits, courtesy of the predefined Search menu. Or maybe you want something for the kids: no nudity, no violence,

director you chose.

As with any reference tool, search success often depends on your determination. Some stormy Tuesday may seem perfect for a horror flick, and you're in the mood for vampires. A search by subject unearths more than a few, but wait—*Dracula* isn't in the lineup. Search specifically for *Dracula* and the classic materializes, as well as *Dracula's Dog*. But where's *Dracula vs. Frankenstein*? This film's in the database, but requires a little more digging to discover. You might miss a few gems if you do only a quick search. On the other hand, the search options provide such easy access to data that anyone who loves movies will spend hours just browsing through.

The movie-trivia game built into Movie Guide can engage up to four players, but cinema historians won't miss many questions, even on the most difficult settings. You'll have just as much fun discovering what truly awful movies Kevin Costner had to make early in his career.

Obviously intended as a middle-of-the-road guide, this product seems a bit on the generic side. The plot summaries don't reveal enough for truly informed decision making, and the ratings for each film come from undisclosed critics. Some people disagree with Roger Ebert's every word, and he might've been a source for Movie Guide, for all we know. Of course, you should take most critics with a grain of salt anyway; Movie Guide gives Kenneth Branagh's *Dead Again* 4 stars, while granting his *Henry V* only 3½.

DAVID SEARS

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FAMILY ORIGINS

Sifting through family ancestry can bring to life a heritage of old, as well as a frustration of new—keeping track of it all. Family Origins, a genealogy software package, can help arrange the entire family tree—potentially forever.

At first, I thought this would be quite a maze to wander through. After phoning for technical support and receiving relatively simple instructions, though, I got into the program. Then, I discovered the software's

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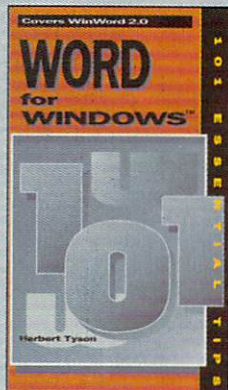
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best feature: its simplicity once you start using it.

You begin with a root person and work generations backward or forward. Individual records include fields for name, birth, christening, marriage, death, and burial information. You can also add people unlinked to anyone listed and import and export gedcom files, the standard format for exchanging genealogical information by computer. Or, to call up a specific person, just use the Search command. Because the entries appear in a tree-style format, the user can see the relationships on-screen.

Some links take more work than others to create. Stepsisters or stepbrothers, for example, are entered differently from full siblings. While full siblings are entered as children of the same set of parents, you change the parents' names accordingly, and enter children under those parents' names. Selecting which

brother or sister (and thus which parents) you view on-screen requires highlighting your choice and hitting Enter. The downside: You can't see full sibs with half sibs or stepsibs.

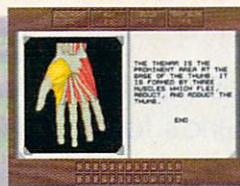
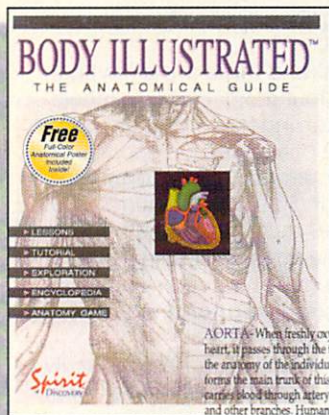
Ultimately, the software can maintain 225 databases with 30,000 people in each; any of the databases can be deleted or modified at any time. A notes-and-sources capability lets you record where you found facts, as well as give personal anecdotes or background information. I made notes ranging from where a husband and wife met to comments on an ancestor's land.

Once enough information is typed in, printed charts and reports allow for virtually any custom hard copy. From a summary of a certain family to an ancestry sketch to a special combination you create yourself, you can produce a document tailored to your needs. I tried all 17 options and was more than pleased. These documents could easily be

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Designed to be fun and easy to use, BODY ILLUSTRATED is a visual and audio guide to exploring the human anatomy. BODY ILLUSTRATED examines hundreds of body parts from different views and is full of detailed illustrations with stunning realism. With just a click of the mouse, each part is explained in clear, non-technical language. A digitized voice provides the correct pronunciation of anatomical part names and "Instant Help" eliminates the need for fumbling with the manual.

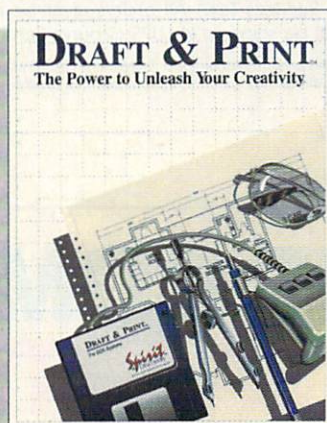
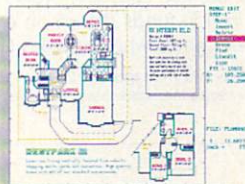
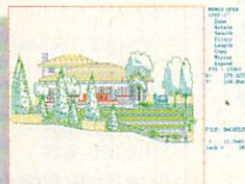
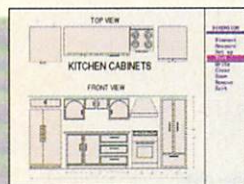
BODY ILLUSTRATED teaches either by lesson method or through the use of the game mode. It is an ideal study guide for junior high to college level students and a valuable reference tool. Instructors can easily use BODY ILLUSTRATED as an interactive anatomy teaching aid. Included in the box is a full-color anatomical parts poster and a written study guide.

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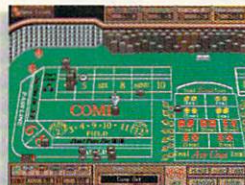
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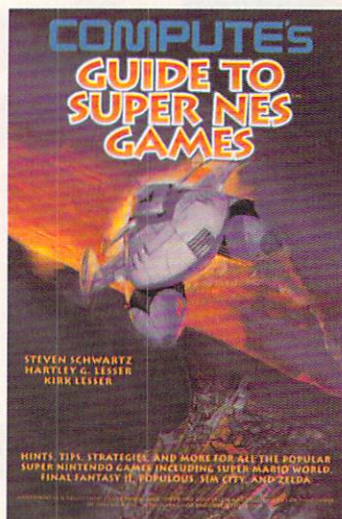
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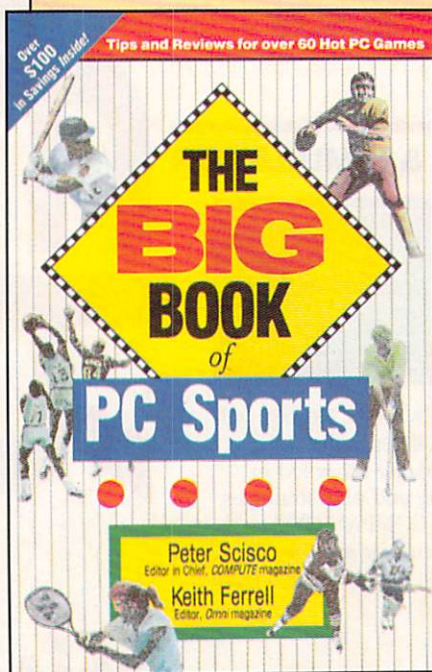


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REVIEWS

turned into gifts, given their variety and appearance.

Any faults (and there are a few) can be worked around. For example, choices under marriage information don't take account of a deceased spouse, offering only married, divorced, unmarried, and annulled as categories. But you can enter the date of death for an individual, then display it as part of the information under his or her name. Also, the system supports up to ten spouses per person.

If you're interested in tracing family roots and sharing that information with others, Family Origins makes that goal more fun and easier to reach. I expected that using this program would be hard, initially—but, much to my joy, it proved quite easy to figure out in a very short period of time.

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SPACEWRECKED

Maybe in space no one can hear you scream, but from even this far away, players of Konami's Spacewrecked: 14 Billion Light Years from Earth could raise a ruckus. With all the tasks you have to perform and all the angry aliens out for your blood, this intergalactic trek could take forever.

A routine exploratory mission turns tragic when you fly into the remains of a moon. Your damaged scout ship won't take you safely home; a long sleep in the cryotube seems the only option. Years later, you awaken, but not to the sounds of rescue. The ghostly—but of human design—Darwin Biological Survey Fleet awaits your inspection. The 20 scientific survey vessels need repair, and you need a lift.

Too bad the crews of the Darwin Fleet can't help you. Alas, the hapless spacemen left hyperspace at just the wrong moment and entered realtime at the heart of a supernova. Cryogenic suspension systems stayed online while most other on-board systems failed. In hopes of a rescue, the daring explorers dream their cold dreams; if anyone will fire up the engines again, it will be you. Oh, and hurry—the fleet could fall apart at any minute. Those poor sleepers! When the cryosystem

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Bobby Orbach, Computer Retail Week

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"The Art Shop is awesome!" Cliff Forese, Age 12

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"The greeting cards are super, as is the Sign Shop where you do banners and signs. The word processor is exceptional with dictionaries (adult and kid), multiple fonts and styles. Work with the Home Inventory or just play with the Art Shop or Solitaire Games and you will be as hooked as I am... This is one of the best DOS programs to come down the pike in a long while." R.L. Creighton, PC Home Journal



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fails, they will die.

To restore the fleet to operational status, you must find and replace the Energy Flux Decoupler, locate the Inhibit Lock and place it on the bridge, and finally, increase all on-board systems to 80-percent efficiency or greater. These repairs take enough time without freshly thawed and vicious xenomorphs roaming free, but you must rush to beat the steady climb of radiation, as well. To add to the complexity, Spacewrecked doesn't much improve the standard "lost in a maze" perspective common to subterranean fantasy games; as with dungeon walls, the often nondescript corridors of a damaged ship can befuddle even careful players. No one wants to waste valuable time stalking down look-alike pathways.

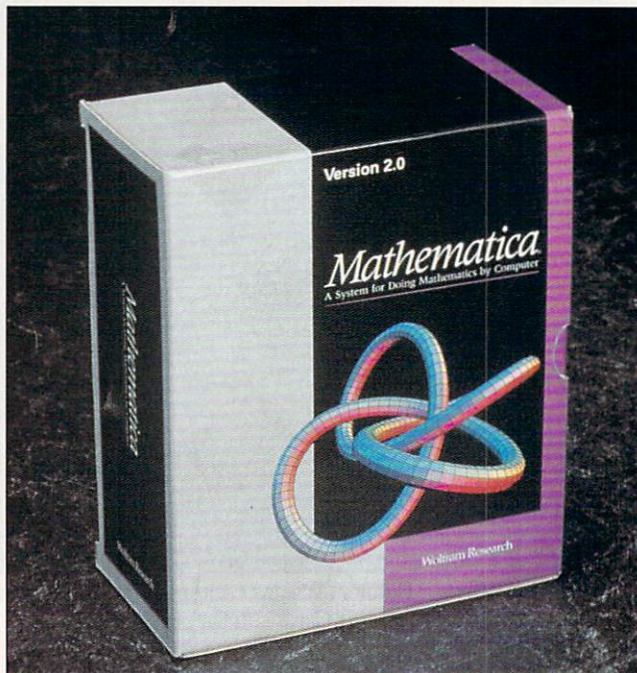
As systems fail, expect even more aggravating problems. The lights may shut down, necessitating flares or flashlights. Fortunately, the crew left a great deal of valuable hardware scattered about; you need only live long enough to collect it. Half the fun of this game involves picking up technological trinkets and attempting to wedge them into the always restrictive inventory slots.

The most valuable knick-knack? A flamethrower. This weapon may not have worked well for the crew of the Nostromo, but it works fine here; the larger targeting sight counteracts the game's simulated jitters. Sights for blasters and handguns twitch constantly, making a direct hit on an enemy difficult. Plenty hard to complete without artificially induced nervousness, Spacewrecked would not miss this annoyance in the least.

You might think that a so-

phisticated team of robots on your side would even the overwhelming odds. They will, but first you have to find them, program them to do your bidding, and sometimes recharge them. With the proper cartridges installed, these helpful droids will scan for life forms, fight for you, and

Blue and glowing, the Spacewrecked introduction sequence seems to promise great visuals to come, but only cartoonish aliens and simple objects follow. Suspenseful theme music plays just after the game loads; unoriginal sound effects accompany the game itself.



Whether it's used to calculate complicated problems or convert data for research, Mathematica occupies a category all its own.

heal you besides. A program could send them to the far end of a ship to carry out a specific function or to simply shut down.

While the programming screens will make perfect sense to a long-time computer hobbyist, they might give pause to a layman. On the other hand, successfully teaching the robots their lessons might illustrate some programming essentials—not a bad tradeoff for the initial confusion—and, with practice, the daunting assortment of programming and inventory interaction options becomes second nature.

Together, however, these aesthetic details neither add to nor detract from gameplay. Fans of task-oriented maze games will enjoy themselves here; space opera enthusiasts shouldn't expect it to be an epic.

DAVID SEARS

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GREMLIN
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Circle Reader Service Number 365

MATHEMATICA

I've seen hundreds of software packages, and at times I've been thoroughly impressed. But I have to tell you: Mathematica transcends the category. It's a complete solution for performing mathematics by computer. I won't be able to tell you everything about the program; even its 958-page textbook left plenty of room for personal exploration. But I can give you a short tour, and I hope you're as impressed as I am.

The easiest and possibly most useful way to use Mathematica is as a numerical and symbolic calculator. Type in a question, and out pops an answer. Sure, you can get answers to problems like $5 * 7 + 4$. But more important, you can get answers to problems like $\text{ArcTan}[\text{Sin}[45]] * \text{Cos}[12]$ without breaking a sweat.

You can develop your own functions, too. If you need something special, all you have to do is define exactly what the function does. It can be as many lines as needed and as complex as necessary. And the most surprising feature is the graphical plotting of practically any mathematical function that can be represented graphically.

The strongest reason to use Mathematica is for scientific applications. You can use the program to generate solutions for a wide range of problems. I'm involved in medical research on facial expressions. The data I have is in the form of captured pictures. Plugging formulas that were developed for this purpose into Mathematica and instructing the program how to read the data from disk, I was able to reduce the picture

SPACEWARD HO!

The Conquest Game of the Stars.

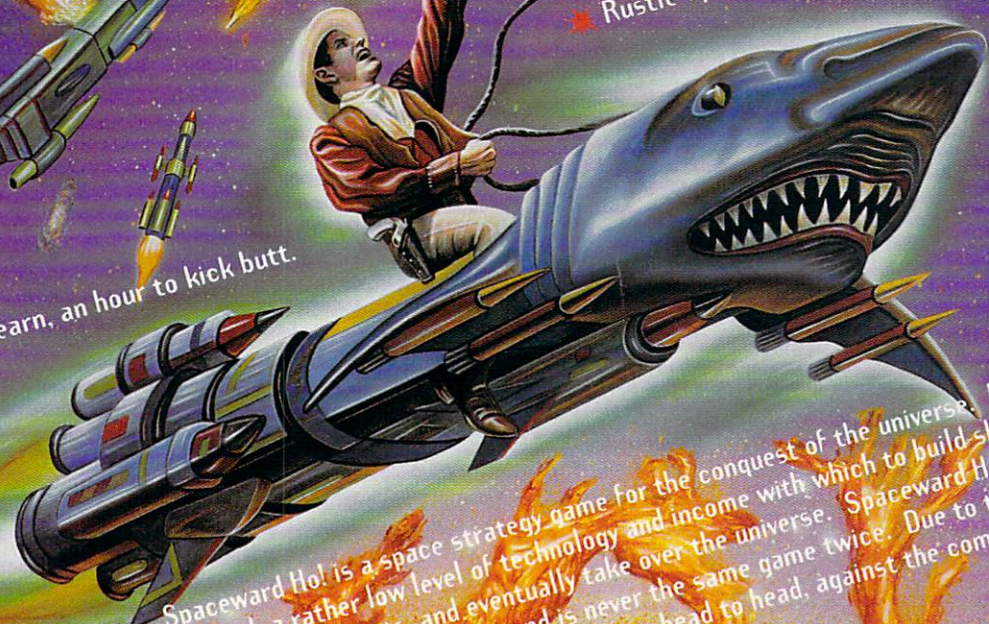
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★ Up to 20 human and/or computer players each game.
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★ A minute to learn, an hour to kick butt.

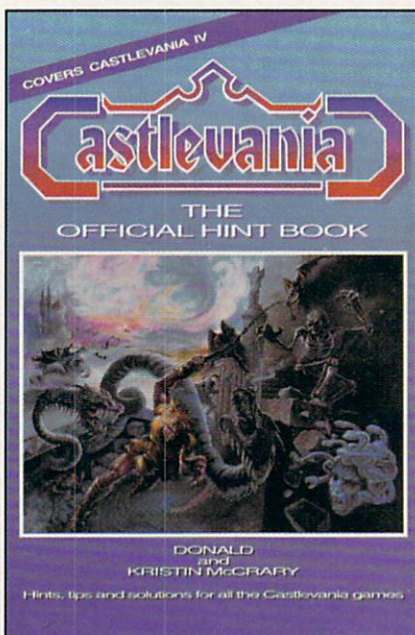


Spaceward Ho! is a space strategy game for the conquest of the universe. Players start out with a rather low level of technology and income with which to build ships, explore and colonize planets, and eventually take over the universe. Spaceward Ho! is an adventure lasting many hours and days, and is never the same game twice. Due to the multiplayer compatibility you and your friends can go head to head, against the computer, or BOTH.

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Here's the official hint book for the popular series of Nintendo games from Konami. This is the book that tells all. Includes background information, complete maps, tips for defeating the enemies, concise descriptions of each of the weapons, and solutions to each of the *Castlevania* adventures, including the new Game Boy adventure, *Belmont's Revenge*.

To order your copy, send \$9.95 plus \$2.00 shipping and handling U.S. (\$4 to Canada, \$6 other) to COMPUTE Books, c/o CCC, 2500 McClellan Ave., Pennsauken, NJ 08109. (Residents of NC, NJ, and NY please add appropriate sales tax.)

All orders must be paid in U.S. funds drawn on a U.S. bank. Orders will be shipped via UPS Ground Service. Offer good while supplies last.

REVIEWS

files to simple outlines of the major facial features.

Of special interest for analyzing facial expressions are the eyebrows. When they're reduced to simple outlines, they're easy to quantify. Once this is done, tables of data for different pictures allow the people doing the analysis to have nice, convenient sets of data for comparison.

If you run a business and want more numeric help than your spreadsheet can provide, think about using Mathematica. It'll let you easily create special functions for anything you can image. Financiers can design special amortization schedules. All that's necessary is entering the formula, typing in the numbers to process or reading them from an ASCII file on disk, and then letting the program work its magic. Before you know it, you'll have your table.

I ran Microsoft Works and loaded in my personal budget spreadsheet. I then saved it to disk as an ASCII file. After running Mathematica, I used the function that loads a list of numbers from an ASCII file into a variable list. Then, the BarChart3D function gave me a graphical display of my budget. You can also view pie charts, 2-D bar charts, and line graphs.

These graphs are great for business presentations. The program saves to a PostScript file that can be converted to film or 35-mm slide. You can also use a capture program that saves as PCX.

If you're in the education field, I'd also recommend Mathematica. In a classroom situation you can generate endless illustrations of your subject matter. I taught geometry for six years. During that time, I got proficient at creating examples at the chalkboard. If I'd had Mathematica, I could've simply prepared the formulas in advance and then typed in sets of numbers during class. There would've been no down time for the students while I created examples on the board.

Before you rush out and buy the package, let me warn you of a few things. First, you won't learn how to use it overnight. For me, it was about as difficult as a course in mathematics. This program is so powerful that there's a lot to learn.

Second, even though the documentation is good, it's not adequate for novices. It doesn't walk you through the program step by step. Besides the large, well-written, textbook-style manual, I would've liked a thorough tutorial that did some handholding.

Lastly, the interface for the version 1

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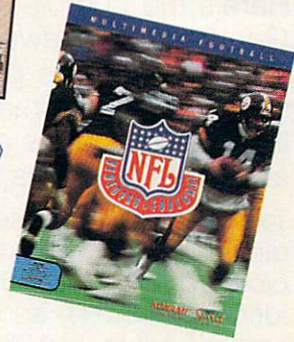
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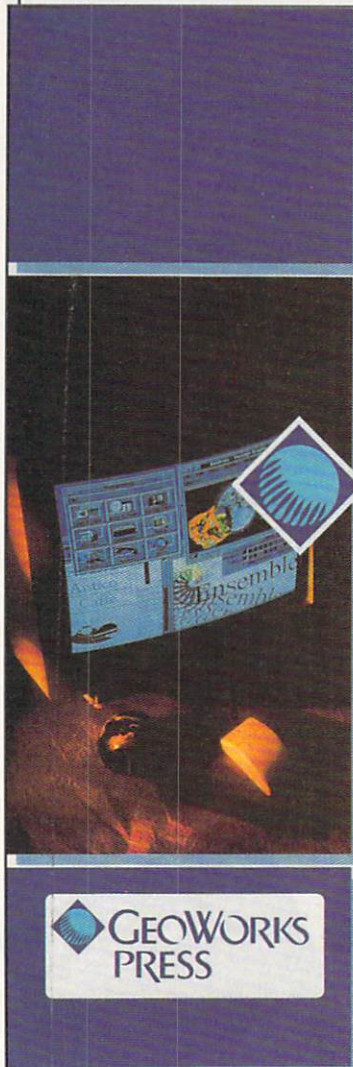
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REVIEWS

have a bit primitive. It's a simple, command line-style interface. If you can order the Windows version, do so. There's even a Macintosh version that uses a graphical interface.

Even with the caveats mentioned, I'd recommend this program to all those who need to do math on their computers. You won't find anything else that's as complete as this. For its technical merits and worthiness I can only say, "Bravo! Well done!"

RICHARD C. LEINECKER

IBM PC or compatible, 4MB RAM, hard drive with 12MB free (additional 16MB recommended for swap space)—\$595, \$895 for enhanced version (requires a math coprocessor)

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Circle Reader Service Number 366

ARE WE THERE YET?

OK, let's be honest: If you're not into crosswords, word searches, and jigsaw puzzles, you may find *Are We Finished Yet?* a better title for this game. But if such brain pickers interest you, *Are We There Yet?* is a challenging, educational package.

The Mallard family wins fourth place in a cereal company's sweepstakes and receives much more than a prize from the box. Leaving the white picket fence behind, they travel the nation with their award, a handy coupon book for U.S. tourist traps. They can move from one state to another only after solving some problems. Making this trip is what the manual calls the typical American family. The hardworking Drake Mallard isn't home much. The mom thinks she may be turning into her own mother (how fitting that the only name listed is Mom), while the daughter, Tiffany, holds a personal vendetta against both parents for not ending her name with an *i*. Blip, the younger brother, finds hand-held videogames and rubber vermin vastly fascinating. We don't see much of these folks, however, since solving the two puzzles in each state forms the bulk of the game.

After choosing a state, the Mallards are given such basic information as state nickname, capital, and points of interest. Then they select one of the two tasks, each pertaining to an actual event or place. Players encounter 23 kinds of puzzles ranging from crosswords and mazes to Hangman and Concentration. At each stop, a pull-down menu gives instructions for over-

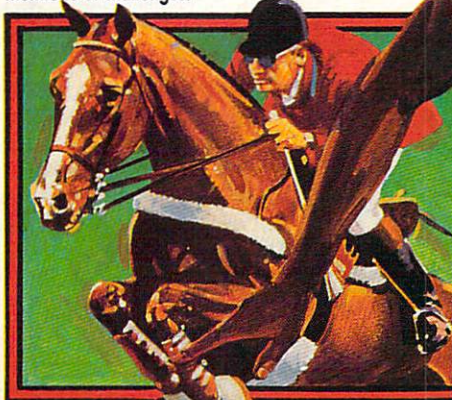
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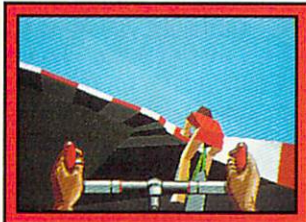
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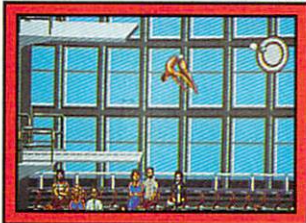


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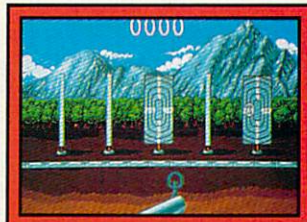


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coming the obstacle. In Virginia, the Mallards venture the Great Peanut Tour (a winding bicycle route) and collide with the Kaleidoscope Festival in Lynchburg. The manual suggests how each puzzle fits with its event or place. For the Rattlesnake Hunt in Pennsylvania, the Sentence Search answer reveals why it's a good idea for participants to check their lunch bags (hint, hint). You're allowed to choose from several highlighted states in any order you want, but you can't move on to another group of states until completing the first.

As the family moves along, it collects souvenirs that appear during the final challenge when the back of each piece reveals part of another jigsaw. Any souvenirs it hasn't collected don't appear on the screen, thus making the game harder to solve. Luckily, the clue book provides answers to all puzzles and lists the souvenirs, in case you miss them on your own.

While the more than 200 puzzles are educational, they also require patience and a considerable amount of "brainery." In fact, before actually starting the game, the player must piece together a map of the United States. Warning: These tasks move rather slowly without a mouse. Both the game's creators and I recommend using one, though it's possible (but somewhat frustrating) to play with a keyboard. Also, saving puzzles as you solve them prevents having to start over later, although you have to load the finished puzzles one by one to move on.

This may not be an action-packed game, but the

sound effects and colorful graphics liven up still screens, providing a more interesting atmosphere for solving crossword puzzles than you'll ever find in the newspaper. For anyone who enjoys the challenge of thinking games, *Are We There Yet?* offers enough to fill

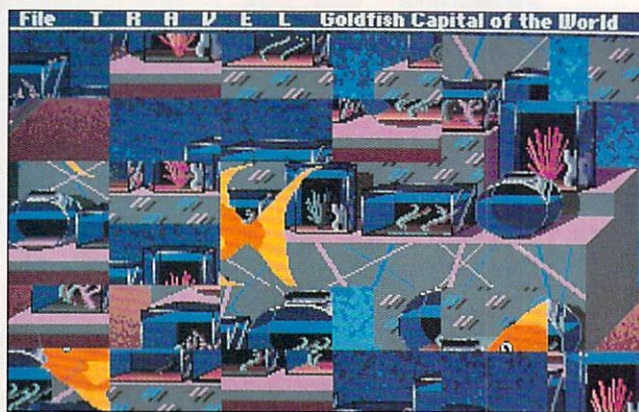
DOS," I cheerfully took the software . . . and then let out a long sigh.

Admittedly, I was a perfect candidate for the job. Next to the people at COMPUTE (and most of COMPUTE's readers), I'm not extremely computer-literate. I can boot the machine, get in-

ple, straightforward language. You don't have to deal with a lot of jargon, and the jargon used is explained. I learned a thing or two from almost everything I read, but there were two lessons that proved especially helpful to me. One is called *The Basics*, which deals with DOS, Windows, disks, file use, and hard disk management. The other, *Automation*, threw in an explanation of the *autoexec.bat* and *config.sys* files (which I thought was just great, because I had always wondered what those "bat" and "sys" things were that seemed to be in every directory I saw).

Professor DOS, on the other hand, performed a few small miracles. Before the Professor took over, I could barely format a disk without asking for directions. Now, I know what a disk operating system does, why operating systems are necessary, and why I should know how to work with DOS. I can write small batch files, use wildcards, make and delete directories, change my *autoexec.bat* file, and perform many other tasks that make it a lot easier for me to deal with files.

Just like *PC Instructor*, *Professor DOS* starts out with basic information about the PC, but it takes you all the way up to using the shell, the Editor, and a barrage of other advanced commands and techniques. The tutorial is careful to point out the differences between DOS 5.0 and previous versions and shows you how to work with DOS 5.0's new features. It also includes *SmartGuide* for DOS, a huge online reference guide. Although DOS comes with a help feature of its own, *SmartGuide* makes a good companion, especially for beginners. That's be-



The family taking the tour in Are We There Yet? contributes little, but the program has good crosswords and jigsaw puzzles.

hours and some interesting tidbits that may someday help you win *Trivial Pursuit*.

TRACY MYGRANT

IBM PC or compatible, 640K RAM; serial mouse (for PS/2 models 25 and 30); VGA, hard drive, and sound card recommended—\$24.95

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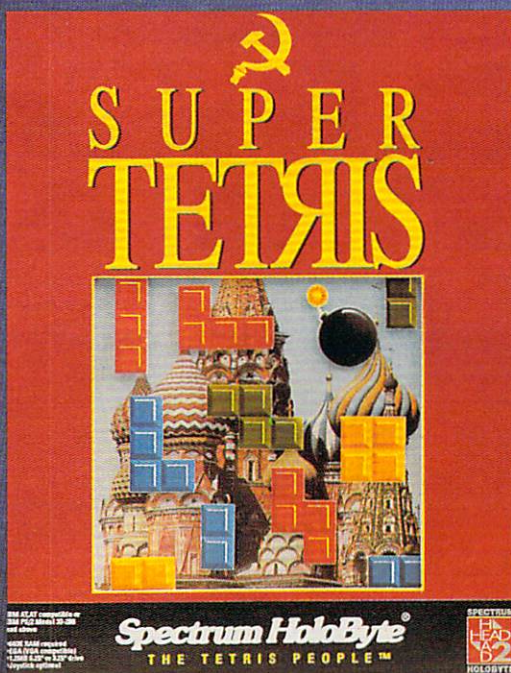
PC INSTRUCTOR, PROFESSOR DOS

I dread online tutorials. Just the thought of being affixed to my seat for however long it takes to "enter" and "space" my way through a program brings me to tears. So, when I was asked to review *PC Instructor* and *Professor DOS*, two programs designed to "help you understand everything you need to know about PCs and

to whatever program I need, and once I'm dealing with software, I'm home free. But ask me about DOS or memory or (God forbid) PC history, and I'm speechless.

Now, it's a different story. Before doing the tutorials, I was interested in learning more about computers, but I didn't even know enough to find out where I needed to start. *PC Instructor*, although it didn't answer every last question I had about computers, gave me a great base to build on. Question marks don't fly around in my head anymore when I hear people talking about CPUs, computer speed, drives, and ports. Dealing with bits and bytes isn't as painful as it was before, either, and I finally know the difference between a PC and a PC clone.

PC Instructor covers everything from PC history to software to networks in sim-



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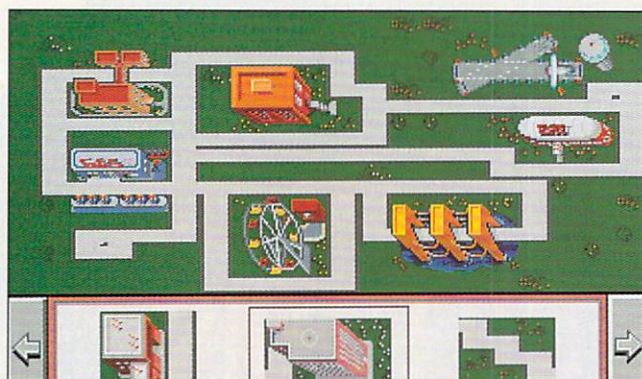
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cause it looks less intimidating, is easy to work with, and contains minirefreshers from the tutorial.

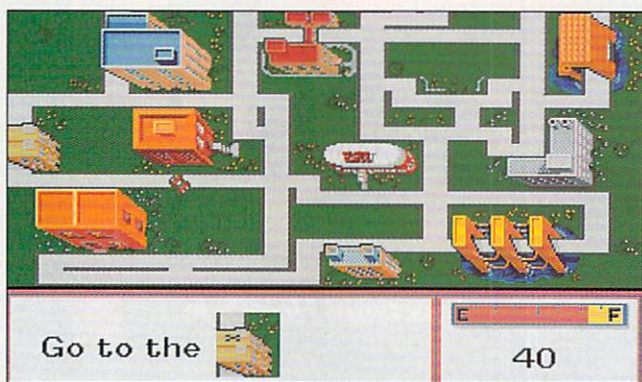
So how do PC Instructor and Professor DOS do all of this wonderful teaching? Just like a book would. The only difference is that the pages appear on a computer screen, they're more colorful, and a few graphics and sounds are thrown in to make reading more interesting. Then, to make the information easier to deal with, the tutorials are divided into sections, and each section is split up into related lessons. The lessons appear in pull-down menus that you pick and choose as you please, and although it took me about 20 minutes to get through one lesson, how fast or slow you go is totally up to you.

Although both programs are great teachers, I experienced two small problems as I made my way through them. First, I found them difficult to follow at times because I couldn't tell when new information had been added to the screen without having to reread everything else. The screens usually changed colors or layouts when new information was displayed, but there were more than a few times when no noticeable changes occurred, and that got to be a bit nerve-wracking after a while.

Then there was the monotony. I'd have to say that PC Instructor and Professor DOS don't exactly "captivate the user's attention through creative use of graphics, sound and color," as their makers claim. There is a chance that you may get a little bored, and boredom doesn't make for learning. The only suggestion I have is to break up the



You can build a town with Stickybear Town Builder, but you sure can't control the roads; too bad—an airport would be nice.



With Stickybear Town Builder, you'll have a hard time figuring out which way to go and an even harder time going there.

sessions instead of trying to tackle them all in one sitting. That way you won't get bored, and you'll pay more attention to the screen and less to your yawns.

After you learn how to deal with the little glitches, PC Instructor and Professor DOS can be fantastic learning tools. Even if you aren't crazy about online tutorials, these are worth a try.

DANIELLE BEST

IBM PC or compatible; 512K RAM for PC Instructor, 256K RAM for Professor DOS—\$49.95 each

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Circle Reader Service Number 368

STICKYBEAR TOWN BUILDER

Let's see. . . I'll put the restaurant with flashing neon sign here, the hospital over there, and the airport on the opposite side of town. Think there's room anywhere for an amusement park with a Ferris wheel?

So begins Stickybear Town Builder, a city construction set for five- to ten-year-olds. Starting with a bird's-eye view of a grassy plain, youngsters pick and place up to 14 buildings from the 30 different pieces supplied. The city automatically adds the roads needed to link each piece to the town center. It's the random na-

ture of these roads—with their weird bends, dead ends, and zigzags—that gives Stickybear towns their unique appearance.

Once built, towns are intended to be the back-grounds in two driving games—Take a Drive and Find the Keys. Use the arrow keys (up, down, left, and right) to guide the car around your town map. But don't expect a free trip. Both games have very specific goals. In Take a Drive, your task is to guide the car to the location that matches the picture on the bottom of the screen. Since each correct visit increases your score, you'll want to get to as many places as possible before time and fuel run out.

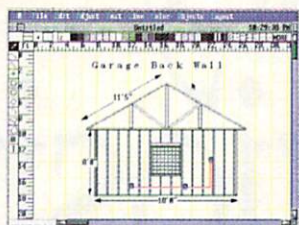
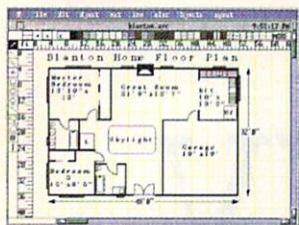
Decidedly more challenging is trying to locate the 12 hidden keys in Find the Keys. Vague directional hints appear on the on-screen compass and are repeated using standard directional notation (north, south-east, etc.). As the car moves around town, the hints change to reflect the new relative location of the target. Employing as-the-crow-flies logic, the clues help determine which building is the final destination, but figuring out which road to take is a bit harder. It's somewhat akin to being asked to drive to the Empire State Building or the Golden Gate Bridge when you see it in the distance; you may often feel that you can't get there from here!

But what happens after you've found the keys or visited all the locations? In 1985, the Apple II version of Stickybear Town Builder offered extremely simplistic text rewards ("Good for you. You found it."). In the 1992 MS-DOS version, digitized audio tracks of the same

PLAN-MAKING SOFTWARE:

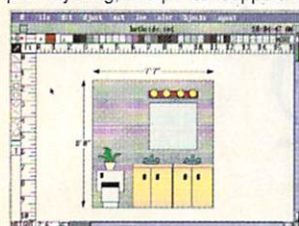
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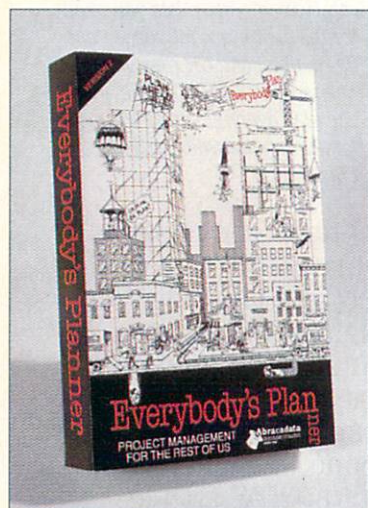
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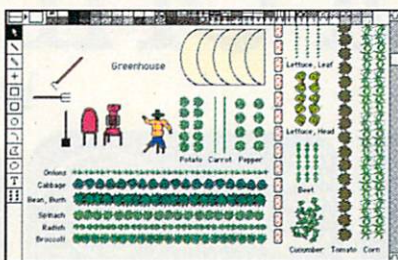
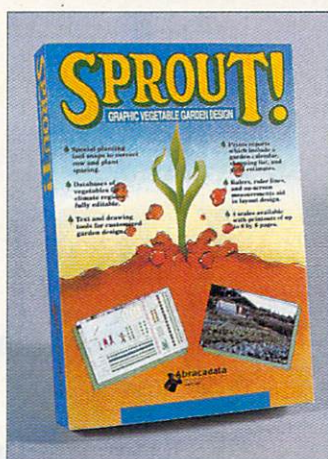
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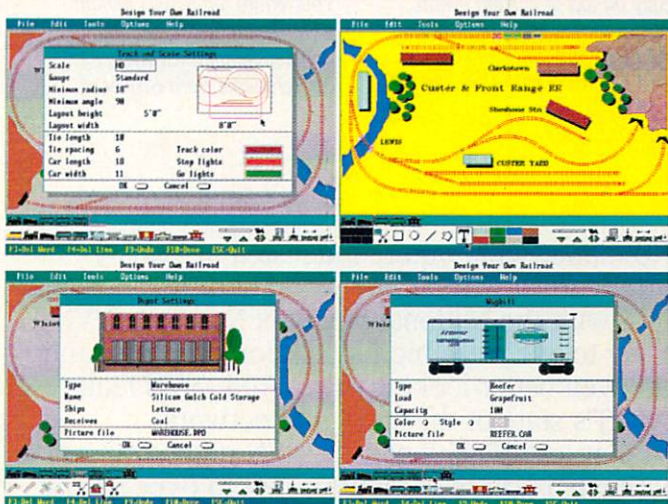
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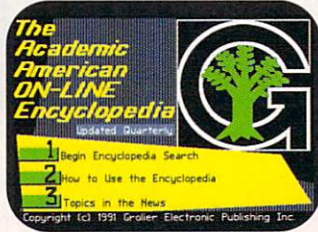
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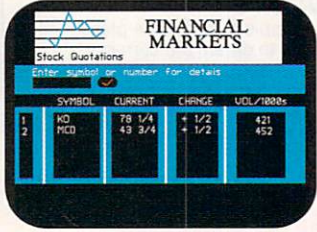
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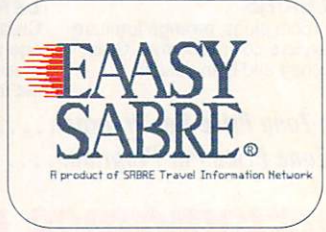
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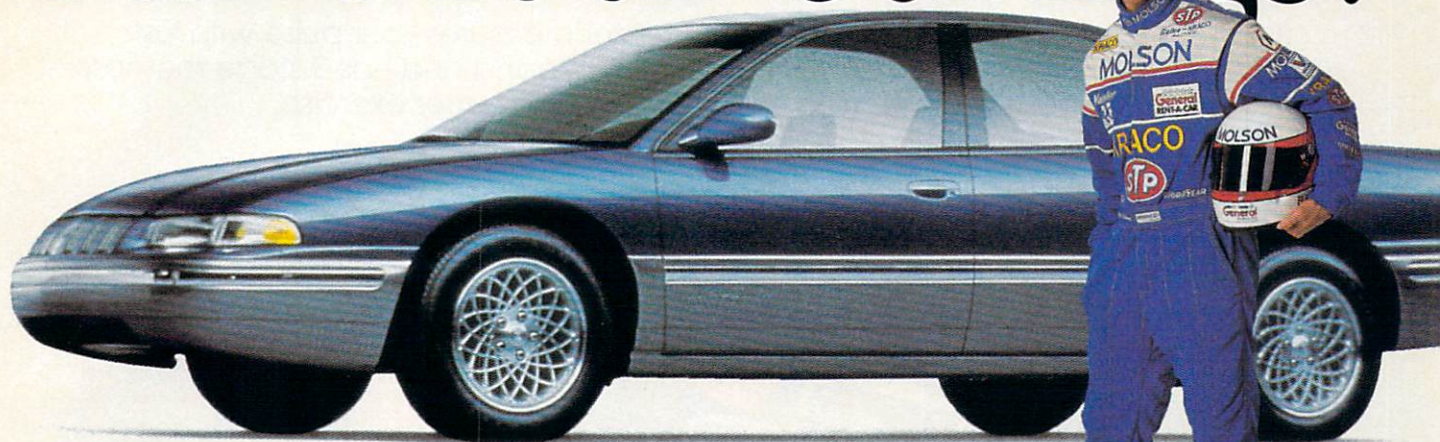
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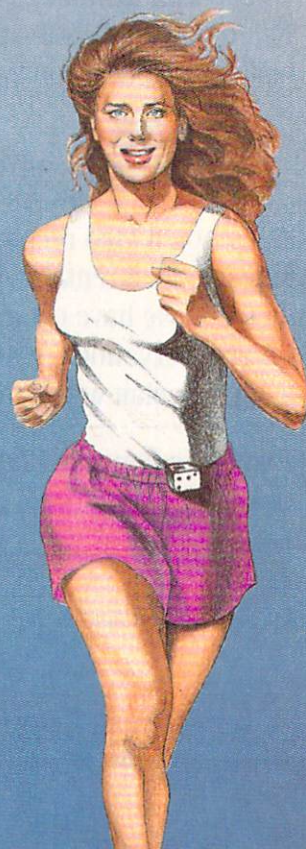
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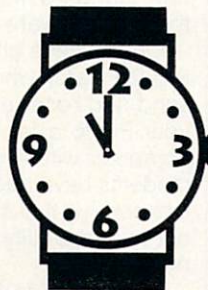
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comments have been added, and the box design has been changed to proudly proclaim that it's Ad Lib, Sound Blaster, and Sound Source compatible. Unfortunately, the sophistication of the target age group has changed in the intervening years, making even simple digitized comments seem old-fashioned. Where's the fancy animation, showy music, recordkeeping, or Hall-of-Fame routine? Not here, that's for sure.

Even the interface is annoying. Using arrow keys to steer from an overhead view was awkward in 1985; for the program to use the same interface in 1992 is unforgivable.

It's tough when the times seem to pass a great publisher by. In the mid 1980s, Stickybear software was the best. The colors were the brightest, the animation the smoothest, and the humor—well, kids of all ages chuckled at the things that crazy bear family did.

Unfortunately, Stickybear Town Builder, while great in its time, simply can't compete with games offering the sophisticated graphics and responsive interfaces that are expected by today's young computer users. Stickybear Town Builder still sticks out—but now it sticks out in the wrong places.

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Communication hardware is changing rapidly. New devices incorporate new data compression features, higher speeds, and a new standard that makes all modems with the Rockwell chip set use standard codes rather than proprietary ones. Software now can make use of these standard codes so that any modem using the new standard will be compatible with the new software packages.

Out of these changes has emerged the fax card, which can allow you to send and receive fax documents from your PC to a fax machine or another computer with similar equipment. Fax/modems have become so popular and inexpensive that sales of modems without fax capability have dropped to almost nothing.

The leader in fax/modem software for Windows has just released a DOS

version of its award winner. Delrina Technology's DosFax PRO brings us the power, reliability, and ease of use that made WinFax PRO sell at a rate of one copy every minute.

DosFax PRO can be used as a stand-alone product and is for people who prefer DOS to Windows. You can also use it in conjunction with WinFax PRO if you jump back and forth between DOS and Windows applications.

One of the most appealing features of DosFax PRO is its compatibility with any DOS application. A 13K terminate-and-stay-resident program (TSR), which can be loaded into either extended or expanded memory, allows the software to remain in the background of virtually any DOS application, such as a word processor, database, or spreadsheet. From the background, it will fax your document. The same TSR allows the modem, computer, and dedicated fax line to receive and print a fax communication transparently while operating in the background of another DOS application.

The key to DosFax PRO's compatibility with any DOS application is its revolutionary ability to act as another printer driver within the application program, making faxing a document as easy as printing one. The Hewlett-Packard LaserJet and Epson printer emulations make DosFax PRO the only fax software to have WYSIWYG faxing of desktop publishing and graphic art pictures to any Group 3 fax machine and to traditional data- or ASCII-based fax documents. The simplicity and compatibility of the printer driver emulation lets DosFax PRO support all font-management systems, font attributes, and embedded graphics.

Unlike most other fax software, DosFax PRO is compatible with over 138 fax/modems, including those which come already installed on notebook computers. DosFax PRO uses standard fax and modem instructions which will remain compatible with any fax/modem that uses the Rockwell chip set. DosFax PRO supports most of the popular Class 1, Class 2, and Sendfax-compatible fax/modems.

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while the 24-character phone number provides ample space for any special codes needed by your telephone carrier. The intelligent phone book saves you keystrokes by filling in the remaining address, number, and prefix from its memory after you enter a unique sequence of letters or numbers that corresponds to that in memory.

DosFax PRO's administrator keeps a running log of all fax transmissions and received fax documents. It can be set to retransmit documents that have failed, and the software automatically complies with any instructions for rescheduling. You can cancel or amend any fax transmission right from the pop-up menus. Received faxes can be stored to memory, printed on receipt, stored or printed when prompted on receipt, viewed graphically with page rotation, used with five-level zoom and thumbnail capabilities, or exported to three fax transmission formats (TIFF, PCX, and FXS).

DosFax PRO allows for

customizable cover sheets when broadcasting to a large group of fax numbers. It draws on the database to allow for data interfacing with the fax cover to put on the correct address, contact person, and other information. Unfortunately, the public will have to wait for future releases of DosFax PRO before the fax mail-merge feature will allow customization of the fax itself, which would be of great use to anyone who sends a lot of faxes.

DosFax PRO uses pop-up menus and hot keys that activate the TSRs. The clean, easy-to-understand, intuitive windows make the well-written, 130-page, indexed manual an accessory which will be needed only in an emergency, if one arises.

As a result of the constantly changing fax/modem technology, many products do not have features that will be available in the near future, such as the ability to integrate voice, data, and fax communication within the computer, modem, and telephone systems. Many new

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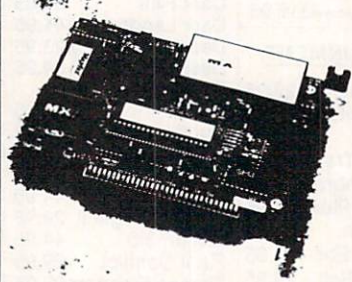
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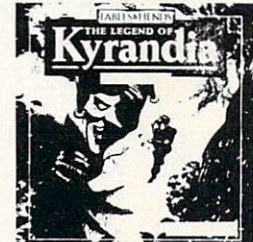


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An illuminated power indicator is embedded into the Relisys logo at the lower left front of the monitor, and knobs for adjusting vertical size, horizontal size, horizontal phase (centering the image from right to left), brightness, and contrast are located at the bottom of the monitor's display.

The RE1422 has a noninterlaced display, which makes it capable of working with a huge number of video adapters and GUI accelerator cards in the extended video modes. I encountered no problems running my Truevision Video VGA with Overlay card, which uses a Tseng 4000 chip set backed by 1MB of RAM, in 1024 x 768 resolution with 256 colors noninterlaced.

The overall image quality, color separation, and clarity of the display are good, even when viewing complex graphics and very small fonts. Moiré patterns and strobing, however, are partic-

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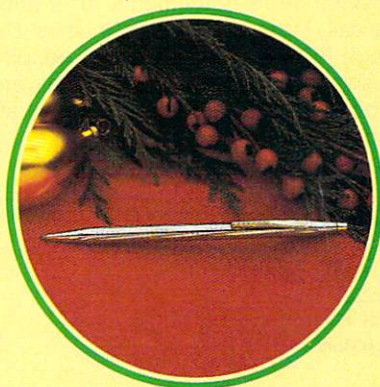
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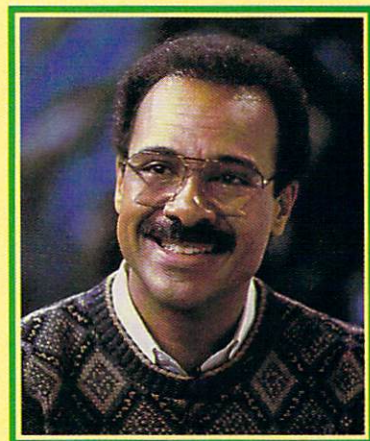
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ularly pronounced with some graphics patterns. Working on a monitor with these shimmering patterns and flickers can be highly fatiguing to the eyes, although some adjustments to the brightness and contrast controls lessen the effect in many instances. The RE1422 also exhibits a tendency toward blooming (getting thicker) at the ends of thin lines and rules and ghosting (images persisting).

Switching from text to graphics mode and back again in DOS applications causes a noticeable bounce as the screen images change; this bouncing phenomenon is not present when running or switching applications under Windows, however, since the video stays in graphics mode throughout the Windows session.

Corner-edge resolution isn't as sharp on the RE1422 as on some other monitors, but cost-conscious purchasers shouldn't see this as a major shortcoming unless they intend to do very intricate full-screen CAD projects or other applications that require pristine focus across the entire screen. For such power users, the more expensive, larger-screen monitors would probably be a better choice.

It would be unfair to compare this monitor on a point-by-point basis with others costing at least twice as much; you'd expect better performance and perhaps more refinements for a substantially larger investment. But most average PC users will find that, despite its shortcomings, the RE1422 delivers good value and performance at an affordable price.

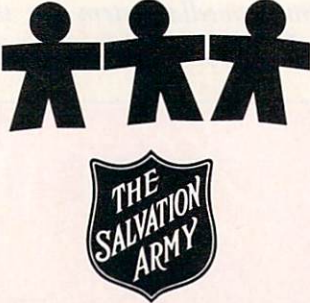
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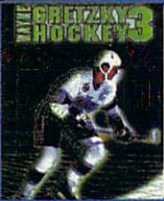
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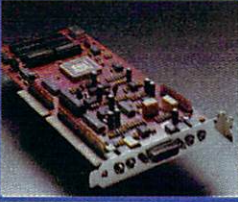
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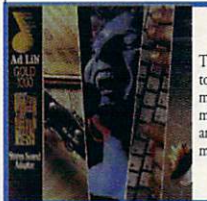
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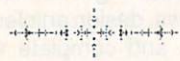
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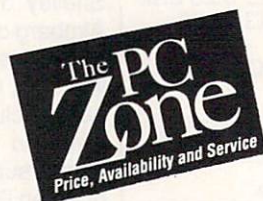
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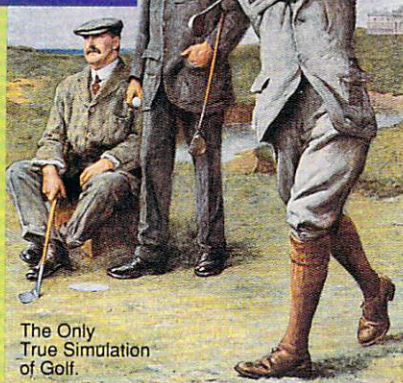
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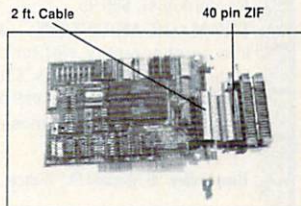
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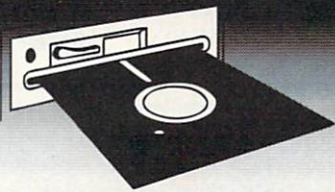
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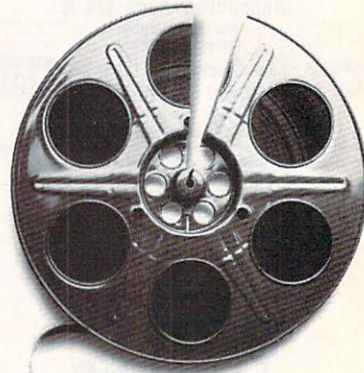
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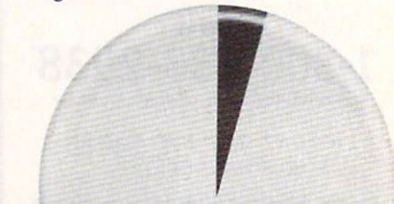


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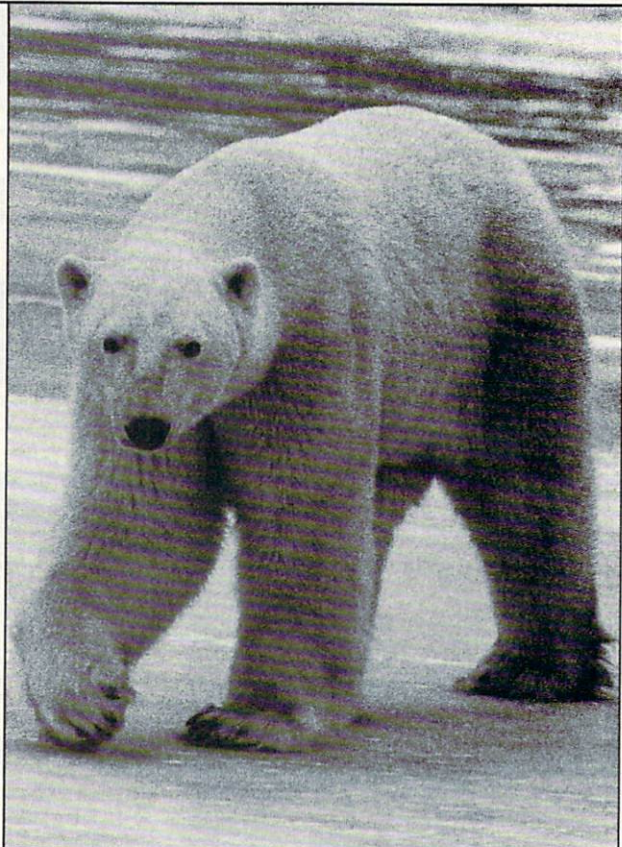
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NEWS BITS

Jill Champion

A map to the future, the rebirth of Ad Lib, virulent virus construction sets, the sound of music, and quickening your bills with plastic money

No More Map Folding

Possibly bringing a TravTek-like computer (see COMPUTE's August 1992 "News & Notes") a bit closer to the consumer is a Texas inventor's new vehicle accessory, the E-Z Finder. The compact, portable electronic device for your car "presents road maps in a clear, easy-to-read manner" and allows you to pinpoint routes surrounding your destination immediately without scanning an entire map. The only crook in the highway is finding a manufacturer to take the product off the drawing board. For now, Invention Submission of Pittsburgh, Pennsylvania, is holding the blueprints.

Sound Byte

The Ad Lib Gold 1000 sound card (Ad Lib Multimedia, 220 Grande-Allée East, Suite 850, Québec, PQ, Canada G1R 2J1; 418-529-9676), the first sound card you can buy with the new Yamaha Magic chip set, is finally on the market. The card allows for stereo sampling at 44.1 kHz per channel and has three different filters to suppress crackling and popping for noise-free operation. Optional add-on modules allow for surround sound, telephone answering, and voice mail, as well as SCSI interfacing to CD-ROM and other peripherals. The Ad Lib Gold 1000 retails for \$299.95.

Controlling the Infectious

The Virus Research Center of the International Computer Security Association (Suite 33, 5435 Connecticut Avenue NW, Washington, DC 20015; 202-364-8252) is calling for legislation to quash virus-authoring software and books.

Last July, a hacker calling himself Nowhere Man released version 1.00 of Virus Construction Laboratory, a slick, professional product in-

tended to write a variety of viruses that resist debuggers and can contain up to 10 of 24 preprogrammed effects such as clear the screen, cold reboot, corrupt file(s), erase file(s), lock up the computer, drop to ROM Basic, trash a disk, and warm reboot. According to the VRC, most of the viruses are undetectable by today's antivirus products. Creating a new virus takes just a few minutes with a virus construction kit. David Stang, Director of Research at the VRC, says such products are destined to make today's virus problems look like "the good ol' days."

While *infecting* a computer with a virus can be either a misdemeanor or a felony, depending on the severity of the crime and the state in which it's committed, the U.S. currently has no laws to deter computer virus authors.

Pop Goes the Software

R.E.M. sets the mood for your newest role-playing adventure. Linda Ronstadt belts out a torch song as the theme to a Hitchcock-type mystery game. Don't be surprised if it happens soon. Software producers who've settled for using generic music by unknown artists because of the prohibitive fees and complex negotiations involved in using popular songs can now bundle those big-name recordings with their software. The landmark turnabout in this traditionally tightfisted industry comes from Warner Special Products (111 North Hollywood Way, Burbank, California 91505; 818-569-0500), which is making available to the consumer electronics industry and computer software producers the master recordings of more than 50 artists for CD-I and CD-ROM.

Warner Special Products, the licensing agency for Time

Warner Music Group, says it looks forward to working with CD-I and CD-ROM software producers and creators and is rushing to keep up with the needs of multimedia by eliminating a great deal of the red tape that's always surrounded master-use licensing fees. WSP is offering a special low licensing fee of \$300 for segments up to 30 seconds. In addition to R.E.M. and Linda Ronstadt, the list of artists includes Travis Tritt, the Doobie Brothers, Anita Baker, James Taylor, Ice-T, and others.

Credit Where Credit Is Due

Intuit (155 Linfield Avenue, P.O. Box 3014, Menlo Park, California 94026-3014; 415-322-0573), publisher of the Quicken series of money management software, has joined forces with Primerica Bank and VISA U.S.A. to bring you the Quicken VISA card. Each month, card holders receive an electronic statement directly into their Quicken software, either on disk or via modem (whichever is preferred). In less than ten seconds, Quicken's new IntelliCharge feature reads the statement and categorizes and records all credit-card transactions. You get a complete spending record on your PC without typing in anything. The IntelliCharge statement is delivered free for the first six months; after that, the charge is \$3.00 a month for modem delivery or \$4.50 a month for disk delivery, either of which is billed annually. There is no annual fee. The Quicken VISA card carries a variable interest rate of 8.75 percent above the prime rate. Currently, the card's rate is around 14.75 percent—less than some other major credit cards. Applications for the Quicken VISA card with IntelliCharge are available from Intuit's customer service at (800) 756-1855. □

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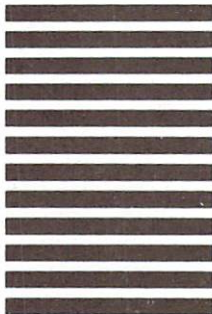
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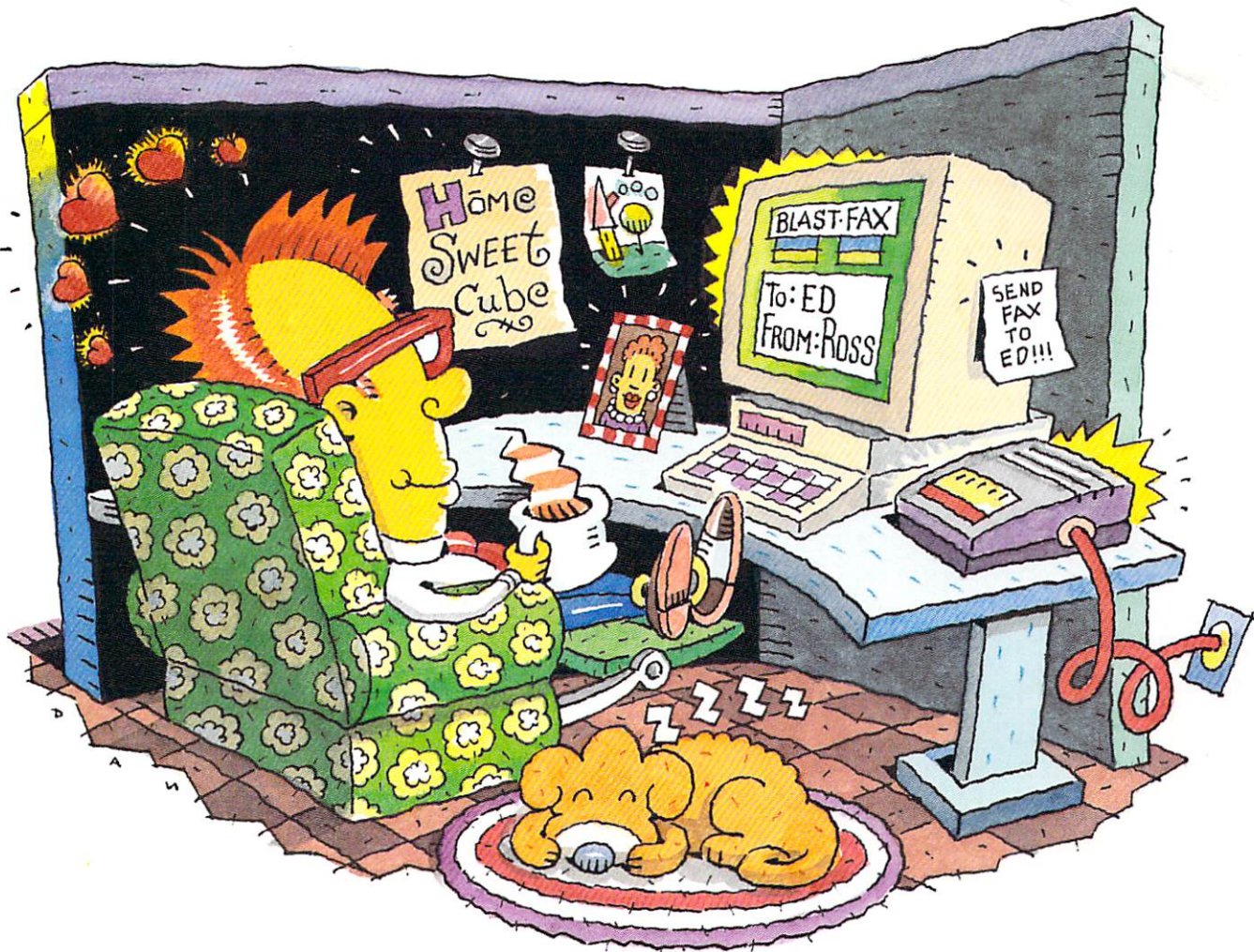
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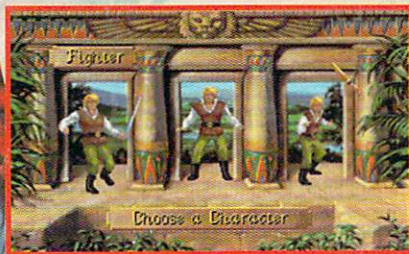
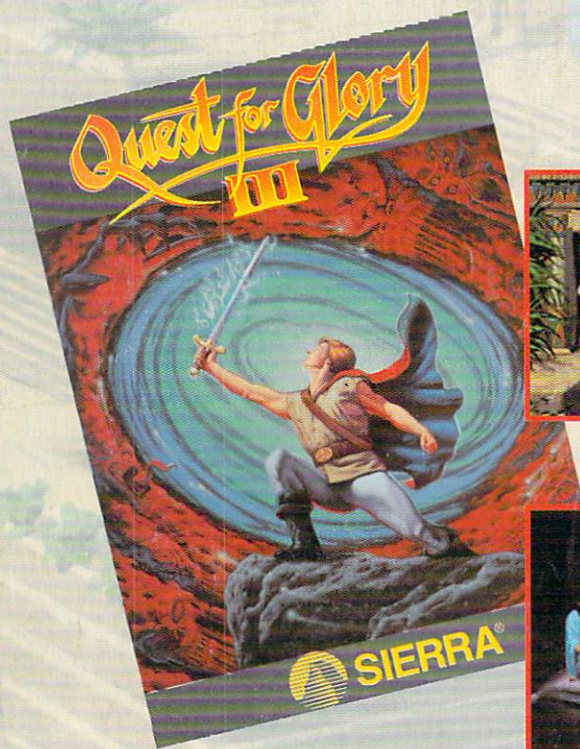
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