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AUGUST 1993

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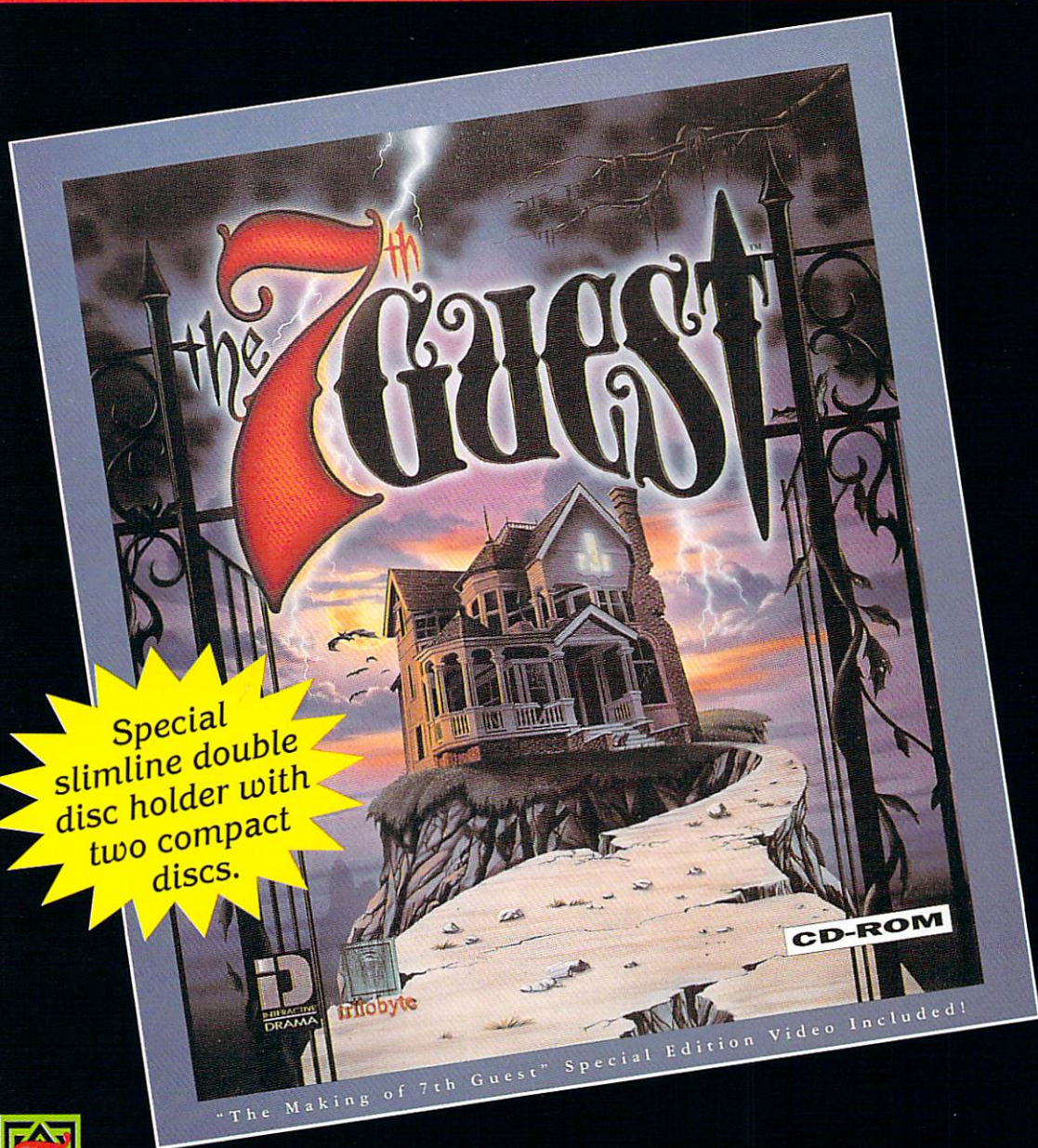
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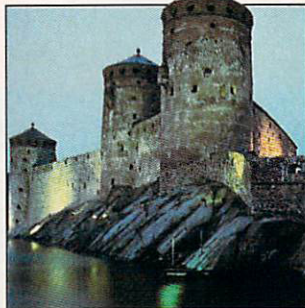
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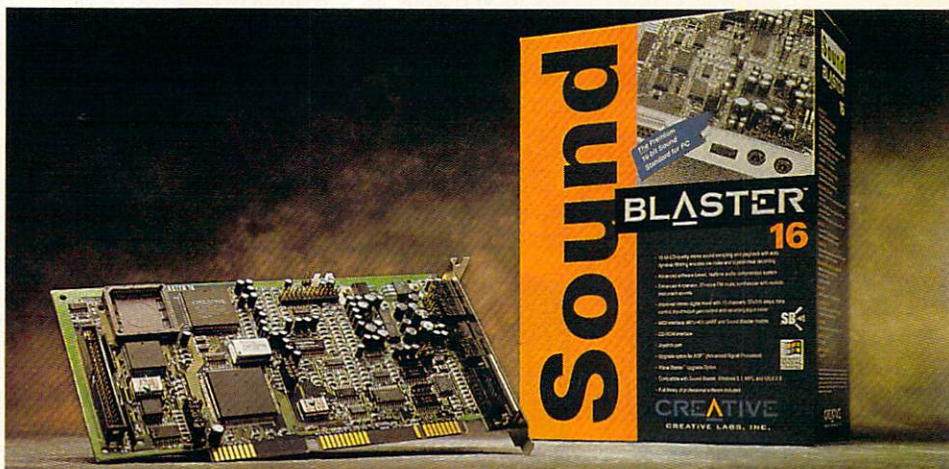
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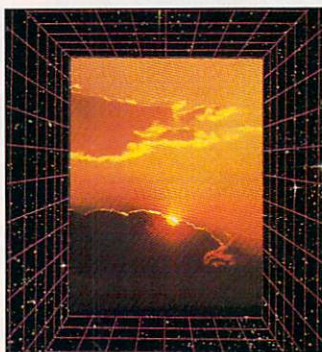
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Clifton Karnes

Spring COMDEX, held this past May in Atlanta, Georgia, will go down in the history books as the best COMDEX to date. Exhibit halls were jam-packed with eager attendees, and a record number of exhibitors filled the show floors and demonstrated an amazing assortment of cool new products. Here are the ten best products I saw at this year's show.

Here's a list of the ten best products I saw at this year's Spring COMDEX.



10. Doublecase makes a series of superlight, hard cases designed to fit almost any notebook. The Doublecase name comes from the case's design, which uses two hard shells for each wall. The inside of the case is dense foam that you can mold to fit almost any notebook or laptop. Your traveling PC is probably as safe in a Doublecase as it is on your desk back at the office. Prices start at \$59.95.

9. Star has really upped the ante in color printers with its sleek, new SJ-144. This superb small printer uses a new medium to print color pages that are amazingly crisp and rich. Cost per page is about the same as with a color DeskJet, and the suggested retail price is \$599.

8. If you find yourself switching screen resolutions in Windows, you'll love Any View from Binar. This clever software add-in lets you click on a button to go from 640 ×

480 to 800 × 600 to 1024 × 768. You also get a virtual desktop, and perhaps most impressive of all, you can adjust your screen's scaling so rulers in programs like Word for Windows and PageMaker measure exactly one real-world inch. Neat.

7. Image-editing and screen capture programs are a large, competitive category in Windows, and a new version of ImagePals (U-Lead) introduced at COMDEX goes to the head of the class. With excellent tools for editing bitmaps, editing color, and capturing screens, all in a scrapbook interface, ImagePals is fast, powerful, and easy to use.

6. Intel's Pentium processor has caused quite a stir in the last few months, and at this COMDEX we saw some of the first machines that are actually designed around the chip. The Pentium's potential is amazing, but hardware systems and software must be specially designed to take full advantage of this potential. When they are, performance increases of nearly ten times over that possible with a 486 are attainable. Putting a Pentium in a 486 system will double your performance.

5. Here's a tie. Corel and Micrografx have long been the two giants in the illustration program category. Both companies had new products at COMDEX, and both looked great. The programs seemed amazingly easy to use, even for nonprofessionals. CorelDRAW! 4.0 includes everything but the kitchen sink in its box, and the company's selling the previous version of CorelDRAW! for \$199, which is a super deal. Designer 4.0 won't have quite as much in its package as CorelDRAW!, but you'll still find lots of goodies including clip art, fonts, and a bitmap editor.

4. Last year, presentation programs became a major category. This year, multimedia presentation software is really hitting its stride, and the best newcomer is Compel from Asymetrix. It's easy to use, and it has all the tools you'll need to combine dazzling graphics, animations, and sounds.

3. If you're in the business of creating Windows help files, RoboHelp 2.0 from Blue Sky Software is the most advanced tool available. New at COMDEX, RoboHelp 2.0 works with Word for Windows and, as the name implies, automates help file creation. Anyone who's created help files by hand will appreciate the point-and-click ease with which you can build topics and jumps and include bitmaps in your help files. You can also compile and test your help files, all from a toolbox that RoboHelp installs in Word.

2. Windows programmers and power users now have a high-powered tool to investigate what's going on behind the scenes in Windows. WinScope from Periscope lets anyone spy on the Windows messages, API calls, and hooks. Ever wonder what's really happening when you drag a file from File Manager and drop it on Notepad? With WinScope you can find out.

1. Page layout has long been the domain of ultraexpensive, powerful programs like QuarkXPress and PageMaker. Now, PagePlus from Serif changes the formula with a program that's ultrainexpensive and very powerful. This amazing program will do the lion's share of what the heavyweights do and at a price of \$59.95. PagePlus even surpasses Quark and PageMaker in a couple of areas, and it's easier to use than either. □

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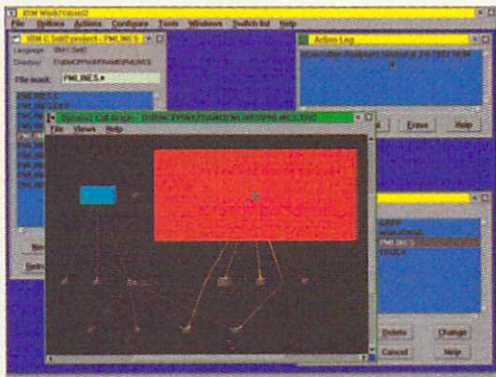
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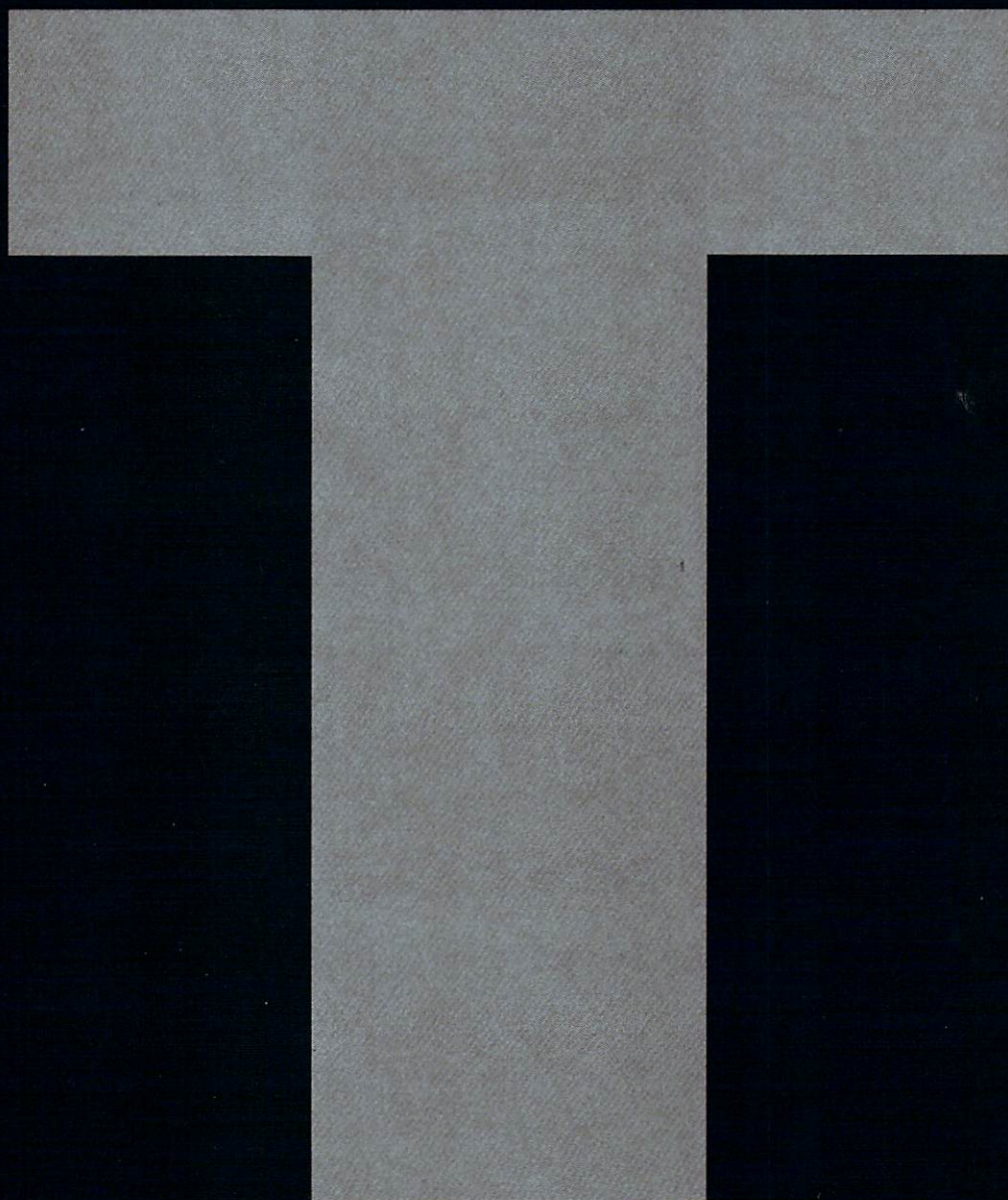
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Microsoft's recently released Windows NT (New Technology) is a bold attempt to extend Windows' incredible market success far beyond individual desktop PCs into companywide networks and essential mission-critical applications. NT is an industrial-strength operating system capable of competing head to head with OS/2 and UNIX, as well as a fully featured network operating system for both modest peer-to-peer networks (à la Windows for Workgroups) and large client/server networks (like those supported by Novell NetWare). Yet, to the average user, Windows NT looks and feels almost identical to today's Windows 3.1.

To understand what Windows NT is, it's important first to understand what it is not. NT is not the next version of Windows 3.1 or Windows for Workgroups, although it can do virtually everything that those two operating environments can do, and far more. Unlike today's Windows 3.1, which is an operating environment that runs on top of DOS, NT is an entirely new operating system, built from the ground up to demolish the limitations that PC users and software developers have labored under for more than a decade. This means that NT can tackle sophisticated networked applications that are far beyond the reach of Windows 3.1; but as we'll see, it exacts a price in the form of hefty processor, memory, and hard disk requirements.

NT's designers had to balance their desire to develop a state-of-the-art operating system, capable of satisfying the computing needs of large organizations, with the knowledge that NT had to be compatible with the huge installed base of DOS and Windows applications. The result is a 32-bit operating system that pays homage to many of today's most popular computing buzzwords (*multitasking, multiprocessing, objects, and client/server computing*) while supporting 16-bit DOS and Windows applications.

Leaving DOS in the Dust

What are some of the practical improvements of Windows NT over today's DOS and Windows combination? For one, Windows NT says goodbye to the memory management limitations of DOS. No more questions about when and how to use extended versus expanded memory, and no more memory managers such as HIMEM, EMM386, or QEMM-386 to tweak and configure. Unlike DOS with its arcane segmented memory archi-

ture, NT supports a linear memory address space of four gigabytes (two gigabytes for programs and two gigabytes for the operating system), which is more than enough for all but mainframe- and supercomputer-class applications.

If you've tried to run multiple applications at once under Windows 3.1, you know how limited Windows' capabilities are. Trying to print a long document or transfer a file by modem while working in your word processor or spreadsheet can be an agonizing process. Even worse, if any of your programs crash, it can bring the entire system to a screeching halt. Windows NT, however, eliminates these problems with a sophisticated preemptive multitasking system that switches between programs so quickly and smoothly that, from the user's point of view, each program appears to run nearly at top speed. An even more sophisticated capability called multithreading enables many programs, or in NT terminology, processes, to be broken down into two or more threads, each of which can be executed concurrently. Multithreading enables NT to do many more things at once, and it's widely applied within NT itself in order to speed things up. However, programs must be written with multithreading in mind in order to get maximum performance.

In addition, NT's virtual memory manager (which gives each program more room to run by combining available RAM with hard disk space) protects the system by keeping programs and system tasks from interfering with each other. If one program crashes, Windows NT itself and the remaining programs continue to run. The frustrating General Protection Faults and freezes that are common in Windows 3.1 are largely a thing of the past in Windows NT.

For complex applications that require more power than one processor can provide (such as sophisticated engineering-design problems or transaction-processing systems for high-speed processing of sales orders or airline reservations), NT supports multiprocessing. With this capability, two or more processors can work in concert to execute applications. In fact, by combining multiprocessing and multithreading, each processor can run different portions of the same application, or entirely different applications, in order to gain potentially enormous performance improvements. However, most applications must be written from the ground up with multiprocessing in mind; otherwise, performance

improvements are modest at best. Virtually no existing Windows applications can take full advantage of multiprocessing without involving extensive redesign.

The Compatibility Suite

Even though its internal architecture is completely different from that of DOS, Windows NT runs most existing DOS and Windows applications without modification. To do so, NT uses an emulator. Macintosh and NeXT users will be familiar with one such emulator called SoftPC, which completely reproduces the PC hardware architecture in software, so that DOS and Windows applications can run "inside" SoftPC under Macintosh System 7 or NextStep. Insignia Solutions, the company that developed SoftPC, worked with Microsoft to develop a similar emulator for Windows NT called the Virtual DOS Machine, or VDM. The VDM emulates both DOS and the standard PC hardware, and it runs all DOS applications except those that bypass the operating system to talk directly to hardware, such as some games, CAD programs, and older applications that require direct access to hardware for acceptable graphics or hard disk performance.

Windows applications also run on NT by using an emulator; in this case, an emulator called Windows on Win32, or WOW for short, runs on top of the VDM. WOW supports most standard and enhanced mode Windows applications, but not Windows 3.0 real mode applications. (As with DOS, any application that bypasses Windows and directly manipulates memory or hardware is unlikely to work with Windows NT.) Multiple applications can run simultaneously inside WOW, but since the WOW environment so closely duplicates Windows, an application crash within WOW has a good chance of crashing other running applications and possibly even WOW itself. Unlike in DOS/Windows-based systems, however, a crash within WOW will not affect any other non-Windows applications. In other words, while existing DOS and Windows applications are no more "bulletproof" in Windows NT than they are today in Windows 3.1, the overall system is far more reliable.

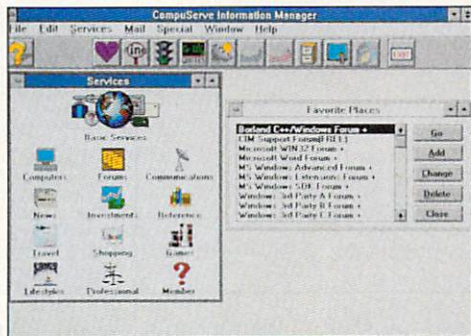
In addition to DOS, Windows, and Windows NT applications, NT also runs a limited set of OS/2 and UNIX-like applications. For example, NT can run character mode OS/2 1.x applications. In reality, this feature is of very limited usefulness, because most OS/2 1.x applications have long since been upgraded to take advantage of



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Features	MS-DOS 6	Windows 3.1	OS/2 2.1	UNIX	Windows NT
Virtual Memory	no	yes	yes	yes	yes
Multitasking	no	limited	yes	yes	yes
Multithreading	no	no	yes	some (a)	yes
Symmetric Multiprocessing	no	no	no	some (a)	yes
Portable	no	no	no	yes	yes
Access Security	no	no	limited	yes	yes
Graphical User Interface	yes (MS-DOS Shell)	yes	yes	yes, multiple	yes
Requires DOS	yes	yes	no	no	no
Runs 16-Bit Real Mode Windows Applications	no	yes	yes	some (a)	no
Runs 16-Bit Standard Mode Windows Applications	no	yes	yes	some (a)	most
Runs 16-Bit 386 Enhanced Mode Windows Applications	no	yes	yes	no	yes
Runs 32-Bit Windows Applications	no	no	no	no	yes
Runs OS/2 Applications	no	no	yes, all	no	1.x character mode only
POSIX Support	no	no	no	some (a)	yes
Supports DOS FAT File System	yes	yes	yes	some (a)	yes
Supports OS/2 HPFS	no	no	yes	no	yes
Supports NTFS	no	no	no	no	yes
Networking Built In	no	Windows for Workgroups only	no	some (a)	yes
Built-in E-mail	no	Windows for Workgroups only	no	some (a)	yes
386 or Higher CPU Required	no	no	yes	yes	yes

(a) This feature is standard or optional in some flavors of UNIX, while other UNIX variants might not offer the feature at all.

OS/2 2.x's Workplace Shell and Presentation Manager graphical user interface features.

Likewise, NT is also capable of running POSIX 1.0-compatible applications. POSIX is a U.S. government-specified standard flavor of UNIX that allows compatible programs to be run on a wide variety of different computers.

Unfortunately, most existing UNIX applications require more features

and capabilities than those specified in POSIX 1.0.

Further, POSIX doesn't yet support the X Window system or higher-level graphical user interface tools that are quickly becoming an integral part of most UNIX systems. Therefore, as with OS/2, Windows NT's POSIX support is, for now, primarily a token gesture aimed at providing cross-platform compatibility, rather than an immediately useful feature.

Keeping Secrets

As mentioned earlier, Windows NT includes sophisticated networking capabilities. Existing Windows for Workgroups (WFW) users will recognize NT's networking features as extensions of WFW's capabilities. NT systems can share files, printers, and other resources (such as networkable modems) on a peer-to-peer basis with other NT systems, as well as with WFW systems. These peer-to-peer

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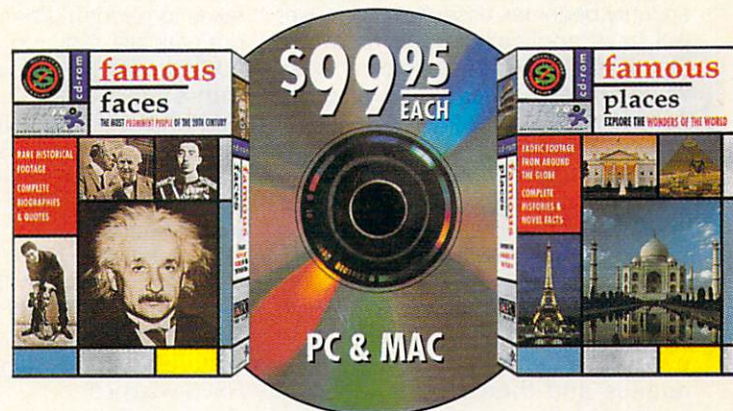
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networks don't require expensive dedicated file and print servers. Or you can choose to create client/server network configurations, with NT systems acting as file, print, and application servers to other NT, WFW, LAN Manager, and DOS-based systems. In fact, Windows NT includes approximately 90 percent of the functions and features found in Microsoft's LAN Manager 3.0. NT supports the network protocols used by LAN Manager and IBM's LAN Server, as well as the protocols used by most UNIX systems and the worldwide Internet. Additionally, Novell NetWare users aren't left out; Windows NT systems can be connected as clients to existing NetWare servers.

A powerful networked operating system like Windows NT will usually be used in applications in which more than one user needs to use the network; otherwise, there's little reason to upgrade from Windows 3.1. As soon as multiple users begin to access a single system or network of systems, security becomes essential. Each user will have applications and data files that must remain private to him or her, while some programs and files will need to be shared by other users.

More importantly, critical functions such as modifying operating system files and adding or deleting users must be strictly limited to authorized system administrators.

Windows NT includes the Security Subsystem, which requires all users to log on with a unique user name and password in order to gain initial access and then strictly controls access to files and subdirectories according to rules set up by the system administrator. NT meets the U.S. government's C2 level of security, meaning that it can be used for moderately sensitive applications (although its safeguards are insufficient for secret or even more sensitive data). By comparison, OS/2 has only rudimentary security features; it relies on LAN Server's network-based security for more extensive protection.

UNIX, on the other hand, has had password protection and access control features for years, but only recently have some desktop UNIX vendors (Univel and SunSoft) brought their products' security up to C2 standards. These vendors require users to purchase add-on software to achieve the same level of security built into Windows NT.

In order to keep track of who has permission to access which files and subdirectories, a file system (which manages the directories and file attributes for each hard disk) must

maintain and update a great deal of security information. The FAT file system used by DOS and Windows makes no allowances for security, nor does it provide the fail-safe features required in mission-critical applications, where a single disk failure could have catastrophic results.

Windows NT's developers devised a new file system, called NTFS (NT File System) that works hand in hand with the Security Subsystem to keep track of security permissions for every file, subdirectory, and user. In addition, for reliability, NTFS supports disk mirroring, in which two disk drives contain identical information, so that the mirror drive can take over instantly in the event of a failure in the primary drive. NTFS can also improve disk performance with a technique called disk striping, in which files are written, or "striped," across two or more physical disk drives.

Because each drive can read or write a different block of data from the same file simultaneously, the time it takes to perform disk functions can be dramatically reduced. In addition, by adding parity, which stores disk data with a small amount of redundant information, small data errors can often be corrected on the fly, and data damaged by more severe hardware or software failures can usually still be reconstructed.

In addition to NTFS, Windows NT is also compatible with the FAT file system and OS/2's High Performance File System (HPFS), although NT's security features can't be used with FAT or HPFS volumes.

Intel and Beyond

One of the most important and exciting new features of Windows NT is its ability to run on non-Intel processors. UNIX can run on a wide variety of different computers, from desktops to supercomputers, but even today, DOS and Windows can run only on either Intel or Intel-compatible processors, or on top of software that emulates the Intel x86 architecture. In addition to Intel's family of 386, 486, and Pentium processors, NT supports the new generation of high-performance RISC (Reduced Instruction Set Computer) processors that offer big price and performance advantages over CISC (Complex Instruction Set Computer) processors (such as Intel's x86 and Motorola's 680x0 families). Windows NT currently runs on MIPS 4000 RISC processors from Silicon Graphics, as well as on Digital Equipment's Alpha RISC processor family. Future support for Hewlett-Packard's HP-PA and Intergraph's Clipper RISC processors

is planned, and IBM is rumored to be working on moving NT to the PowerPC processor family that will form the backbone of Apple's and IBM's next generation of desktop computers.

Later this year, the first RISC PCs will begin to appear, using Alpha and MIPS 4000 processors. These PCs will be priced slightly higher than, and look and run very much like, existing high-end PCs; they'll have EISA-bus slots and support ISA- and EISA-bus expansion cards.

For superior video display and hard disk performance, most will also support local-bus architectures such as VL-Bus or PCI. They'll use the same keyboards, mice, monitors, modems, printers, and other peripherals as conventional PCs, but instead of DOS and Windows, they'll run either Windows NT or a flavor of UNIX.

These RISC PCs will run existing DOS and Windows applications under NT about as fast as a 33-MHz or clock-doubled 50-MHz 486-based PC does today under DOS, but they'll equal or exceed all but the fastest available Pentium chips when running native Windows NT applications. (Existing DOS and Windows applications won't have to be modified in order to run on these systems, but new NT applications will have to be recompiled in order to run on different processor designs.) Windows NT will help to turn these RISC PCs into real competitors for Intel-based PCs and servers, and in so doing will help to drive down the price of high-end 486- and Pentium-based systems.

NT Versus OS/2 and UNIX

Windows NT is often compared to OS/2 and UNIX. In fact, when NT was first conceived by Microsoft, it wasn't called Windows NT at all. Instead, it was called OS/2 3.0, and it was intended to be Microsoft's next-generation platform-independent version of OS/2. The split between IBM and Microsoft sealed OS/2 3.0's fate, and the announcement of the ill-fated Advanced Computing Environment in the fall of 1991 by MIPS, Compaq, Microsoft, and others was the first formal acknowledgment that OS/2 3.0 had metamorphosed into Windows NT. Today, Windows NT 3.1 will compete head to head with OS/2 2.1, as well as with a variety of UNIX flavors, including UnixWare (Novell/Univel), SCO UNIX (Santa Cruz Operation), Solaris (SunSoft), and NextStep (NeXT).

The table provided on the preceding page summarizes the similarities and differences between NT, OS/2, and generic UNIX.



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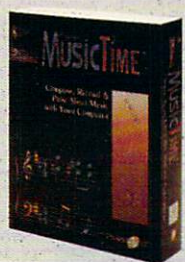
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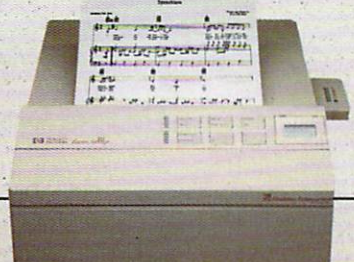


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The Price of Power

Windows NT's power and flexibility has its price. NT demands faster processors, more memory, and bigger hard disks. Unlike Windows 3.1, which runs on virtually any 386, 486, or Pentium processor, Microsoft states that at least a 25-MHz 386 is required for NT. In fact, anything short of a 486 is underpowered so far as NT is concerned. A 25-MHz 486SX is probably the minimum processor needed for adequate performance.

Also, be prepared to buy more RAM. Until March of this year, Microsoft's stated goal was to make NT run in 8MB of RAM with acceptable speed, but software developers who tested the first two beta versions of NT were dubious that Microsoft would ever achieve its goal. With the March beta release, Microsoft threw in the towel and raised the minimum requirement to 12MB of RAM, with the best performance possible only on systems with 16MB or more.

Finally, NT needs lots of disk space; the complete operating system, including networking, OS/2, and POSIX support, requires 80MB of storage. The complete Software Development Kit requires another 40MB. Swap files for virtual memory will require another 10–20MB, so depending on whether you'll be developing applications or simply running them, you'll need 100–140MB of hard disk space just to get started. And don't plan to save money or slots by using Stacker or SpeedStor; at the present time, NT is totally incompatible with these utilities. In fact, NT doesn't even understand Microsoft's own DoubleSpace compression, which is built into DOS 6. (Microsoft is working on a new NT disk driver that will be able to read

and write DoubleSpace volumes, but it won't be available until sometime after NT ships.)

Should You Switch?

It's clear that Windows NT is a big step beyond DOS and Windows. However, for the average home or small-business user, does it make sense to switch? The answer depends on how successfully you can get your tasks done today with Windows 3.1. If you're constantly battling with DOS's memory limitations, if you need the ability to do both peer-to-peer and client/server computing, or if you want to move a favorite UNIX application to Windows, NT could be right for you. Keep in mind, though, that NT currently doesn't support multi-user capabilities with low-cost character-oriented terminals. Unless you're going to develop your own application from scratch, or move an existing application from UNIX to NT, be sure that your software suppliers are readying NT versions of their programs before you take the plunge. Otherwise, you'll be stuck with expensive NT systems that offer little practical benefit over what you're already using.

On the other hand, if you're currently using Windows applications and you don't really need the additional

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power of Windows NT, or if you have an existing small LANtastic, NetWare, or Windows for Workgroups network and you're not planning to add lots of new users, today's DOS/Windows combination is probably fine for you. In fact, switching to NT might actually be counterproductive for two reasons. First, as I explained earlier, both DOS and Windows applications run in emulators under NT, not in the native NT environment. Like all emulators, NT's Virtual DOS Machine and Windows on Win32 exact a performance penalty.

The second reason for not switching is the extra expense involved in equipping each PC to run Windows NT. Applications that run perfectly well today on a 25-MHz 386SX will probably need at least a 25-MHz 486SX in order to satisfy NT's requirements and still provide adequate performance. In addition, a system with 8MB of RAM that's perfectly adequate for your current DOS/Windows needs will require at least 12MB and probably 16MB of RAM for acceptable performance with NT. For existing applications, you'll get even greater performance gains by upgrading your PC's processor and memory while keeping your current DOS/Windows software configuration. Your existing software will run

significantly faster, and you'll be ready for Windows NT in the future.

If you're willing to wait until sometime in 1994 for a "lite" version of NT, Microsoft is working on Windows 4.0, often referred to by its code name, *Chicago*. According to industry sources, Chicago will have most of the features of Windows NT except its ability to act as a server on client/server networks and its support for OS/2 and POSIX applications. Like NT, Chicago will be a complete operating system and thus will no longer require DOS in order to run. Chicago's memory and disk requirements will probably be significantly more modest than NT's. For example, Microsoft claims that Chicago will be able to run on PCs with 8MB of RAM; however, keep in mind that up until March of this year, Microsoft claimed that NT would also be able to run in 8MB. Also, indications are that like today's DOS and Windows, Chicago will run only on Intel and Intel-compatible processors, although that might change if NT is a big hit on non-Intel platforms.

The bottom line is that Windows NT offers true multitasking, multithreading, and multiprocessing, along with extensive networking capabilities, while remaining compatible with most exist-

ing DOS and Windows applications. In addition to Intel x86- and Pentium-based PCs, you'll also be able to run NT on RISC-based PCs and workstations using MIPS 4000 and Digital Equipment's Alpha processors. However, to use NT with your present PC, be prepared to upgrade your system with a faster processor, more RAM, and a bigger hard disk. If you're a home or small-business PC user, there's little reason to switch to NT unless you really need one or more of its advanced features. Windows 4.0, or Chicago, due out sometime next year, promises to offer most of NT's functionality in a smaller package. In short, Windows NT is a powerhouse that's likely to be overkill for all but the most demanding applications, but it offers a first look at the future of desktop computing, Microsoft style.

Len Feldman is the author of Windows NT: The Next Generation, published by Sams Publishing. Mr. Feldman is a computer industry consultant based in San Jose, California; his clients include Borland, Hitachi, Radius, and Toshiba. He was formerly the chief sysop of CompuServe's Multimedia Vendor Forum. □

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TEST LAB

Edited by Mike Hudnall
Reviews by Tom Campbell

This is an exciting time in the Windows database arena. And it's no wonder: Database applications are, depending on whom you believe, the most popular or the second-most-popular use for computers.

The arena wasn't always this interesting. When Windows 1.0 came out in 1984, there was nothing. A few vertical market applications appeared with 2.0, as well as a couple of failed Mac ports. Microsoft was curiously silent all this time, developing, we now know, Access. Microsoft was also well behind the market curve, for by version 3.1, Windows had a downright respectable selection of database managers. Approach Software released Approach 1.0 to great acclaim; it's at version 2.0 now and shows Windows at its best.

SPC's Superbase had a commanding lead of the market before Access sold nearly a million copies at the loss-leading price of \$100; with its intelligent implementation of a database-oriented BASIC, Superbase is still a premier development environment. Fox Software, now subsumed by Microsoft, had done a great job porting its FoxBase dBASE clone to the Macintosh and was reversing the process when Microsoft

bought Fox for a cool \$175 million. The reversal was complete this year when FoxPro appeared on Windows, DOS, Mac, and UNIX—a desktop computer grand slam. Borland was hardly idle. It was developing a dBASE clone for Windows and reengineering Paradox, its flagship database. After more than a year's delay, Paradox emerged from the chrysalis just in time to battle with FileMaker Pro, from that insanely great software company called Apple.

As interesting as the market soap opera is, the products are much more so. These full-featured database managers can all be used to create mousing, windowing, push-button database applications. With some of them it stops there; you can add push buttons, but not list boxes, combo boxes, or radio buttons. All of them import dBASE files—a great relief from times past when compatibility wasn't even mentioned by database publishers. Some of them provide macro languages and ways to replace the standard menus with your own; some don't. All have some form of network support, and many speak SQL; both of these features are left unexplored in these reviews because the typical COMPUTE reader is a hobbyist or small-business person on a single-user system.

Access, FoxPro, Paradox, and Superbase all have programming languages of their own. Every one of them is expensive, and every one of them is a stunning achievement. At list price they're bargains; at the competitive upgrade prices, they're steals. You can't go wrong with any of them.

AceFile 2.0
List price: \$199

ACE SOFTWARE
1740 Technology Dr., Ste. 680
San Jose, CA 95110
(408) 451-0100

The middle tier is less predictable. Its products range wildly in feature combinations; among them, Approach and FileMaker Pro are out-and-out winners.

If your needs are simpler, you'll want to take a look at the sidebar describing Instant Database from Asymetrix, Data Manager from Timeworks, and FormWorx from PowerUp. They taste great, and they're less filling price-wise. Another sidebar covers CA-dBFast 2.0, a product that shipped too late for coverage in the Test Lab regular reviews.

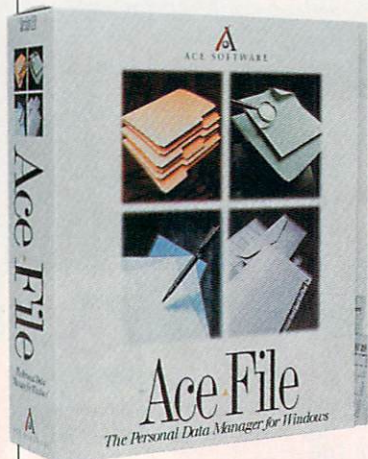
Some of the products covered in this Test Lab support an image data type for fields, but OLE gets extra credit because it can handle any data type, at no cost to the DBMS. Interestingly, few use the common file open dialog Microsoft began promoting with Windows 3.0, and too few support data entry masks to restrict input to, say, a phone number or Social Security number style.

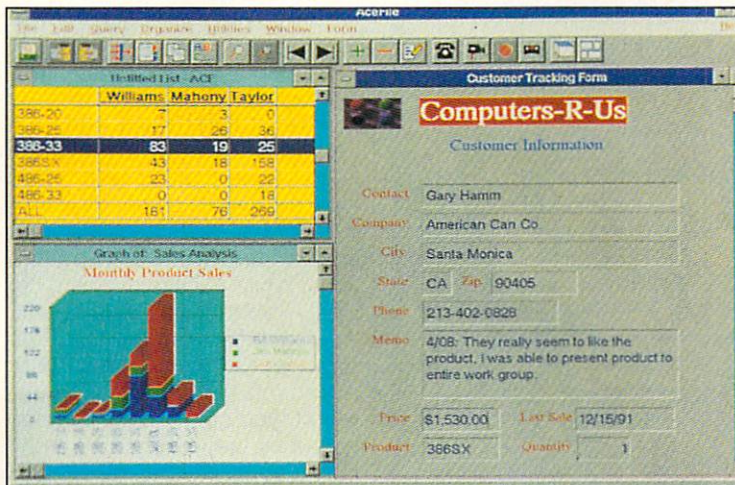
All trends point upward; this is a healthy and impressive bunch. Installation programs are all competent at the very least, although some are called INSTALL.EXE instead of the more standard SETUP.EXE and some don't show available and required disk space. A goodly number offer something besides a full, default installation: sometimes a minimal installation and sometimes a custom installation.

All can print a report to a text file if you install the Windows Generic print driver, but that's a pain. I looked for plain text output without Generic. All of them have calculated fields, and all but one employ the standard Windows help system. Paradox uses the help system most effectively, with a number of well-thought-out visual metaphors that show we are only now beginning to understand the efficacy of hypermedia.

If you've been thinking about graduating from Cardfile, go for it. The game has begun.

TOM CAMPBELL





ACEFILE 2.0

AceFile is a midrange product with a broad, shallow feature set. In addition to using dBASE III PLUS data files as its native format, AceFile boasts graphing, a dialer, and a rudimentary mail-merge facility with a text editor.

Because of its shallow feature set, AceFile is pretty easy to learn. Some things are a little awkward, such as its handling of index files, but if AceFile is your first database, these considerations are small and shouldn't affect your enjoyment. I find AceFile fairly snappy, and it would be an even better performer were it not for bad handling of screen redraws. There's way too much flicker when AceFile launches, when you quit, and when you enter data or scroll through records in a multiwindow application.

AceFile's idea of a complete database application is a "view set," a file containing the arrangement of windows, databases, and relationships in the application. Nowhere nearly as cohesive as, say, the equivalent application in Access or Superbase, but it gets the job done.

While there's no programming language, AceFile has a wide variety of very useful functions you can embed in forms and reports;

reports are especially flexible. It also has a macro facility, so putting together a view set as a turnkey application is straightforward with only a little study.

The graph module is flexible and has a number of charts. It's not quite as visual as I'd like, taking a fill-in-the-forms approach when direct manipulation would be more desirable. For example, you type in numbers for the angle and tilt of a 3-D pie chart, rather than rotating a model of the chart in realtime.

Somehow I feel that the whole is less than the sum of its parts. I probably wouldn't have noticed this had I not dealt with such seamlessly integrated masterworks as Access and Superbase. For example, you can't have parts of several related files show up in the same window. Each must occupy its own window, leading to rather creative use of tiling in the sample applications.

The manual is pretty good,

Approach 2.0 for Windows
List price: \$399 (\$99 for competitive upgrade)

APPROACH SOFTWARE
311 Penobscot Dr.
Redwood City, CA 94063
(415) 306-7890

although, despite a longish index, I was stymied when I tried to find out whether the program has memo fields. I couldn't find *memo* or *field types* in the index. AceFile does indeed support memo fields, by the way, because it uses dBASE files as its native format.

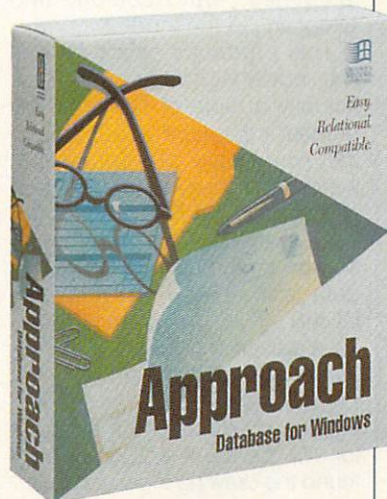
If you need a broad range of features in one box with a moderate price, AceFile is a good choice.

Circle Reader Service Number 371

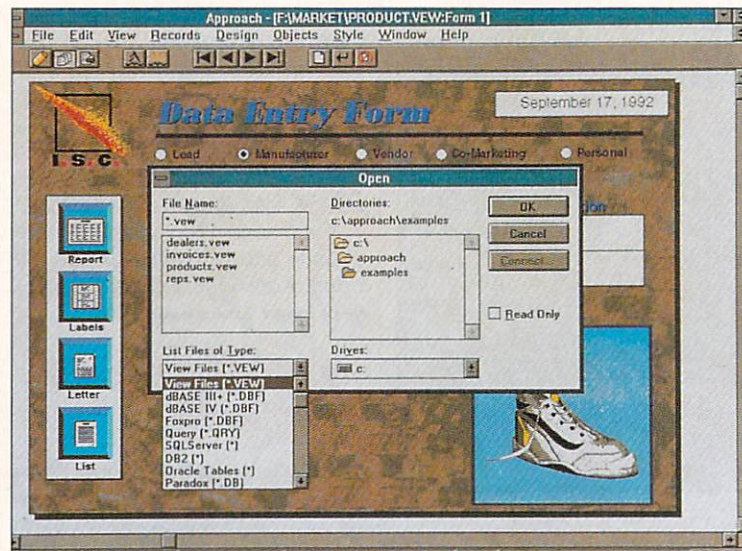
APPROACH 2.0 FOR WINDOWS

Of all the "easy" Windows database managers in this roundup, Approach and FileMaker Pro seem the best to me. While Approach lacks a programming language, it lets you create impressive turnkey applications very quickly.

Approach impressed me right from the start. Its toolbar contains only the most-used features, so I found it the easiest to learn. Its menus are perhaps the best designed of any in the products I used, leaving the toolbar for what it's supposed to do—provide quick access to the actions that you'll perform most frequently. And let's face it: Icons are helpful if you already know what they mean; however, having to learn 30 or 40 of them can slow you down, even if you're the



TEST LAB



most determined power user.

I found the manuals elegant and useful, with a well-written tutorial. Unlike, say, FoxPro's big tutorial, which targets experienced Xbase programmers who want to learn FoxPro's special features, the Approach tutorial teaches you both the product and database management at the same time.

The Approach user's guide is equally good, making its few omissions stand out. According to the box, Approach allows you to "become productive instantly by providing turnkey business templates," but I couldn't find *templates* in the index.

This product's online help is fine, but what it calls an index is actually a table of contents. My biggest complaint about help is that you usually can't get it from inside a dialog, such as when you're adding a field to the database structure. The documentation on importing and exporting data is the best I saw with any DBMS. The few complaints I have are minor ones about an otherwise superb product.

Approach was one of the first significant database managers for Windows 3.x, and it shows. I found the drawing tools particular-

ly good, and they have a Group/ Ungroup feature, which lets you fuse objects together to form a single selectable unit. Need form

letters? With Approach they're easy, and they're built right into the product. Creating a macro is a snap, although macros are somewhat limited and don't run very fast. The query mechanism is so simple that it doesn't even have a separate name; it's just an extension of the Find dialog you'll see in most Windows applications. While Access makes a big deal about its dynasets, Approach has had a similar feature for a long time. With Approach, when you create a report, you can edit the records output by the report. They aren't called dynasets, but the effect is similar.

An Approach application is held together by a "view" file, and view files do some amazing things. For example, Approach can use both Paradox and dBASE as native file formats without translation. Neither has a

CA-DBFAST 2.0

A few months ago, I questioned Computer Associates' purchase of both Clipper, a DOS Xbase compiler, and dBFast, a Windows compiler. Since they had different extensions to the dBASE language, I implied that perhaps CA had gotten in over its head.

I'm happy to be proved wrong by release 2.0 of CA-dBFast—gloriously wrong. (Release 2.0 arrived too late for regular coverage. This preliminary look is based on just one day of examination, so bear in mind that it's not an exhaustive look. The dBASE compatibility helped me in this regard, because I was able to run a goodly amount of vanilla III PLUS code through.)

Like Clipper, dBFast is an implementation of the dBASE III PLUS language. Wisely, CA has given dBFast a complete development environment with a multiwindow editor, a debugger, and visual report and form designers. The extensions to dBASE III PLUS are numerous—more than 350 of them, by my count. Many of them echo similar extensions to Clipper (array-handling routines, conditional compilation, binary file I/O), making it clear that

CA is heading in the same direction with both products.

Like FoxPro, CA-dBFast lets you create true Windows applications in dBASE style. Unlike FoxPro, CA-dBFast gives you true EXE file creation at a price that competes favorably with those of Borland and Microsoft language products: \$550, versus about \$1,500 with FoxPro. The EXEs require some frightening overhead—a simple one was 500K—but the productivity gains are worth it.

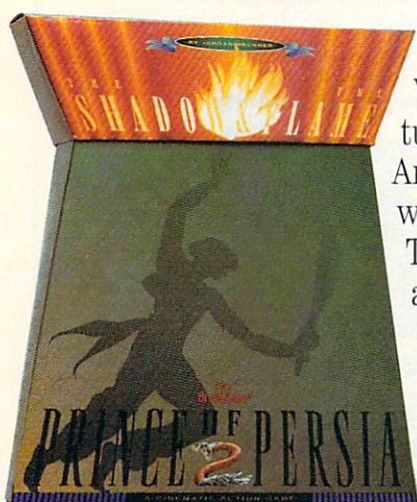
Version 1.0 was beset with problems and was so delicate that it often couldn't run even generic dBASE code. Happily, this seems to be a thing of the past. CA-dBFast 2.0 has some incredible language extensions, a terrific language reference that's chock-full of examples, and a good debugger at a very competitive price. It has a bright future.

CA-dBFast 2.0 lists for \$550. For more information about this product, contact Computer Associates at 1 Computer Associates Plaza, Islandia, New York 11788 (800-225-5224 or 516-342-5224).

—TOM CAMPBELL

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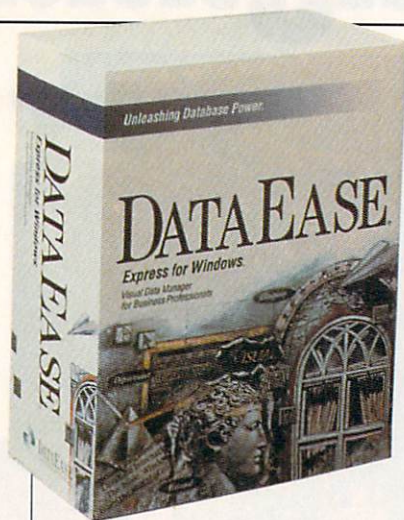
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TEST LAB



counter data type, yet you can have them in any Approach database, because the view file manages them—an ingenious strategy. The README file is an Approach view file, giving a hypertext twist to the usual last-minute documentation along with a showy but useful illustration of Approach's assets.

One truly non-Windows feature is that Approach is pleasingly fast, allowing you to scroll through records at a satisfying clip. All in all, Approach is probably the best of the nonprogrammable Windows databases in this Test Lab roundup.

Circle Reader Service Number 372

DATAEASE EXPRESS 1.1 FOR WINDOWS

DataEase is a powerful development environment for nonprogrammers, though it has significant flaws. Designed more for corporations than for individuals, it's built on a rock-solid data engine with numerous connections to minicomputer and mainframe database managers.

While I found it more complicated than the other nonprogrammable database managers, I also found that it can do substantially more in certain areas: queries, viewing the data in different form configurations, and mainframe queries. Another feature geared more toward the corporate user, its use

DataEase Express 1.1 for Windows
List price: \$395

DATAEASE INTERNATIONAL
7 Cambridge Dr.
Trumbull, CT 06611
(203) 374-8000

of style sheets on forms, allows you to standardize on one or more visual themes.

Some things just didn't sit well with me. For example, to create a table (database file), you have to choose File/New/Form and choose <New Table> in the Select a Database Table column. It never occurred to me to look there because most DBMSs keep the form and table separate.

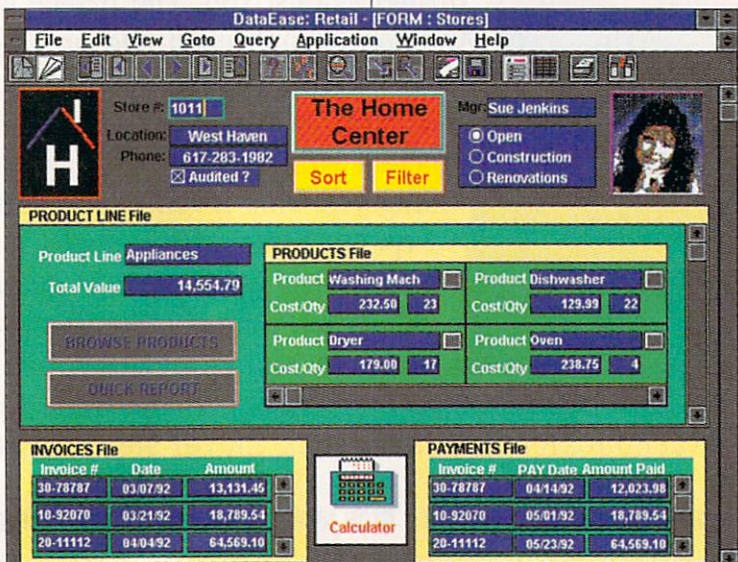
While most of the packages in this Test Lab offer a good number of sample applications, DataEase wins for real-life usability. You can modify the Club ParaDease and project manager sample apps for use in your own business, whereas the sample applications that come with other products would be better thought of as starting points. The DataEase sample apps show a weakness of the overall package, a cluttered design and overenthusiastic use of color that I found somewhat confusing.

Compounding this, the sample apps seem to have been created for a Super VGA system, so the text label *Appointment* became *Ap-poinmen* and *DayMinder Personal Planner* was truncated to *DayMin-der Personal Pla*. Also, the sample application uses teeny fonts in some areas that users with less than perfect vision will find impossible to read.

DataEase employs my favorite catalog approach of the bunch, giving it the edge for team projects. The main window of the catalog is collapsible, like an outliner, and you can double-click on its elements to go directly to them. Its support of graphics is a little iffy, requiring you to enter a filename for each graphic; you can't just paste it in from the Windows Clipboard. On the other hand, it supports all major graphics file types: Windows bitmap, Encapsulated PostScript, CompuServe GIF, Paintbrush PCX, Targa, TIFF, and Windows Metafile.

DataEase wouldn't be my first choice for home or small business use. It's sufficiently eccentric and complex to learn that I'd rather go all the way and learn Access or Paradox.

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I direct that my just debts, funeral expenses and expenses of last illness be first paid from my estate.

ARTICLE II DISPOSITION OF PROPERTY

A. Residuary. I direct that my residuary estate be distributed to my spouse, Martha Parsons. If my spouse does not survive me, my residuary estate shall be distributed to my child(ren) in equal shares. If a child of mine does not survive me, such deceased child's share shall be distributed in equal shares to the children of such deceased child who survive me, by right of representation. If a child of mine does not survive me and has no children who survive me, such deceased child's share shall be distributed in equal shares to the other child(ren), if any, or to their respective children by right of representation. If no child(ren) survive me, and if none of my deceased child(ren) are survived by child(ren), my residuary estate shall be distributed to Martha Parsons, Hiawatha, Iowa 52233.

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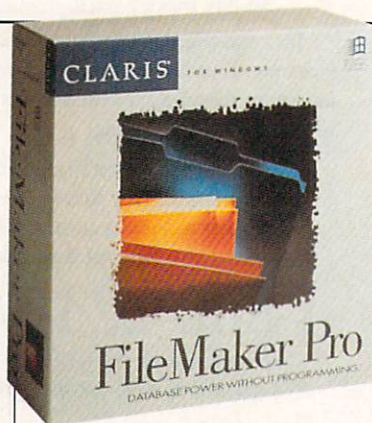
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TEST LAB



FILEMAKER PRO 2.0 FOR WINDOWS

From the manual to the sample applications to the software itself, this version of FileMaker Pro oozes quality.

It's one of the first Windows products released by Claris, a wholly owned subsidiary of . . . Apple! Yes, the people who created the Macintosh finally wised up and started cashing in on the Windows market, which they indirectly helped to create. FileMaker Pro has attracted a lot of attention and deserves it. While you can exchange files between the Macintosh and Windows versions of FileMaker Pro, this does not feel like a soulless ripoff. FileMaker Pro is one of the best examples around of how to create a great Windows product.

Miscues are few and far between. One of them is that there are two kinds of scroll bars, the standard Windows variety and a homegrown one. The radio buttons aren't factory issue, either. This is no doubt an artifact of the common code base the program shares with the Macintosh version, but these features jumped out at me. And you can't get help from within dialogs, a feature I missed greatly but was able to do without because of the program's amazing design. The help system is a model for Windows applications—another surprise given its ancestry.

With FileMaker Pro, creating a database is easier than with any

FileMaker Pro 2.0 for Windows
List price: \$129 (during special promotion)

CLARIS
5201 Patrick Henry Dr.
Santa Clara, CA 95052-8168
(408) 727-8227

other product in this Test Lab. An Options dialog for each field type allows you to override the sensibly chosen defaults, and it makes such tasks as defining the field as unique or uppercase downright simple. I missed logical field types, but you can get the same effect by making the field a check box—arguably a better solution. Choosing a font brings up a visual representation of all the fonts on your system; I've never seen this in a Windows product, and it's a godsend.

The Find dialog is secretly also a query mechanism, used to select records for reports. This is so subtly integrated into the program that there isn't even a section on reports in the manual.

There is a macro facility that's limited but easy to use. As a programmer, I found it limiting, but as a user in need of slapping together a database application fast, I found it agreeable. File-

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Maker Pro reads all the major graphics file types and then some, probably more than any other DBMS in this roundup. The sample applications have their own manual, so you don't have to document or create them from start.

Its price puts FileMaker Pro up with the high-end programmable database managers, but I think it's justified by the sheer elegance of its implementation. It adds up to a brief learning curve married to an ample feature set—two qualities that appear often in Windows products but seldom in the same one.

Circle Reader Service Number 374

The screenshot shows the FileMaker Pro 2.0 interface for a 'CONTACT.FM' database. The window title is 'FileMaker Pro - [CONTACT.FM]'. The menu bar includes 'File', 'Edit', 'Select', 'Format', 'Scripts', 'Window', and 'Help'. The main area is titled 'Contact Manager' and displays a record for 'Alan Mitchell', a Marketing Manager. The record is shown in a form layout with fields for 'Contact First', 'Contact Last', 'Contact Title', 'Phone/Extension', 'ACME Accessories', 'ACM#', 'Contact Code', 'Date Entered', 'Year', 'Holiday Card', 'Company Name', 'Main Phone Number', 'Type', 'Address', 'Fax Number', 'Referred By', 'City', 'State', 'Zip', 'Home Phone', and 'Priority'. There are also checkboxes for 'Perf', 'Ent', 'Trade', 'High', 'Med', and 'Low'. A 'Notes' field is at the bottom with a 'Needs a quick delivery time' note. At the very bottom, there are buttons for 'Letter', 'Envelope', 'Fax', 'Dial #', 'Diary', 'Add Name', 'Find', 'List', and 'Labels'.

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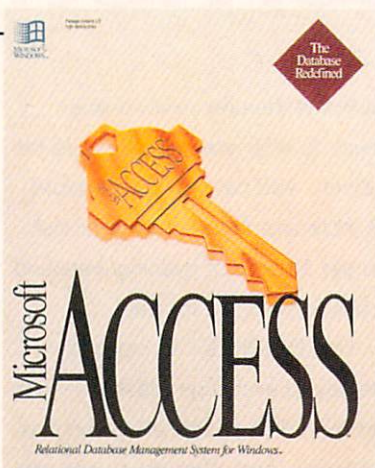
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TEST LAB



MICROSOFT ACCESS 1.0

Access typifies the worst and the best of Windows. It's big, slow even on a four-meg 486SX machine, and complicated. It's also a masterpiece, an instant classic of Windows design.

What makes Access special is the depth, richness, and integration of its features. You can save a form as a report. You can edit the results of a query exactly as if you were using the data itself. Windows drag-and-drop features are used extensively. And often, a feature is so obvious that you'll use it without thinking about it because you're simply not accustomed to such an intensely visual environment. The manuals and sample applications look fine and do an amazingly good job for a 1.0 product.

Rough edges in this package are evident but few: The manual slips and calls the program Cirrus, its code name under development; I noticed a page reference of ??? where the writer had neglected to fill in the number; and some simple tasks require a dip into the Access Basic programming language.

I don't see this as an easy database manager, but the program's incredible power yields more per hour of learning than any Windows product I've ever seen. After a few serious months learning Access, you could create very sophisticated Windows

Microsoft Access 1.0
List price: \$495

MICROSOFT
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applications in very few billable hours. It has the best macro facility of any of the databases reviewed in this Test Lab roundup, and when I checked CompuServe, I noticed that a fair number of nonprogrammers are doing the job of programmers using macros alone.

Access Basic is a strong, capable language, but you won't learn it fast. It looks a lot like Visual Basic, but the two aren't compatible. If you've never used Visual Basic, Access Basic will be a real stretch. There's an extensive, well-written tutorial to help you bridge the gap.

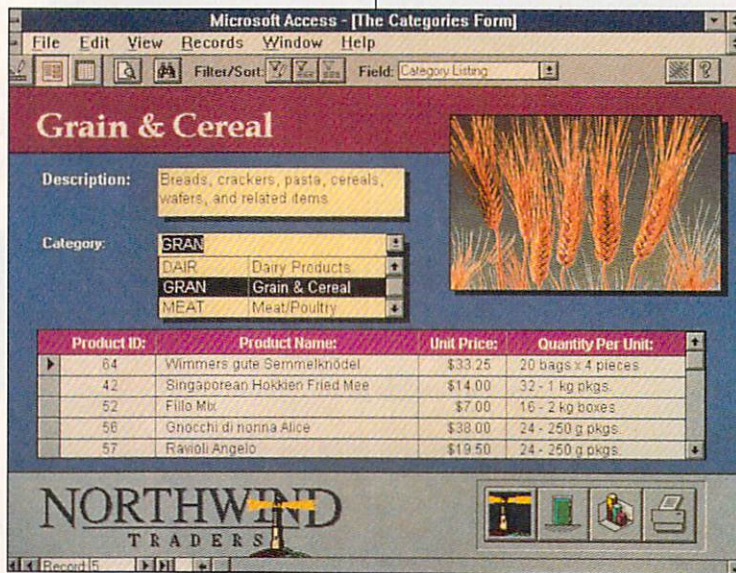
Not only can Access import data from a respectable variety of sources, but it can also "attach" dBASE and Paradox files and indexes. Attached files are left in their original formats, but they act just like they're native to Access. It's faster if you import them, but if you're not willing to entrust your

current data exclusively to Access, you can have it both ways. Keep in mind, however, that importing has a hidden price. Access stores everything—forms, data, program code, reports, macros, queries—in a single file. So if you're developing Access applications for clients off-site, there's no comfortable way to update the code portion of a database without destroying the existing data.

I must admit that my Windows system wasn't comfortable with only four megabytes of memory. Microsoft optimistically lists two megs as the minimum working configuration, but don't even think about it. Be willing to accept the reality that Access is a resource hog.

Access is a thrilling first release. Some features, such as data entry validation, aren't as polished as they could be. Most others, such as its macro facility, drag-and-drop user interface, and Basic language implementation, have already made it to the head of the class. If you're willing to spend some time with the manual, Access will handle any database management task you throw at it.

Circle Reader Service Number 375



MICROSOFT FOXPRO 2.5 FOR WINDOWS

FoxPro is the one product in this roundup that you must be a database expert to use. Users who don't already know an Xbase language need not apply. If you do know dBASE and want to move to Windows, this is quite simply a product without peer. If you want source compatibility among DOS, Mac, and UNIX versions of a serious database manager, it's the only game in town.

FoxPro is an unabashed power user's tool. While it will laugh in your face if you feed it a machine with less than a 386 and two megs, it gets more performance out of that machine than any other Windows DBMS. (However, all of the products in this Test Lab will do just fine for the typical COMPUTE reader, who usually has fewer than 20,000 records in a database.) Typical FoxPro developers either are porting a DOS Xbase application to Windows or need its screaming performance on data sets with 100,000 or more records.

If you already know dBASE or Clipper, you can't go wrong with FoxPro. The dBASE language

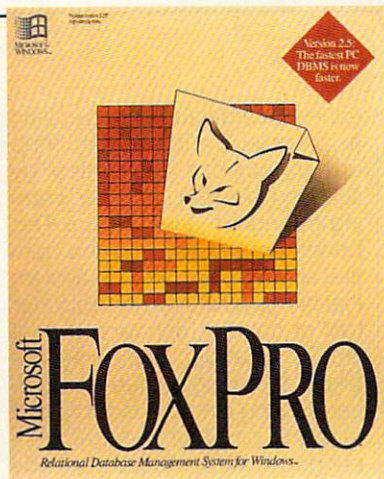
Microsoft FoxPro 2.5 for Windows
List price: \$495

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was already becoming Byzantine with version III PLUS, and the trend has continued to the behemoth FoxPro is today. As a programmer, I'm particularly fond of FoxPro because the entire application can be represented in simple ASCII program listing. This makes team development of programs a realistic goal in a GUI world where maintaining source code for visual application environments is uncharted territory.

While the ads proclaim FoxPro has an applications generator that will let you create programs without coding, don't be misled. The applications generator is weaker than those of Access and Paradox, and you'll have to dip into the source it generates pretty quickly. Also, FoxPro is oriented to the creation of stand-alone EXE programs (with the purchase of the FoxPro Distribution Kit) that can use the Windows API directly, so language shortcomings can always be patched up with C.

If you know a variant of the



dBASE language already or are willing to learn it from third-party materials in order to make use of FoxPro's unique portability to DOS and UNIX, you'll be well served by FoxPro. If you need an easy-to-learn, easy-to-use Windows DBMS that holds your hand, look elsewhere.

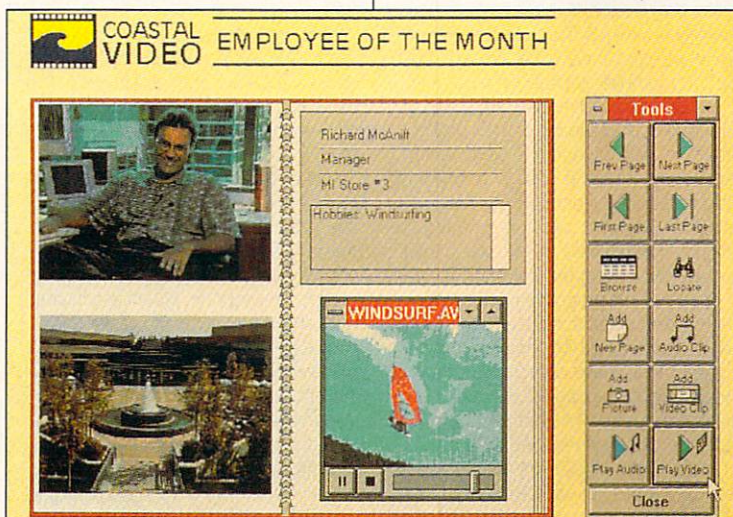
Circle Reader Service Number 376

PARADOX 1.0 FOR WINDOWS

Paradox gives you the best of both worlds: the assured maturity of a product created by an experienced design and documentation team and the freshness of a 1.0 version. Although Paradox for DOS has been around for years now, the Windows version is a complete rewrite with only data compatibility. Paradox is an awesome development environment.

Paradox, like Access, is billed as being easy enough for an end user but powerful enough for the most experienced developer. I don't believe the former, but the latter is true in spades. If you want to make full use of Paradox, you'll have to learn at least some of its ObjectPAL language, but your efforts will be rewarded handsomely.

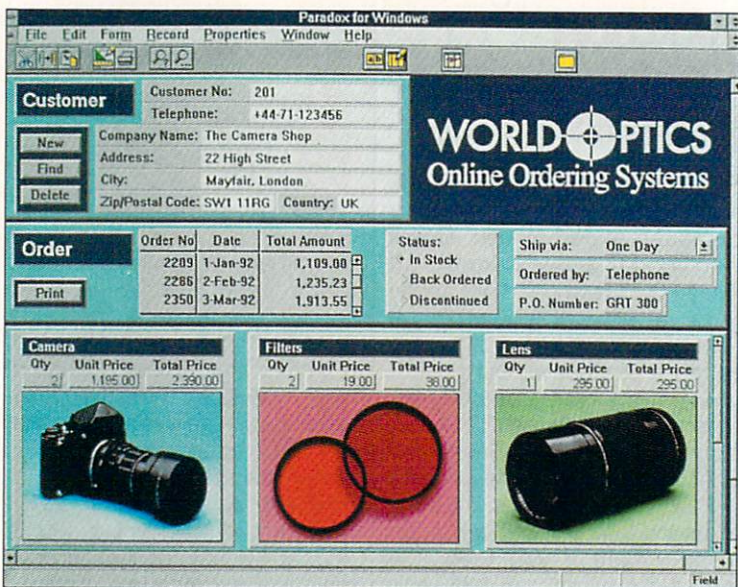
Paradox, long famous for its query mechanism, is even better as a Windows product, allowing you to edit the data set returned by a query. Excellent under DOS, the form designer has no equal in Windows. Paradox thinks of eve-



TEST LAB

rything in a database application as an object, and you can bring up an object's properties by selecting the object and then clicking the right mouse button. This brings up a submenu, and from that submenu you choose an item that brings up a property dialog for font or color or behavior at print time or whatever. Explaining this takes a lot longer than doing it, and I found it much easier to use than the property sheet Access brings up. While Access lets you see all the properties at once, they appear in a tiny system font that often doesn't fit completely in the box. The Paradox way was much more comfortable to me.

Paradox has an industrial-strength report generator. It does the best job of all the data-



GLOSSARY

calculated field. A field that displays the result of some computation, usually based on other fields. Calculated fields require no space in a file because their values aren't stored, only displayed.

catalog. An idea gaining currency in the last few years, the catalog is a way to store information about a single database application—the files it uses, the way data is stored, the program code, and the visual attributes of the application's user interface.

counter data type. A number that increments automatically when a record is added; normally, counter fields can't be edited. Useful for generating serial numbers and, more important, for guaranteeing that no record in the database is identical to another record.

DBMS. DataBase Management System, such as the programs reviewed here. This is different from a database, which is usually information that can be stored in categories, such as names, addresses, and phone numbers. Lately, databases are being called tables, to emphasize the theoretical view of data as rows and columns.

field. A single "unit" or category of information: last name, first name, area code, phone number, and so on. Also called a row in a table.

filter. A quick way to select records meeting certain criteria from the database. By convention, a filter can't be

saved and a query can, but they are otherwise similar.

form. The user interface into which data is entered. Usually, the form is separated from the structure of the table (a.k.a. database), and there can, in fact, be several forms per table.

function (in forms and reports). All of the database managers in this roundup allow the use of built-in numeric and text manipulators such as SUM(), UPPER-CASE(), and AVERAGE(); these are called functions. Sometimes the functions can be used only in forms, sometimes only in reports, but usually in both. Functions work just like spreadsheet functions and can usually be similarly built up into complex expressions.

index. Database records are stored on disk and copied into faster RAM only one at a time, while a record is being edited. An index contains a copy of a selected field from all the records in the database in RAM, making it possible to navigate through the database in an ordered fashion without sorting the database.

macro. A macro contains one or more memorized actions, such as positioning to the next record or choosing an item from a menu. Less complicated than a programming language but also less useful, macros allow the creation of turnkey applications by nonexperts.

memo field. Most fields in a database are of fixed size—a 30-character last

name, an eight-byte numeric field, a two-byte time field, and so on. Memo fields let you store arbitrary amounts of information, usually textual, without wasting space on the disk for records that don't have such information. Useful for recording patient histories, special directions, and sometimes more exotic values like images or sound.

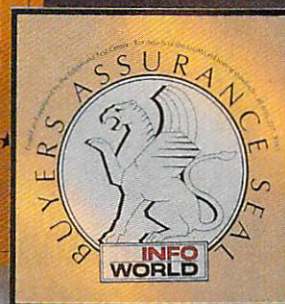
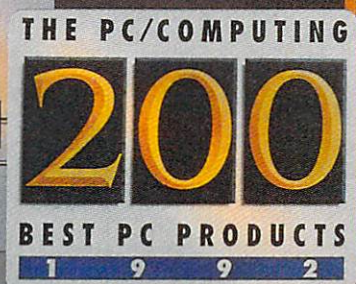
query. A way of finding records that meet selected criteria so a report can be printed. Queries are like filters except that they can be saved and quickly retrieved for later use. Sometimes called filters.

table. Information stored in row-and-column format, sometimes called a database. Columns are sometimes called fields. The rows are called records. The old term for table is *database*, but that's slowly going out of style.

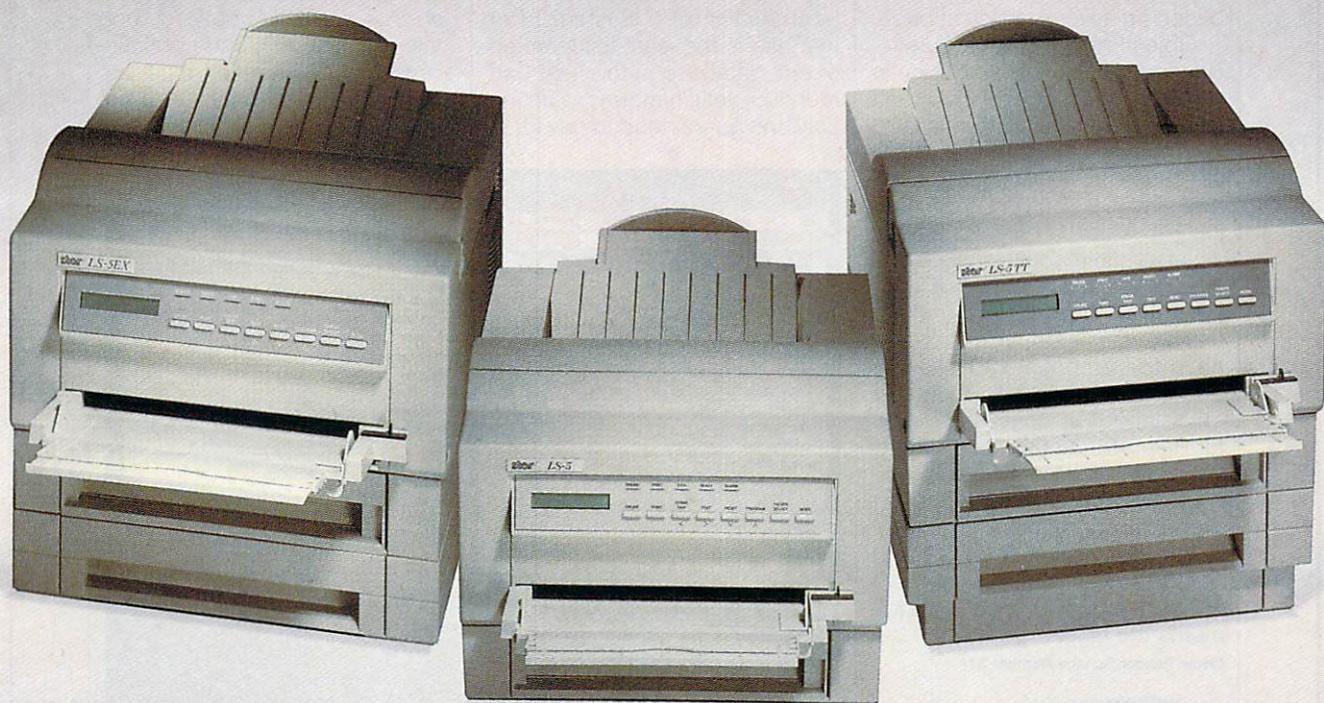
turnkey application. A program written using the database manager that anyone, not just the programmer, can use. Normally, it has its own menu, help system, prompts, tables, data entry forms, queries, and reports, typically activated by push buttons or menu picks.

Xbase. The most popular database language in the world is dBASE, so influential that it has inspired a horde of similar-but-not-identical counterparts: Clipper, Arago, FoxPro, and so forth. Xbase encompasses all these entities.

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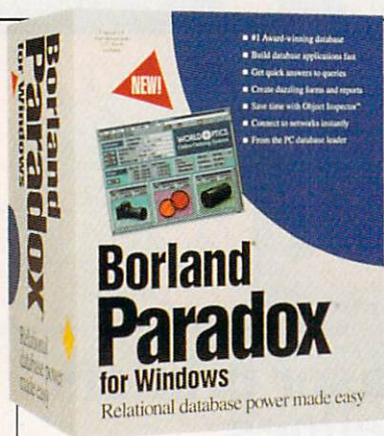
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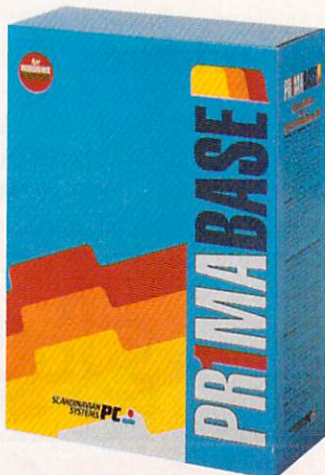


bases surveyed here when creating a default report or form that's based on several tables at once.

ObjectPAL is a killer language. Borland made the right choice in creating a new language that can't use programs created for its DOS predecessor, despite the pain it will cause those with a big investment in DOS Paradox code. ObjectPAL is documented brilliantly; its reference manual is by far the best of the bunch. You can learn ObjectPAL from the ground up through this manual and never have to purchase a third-party book. The ObjectPAL debugger outdistances all other debuggers for database languages.

Paradox is a major achievement and a product of staggering proportions. Among the programmable databases, Access and Superbase are its only competition in this group, and Paradox meets the challenge.

Circle Reader Service Number 377



Paradox 1.0 for Windows
List price: \$795 (\$139 while supplies last; call Borland for information on the Super Pack and Borland Office offers.)

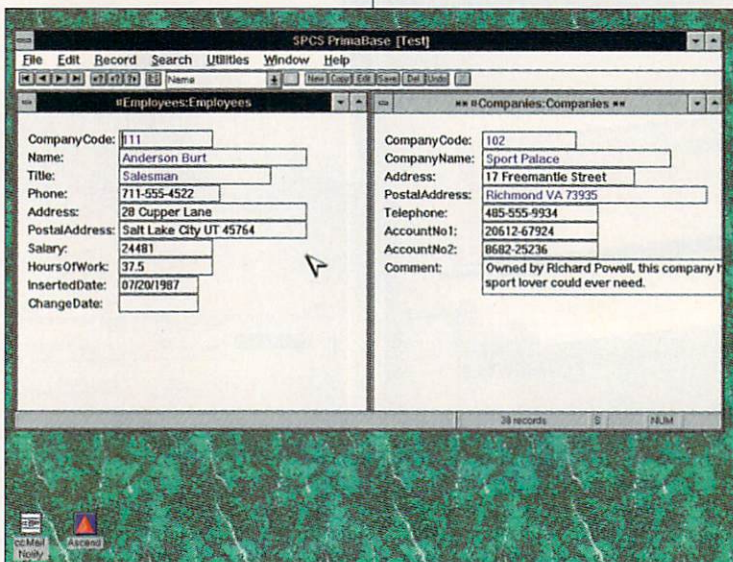
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SPCS PRIMABASE 3.1

Scandinavian PC Systems' PrimaBase is the least full featured of any database in this Test Lab roundup, yet it happens to be the only one guaranteed to pay for it-

Who cares? Anyone whose business or club sends out a lot of bulk mail. Applying bar codes to the labels as the postal service requires is tricky without computerized help, but it can result in massive savings when you convert from first class to third class with machine-readable POSTNET markings.

Without the bar codes, PrimaBase would be better positioned as an inexpensive shareware database manager. Forms are sharply limited. For example, you can add push buttons, but their size, function, and captions are fixed—17 varieties such as New, Edit, Search Next, and so forth. Reports are fairly good, but



self. That's because PrimaBase's main claim to fame is its ability to print all popular bar code types and then some: POSTNET, UPC-A, UPC-E, and others.

SPCS PrimaBase 3.1
List price: \$349.95

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P.O. Box 3156
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queries are little more than advanced Find dialogs and can't be saved.

A handy little mail merge that you can use with Windows Write allows you to include text formatting in the form letters that you create. This is certainly a novel and very appropriate use of existing tools.

If you need to print bar codes, PrimaBase is well worth its \$349.95 price. If not, you should probably look elsewhere.

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LESS FILLING, FEWER FEATURES

FormWorx 2.0 for Windows

It would be wrong to call these products full-featured database managers, but they're handy tools in the fight against data glut.

FormWorx 2.0 for Windows (there's a nearly identical, compatible DOS version) is an intriguing package designed specifically for the creation of printed forms such as purchase orders, past-due notices, credit card applications, fax cover sheets, sales reports, and so forth. It also comes with a companion product named Fill & File, which effectively turns FormWorx into an indexed database manager, complete with table lookups, default data entry values, calculated fields, search and replace, and customized prompts.

As you might imagine, FormWorx is heavy on border patterns, variable units of measurement, alignment tools, and so on. You can create libraries of form objects or use the supplied ones. Hidden in the back of the book is an invaluable discussion of how to use LaserJet output and manipulate the files from other languages (you can send the form out as an HP macro, a customized set of commands processed directly by the laser printer).

To ease form creation, there's a palette of "data objects," which constrain data entry to the formats for American currency, numbers, dates, times, five- and nine-digit ZIP codes, and seven- and ten-digit phone numbers. You can create custom input masks for those that aren't covered—for example, Social Security numbers, foreign telephone numbers, or European date styles. In all, FormWorx is a bargain and, with a library of 600 forms, may be less expensive than hiring an artist to rustle up even one simple form.

To order FormWorx (\$99.95), call (800) 826-0706 (in London, call 44-81-742-7222) or write Power Up, A Subsidiary of Spinnaker, 201 Broadway, Cambridge, Massachusetts 02021.

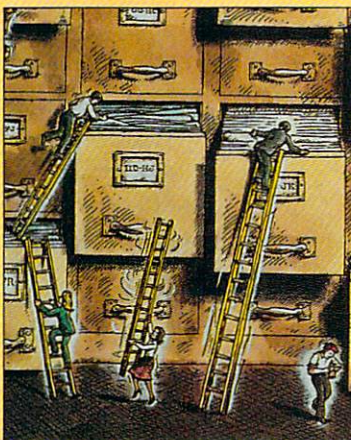
Circle Reader Service Number 381

Instant Database 2.0

Instant Database 2.0 comes from Asymetrix, the company that brought you ToolBook. Written in ToolBook, Instant Database exhibits some of that product's slowness, but not unbearably so. Instant Database has an 80-page manual that manag-

es to cover most issues, but it leaves a few of them, such as the dialer, woefully short of full coverage.

Instant Database is just that; you can create a database structure in a very few minutes just by drawing the fields onto a blank form. You don't bother with giving the fields types, such as number or text, and you don't even type in a maximum length, as is customary with most other database managers. The result is a database that runs plenty fast with up to a few thousand records but



then bogs down quickly. The report mechanism is quite limited, but it has a few useful options such as one to four columns, rudimentary mailing label support, and conditional expressions. This last option appears to be quite powerful.

If you're interested in multimedia computing, take note: With Instant Database, you can add animation, graphics, Asymetrix MediaBlitz scores, Wave audio, MIDI audio, and digital video files to the record fields. The product also supports Microsoft Video for Windows.

If flexibility is less important to you than convenience, Instant Database, with 14 gorgeous but limited sample applications, may be for you.

To order Instant Database (\$95, \$25 upgrade for users of Instant Database 1.0), call (800) 448-6543, or write Asymetrix at 110 110th Ave. NE, Ste. 700, Bellevue, Washington 98004.

Circle Reader Service Number 382

Timeworks Data Manager 1.0 for Windows

Timeworks Data Manager 1.0 for Windows wins the sweepstakes for best price-to-performance ratio in the non-programmable database category. For \$60, you get a DBMS that competes favorably with AceFile and PrimaBase in most features, at a fraction of the price.

While it's not possible for you to create forms with custom buttons or to replace the standard menus with menus of your own, Data Manager does its job just fine, thank you. It has a toolbar with 12 icons and—miracle of miracles—they're actually labeled! While this may not seem to be a great leap forward in user interface technology, it typifies what Data Manager is so good at: getting the job done.

Timeworks' forms don't support data entry masks such as A* to force the input to uppercase in a text field. While I'd like that feature because of the flexibility it adds, Data Manager instead lets you bring up a Field Formatting dialog box, and here's where you see some of the program's flexibility. It allows you to force text to uppercase, lowercase, or initial capital (very handy for entering names, unless it's one like deForest); round numbers up or down or truncate them; limit numeric and date values to a certain range; and set the precision for numbers. Sure, it does mean that I can't create a data entry mask for, say, Social Security numbers, but it lets me do the most common tasks easily.

Calculated fields and reports make use of an expression builder that works in an easy, visual Windows fashion. Reports have all the standard features and, while there are no presets for Avery labels, the instructions for creating labels are crystal-clear. Tech support was not hard to reach—amazing for such an inexpensive product.

At \$60, Data Manager is a steal and quite good enough for most applications.

For more information or to order the product, call (708) 559-1300, or write Timeworks at 625 Academy Drive, Northbrook, Illinois 60062.

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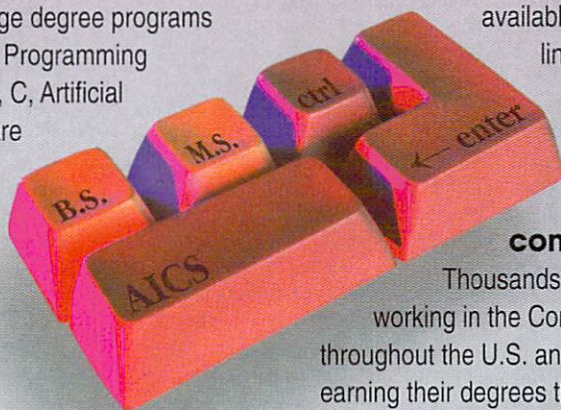
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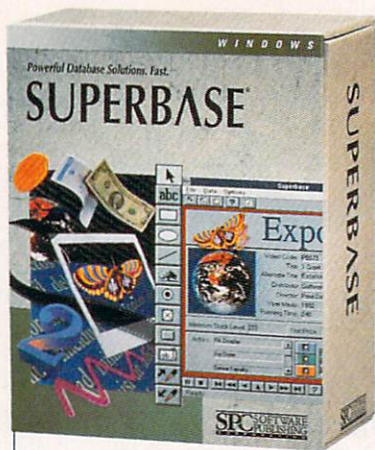
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SUPERBASE 2.0

Let's get one thing clear about Superbase from the start. You must know BASIC to use it properly. If you know BASIC, good, because the Superbase dialect is a good one. Superbase is a mature product that's gotten rave reviews, and it deserves them. It's fast, easy to program, and wonderfully documented, and it comes with some bonus development tools that will make you even more productive.

Superbase has all the bells and whistles you expect from a high-end Windows database manager: easy forms design, a complete and well-integrated query-by-examples mechanism, default creation of several different kinds of reports, a dialog editor, and a macro recorder. The macro recorder is ingenious in that it generates code in SBL, Superbase's version of BASIC.

Creating applications with Superbase is even easier than with Access. For example, you can attach SBL code directly to a button (or list box or whatever), whereas in Access you must attach the code to a macro and then run the macro from the button. I also like SBL better than Access Basic because it's far closer to the spirit of BASIC. Software Publishing intimates in its literature that it will begin to

Superbase 2.0
List price: \$795 (\$199 for competitive upgrade)

SOFTWARE PUBLISHING
3165 Kifer Rd.
P.O. Box 54983
Santa Clara, CA 95056-0983
(408) 988-7518

make SBL more like Access Basic, but I hope the plans don't pan out. While Access is quite powerful, it's harder to learn than Superbase. If you've been developing applications in, say, PowerBASIC or QuickBASIC as opposed to Visual Basic, Superbase will make more sense to you. There's also a big library of canned SBL routines, so you could well put together a complete app with nothing more than those and some glue code.

Superbase is very fast, too—one of the fastest of the DBMSs in this group. You can scroll through complicated forms even faster than with some DOS data managers.

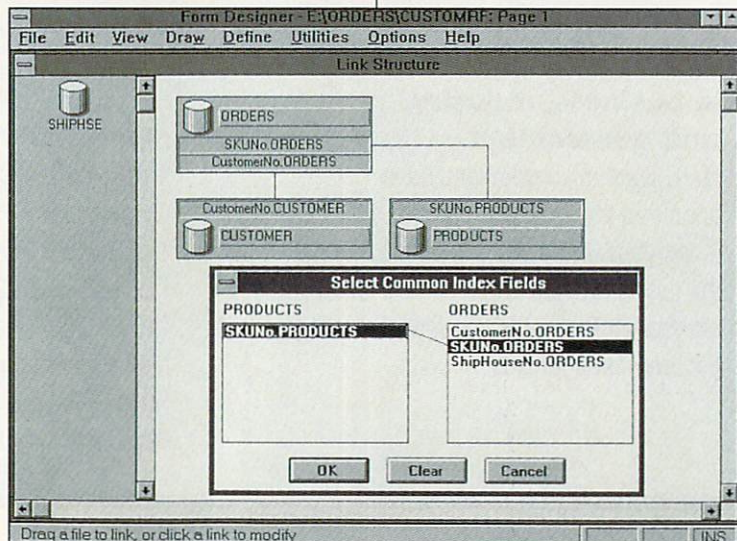
I do have a few complaints, though. I found that dBASE memo fields don't import properly (they become ten-character text fields), and I could find no documentation addressing the

issue. The SBL reference manual, chock-full of useful example code, isn't indexed. And I began to realize that the reason Superbase relies so heavily on what it calls validation formulas (which check to see whether you've entered information into a field properly) is that it doesn't have data entry masks, also known as picture fields.

But you can't go wrong with Superbase, especially if you have experience as a BASIC programmer. Like dBASE in its heyday, Superbase is a full data management system with an easy-to-learn, state-of-the-art script language.

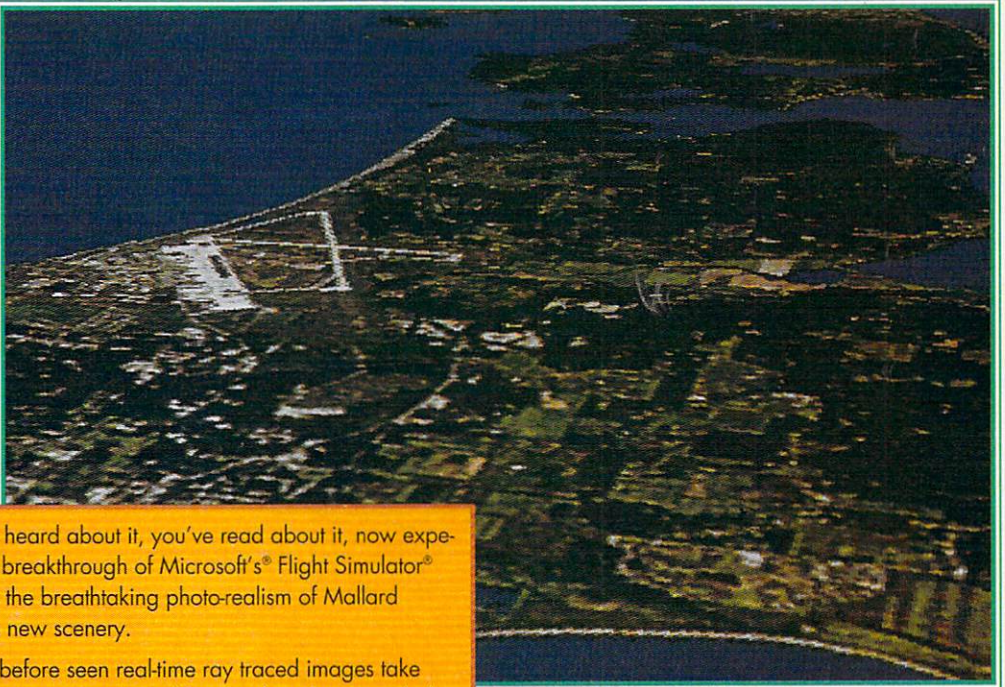
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WINDOWS DATABASE FEATURES	AcceFile 2.0	Approach 2.0 for Windows	CA-dBFast 2.0	Database Express 1.1 for Windows	FileMaker Pro 2.0 for Windows	Microsoft Access 1.0	Microsoft FoxPro 2.5 for Windows	Paradox 1.0 for Windows	SPCS PrimaBase 3.1	Superbase 2.0
DATA TYPES										
Fixed-length text	■	■	■	■	□	■	■	■	■	■
Memo (variable-length text)	■	■	■	■	■	■	■	■	■	□
OLE objects	□	■	□	■	□	■	■	■	□	■
Floating-point numbers	■	■	■	■	■	■	■	■	■	■
Currency	□	□	□	■	□	■	□	■	□	□
Date	■	■	■	■	■	■	■	■	■	■
Time	□	□	□	■	■	■	□	□	□	■
Images	□	■	■	■	■	□	■	■	□	■
True/false	■	■	■	■	□	■	■	■	□	■
Counter/serial numbers	□	■	□	■	■	■	□	□	□	□
DOCUMENTATION										
Tutorial	■	■	■	■	■	■	■	■	■	■
Quick-start guide	■	■	■	■	■	■	■	■	□	■
Number of example applications on disk	6	18	5	9	7	3	10	6	3	3
Shows how to create an application from scratch	■	□	■	■	□	■	■	■	■	■
Continuous page numbers (for example, 1-300)	□	□	□	□	□	■	□	■	■	□
Sectioned page numbers (for example, A1-A99, B1-B236, and so on)	■	■	■	■	■	□	■	□	□	■
PRINTING										
Templates for Avery labels	■	■	■	□	■	■	□	□	□	□
Postal service bar codes	□	□	□	□	□	□	□	□	■	□
Envelopes	□	■	□	□	■	■	□	□	□	□
Print preview	□	■	■	■	■	■	■	■	■	■
IMPORT										
dBASE III PLUS	■	■	■	■	■	■	■	■	■	■
dBASE IV	□	■	■	■	□	■	■	■	■	■
Lotus 1-2-3 1.0	■	■	■	■	■	■	■	■	□	■
Comma-delimited ASCII	■	■	■	■	■	■	■	■	■	■
EXPORT										
dBASE III PLUS	■	■	■	■	■	■	■	■	■	■
dBASE IV	■	■	■	■	□	■	■	■	■	■
Lotus 1-2-3 1.0	■	■	□	■	■	■	■	■	□	■
Comma-delimited ASCII	■	■	■	■	■	■	■	■	■	■
DATA ENTRY FORMS										
Picture fields	■	■	■	■	□	□	■	■	□	□
Combo boxes	■	■	■	■	■	■	■	■	□	■
List boxes	■	■	■	■	■	■	■	■	□	■
Push buttons	□	■	■	■	■	■	■	■	■	■
Check boxes	■	■	■	■	■	■	■	■	□	■

TECHNOLOGY UPDATE

How to get surround sound without buying the theater...

An amazing new surround sound decoder turns your existing stereo into a five channel home theater.

By Chuck Anton

As much as I love renting videos, it's just not the same as seeing a movie in a theater. I remember the first time I saw *Top Gun*. I nearly jumped out of my seat when the planes flew overhead. One of the reasons movies seem so real is because they use surround sound to make it seem like you're actually there. Now, an incredible new device lets you use your stereo receiver to get that same surround sound in your home.

It takes more than just four speakers to get surround sound. You need to have some way of separating the signals. The new QD-1 Series II decoder does just that, and in a revolutionary way that rivals the best Dolby Pro-Logic and THX Systems available.

Wins over critics.

Noted audio critic, Len Feldman, reviewed the QD-1 for the September issue of *Audio Magazine*. He concluded that "...the QD-1 produced a completely accurate and realistic surround sound experience from a variety of videotapes and laser discs with Dolby surround encoding... the QD-1 delivers home theater sound the way it was meant to be heard."

Breakthrough 'L minus R.'

Back in the 1960's, Dynaco discovered that in addition to the right and left channels, a "difference" signal existed in a stereo recording, and aptly named it "L minus R." The QD-1 is able to de-

code Dolby Surround signals in a videotape or a laser disc because those spatial and depth cues have been matrixed into the "L minus R" portion of the stereo soundtrack. It does so passively, with no signal processing. What's more amazing, the QD-1 uses your main stereo amp to amplify the rear channels. You do not need any additional amplifiers!

Concert hall sound.

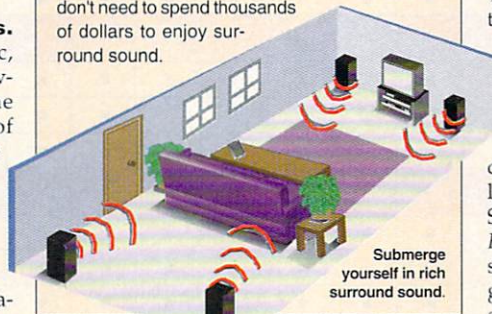
The QD-1 also decodes the ambience found in all musical recordings. This sense of space, or concert hall acoustics is present in all CDs and cassettes, especially live recordings. John Sunier of *Audiophile Edition*, a nationally syndicated radio program, says "If you're a surround sound

The Secret of Surround Sound

Surround sound has become the rage of the '90's because it adds "depth" to stereo sound, giving you the home theater experience. Simply stated, it makes you feel like you're actually at a concert or a movie theater.

To "fill a room" with sound you need more than the two channels. And that's the beauty of the Dynaco QD-1, it provides five channels from any two channel stereo or TV.

Dynaco offers rear channel speakers specifically designed to integrate with the QD-1 decoder. You may also need our center channel speaker, the A10-V, if your two front speakers are more than eight feet apart. Adding this fifth speaker, or center channel, helps keep dialogue and important localization cues centered. So you don't need to spend thousands of dollars to enjoy surround sound.



buff who loves to listen to music, you'll find this \$79 passive black box superior to even the \$3000 THX or Dolby Pro-Logic processor."

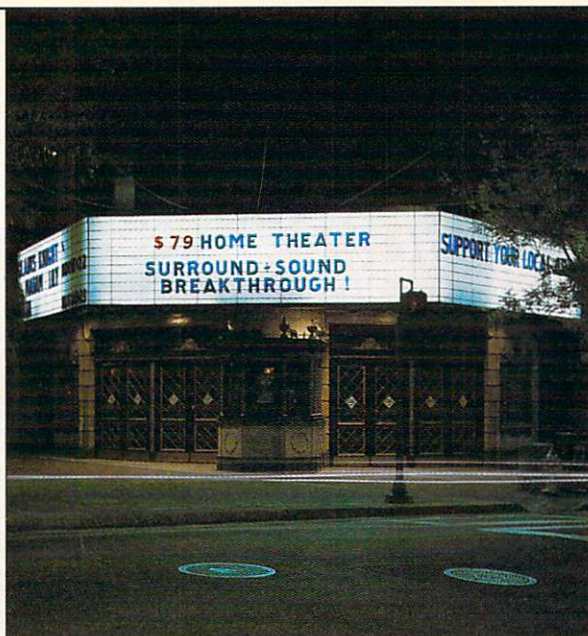
THE PASSIVE ADVANTAGE

Passive. The QD-1 is *passive*, meaning it requires no AC current. It actually sounds better than active decoders, producing more clarity, more detail, no noise, a greater sense of space, and zero distortion. This superior passive system is a breakthrough unique to Dynaco.

The QD-1 decoder makes your movies come to life. Surround sound brings the theater experience home to you.

Active. All Dolby Pro-Logic decoders (stand-alone or built-in units) are active. This means they decode and amplify the signal electronically. The active way induces noise and distortion, hindering the home theater experience.

This is an example where "more is less." Spending thousands on an active system will not give you the performance of the QD-1.



Quick and easy installation. Hook up is easy. The QD-1 connects to the speaker outputs on your amp. The speaker leads then run to each of your four (or five) speakers. The rear channel speakers may be small; we recommend the AW-1s at \$99 a pair. They come with mounting hardware, a key-hole slot for flush mounting, and have an attractive all-weather gun metal aluminum finish.



The AW-1 rear channel speakers integrate perfectly with the QD-1.

Factory direct offer. The QD-1 is so new you won't find it at your local department store. To introduce this product, we are offering it direct to you for a limited time special offer. By ordering now, you can save a substantial amount of money.

Risk-free home trial. Let's face it. The best way to evaluate surround sound is in your home, not in a showroom. That's why we're offering this risk-free home trial offer.

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WINDOWS DATABASE FEATURES	AceFile 2.0	Approach 2.0 for Windows	CA-dBFast 2.0	DataEase Express 1.1 for Windows	FileMaker Pro 2.0 for Windows	Microsoft Access 1.0	Microsoft FoxPro 2.5 for Windows	Paradox 1.0 for Windows	SPCS PrimaBase 3.1	Superbase 2.0
Radio buttons	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Multiline edit boxes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
May contain graphics	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Drawing tools (arcs, lines, circles, and so on)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Snap to grid when creating forms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Default values	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Can change tab order	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Spelling checker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Functions (simple programming in reports)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
QUERIES										
Automatic creation/assistant	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Query by example	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Expression builder	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Multiple AND/OR expressions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wildcard/regular expression searches	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
REPORTS										
Can print date in header and footer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	NA	<input checked="" type="checkbox"/>
Can print time in header and footer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Can print page number in header and footer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Functions (simple programming in forms)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
APPLICATION DEVELOPMENT										
Macros	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Script language	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Can replace main menu	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HELP										
Search for topics	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Hyperlinked	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Table of contents	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Index	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MISCELLANEOUS										
Minimum disk space for installation (in MB)	2.5	NA	3	6	2	8	8	12	2	5
Maximum disk space (in MB)	4	4.5	7	12	3	14	16	15	2	7
Recommended RAM (in MB)	2	4	4	4	4	4	4	6	2	4
Spreadsheet-style or "list" view of data	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dialer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	*
Network support	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NA=not applicable or information for this feature not available <input checked="" type="checkbox"/> = yes <input type="checkbox"/> = no *Not automatic, but you can tweak the product to make it happen.										



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NEWS & NOTES

Jill Champion

Of Mice and People

Both Microsoft and Logitech have chosen this summer to introduce new ergonomically designed mice. Logitech, maker of the Kidz Mouse and millions of OEM mice, made headlines two years ago with its new line of built-for-comfort mice. Its new three-button cordless mouse fits the palm pleasantly while substituting low-energy radio waves for the usual desk-encompassing tangle of mouse cable. The mouse can be sensed by its receiver over a range of six feet. Users can program the driver to interpret the middle button as a double click and the third button as a keypress (the default is the Esc key). The mouse is scheduled for release in August. Its suggested retail price is \$149.

Microsoft, also vying for the

**Ergonomics helps
Microsoft's
mouse ease wrist
strain.**



“Order of the Palm”, introduced its latest version of one of the most successful rodents since Disney’s. Its first redesign in six years boasts a more comfortable angle (while retaining ambidextrous operation), a thumb grip, and a weight over the ball for enhanced traction. The new mouse driver (version 9) provides many improvements to ease working in Windows, including an automatic snap to the default button in a dialog box, a magnifier for the two square inches of screen nearest the mouse pointer, and a wrap feature that moves the mouse pointer to the opposite side of the screen when you

move past the edge. The serial version lists for \$109.00 and the bus version for \$125.00. The software’s suggested retail price is \$19.95.

New Deal

Compaq Computer and Microsoft have formed the Frontline Partnership, in which both companies will work together to develop products “that are the easiest to use and the simplest to install, with the best performance and value in the industry”—including desktop PCs, portable PCs, docking stations, and hand-held computers, according to a press release issued by Compaq.

One area that the two companies plan to promote heavily to PC hardware, software, and peripherals industries is the new Plug and Play ISA specification codeveloped by Compaq, Microsoft, Intel, and several other companies. The goal of Plug and Play is to create automatically self-configuring hardware and software.

Easy Labels

Whether you want one label or a hundred, forget your printer. The LabelWriter II is a hardware/software combo that plugs into your computer’s serial port, ready to produce labels in any quantity instantaneously. Running as a TSR program (DOS version) or a full-featured Windows application (Windows version), the LabelWriter II software gives you a number of options for creative label making, including scalable fonts and the ability to mix font sizes and styles on a line-by-line basis. Other features let you create time-saving label templates, print POSTNET postal bar codes, and view WYSIWYG displays of each label before printing.

LabelWriter II uses a 1-inch printhead and retails for \$249.95. The LabelWriter II Plus uses a 2¼-inch print-

head and retails for \$299.95. For more information, contact CoStar, 100 Field Point Road, Greenwich, Connecticut 06830-6406; (203) 661-9700, (203) 661-1540 (fax).

Sounds like a Bargain

If your budget can’t handle a Roland MT-32, you might want to consider Modular Circuit Technology’s \$49.95 AdLib-compatible sound card. Called MCT-SOUND, the low-cost card is equipped with a stereo connector that allows external speakers, headphones, or an amplifier to be connected. MCT-SOUND is available through JDR Microdevices. JDR says that the card “makes the most of applications by producing the high-quality sounds they’re designed to create.”

For more information, contact JDR Microdevices, 2233 Samaritan Drive, San Jose, California 95124; (408) 559-1200, (408) 559-0250 (fax).

Photo CD Catalog

Searching through tiny photographs in a big stock-photo book is the *old* way of doing things, now that Kodak’s new Photo CD technology allows high-resolution 35-mm film images to be stored on a CD for review on a computer or TV screen. And Kodak has formed a joint relationship with L.A.-based Westlight, one of the largest stock-photo agencies in the world, to market its new Kodak Photo CD Catalog, which allows Westlight’s photos to be viewed and manipulated on a Mac or PC.

Ad agencies, publishers, or anyone else who uses stock photos in creative work “can review and discuss each photo in a conference room instead of crowding around a light table,” says Westlight’s founder, Craig Aurness. And once a photo’s se-

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Whether you take your work across the hall or across the country, with PORT-ABLE Sound Plus, you have all the cards you need to play right in your hip pocket. The hinged design lets you flip up the unit if you are short on desk space or lap space. And, the power will always be with you whether you use rechargeable or non-rechargeable AA batteries. PORT-ABLE Sound Plus also comes equipped with an AC/DC power converter.

As a bonus, you will get all the software you need to communicate. Like Lotus Sound™ an OLE server for Windows 3.1. WinReader for Windows 3.1, a handy text-to-speech utility. Digispeech's DOSTalk and DOSReader text-to-speech applications. Show & Tell For Kids™ for

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- Sound Blaster Compatible
- 16 Bit CD Audio
- Advanced DSP Technology



lected, it can be quickly imported into a program like PhotoShop to create a comp for the client.

For Kodak, the move is a major rollout of its Photo CD technology into the professional and commercial graphics markets, not to mention bringing ever closer the day when visual information available in a standardized, multiplatform digital format will be business as usual.

For more information about the CD catalog, contact Westlight, 2223 South Carmelina Avenue, Los Angeles, California 90064; (800) 872-7872.

Logitech continues its design excursion into hand-friendliness with a new cordless mouse.



Videogames on TV

Don't look up if you hear a sonic boom this fall. It's probably just Sonic the Hedgehog spinning faster than sound across your TV screen—on the new Sega Channel.

The Sega Channel is a sign of these electronic times—the first TV channel devoted to videogame playing and specifically to owners of Sega Genesis game machines. Subscribers will choose from a wide selection of popular games, previews, and upcoming releases. News, playing tips, contests, and promotions will be featured regularly.

Set for test marketing this fall, the Sega Channel will be priced in the range of most

pay-cable subscription services and, if all goes well, could be available to all U.S. cable operators by early 1994.

Digitize It

A new service from Orbit Enterprises allows you to "sign" a digitized version of your signature to letters, reports, financial statements, or anything else you regularly print out that requires your John Hancock. Orbit says the result looks hand-signed.

To use the service, you send your signature to Orbit for digitizing. The company returns your digitized LaserJet Signature Macro as either an easily installed DOS application (\$75) or a TrueType font for Windows applications (\$95). To use the signature, Windows users simply select a signature font, type a character, and choose a point size. DOS users enter a short printer command at the place in the document where the signature will appear.

The Signature Macro works with most word processors, including WordPerfect and Word, and it doesn't slow down printing time.

For more information, contact Orbit Enterprises, P.O. Box 2875, Glen Ellyn, Illinois 60138; (800) 767-6724.

Your Health on a Data Card

The newest thing to hit the healthcare industry is the Optical Card System, developed by Canon, that serves as a portable patient record. The credit card-sized OC20 optical card can store the equivalent of 1600 pages of text. Information is written to the card and read by a read/write drive unit, the RW20, that connects to standard IBM PC/AT and compatible computers.

Healthcare-system administrators, insurers, and providers currently conducting pilot

projects with the card say it should help head off healthcare fraud and eliminate redundant medical procedures—and therefore help contain costs. Also, you can expect improvements in the quality of your care "when a comprehensive, accurate, up-to-date medical summary—including full medical history and drug therapy—is immediately available to a doctor during consultation," according to a press release issued by Canon. But healthcare is only the first application for the card.

Possible uses for optical data cards as storage media are almost unlimited.

It's Virtually Golf

The plaid high-waters are for real, but you'll only *think* you're playing 18 holes in Hawaii when you swing a club on this virtual-reality golf course, where you'll see exactly where your ball would land—fairway, green, hazard, rough, trees—if you were playing on an actual course. Technigen's Joytec Indoor Golf Center, located in Merv Griffin's Resort Casino and Hotel in Atlantic City, New Jersey, is where you'll find the thrills.

Besides having fun, you might learn something, too, because the computerized "green" you stand on analyzes your stroke, weight distribution, and other factors after every swing—it's sort of like having a built-in personal golf instructor.

Companies or public relations firms with items suitable for "News & Notes" should send information along with a color slide or transparency to News & Notes, Attention: Jill Champion, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

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FEEDBACK

Music Man

Years ago I ran across a BASIC program that would turn a PC keyboard into a simple organ keyboard. Can you show me how that's done?

WILLIAM TAYLOR
LOS ANGELES, CA

Here's a very simple record-and-play-back program that turns your keys A- (the second tier of keys on a standard keyboard) into the white keys on a piano. It keeps track of the notes you play and allows you to play them back at will.

You might want to alter the program to request a filename for your recording, because the way the program is written, you'll overwrite your recording each time you play.

It works better if you play staccato, because the operating system's debounce routine causes the note to be turned off and then back on as you hold the key down.

We attempted an alternative version using the ON KEY command, which worked very well but limited the keyboard to 11 keys. With this version of the program, you can add to your keyboard whenever you like.

```
INPUT "(P)layback or  
(R)ecord"; a$  
IF a$ = "r" OR a$ = "R" THEN  
  GOTO record  
  playback:  
  OPEN "notefile.dat" FOR INPUT  
  AS #1  
  WHILE NOT EOF(1)  
  LINE INPUT #1, a$: a = VAL(a$)  
  LINE INPUT #1, a$: b = VAL(a$)  
  SOUND a, b  
  WEND  
  GOTO ender
```

```
record:  
SHELL "mode con rate = 32 delay  
= 1"  
OPEN "notefile.dat" FOR OUTPUT  
AS #1  
top:  
a$ = INKEY$  
SELECT CASE a$
```

```
CASE "a": a = 451  
CASE "s": a = 506  
CASE "d": a = 536  
CASE "f": a = 602  
CASE "g": a = 675  
CASE "h": a = 716  
CASE "j": a = 803  
CASE "k": a = 902  
CASE "l": a = 1012  
CASE ";": a = 1072  
CASE "'": a = 1204  
CASE " ": a = 0  
CASE "q": GOTO ender  
END SELECT  
SOUND a, 1  
IF a = b THEN  
  counter = counter + 1  
ELSE  
  PRINT #1, STR$(b): PRINT #1,  
  STR$(counter + 1): counter = 0  
END IF  
b = a  
GOTO top  
ender:  
CLOSE
```

Old Times

I read somewhere that you can change the time and date of a file with some parameter of the Copy command. I can't remember where I read it. Do you know the command syntax?

WALTER GREENWOOD
SANTA ROSA, CA

This technique was covered in the March 1993 "Tips & Tools" column. Use the Copy command with concatenation. If you want to change the time and date to something other than the current time and date, use the Time and Date commands first to change these settings in DOS. Then, use this command.

```
COPY FILENAME + ,,
```

This will change the file's time and date stamp to whatever the computer's current time and date is.

Norton Utilities has the command FD that will allow you to set any date you wish for a file.

There are ways to access the directory listing directly with Debug. Each directory listing is exactly 32 bytes long. Bytes 22-23 are the time and 24-25 are the date. It's a little difficult to figure out the coding of these bytes, but if you're adventurous, you can alter them to reflect times and dates that can't exist, such as the time 25:63:62 on the 31st day of the 13th month.

We only mention Debug as an option because DOS's command interpreter (the spoiler) prevents you from entering impossible times and dates from the command line.

Is There a DR in the DOS?

You see the statement "Must have DOS 3.0 or higher" everywhere. I have DR DOS 6.0. Does that fulfill the requirement? What's the difference between MS-DOS 5.0 and DR DOS 6.0? Also, where can I get a BASIC language (GW-BASIC or QBASIC)?

R. G. DINGWALL
MEADVIEW, AZ

DR DOS 6.0 should perform properly with any program that requires MS-DOS 3.0 or higher. The main difference between DR DOS and MS-DOS is the collection of utilities you receive with each one. One of the advantages of MS-DOS is that you get a free BASIC programming language with it. Bill Gates, the cofounder of Microsoft, got his start writing BASICs for microcomputers, and he's never forgotten his roots. Gary Kildall, the founder of Digital Research, got his start creating microcomputer operating systems.

The only way you could get GW-BASIC or QBASIC without purchasing a Microsoft version of DOS would be by committing a federal crime—copying one of them from someone else's DOS. We don't advise that you do that. If you

Music by the numbers, time bending, back to BASICS, density readings, and more

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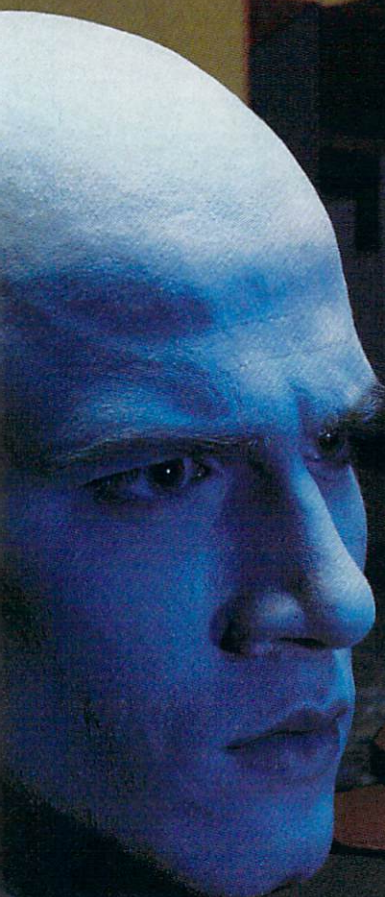
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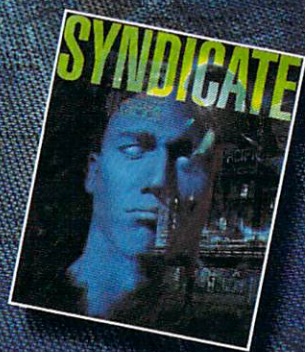


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FEEDBACK

need a BASIC, "Feedback"'s recommendation would be to purchase Quick-BASIC 4.5. PowerBasic is supposed to have a new version out, but as of this writing, we haven't seen it. True BASIC is another contender. The cheapest way to get a BASIC would be to purchase and install Microsoft DOS 6.0.

More Density Problems

My home computer has a double-density disk drive. When I purchased some programs on high-density disks, I was told that I could install them on a computer with a high-density drive and then recopy them to double-density disks so my computer could read them. I have tried this with several programs, but it doesn't seem to work. I get an error message from DOS, such as *Data error reading drive A: or Sector not found: error reading drive A:* Is there a way to run high-density disks on my double-density drive? Is there something wrong with my drive?

MICHAEL STAUFFER
ALLEN, WY

The answer to your last question is that there's probably nothing wrong with your disk drive. We suspect that you're using disks formatted as double-density in high-density disk drives. These drives leave narrow tracks that the relatively coarser heads in double-density drives have trouble locating and reading. Format some double-density floppies in your computer, and then copy the files to them on a computer with a high-density drive. If this doesn't work, there's a possibility that your drive is out of alignment and will require the attention of a trained technician.

In answer to your penultimate question, you can't read high-density disks with your double-density drive.

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. Call our special "Feedback" line: (900) 884-8681, extension 7010201 (sponsored by Pure Entertainment, P.O. Box 186, Hollywood, California 90078). The call will cost 95 cents per minute, you must be 18 or older, and you must use a touch-tone phone. Or you can write to "Feedback" in care of this magazine. Readers whose calls or letters appear in "Feedback" will receive a free COMPUTE baseball cap while supplies last. We regret that we cannot provide personal replies to technical questions. □

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WINDOWS WORKSHOP

Clifton Karnes

DO WINDOWS USERS NEED DOS 6?

If you live on a desert island, you may not have heard about DOS 6. The rest of us, though, have been hearing about it a lot. And everyone's trying to figure out the same thing: Is it worth the \$50 upgrade? The ones wondering the loudest are probably Windows users. Many of us, after all, don't have all that much to do with DOS. So is DOS 6 worth the upgrade if you run Windows? In a word, yes, and in this column, I'll tell you why.

First, there are several Windows programs included with DOS 6: Microsoft Undelete, Microsoft Backup, Microsoft Antivirus, and a Windows-hosted compression information program that works with DoubleSpace.

The Undelete and Antivirus programs are from Central Point Software, and they strongly resemble the programs of the same name in PC Tools Deluxe. The Backup program is a special version of Symantec's Norton Backup. These are all first-class tools that any Windows owner will be happy with. And to its credit, the DOS 6 installation program automatically installs a Microsoft Tools group in Program Manager, a Tools menu on File Manager, and, if you're using Windows for Workgroups, four new buttons on the File Manager's toolbar.

Of these utilities, the Undelete program is especially useful. It offers an easy way to recover deleted files, and it can be configured for three levels of delete protection. With Standard, a file can be recovered if it hasn't been overwritten. With Delete Tracker, Undelete stores some information about the state of each file

to make successful undeleting more likely. And with Delete Sentry, deleted files are actually spirited to a hidden subdirectory and held there as long as disk space permits. With Delete Sentry, files can always be undeleted in perfect condition as long as you don't wait too awfully long.

The Undelete command installed in File Manager is very helpful, too. The installation program puts this command on the File menu, and, if you're using the Windows for Workgroups File Manager, it installs an Undelete button on the toolbar. When you access Undelete from File Manager, Undelete opens in the directory selected in File Manager. It's much faster and easier to select a directory in File Manager than to use Undelete's Change Drive and Directory dialog box.

These Windows programs are obviously useful to a Windows user, but beyond them there are several other significant enhancements in this DOS.

First, there's MemMaker. If you run DOS programs from Windows, this can be a godsend. MemMaker optimizes the way your computer uses UMBs (Upper Memory Blocks). On my PC, I'm running Stacker, DOS network drivers, multimedia drivers, plus the usual stuff like SMARTDrive, Share, Mouse, and Doskey. Before running MemMaker, I had less than 500K of conventional memory free in a DOS session, and some DOS programs just wouldn't run. After running MemMaker, I have about 570K of memory for DOS programs, and everything runs fine. If you need more DOS memory, MemMaker alone may be worth the upgrade.

The next DOS 6 enhancement that may be useful to Windows users is Interlnk. If you

share information between computers, Interlnk is an easy way to move files. With Interlnk, you have a client machine and a server machine. On the client, you run an Interlnk device driver. On the server, you run an Interlnk executable. When both programs have been run and your computers are connected with either a serial or parallel cable, the server's drives appear as virtual drives in both DOS and Windows.

If you run Windows File Manager on the client, you'll see the server's drive icons on File Manager's drive bar. You can treat these drives just like your machine's native drives. You can display a directory tree and file window for them, you can copy files to and from these drives, you can tile and arrange the drive windows mixed and matched with your native drive's windows, and you can run programs from them.

The first time I ran Interlnk between my desktop and laptop, I copied a directory and all its subdirectories from the client to the server by dragging and dropping. This is the easiest way I've seen to transfer files between machines.

The last reason for Windows users to upgrade to DOS 6 is DoubleSpace, which can nearly double the size of your hard disk. We all know how Windows programs gobble up disk real estate, and we can all use the extra space. DoubleSpace seems like a blessing for Windows users, but no other part of DOS 6 has caused as much controversy. Next issue, I'll talk about how to install DoubleSpace, how to use it, how it fares against Stacker, and some DoubleSpace add-ons. If you want to go ahead and try DoubleSpace, please see my "DOS 6 First-Aid Kit" in this issue for some safety tips. □

For Windows users, DOS 6 is an upgrade that's definitely worth considering.

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Circle Reader Service Number 154

TIPS & TOOLS

Edited by Richard C. Leinecker

Screen Saver Heaven

Two readers sent in graphical screen savers that were written in QBASIC. Although monitor manufacturers insist that their monitors won't be damaged if left on for extended periods of time, most people don't like to take chances. Besides, screen savers add an appealing, interesting look to what might be a boring screen with a command line prompt. If you have DOS 5.0 or higher, you should have QBASIC in your DOS directory. If it's missing, try reinstalling DOS 5.0.

You can run any one of these as an independent program. I'd suggest putting them all in a subdirectory where you can keep track of them. I put mine in a directory within my DOS directory called SAVERS. All of my references will assume a path to the BASIC source code of \DOS\SAVERS.

With QBASIC in your path and the code in a central location, you can type *qbasic /run \dos\savers\saver1.bas* from anywhere on your drive, and the first screen saver will run. You could also put this command in a batch file to save typing.

```
REM BASIC Source Code for
REM Screen Saver 1 Display
REM by Zach Dinkmeyer
REM of Huntington Beach,
REM California
CLS: SCREEN 9
RANDOMIZE TIMER
DrawLoop1:
x1% = RND * 639
y1% = RND * 349
x2% = RND * 639
y2% = RND * 349
c% = RND * 15
LINE (x1%, y1%)-(x2%, y2%), c%
Counter = Counter + 1
IF Counter = 1000 THEN CLS (0):
Counter = 0
a$ = INKEY$
IF a$ = "" GOTO DrawLoop1
SYSTEM
```

```
REM BASIC Source Code for
REM Screen Saver 2 Display
REM by Jason Haimerl
REM of Oconomowoc, Wisconsin
CLS: SCREEN 1
RANDOMIZE TIMER
DrawLoop2:
x% = (RND * 300) + 1
y% = (RND * 260) + 1
RESTORE
FOR j% = 1 TO 13
READ k%
CIRCLE (x%, y%), k%
FOR i% = 1 TO 5000: NEXT: CLS
NEXT
a$ = INKEY$
IF a$ = "" GOTO DrawLoop2
SYSTEM
DATA 1, 25, 50, 75, 100, 125
DATA 150, 175, 200, 225, 250
DATA 275, 300
```

```
REM BASIC Source Code for
REM Screen Saver 3 Display
REM by Jason Haimerl
CLS: SCREEN 2:
RANDOMIZE TIMER
DrawLoop3:
x% = (RND * 155) + 1
y% = (RND * 1000) + 1
LINE (y%, x%)-(y%, x%)
x% = (RND * 2000) + 1
y% = (RND * 155) + 1
LINE (x%, y%)-(x%, y%), 300
CIRCLE (x%, y%), 1
PRINT
FOR i% = 1 TO 1000: NEXT
a$ = INKEY$
IF a$ = "" GOTO DrawLoop3
SYSTEM
```

```
REM BASIC Source Code for
REM Screen Saver 4 Display
REM by Jason Haimerl
CLS: SCREEN 1
RANDOMIZE TIMER
DrawLoop4:
x% = (RND * 800) + 1
y% = (RND * 145) + 1
j% = (RND * 50) + 1
CIRCLE (x%, y%), j%
PRINT
FOR i% = 1 TO 1000: NEXT
a$ = INKEY$
IF a$ = "" GOTO DrawLoop4
SYSTEM
```

```
REM BASIC Source Code for
REM Screen Saver 5 Display
```

```
REM by Jason Haimerl
CLS: SCREEN 1
RANDOMIZE TIMER
DrawLoop5:
x% = (RND * 800) + 1
y% = (RND * 100) + 1
LINE (x%, y%)-(x%, 191)
PRINT
FOR i% = 1 TO 1000: NEXT
a$ = INKEY$
IF a$ = "" GOTO DrawLoop5
SYSTEM
```

With a little bit of effort and some programming savvy, you could turn these stand-alone programs into something more. I wrote two small utilities and a batch file that use these screen savers.

The first utility waits a specified number of minutes. If there's a keypress, it returns with an errorlevel of 1. If the time has elapsed, it returns an errorlevel of 0, and you can execute one of the screen savers. It's called *Waittime*, and to use it, you just type *waittime* followed by the number of minutes you want to wait.

The second utility returns a random number as an error code. You must specify a maximum value. If you want it to return values from 0-14, you'd type *getrand 14*.

```
debug waittime.com
File not found
-e 100 be 81 00 ac 3c 0d 74 20
-e 108 3c 20 74 f7 4e ac 3c 30
-e 110 7c 16 3c 39 7f 12 8a c8
-e 118 b8 0a 00 f7 e3 8b d8 80
-e 120 e9 30 2a ed 03 d9 eb e5
-e 128 0b db 75 03 bb 05 00 b8
-e 130 47 04 f7 e3 8b d8 2b c0
-e 138 8e d8 be 6c 04 8b 0c b4
-e 140 01 cd 16 75 10 3b 0c 74
-e 148 f6 8b 0c 4b 0b db 75 ef
-e 150 b8 00 4c cd 21 b8 01 4c
-e 158 cd 21
-RCX
CX 0000
:5a
-W
Writing 005a bytes
-Q
```

Dazzle yourself with screen savers and get random numbers for your batch file.

If you run Checksum (July 1993 "Tips & Tools") on Waittime, you should see the number 10125 on your screen.

Bradley M. Small (of Greensboro, North Carolina) points out that if you change the last two lines of Waittime, the program will return the ASCII value of the key pressed as an errorlevel.

If you are interested in creating this utility, give it another name because it isn't intended to work with this series of programs. The following lines are the ones you should modify in Waittime.

```
-e 150 b8 00 4c cd 21 90 b4 4c
-e 158 cd 21
```

If you make this modification and run Checksum, the number 10264 should appear on your screen.

debug getrand.com

File not found

```
-e 100 be 81 00 ac 3c 0d 74 20
-e 108 3c 20 74 f7 4e ac 3c 30
-e 110 7c 16 3c 39 7f 12 8a c8
-e 118 b8 0a 00 f7 e3 8b d8 80
-e 120 e9 30 2a ed 03 d9 eb e5
-e 128 2b c0 8e d8 be f0 04 8a
-e 130 0c 80 e1 0f 8a e9 fe c5
-e 138 88 2c be 6c 04 2b d2 3b
-e 140 d3 73 07 d1 e2 80 ca 01
-e 148 eb f5 8b 04 d3 c8 23 c2
-e 150 3b c3 77 d4 b4 4c cd 21
-RCX
CX 0000
:58
-W
Writing 0058 bytes
-Q
```

If you run Checksum on Getrand, the number 11268 should appear.

Here's my batch file. If a key is pressed, the keypress is sensed, and the batch file simply quits. Otherwise, the batch file executes one of the screen savers at random after five minutes.

Make sure that the batch file, QBASIC, and the two util-

ities are in your path.

```
ECHO OFF
CLS
REM First, we'll wait for a five-
REM minute period or a
REM keypress.
WAITTIME 5
IF ERRORLEVEL 1 GOTO END
IF ERRORLEVEL 0 GOTO DOSAVER
GOTO END
```

```
:DOSAVER
REM Next, we'll call the program
REM that gives us a random
REM number. The maximum value
REM is 4 because we have five
REM screen savers and our
REM numbering starts at 0.
GETRAND 4
IF ERRORLEVEL 4 GOTO SAVER5
IF ERRORLEVEL 3 GOTO SAVER4
IF ERRORLEVEL 2 GOTO SAVER3
IF ERRORLEVEL 1 GOTO SAVER2
IF ERRORLEVEL 0 GOTO SAVER1
```

```
:SAVER5
QBASIC /RUN
\DOS\SAVERS\SAVER5.BAS
GOTO END
```

```
:SAVER4
QBASIC /RUN
\DOS\SAVERS\SAVER4.BAS
GOTO END
```

```
:SAVER3
QBASIC /RUN
\DOS\SAVERS\SAVER3.BAS
GOTO END
```

```
:SAVER2
QBASIC /RUN
\DOS\SAVERS\SAVER2.BAS
GOTO END
```

```
:SAVER1
QBASIC /RUN
\DOS\SAVERS\SAVER1.BAS
GOTO END
```

```
:END
```

RICHARD C. LEINECKER
REIDSVILLE, NC

Deep Directories

I often need to make directories that have more than one

new subdirectory when I'm organizing my hard drive. For instance, I might need to store THIS.TXT in the C:\EDIT\FILES\TXT subdirectory. Normally, if all three of these don't exist, you have to make each one. I have a batch file, called MMD.BAT, which creates them in one step and removes one more headache from the DOS prompt.

```
@ECHO OFF
IF "%1"==" " GOTO USAGE
CTTY NUL
ECHO D |XCOPY %COMSPEC%
%1\NUL
CTTY CON
GOTO END
```

```
:USAGE
ECHO Usage: MMD
PATH_TO_CREATE
:END
```

THOMAS E. HINES III
KANSAS CITY, MO

Maintain Your Cover

If you're constantly putting new cards in your computer, you might be tempted to leave the cover off. Don't do it. The cover is important. It guards your safety, it channels cooling air through the machine, and it protects the boards inside (one dropped paper clip or screw could wreak havoc on an open, running machine).

ROBERT BIXBY
GREENSBORO, NC

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to COMPUTE's Tips & Tools, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you \$25-\$50. All tips submitted become the property of General Media International. □

Make batch files pause for a specified time and create whole directory trees with a single command.

INTRODOS

Tony Roberts

UPGRADE UPDATE

Have you upgraded to DOS 6 yet? Do you have the latest and greatest version of your word-processing program? How about the newest installment of your checkbook manager, the one with charts and graphs?

My mailbox—and I'll bet yours, too—is often chock-full of upgrade notices for the software I own, and for some programs I don't own. All this mail has me wondering how important it is to keep up with the versions, software's version of suburbia's keeping up with the Joneses.

The answer is not a simple one: It depends on how you use your computer and how you work.

For starters, let's take a look at DOS 6. This is an interesting, but not a revolutionary, upgrade. In my case, it adds nothing to my system that is not being accomplished by some other commercial or shareware program.

Do I need DOS 6? No.

Do I have DOS 6? You bet. After all, this is a DOS column. Its author ought to be in touch with the latest DOS product whether he needs it or not.

Upgrade Rule #1: If your livelihood depends on the software, upgrade.

Another issue to consider is support. Do you, or those who work for you, need help using your software? Do you rely on the software manufacturer's support staff to help solve technical problems as well as to give you guidance when you don't feel like reading the manual? If so, it's probably a good idea to stay current for that product; as each day passes, the support staff will become less and less familiar with the foibles of past versions.

Upgrade Rule #2: Stay current if you want handholding.

When deciding whether to

upgrade, you also must consider whether you're a loner or you share your work with others. In the desktop publishing business, for example, publication files often are worked on by two or three people. Then the files are handed over to a service bureau for output. In a case like this, it makes sense to make sure everyone is upgraded to the same software level.

Upgrade Rule #3: Stay compatible with associates, vendors, and suppliers.

Many software companies seem to have embraced the idea of annual upgrades. I'm willing to bet that I'll see an upgrade notice for my checkbook/financial manager software this October. The program's been upgraded each of the last three autumns; why should 1993 be any different?

Looking back at my records, I see I've paid more for upgrades than for the original version of that program. But that's OK; the upgrades I've purchased have added important functions, made the program easier to use, and saved me time. I'm happy with what I've paid for.

I did bypass last year's invitation to upgrade, however. The improvements in that upgrade centered on the program's new abilities to create charts and graphs pertaining to my financial situation. I didn't see how those multicolor graphics would make me richer or better organized financially, so I skipped the upgrade and saved a few bucks—a clear plus for my financial status.

Upgrade Rule #4: Don't be swayed by the fancy brochures; it's up to you to decide whether new features are valuable to you.

Finally, be aware that computer and software technology is a rapidly advancing field. No program invented today

will be worth much in five years. If you're buying software that's central to your business, plan to make regular upgrades to stay on the cutting edge. If you're a hobbyist, it probably won't hurt you to be a generation or two behind.

Upgrade Rule #5: Software upgrades are a cost of doing business—budget for them.

Now that we've looked at whether to upgrade the software you have, what about upgrading the software you don't have? This phenomenon has become known as the competitive upgrade, and for software addicts, it's one of the best deals around.

Let's say you own Brand X word-processing program, which normally lists for \$495. The maker of Brand Y word processor wants you to convert to his program, so he offers you a competitive upgrade for the price of \$99. What a deal! You get a brand-new \$495 program for \$99!

If you like to acquire new software, keep your eyes open for the competitive upgrade deals, and when the program you're yearning for goes on sale, snap it up.

But competitive upgrades are a little unfair, and that may contribute to their undoing. Let's say you don't own a word-processing program. How does it make you feel to pay full price, when everyone around you buys a copy for 80 percent off?

I find it hard to buy under those conditions. I'll stay on the sideline until the price comes down for everybody. Software companies are discovering that lower software prices translate into increased sales. Perhaps before long, the competitive upgrade prices will become the suggested retail prices.

Then the manufacturers will have thousands of new potential upgrade customers. □

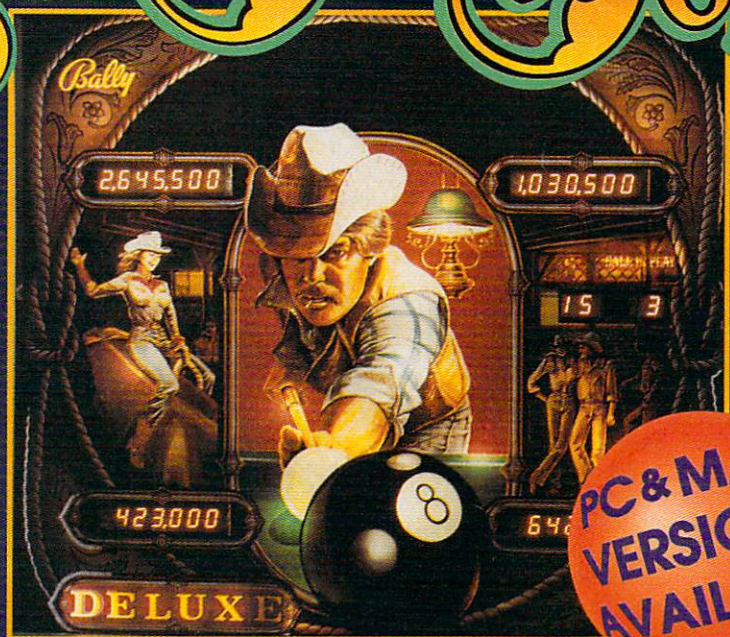
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Circle Reader Service Number 157

PROGRAMMING POWER

Tom Campbell

BASICALLY, A TRUE BARGAIN

Continuing a BASIC hot streak (last month, we covered the estimable PowerBASIC), we turn to an amazing bargain: The True BASIC Sampler Edition, a \$15 version of the only ANSI-standard BASIC implementation from the guys who invented BASIC.

John Kemeny and Tom Kurtz, two professors at Dartmouth, literally created BASIC from scratch in 1964. They wanted a friendlier introduction to computers than FORTRAN, then the state of the art. What is not so well known is that they upgraded their BASIC with astonishing speed, creating interactive versions that acted very much like QuickBASIC did 20 years later. They gave the language a host of features yet to be matched in most other BASICs, such as matrix manipulation, advanced graphics, local variables, and required variable declarations. Kemeny and Kurtz were understandably embarrassed when simplified imitations of the very earliest version of their language were cloned on every machine from toy microcomputers to mainframes and their beloved creation was then nearly throttled to death by programming cognoscenti who judged it thirdhand and pronounced the impostor versions dead on arrival.

It is also relatively uncommon knowledge that there is an ANSI standard for BASIC, ratified several years ago, and True BASIC conforms to that standard (QuickBASIC, GW-BASIC, and the like don't even come close). The obvious question is, of course, so what? QuickBASIC and QBASIC are the de facto standards, running on millions of desktops, as opposed to perhaps tens or hundreds of thousands us-

ing True BASIC. It would not be difficult to stop the argument there.

But an ANSI-standard BASIC has the tantalizing potential of allowing, say, PCs, Macintoshes, Amigas, and Sun workstations to run the exact same source code. Kemeny and Kurtz finally wised up and formed their own company, one that now carries—sit down; you'll be shocked when you hear this—versions of True BASIC that run identically on PCs, Macs, Amigas, and Sun workstations. True BASIC (it's the name of the company, too, and it's located at 12 Commerce Avenue, West Lebanon, New Hampshire 03784; 800-872-2742, 603-298-7015 [fax]) also carries a host of True BASIC source libraries for math, scientific, engineering, and some general-purpose use.

What's most exciting to me is that you can experience True BASIC yourself if you own a PC compatible (or if you slipped and accidentally bought a Mac) for only \$14.95. This is easily the best demo package I've ever seen; it gives you a full version of the language, the ability to create files up to 150 lines long, and a 208-page paperback book by the masters themselves showing you BASIC from the ground up. I got both the Mac and the PC versions, and sure enough, the same source runs identically on the two machines.

True BASIC is a very different animal from the other BASICs. Like QuickBASIC and QBASIC, it compiles programs in the background as you type, so you get the speed of a compiler with the convenience of an interpreter. The environment isn't nearly as comfortable as QBASIC, although it's similar in concept: menus, an immediate window, and so forth. The problem is

that it's clunky. You bring up a menu by pressing Alt-1 for the leftmost menu, Alt-2 for the one next to it, and so on. The help system, while user-extendible, is primitive and requires that you press Ctrl-Break to leave a help screen. F1 isn't the help key, F10 isn't the menu key, and it can't find help files when run outside the directory it was installed in.

True BASIC is very strong in the math and string-handling departments. TRUNCATE truncates a number to the specified decimal places; MIN and MAX return the minimum and maximum of two numbers; pi is built in; there's support for natural, common (base 10), and base 2 logarithms; and more. There are whole groups of string functions not found in other BASICs. LTRIM, RTRIM, and TRIM removing leading and trailing blanks; CPOS finds the first occurrence of a character in a string; CPOSR does the same but from the end; NCPOS finds the first occurrence of a character not found in a string; and NCPOSR does the same but from the end. There's a whole array (sorry) of matrix-handling statements and functions, and the graphics subsystem is far better thought out than those built into other BASICs.

The sample edition is a roaring success, and my main criticism is a political one. The manual never mentions the Microsoft BASIC variants, probably on the theory that there's no reason to aid the competition. That doesn't make sense to me. I'd much rather the book contain a 10- or 12-page comparative analysis and conversion guide so that interested parties could convert their Microsoft BASIC code over to True BASIC. This would only increase its market, a move both True BASIC and we users deserve. □

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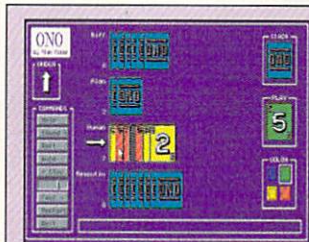
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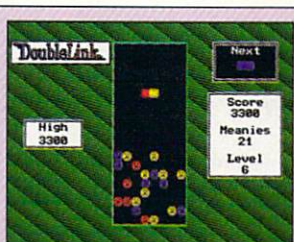
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HARDWARE CLINIC

Mark Minasi

DOS 6's MULTI-CONFIG, PART 2

In the June issue, I started looking into MultiConfig, the new DOS 6 feature that allows you to unify your scattered CONFIG.SYS/AUTOEXEC.BAT files. This month, we'll look further into MultiConfig's many capabilities.

If you have a color monitor, you can customize the colors of your MultiConfig menu with the Menucolor command. It looks like this: menucolor foreground,[background].

Foreground and background are numbers representing the colors that the PC text screen can display—there are 16 of them. Foreground is a mandatory value, but background is optional. If you don't specify a number, then you just get the normal black background.

I guess what troubles me about this command is the wasted time it causes. If you remove all the combinations where the foreground equals the background, there are still 240 different foreground/background combinations. Experience has shown me that there are a fair number of people who won't rest until they've seen them all.

So far, we've merged only one of DOS's startup files. Now that you've merged two different CONFIG.SYS files into one using MultiConfig, complete with a startup menu, defaults, timeouts, and even colors, it's time to see what MultiConfig does for your AUTOEXEC.BAT. And the answer is, "not much."

There is, however, enough in the way of tools to allow you to link CONFIG.SYS configurations to AUTOEXEC.BAT configurations. Here's how.

Let's return to the two-configuration approach we established in June. Suppose there

are two AUTOEXEC.BATs, one for the normal configuration and another for the interlink configuration. The normal AUTOEXEC.BAT might look like this.

```
@ECHO OFF
PROMPT $P$G
PATH C:\DOS
DOSKEY
```

The interlink AUTOEXEC.BAT might look like this.

```
@ECHO OFF
PATH C:\DOS
INTERSVR
```

I want to explain this so both batch veterans and beginners can use this information, so let me first show the people who are comfortable with batch language programming how to put these AUTOEXEC.BATs together into one AUTOEXEC.BAT. Then I'll present a step-by-step formula for combining batch files that anyone who can use an editor can follow.

The key to being able to combine two (or more) AUTOEXEC.BATs into a single batch file and then extract them as they were originally is an environment variable called CONFIG. It contains the name of the configuration that you selected—in our example, that means either normal or interlink. You then use "IF . . . ==" commands and GOTOs to control which part of the AUTOEXEC.BAT file is executed. Here's what it would look like for our example AUTOEXEC.BAT situation.

```
@ECHO OFF
IF %config%==normal GOTO
normal
IF %config%==interlink GOTO
interlink
:normal
PROMPT $P$G
PATH C:\DOS
```

```
DOSKEY
GOTO end
:interlink
PATH C:\DOS
INTERSVR
GOTO end
:end
```

Batch experts may look upon my approach in the previous example as being a trifle inefficient, but it follows a nice, simple formula that anyone can use to quickly combine a number of configurations into a single AUTOEXEC.BAT. Let's see how to use that formula to assemble different AUTOEXEC.BATs into a single file. If we have three AUTOEXEC.BAT configurations that are named c1, c2, and c3, we could build our AUTOEXEC.BAT like this.

```
@ECHO OFF
IF %config%==c1 GOTO c1
IF %config%==c2 GOTO c2
IF %config%==c3 GOTO c3
:c1
[put the c1 commands here]
GOTO end
:c2
[put the c2 commands here]
GOTO end
:c3
[put the c3 commands here]
GOTO end
:end
```

This skeleton of a batch file is intended to underscore how to build an AUTOEXEC.BAT that supports three configurations. You can easily see how to extend it to four, five, or any number of configurations.

It may be obvious, but I'll mention anyway that the lines in brackets shouldn't be typed literally; they're intended to be instructions to you, not to be typed to the PC.

Perhaps even more generally, you can assemble a combined AUTOEXEC.BAT using this step-by-step method.

**DOS 6's
MultiConfig lets you
combine several
AUTOEXEC.BAT and
CONFIG.SYS files.**

Step 1: The first line of your combined AUTOEXEC.BAT should be an @ECHO OFF.

Step 2: Examine your CONFIG.SYS's [menu] section that you assembled previously and write down the names of all the configurations. Take the name of the first configuration and incorporate it into an if statement that looks like this: IF %config%==[name of configuration] GOTO [name of configuration].

You should replace [name of configuration] with the actual name of the first configuration. Do that for each configuration name. For example, suppose you find that your CONFIG.SYS has a menu section that looks like this.

```
[menu]
menuitem standard,Normal
stuff I use
menuitem maxmemory,Set up
to give maximum free
memory
menuitem wingcomm,Configura-
tion to run Wing Commander II
menudefault . . .
```

That means that you have three configurations named standard, maxmemory, and wingcomm. (Notice that I didn't include the normal and interlink configurations. I didn't want you to start thinking that they were mandatory.) You'd prepare the first configuration IF to look like this: IF %config%==standard GOTO standard.

Notice that the ==standard is in lowercase. The case in the IF statement must match the case of the named configuration, or this just plain won't work.

You'd then assemble the other IF statements, one for each of the two other configurations, and you'd have an AUTOEXEC.BAT that looks like this.

```
@ECHO OFF
IF %config%==standard GOTO
standard
IF %config%==maxmemory GOTO
maxmemory
IF %config%==wingcomm GOTO
wingcomm
```

Step 3: Create a section of the AUTOEXEC.BAT for each of the configurations. Each section should have two lines. The first line is the name of the configuration preceded by a colon, and the second line should say GOTO end. The last line in the batch file should say :end. If you do that, your AUTOEXEC.BAT will look like this.

```
@ECHO OFF
IF %config%==standard GOTO
standard
IF %config%==maxmemory GOTO
maxmemory
IF %config%==wingcomm GOTO
wingcomm
:wingcomm
GOTO end
:maxmemory
GOTO end
:standard
GOTO end
:end
```

Step 4: For each section, insert the AUTOEXEC.BAT for that section between the label with the colon at the beginning of it and the GOTO end. Save this file, and you're done.

To put it all together, let's suppose the AUTOEXEC.BAT for the standard configuration looks like this.

```
PROMPT $P$G
PATH C:\DOS
DOSKEY
PRINT /Q
SMARTDRV
```

The configuration for maxmemory looks like this.

```
PROMPT $P$G
```

```
PATH C:\DOS
LH DOSKEY
```

And the configuration for wingcomm looks like this.

```
CD\GAMES\WC2
WC2
```

You'd insert these files into the AUTOEXEC.BAT that you're building, and your final AUTOEXEC.BAT would look like this.

```
@ECHO OFF
IF %config%==standard GOTO
standard
IF %config%==maxmemory GOTO
maxmemory
IF %config%==wingcomm GOTO
wingcomm
:standard
PROMPT $P$G
PATH C:\DOS
DOSKEY
PRINT /Q
SMARTDRV
GOTO end
:maxmemory
PROMPT $P$G
PATH C:\DOS
LH DOSKEY
GOTO end
:wingcomm
CD\GAMES\WC2
WC2
GOTO end
:end
```

There you have it—a quick and painless way to integrate your configurations under DOS 6.

Speak Up!

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12.2007



**DON'T TRY THIS AT
HOME**

By Lamont Wood

**The desktop publishing revolution
has made the personal computer the playground of the
forger and the counterfeiter—or has it?**

Sure, you're an honest person. Basically. But you've applied for a nice job, and they want a letter of recommendation from, say, your college department head. But all they're likely to get from that professor is a damning letter describing what you were caught doing while the lab burned. In fact, you have a letter like that sitting in front of you now, written on university letterhead and signed by your professor.

Desperately, you cast about for a solution to your dilemma—and note that your computer has a color scanner and a laser printer attached to it. So you could just scan in the letterhead and the signature, and write your own letter.

Why not? Who would know?

Forging Ahead

Welcome to desktop forgery. It's a new scam many observers expect to snowball as technology makes documents easier and easier to reproduce, perhaps ending the concept of face value. And perhaps also changing the way some of our paperbound institutions function.

Or perhaps not—because we still have those first two questions:

Why not? Because it would be wrong (to paraphrase Richard Nixon).

Who would know? The people who catch you. Because you're very likely to get caught.

For instance, the printout from your laser printer could be traced back to you—although it's difficult to make such a trace, acknowledges Mike Noblett, chief of the Document Analysis Research and Training Unit at FBI headquarters in Washington, DC. Fans of detective novels know all about how the FBI collects print samples from typewriter brands and how every manual typewriter has distinctive wear patterns that can identify its output. Of course, hardly anybody uses such machines anymore, but the rollers and paper grabbers of laser printers do leave distinctive marks that can at least give away what brand of printer was used, Noblett notes. And scratches on the toner drum (if there are any) can be distinctive enough to identify an individual machine.

So you resolve to get a new toner cartridge just for this scam. But after that, you run into a problem—the letterhead you want to copy includes an embossed silver logo. Your laser printer can't emboss anything, and no metallic (silver, gold, or bronze) toner is available for laser printers, even if your scanner could pick up those reflective colors. That's why you see more and

more letterheads printed with embossed metallic backgrounds, explains William Flynn, a document examiner and president of Affiliated Forensic Laboratories in Phoenix, Arizona.

Anyway, you ponder, you also have to fake a letterhead envelope, and that's even harder. Indeed, sources say that beginners often give themselves away by overlooking the need for a convincing envelope. Or by leaving their fingerprints all over it, even when the document inside is surgically clean.

Ah, you think, but what if I fax the letter? Everyone faxes everything these days. All faxes are black-and-white, so the original color won't matter. And no envelope is needed.

So you whip out something convincing and head down to the copy shop to use the fax machine. There are other people there, too, nervously making photocopies of medical records, buying snapshot film, fingering check paper, and making furtive glances at the color copier.

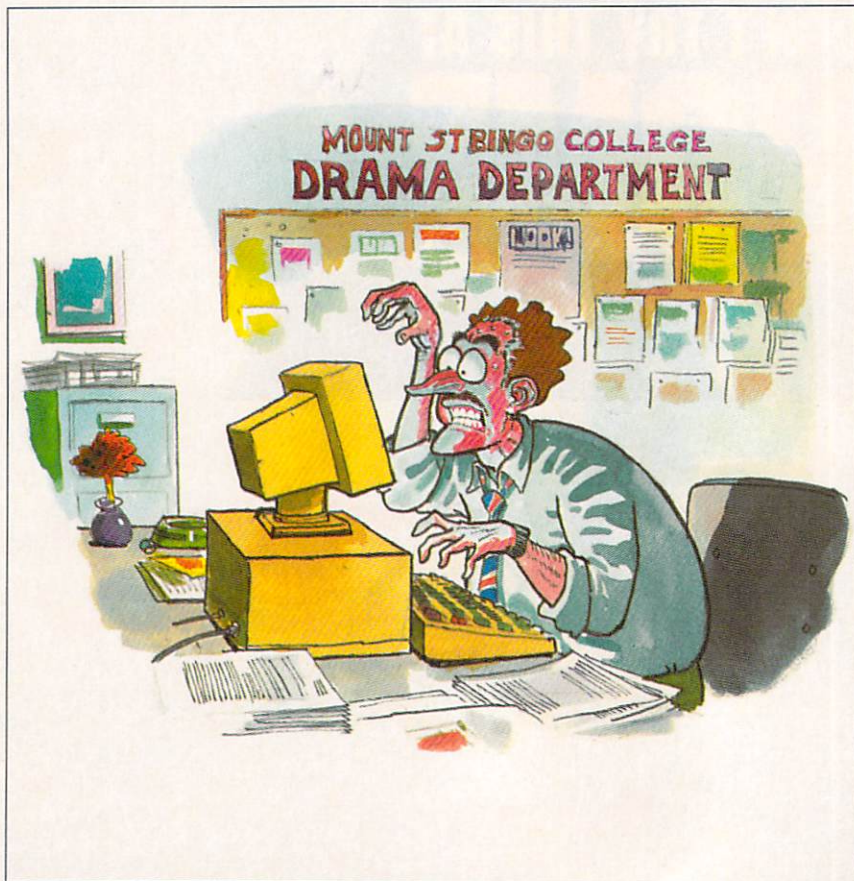
Are they up to something, too? you wonder. No, they probably aren't. But maybe it's just as well that you wonder.

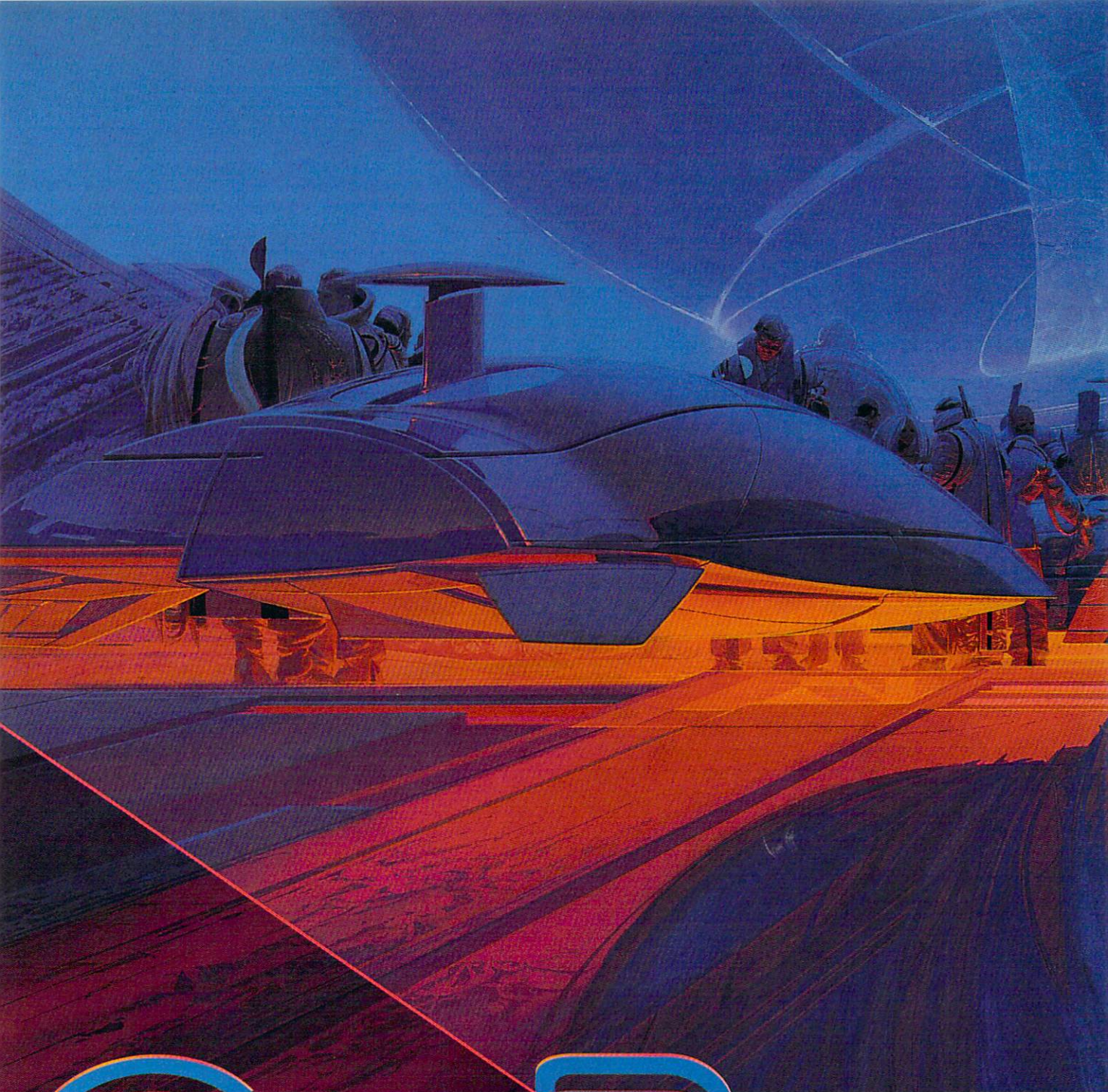
Paper Hanging

Those people fingering the check paper in the copy shop can give the hives to someone like Susan Morton, senior forensic document examiner with the U.S. Postal Service in San Francisco. While laser printers were once considered unsuitable for printing checks, today even large payroll firms use them, leaving bank tellers accustomed to the sight of laser-produced checks, she mourns.

The result is that she has seen gangs traveling the country packing computers, scanners, and laser printers. Arriving in a town, their first move is to rob a mailbox to acquire some checks that were mailed to, say, the local utility company. They will copy the account and routing code off some citizen's check and decide what branch bank that person probably uses. Then they forge a large corporate or government check to that person, using information from other checks they found in the mail. Packing a forged ID, a gang member will then go to a branch across town where presumably nobody knows the citizen and deposit part of that forged check. The check may be for \$5,000, of which the forger takes \$2,000 as cash, smiles, and leaves.

The bank may admit it's been scammed, or it may seek to blame the innocent citizen. "Some banks are nice and cooperative, and some can hassle you for years," Morton notes.





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One check-forging gang was chased across Texas for about six months in the late 1980s, recalls Robert Ansley, corporate security manager for Dell Computer in Austin, Texas, then with the Austin police department. Armed with a stolen Macintosh and an ID maker stolen from a highway patrol substation, they passed more than \$100,000 in bogus checks in Austin alone. But instead of hiring street people to go into the bank, as other gangs have done, they used the same woman over and over, and her description was sent to every check-cashing outlet in the city. A teller spotted her, she fled—and it turns out the gang had overlooked the detail of forging a license plate for their getaway pickup truck.

Sources say other gangs have used laser printers to forge security ID badges to get into office buildings and steal the computers, nodding to the friendly security guard at the front desk while trudging out with their arms full. But they usually find that fencing computers is harder than stealing them and get caught.

Knowing this, perhaps you've decided that forging is not the career for you. And anyway, you're just one faxed letter away from a good job. So

you fax your forged letter from the copy shop. Your prospective employer gets it. And sees from the ID line that fax machines insert at the top of each page that the letter came from the copy shop down the street, instead of that university three states away.

The fax, and your job, go straight into the trash can.

Copycats

You're not alone in getting caught. Think back to the crowd at the copy shop. That medical professional was creating a new page for a patient file with some dates changed to make himself look like a genius instead of a quack. But at the malpractice trial it comes out that the page in question has one set of staple holes and all the surrounding pages have seven. The person buying the snapshot film was trying to back up a burglary insurance claim, but the insurance investigator checks the production code on the back of the film and finds it was made some weeks after the photographed jewelry was supposedly stolen. The ones fingering the check paper get caught as described. As for that furtive guy at the color copier—he's doomed.

So, to return to our earlier question, does all this new technology mean

our paperbound civilization is in danger of coming apart at the seams?

Apparently not. "We have not seen an increase in the amount of document fraud per se," says Noblett. "We have seen more and more computer-generated documents, but the total amount [of document fraud] is about the same. Computers have also made things easier for counterfeiters, but we don't see any more counterfeiters than before."

So perhaps people have remained basically honest—although a few safeguards may be in order. "We have been urging corporations to move forward with EDI [paperless invoicing, ordering, and so forth, using Electronic Data Interchange] for more and more of their business transactions and avoid paper, since it will become so vulnerable," says Donn Parker, computer crime expert with SRI International in Menlo Park, California.

Read This or Go to Jail

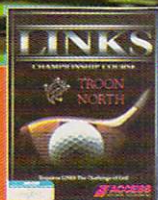
Yes, modern color copiers make reproductions of paper money so convincing that they can often readily be passed, notes Gayle Moore, special agent with the public affairs office of the U.S. Secret Service in Washington, DC.

And making such copies can get

A COURSE FOR YOU



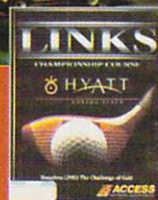
Firestone
Akron, Ohio



Troon
Scottsdale, AZ



Pinehurst
Pinehurst, NC



Dorado Beach
Puerto Rico



Barton Creek
Austin, Texas



Bayhill
Orlando, FL

you sent to prison for 15 years, fined \$5,000, or both, she adds. And you're likely to get caught because, while the reproductions may *look* good, they don't *feel* anything like paper money—they are far slicker.

Meanwhile, new anticopying measures are being added to U.S. currency. Microprinting is being added around the outside of the portraits, which copiers will pick up only as fuzzy lines—which is all it looks like except under high magnification. And plastic strips are being added inside the paper itself—a copier won't reproduce them, but they will appear when you hold a genuine bill up to the light.

Meanwhile, Canon USA is said to be adding anticounterfeiting technology to its color copiers. A Canon spokesman declined to discuss the matter, but other sources say the technology can sense the graphical patterns of U.S. currency in whatever it scans. If currency is detected, the unit will spit out a black page.

But serious counterfeiters are likely to eschew color copiers anyway, preferring traditional methods, Moore notes. While a \$47,000 color copier might give you seven copies a minute, you can churn out millions of bogus dollars a day with an offset press. So

color copiers are mostly used for low-volume opportunistic counterfeiting, she explains. In 1991, the Secret Service busted 66 traditional counterfeiting operations, while seizing 52 office machines that had been used for counterfeiting. But whichever method is used, there is usually some paper trail connecting the perpetrator to the machinery, she notes.

Meanwhile, truly sophisticated counterfeiters are often too smart to waste their time producing money, preferring negotiable instruments like stocks and bonds. Desktop forgery hasn't been much of a factor in this field, says Jack R. Calvert, director of the National Forensic Laboratory of the Criminal Investigation Division of the Internal Revenue Service in Chicago, since copiers still don't have the resolution to defeat the safeguards of the safety paper such bonds are printed on. Safety paper can have pantagrams (continuous background patterns) that appear only when a photocopy is made, ink that appears only under special lights, or watermarks no copier can duplicate.

"Things are not falling apart yet, but we are running at full tilt to counteract anything that might come out in the near future," he says.

Meanwhile, perhaps you should consider joining the other side. There are estimated to be fewer than 600 qualified document examiners in the U.S. and Canada, and the industry is looking for new blood. If you're interested, George Pearl of Atlanta, president of the Association of Forensic Document Examiners, urges you to contact AFDE's membership director, Vickie Willard, at 526 Superior Avenue, Suite 740, Cleveland, Ohio 44114, or (216) 574-2204. It takes about two years to learn the trade.

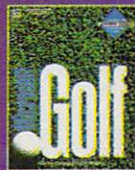
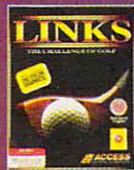
Don't Do the Crime

Don't do the crime, if you can't do the time, as the theme song from "Baretta" used to say. It's so easy to break certain laws with a computer that people sometimes forget they're engaging in criminal acts. You could make enough copies of WordPerfect in an afternoon to supply everyone on the block, but you would be breaking federal laws by doing so—and more and more pirates are being caught and prosecuted. Scanning in a dollar bill takes seconds, and printing out hundreds of them takes only a few minutes. But when you figure years behind bars into the equation, you just might not have time to take the risk. □

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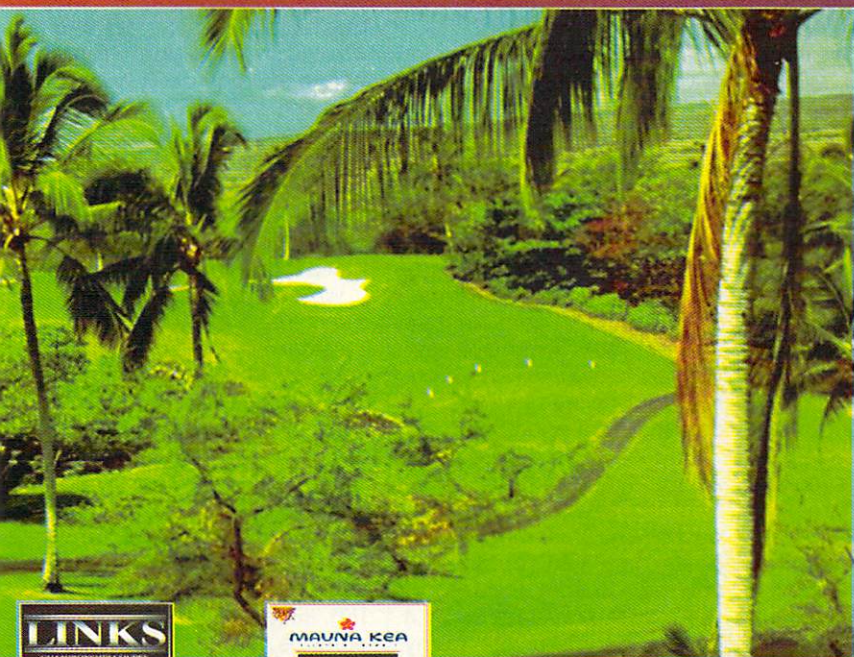
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PRODUCTIVITY CHOICE

With 45 fonts, 600 dpi, supersonic speed, and a great price, this printer leaves you with no reason not to buy it.

William Harrel

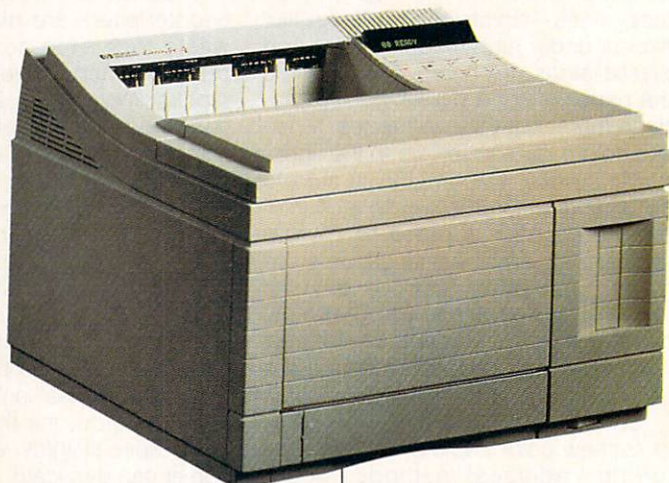
LASERJET 4

It's no wonder that Hewlett-Packard's LaserJet printers are so popular. Hewlett-Packard consistently offers great printers at incredible prices. The LaserJet 4 is no exception. In fact, it's the best LaserJet ever, and it's the best value Hewlett-Packard has offered so far. With a suggested retail price of \$1,759 (if you look around, you can find one for around \$1,400), the LaserJet 4 weighs in at \$200 dollars cheaper than the LaserJet III. For the price, the LaserJet 4 gives you four times the resolution, 37 more fonts, much improved print quality, and over twice the speed.

Many computer pundits have hailed 1993 as the year of the 600-dpi (dots per inch) printer. Why 600 dpi? While this seems like only twice the resolution of standard 300-dpi printers, it's actually four times higher. Smaller, tighter dots mean crisper, cleaner text. That means type in small point sizes (such as, say, 12 points or lower) maintains its fine lines and stroke weights, and large text remains black and has smooth, sharp edges.

But where you'll really notice the difference with a 600 dpi printer is in printing grayscale and graphical images. Since laser printers simulate shades of gray by alternating black dots with noncovered white areas, 600 dpi offers a significant improvement over 300 dpi. When you use a 600-dpi machine, what you wind up with is about four times the number of simulated shades of gray that you can get with a 300-dpi machine.

Need more fonts? The LaserJet 4 is more than obliging.



It comes with 35 scalable Intellifont outlines, including Garamond, CG Omega, and Albertus; plus it has a TrueType font rasterizer and the ten TrueType fonts in Windows—families of Arial and Times New Roman, as well as Symbol and WingDings.

And, if you have a LaserJet 4, you can also download any Intellifont or TrueType outline to the printer. PostScript Type 1 fonts are supported as well, with a \$499 PostScript Level II upgrade. (PostScript is the standard language used by graphic artists and desktop publishers. They use PostScript printers to proof their documents before taking them to service bureaus for a final, high-resolution imagesetter output.)

You can, of course, use Adobe Type Manager (ATM) to utilize Type 1 font technology on the LaserJet 4. ATM costs only \$99, but before you buy it, make sure you don't already have a copy. It comes bundled with many popular word-processing, desktop publishing, and graphics applications.

Just when you thought printers couldn't get any faster, Hewlett-Packard comes

through again. The company's Printer Command Language 5 (PCL 5), the language used in LaserJet III's and 4s, is already faster than most other languages—especially the popular PostScript. But the addition of the TrueType font rasterizer and Windows TrueType fonts means that you don't have to wait for your computer to download fonts. The LaserJet 4 comes with one of the fastest processors in the business: Intel's 20-MHz 80960 RISC processor. It also has increased data compression.

What all these new enhancements mean to you is that the LaserJet 4 is one fast printer—perhaps the fastest eight-ppm (pages per minute) printer available on the market today. Another terrific speed enhancement you'll really appreciate is Hewlett-Packard's new Bi-Tronic bidirectional port. The Bi-Tronic can handle data transfers at up to 156 kilobytes per second, which is a much faster rate than that offered by standard parallel ports. Depending on the speed of the computer it's connected to, the Bi-Tronic traditionally sends data to the printer at between 50 and

150 kilobytes per second. So the only thing that will hold back the LaserJet 4 is the speed of your computer.

The bidirectional parallel port also talks back to your computer, in a similar manner that a serial port talks with a Mac. Wouldn't it be great if you could get a message on your computer screen that tells you when your printer is out of paper or that notifies you of a paper jam, instead of your having to walk down the hall to see what's holding things up? The LaserJet 4 is capable of this kind of two-way communication with your computer. However, as of yet there is no software interface support for either DOS or Windows. In order for your computer to receive the printer's messages, support must be written into DOS applications.

Windows users, take heart. Microsoft is working on software to activate the Bi-Tronic interface under Windows. It may be available by the time you read this; check the Microsoft forum on CompuServe, or look on the Microsoft BBS.

All these wonderful frills aside, the question remains: How does the LaserJet 4 actually print? I tested speed and output against a Lexmark 4029 600-dpi printer. The Lexmark 4029 has a software option—the 4029 Windows Print Accelerator—that uses TrueType fonts to turn in

record print times at 300 dpi.

In some of my field tests, especially when I was printing pages containing just TrueType text, the LaserJet 4 was a hair faster than the Lexmark 4029; however, the LaserJet ran at about the same speed as the 4029 when I was printing pages containing graphics.

The print-quality tests—in which I was comparing the smoothness of type, monotone graphics, and gray-scale photographs of the printouts—revealed that Hewlett-Packard's Resolution Enhancement Technology (RET) is slightly superior to the Lexmark's Print Quality Enhancement Technology (PQET).

On the LaserJet 4, small text (12 points and under) prints just a little crisper, and large text (14 points and higher) looks a little smoother. There is, however, a quite noticeable difference in quality when you use a magnifying glass to compare the print samples. The LaserJet 4 prints text much better.

Graphics and photographs also come out cleaner and with seemingly more shades of gray when printed on the LaserJet 4. I always thought that the Lexmark's halftone quality couldn't be beat—until I saw what came rolling out of the LaserJet 4. It's quite impressive!

Once again, Hewlett-Packard has done what it usually does better than anybody else in the printer market: It has created a fine printer at a fine price. As with the earlier LaserJets, this one sets several new standards.

First, although 600-dpi printing has been available for a while now, it has never been

offered at such a reasonable price. Usually, if Hewlett-Packard has it, everybody else soon will. Second, last fall Hewlett-Packard entered into an agreement with Microsoft to develop Windows-based printing standards. The first results of this team effort are the resident TrueType fonts in



the LaserJet 4 and the bidirectional parallel port. Count on the bidirectional port being the next-generation computer-printer interface, with several other printers sporting it by year's end.

With all this, there are fewer and fewer reasons for business users to shell out the cost of PostScript. PCL 5 now offers scalable-font technology, higher resolution, better handling of vector (draw-type) graphics, on-board TrueType fonts, and a low price—all of which give the LaserJet 4 a true advantage over other 600-dpi printers.

Do you need 600 dpi? Well, look at it this way: Considering all the other features and the improved print speed and quality of this printer, the higher resolution is just a bonus. If you're in the market for a new printer, unless you are a desktop publisher or graphics designer, you can't beat this one. □

**LaserJet 4—
\$1,759**

**HEWLETT-PACKARD
(800) 752-0900**



Circle Reader Service Number 391

PERSONAL PRODUCTIVITY

Rosalind B. Resnick

TO ERR IS HUMAN

With all the great deals on computers these days, it seems as if you can't go wrong in selecting a new computer. Surprisingly, though, many people do go wrong.

Here are ten common mistakes that computer buyers make and some tips to help you avoid them:

Not asking yourself why you need the computer in the first place. Before you can shop intelligently for a computer, you have to decide what tasks you want to use it for and what soft-

If you look before you leap and buy exactly the computer you need, you'll find the bargain that's waiting for you.



ware you'll be using. If you plan to do mostly word processing, for example, you can get by with a less powerful—and less expensive—computer than if you intend to do desktop publishing or run lots of Windows applications.

Not doing your homework beforehand. While benchmarks and test procedures vary from reviewer to reviewer, product reviews can be a valuable guide to a computer's performance. Don't forget that friends, colleagues, user-group members, and even bulletin boards can offer useful suggestions as to which computer to buy—and which computer to steer clear of.

Buying too little random access memory. As the adage goes, You can never be too rich or too thin—or have too much RAM. Especially if you're planning to use software that runs under Windows. You're going to need at least 4MB of RAM; some experts suggest 8MB. "Sixteen would be even better," says Jerry Siegel, a computer consultant in Hollywood, Florida. Even with RAM prices higher than usual right now, it's one of the least expensive upgrades you can make.

Buying too small a hard drive. Just a few years ago, a 40MB hard drive was considered quite roomy. But now that Windows has burst onto the scene, PCs with hard drives as large as 250MB are not uncommon. That's because some Windows programs, such as Word for Windows 2.0, grab upwards of 10MB of hard disk space and require lots of room to run.

Buying a microprocessor (CPU) that can't be upgraded. While the 386 computer you buy today may be adequate for now, chances are that before long you'll need a PC with a 486 processor to run the newest software. By spending a little more to buy a PC that's upgradable, you won't have to junk the thing a year from now.

Spending big money to upgrade your old PC. Now that computer prices are down, it's hard to justify the cost of outfitting your old computer with a bigger hard drive or a color monitor. "Throw away and buy new," suggests Robbie Robertson, a consultant in Waterloo, Iowa, "or better yet, sell the old while there is still a market for it, and buy new."

Buying the latest and greatest system on the market. While you shouldn't buy less computing power than you need, there's no reason to buy more. State-of-the-art systems

often carry a premium price. For example, a top-of-the-line PC equipped with Intel's 66-MHz 486DX2 chip sells for about \$3,000 these days, while you can get a slightly slower PC with a 50-MHz chip for \$1,000 less. If you're like most users, the difference in speed will be far less noticeable than the dent in your bank account.

Failing to arrange for good technical support. Unless you're handy with a screwdriver and unafraid of tinkering with your AUTOEXEC.BAT file, you'll want to pick a PC vendor that offers prompt, reliable technical support. Some companies offer on-site service, others offer a toll-free hot line, while still others let you sink or swim on your own. It may also make sense to invest in an extended warranty.

Paying cash. If your credit card offers a buyer protection plan, it's a good idea to use your card, rather than cash or a check, to buy your PC. This way, you're protected if the computer you get turns out to be a lemon or the company you bought it from goes belly up.

Grabbing a deal that seems too good to be true. These days, some PC vendors are hawking 486-chip systems for rock-bottom prices of under \$1,000. But not all 486s are alike, warns Yisroel Goodman, a consultant in Far Rockaway, New York. "[A low price] does not mean that [the company] put together a balanced system and then discovered to their delight that they could sell it for \$995," Goodman says. "It means that they purchased the cheapest components they could in order to assemble a \$995 system."

If you look before you leap, use your money wisely, and match your purchase to your purpose, you'll find the bargain that's waiting for you. □

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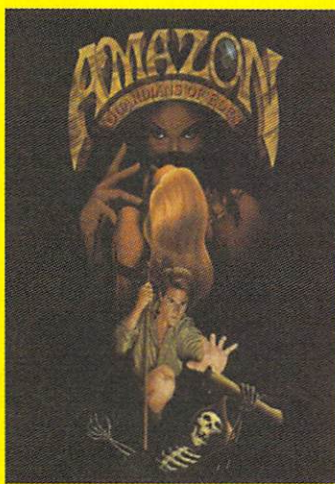
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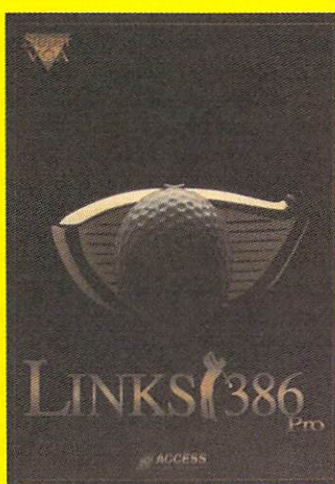
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MULTIMEDIA PC

David English

MULTIMEDIA MEGASHOW

It's billed as the world's largest multimedia event, with over 10,000 attendees and 150 exhibiting companies. Last year it acquired the weighty title of The Seventh Annual Conference & Exposition on Multimedia and CD-ROM. This year, it was simply called *intermedia*.

On the conference side of *intermedia*, attendees heard a lot of talk about converging technologies (though one speaker noted that "colliding cultures" would be a more appropriate way of putting it). Everyone, it seems, is either anticipating or dreading the coming merger of computers, cable television, broadcast television, publishing, consumer electronics, telephones, movies, and the recording industry. Not surprisingly, computer and software companies are rushing to form alliances with companies in other fields, so as not to be left behind. Microsoft, for example, showed a computer-enhanced television that lets you view real-time statistics and order stadium tickets while watching a baseball game.

Meanwhile, back on the show floor, you could almost smell the optimism in the air as companies displayed their latest crop of multimedia products. Warner New Media dazzled showgoers with *Hell Cab*, a nightmarish ride with a New York cab driver who is out to capture your soul. Stunning 3-D graphics and sound make this Macintosh CD-ROM a ride to remember. A PC version should be cruising the streets soon.

Microsoft announced three new CD-ROM titles, including Microsoft Dinosaurs, a sumptuous look at everyone's favorite former earth rulers. Dinosaurs includes over 1000 high-quality illustrations and photo-

graphs, 200 background articles, plenty of ambient sounds and growls, and even dinosaur screen savers. Microsoft worked with The Dinosaur Society to verify the information and included a section for us old fogies which explains that many of the dinosaur facts we learned as kids are no longer true. The other new Microsoft titles are *Multimedia Mozart: The Dissonant Quartet* and *Multimedia Stravinsky: The Rite of Spring*. Like *Multimedia Beethoven: The Ninth Symphony*, each contains a famous work of classical music and a wealth of background information.

DeLorme showed the follow-up to its popular CD-ROM applications, *Street Atlas USA* and *MapExpert*. It's called *Global Explorer*, and it contains street maps for more than 120,000 places worldwide, as well as detailed topographic maps for the entire world. Asymetrix introduced a powerful multimedia presentation program called *Compel*, with extensive video, animation, and sound support. In a break from its usual hardware products, ATI demonstrated its new video editor, *MediaMerge*. It lets you edit video files, record and edit audio, and add a variety of transition effects.

Other new CD-ROM titles include *Jazz: A Multimedia History* from Compton's *NewMedia*, which lets you hear as well as read about the legends of jazz, from Duke Ellington and Louis Armstrong to Miles Davis and *Weather Report*; *Interactive Venture's Mayo Clinic Family Health Book*, which includes 45 animations and 500 color illustrations, in addition to 1300 pages of interactive text; *The Compleat Beatles* from Compton's *NewMedia*, which includes the entire documentary film, *The Compleat Beatles*, as well as text from the book of the same name; *Voyager's A Hard Day's Night* (initially available on-

ly for the Mac), which includes the entire Beatles movie, the movie's script (which can automatically scroll with the movie), and a preview trailer; *TestDrive Software System*, a new quarterly CD-ROM from TestDrive, which lets you try out and optionally purchase major PC applications; and the 1993 edition of the *New Grolier Multimedia Encyclopedia*, which includes dynamic maps and audio-visual essays.

Adult CD-ROMs drew a lot of attention at *intermedia*. Popular adult movies are now available on CD-ROM. Titles include *House of Sleeping Beauties*, from Pixar; *Hidden Obsessions*, from Romulus Entertainment; and *Things Change: My First Time*, from PC CompoNet. At a special session devoted to the future of erotic multimedia, *Penthouse* wowed the crowd with its first CD-ROM title, *Penthouse Interactive*. It lets you become the photographer in a *Penthouse* photo shoot.

On the hardware front, you can now equip your PCMCIA-equipped laptop or notebook computer with a variety of multimedia options, including a sound card (MediaShare's *Tempo*), a video capture card (MediaShare's *Focus*), and a SCSI adapter (Trantor's *SlimSCSI*). NEC showed the first double-speed portable CD-ROM drive, the *NEC MultiSpin 38 Portable CD-ROM Reader*. Media Vision displayed its new *Pro Audio Studio 16* package, which includes an improved 16-bit sound card, voice recognition software, and a small microphone. Creative Labs privately showed me its own voice recognition software, which will be available soon for its sound cards. Finally, *Gold Disk* demonstrated *VideoDirector*, which lets you use your computer to control both your home VCR and camcorder, allowing you to quickly and easily edit your videotapes. □

There were a lot of new multimedia products at this year's *intermedia* show.

128 feet and two floors away you'll still get great sound from your stereo... without wires!

Amazing new technology gives you the power to broadcast your favorite music through walls, ceilings and floors to wireless speakers anywhere in or around your home.

by Charles Anton

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State of the art sound.

These wireless speakers will work with any stereo, TV or VCR. And wait till you hear how they sound. The four-inch full range speakers deliver deep, rich bass and crystal clear highs. You'll get the perfect volume for any room because each one has its own volume control on/off switch. Plus, they have separate treble and bass controls.

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Chase transmitter

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Are you concerned about:

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- **Value.** *You want to get your money's worth out of your stereo equipment, tapes and CDs by listening to them more often and in more places.*
- **Quality.** *These wireless speakers use FM technology to transmit static-free music throughout your home.*
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Patented technology. These incredible Chase speakers use a patented FM technology to broadcast wirelessly through your home's walls, floors and ceilings. In fact, at the Annual Consumer Electronics Show, they were dubbed "one of the most exciting new products of the '90's."

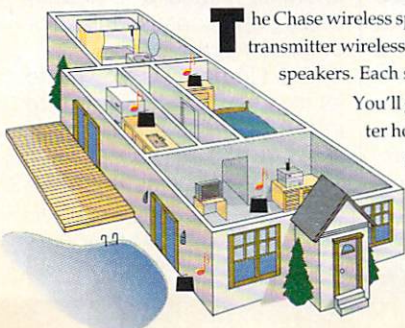
Easy installation. The powerful Chase transmitter plugs into a headphone, audio-out or tape-out jack on your stereo, CD player, VCR or TV. Use *one* transmitter to send both left and right channels to an unlimited number of speakers. Or use *two* transmitters to send the left and right channels separately to get full stereo separation on as many pairs of speakers as you want.

'No Questions Asked' guarantee. With every product from Comrad, you get a complete "No Questions Asked" 30 day money-back guarantee.

Plus the wireless Chase speakers come with a 90 day manufacturer's warranty. If you're not completely satisfied for any reason, return them for a full refund.

Factory direct offer. For a limited time, we can send these amazing wireless speakers direct-to-you far below the \$149 retail price. Now through a special promotional campaign, the Chase wireless speaker is only \$79. Order more than one, and your additional speakers are only \$69 each. The wireless transmitter is only \$29.

HOW DO THEY WORK?



The Chase wireless speaker uses a breakthrough patented FM technology. A small transmitter wirelessly broadcasts music through walls, floors, and ceilings to your speakers. Each speaker has a built in receiver so no wires are needed!

You'll get a complete 150-foot range, giving you great sound no matter how large your home. And because this system uses radio signals unlike "line of sight" infrared systems, you'll get static-free transmission...even through walls!

A single transmitter can broadcast to an unlimited number of wireless speakers. The speakers with their built-in receivers and amplifiers can then provide music from your sound source anywhere around your home—even outside!

Circle Reader Service Number 199



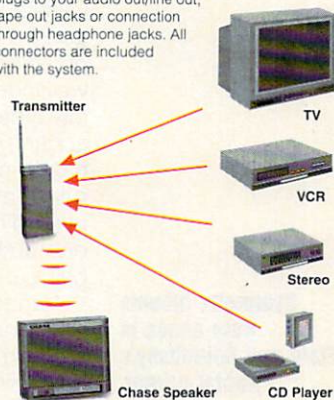
Chase's wireless speaker breakthrough.

This amazing wireless speaker has its own built in receiver and amplifier. Utilizing FM technology for a 150 foot range through walls, they can blanket even the largest home with clear, crisp music. Designed in an "acoustically balanced" bookshelf size (9H x 9.5W x 3.75D") it operates on four 'D' batteries or with an optional AC adaptor.

Broadcast wirelessly from virtually any sound source.

Broadcast to wireless speakers through walls, ceilings and floors up to 150 feet.

Easy hook-up of the transmitter to virtually any sound source with RCA plugs to your audio out/line out, tape out jacks or connection through headphone jacks. All connectors are included with the system.



So, take advantage of this direct offer and purchase your wireless transmitter and as many speakers as you need to fill your home with music.

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*Discount of \$10 on each additional speaker you order.
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Robert Bixby

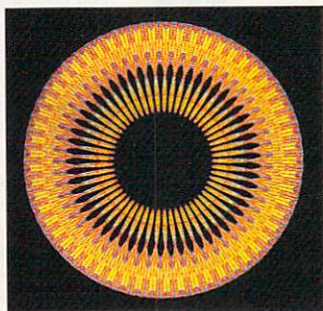
BY THE BOOKS

Each month, we receive dozens of books for review. For some reason, most of them come addressed to me. Since this is a column about publishing, I thought I might take a moment to talk about the books received as a group and to single some out for attention.

Generally, computer books are here-today-gone-tomorrow books, temporarily a step above periodicals: a slightly longer pause for paper between the forest and the recycling bin. Not even used-book dealers are interested in old computer books. On the other hand, during their brief lifetimes, computer books are invaluable. They need to be ruggedly made, easy to read, full of reference material, and well indexed. The rigor of rapidly creating good books from scratch that have a 6- to 18-month shelf life has been the ruin of more than one publisher (and has caused more than one author to tear his or her hair out).

Random House, like a lot of major publishers, is a relative newcomer to computer-book publishing. Its books are mark-

edly more attractive than the general run of the mill. If you think you know what a computer book looks like, you should take a look at Random House Electronic Publishing's books. They use ample, but not excessive, color, and the covers are as attractive as those of any trade paperback. Look for Robin Raskin and Carol Ellison's *Parents, Kids, & Computers* (ISBN 0-679-73910-6, Random House Electronic Publish-



ing, \$20) if you want to see what can be done with computer books.

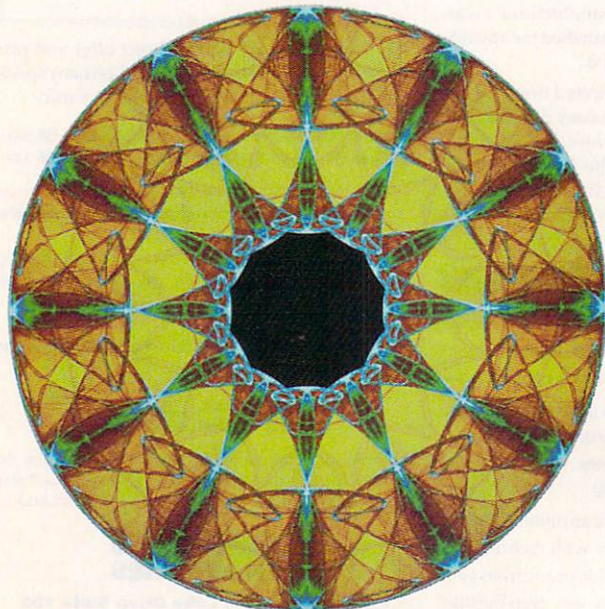
We receive many books on fractals. I've probably seen no fewer than a dozen in recent months. These books generally have the look of a good art book, full of beautiful full-color illustrations. *Symmetry in Chaos: A Search for Pattern in Mathematics, Art, and Nature* by Michael Field and Martin Golubitsky (ISBN 0-19-853689-5, Oxford University Press, \$35) is a little more than the standard fractal book, in that it explains in layman's terms what is meant by *symmetry* and *chaos*. It goes into the mathematics behind the fractal designs and even provides a collection of BASIC fractal programs. Having published books containing programs (and macros) myself, I can forgive the fact that there are some typos in the programs. Be forewarned: Use a little common sense when typing in the programs. You'll find some errors. I don't think there is a prac-

tical way to eliminate them from program listings published in books.

Computer art books come and go, but some have lasting and universal interest. *The Computer Artist's Handbook* by Lillian F. Schwartz (with Laurens R. Schwartz; ISBN 0-393-02795-3, W. W. Norton, \$55) tells you much more than how to draw a circle in a paint program. Lillian Schwartz is one of the true pioneers of computer art. She started creating art with computers before computers were seen widely as a medium for art, back when the initial stabs at computer graphics were being made in the inner sanctums of IBM and AT & T. She talks about how she created many computer masterpieces. Along the way, she drops hints for creating images and illusions with the computer, as well as describing the circumstances of some of her great discoveries. You may recall that a few years ago an artist serendipitously discovered that the Mona Lisa was actually a self-portrait of Leonardo da Vinci. Schwartz was the discoverer of that secret, and the story of her discovery, complete with sketches and computer enhancements of the painting, an x-ray of the Mona Lisa, and the original cartoon for the Mona Lisa are provided. In addition to teaching a great deal about the computer as an artist's tool, Schwartz goes a long way toward showing the kind of innovative thinking an artist must go through in order to create original art. Virtually every page contains full-color computer graphics.

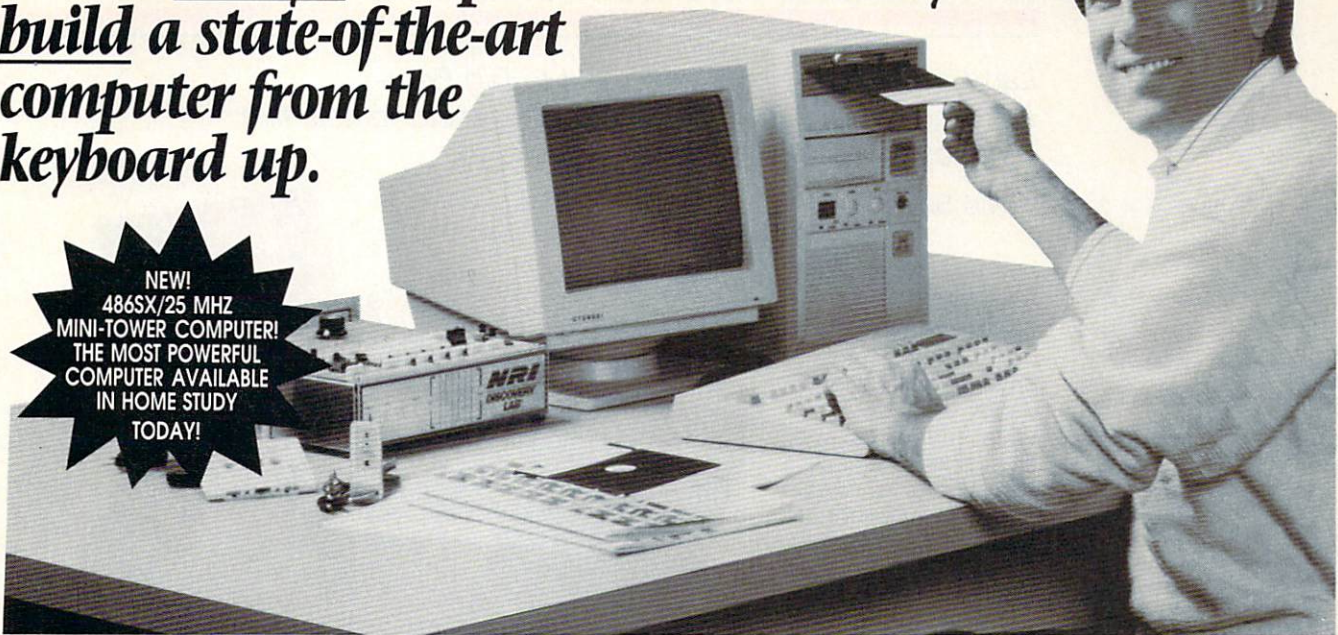
Don't forget to write to me to let me know what you're up to in the publishing world. Remember that I want to hear about your projects and your interests—and that I'm soliciting publishing and graphics tips for publication. □

Symmetry blooms from chaos in Field and Golubitsky's fractal primer.



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DISCOVERY CHOICE

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David Sears

STUNT ISLAND

Back in the early days of filmmaking, daring young aviators often ended a day of breathtaking aerobatics with grievous injuries. Disney Software's Stunt Island—equal parts flight simulator, production studio, and Hollywood magic—manages to extract the danger and intensify the fun. Suddenly, those of us with the urge to barnstorm can prove our mettle for some virtual dollars and even make some movies. More important, however, we can now go behind the scenes and play the roles of director, set designer, property manager, and stunt man. Wearing all those hats proves an educational experience, and as an introduction to Hollywood-style filmmaking, it's a bargain that film school tuition can't hope to beat.

Somewhere at sea, protected from the pesky mainland safety regulations, Stunt Island waits, the site of countless chase sequences, airborne rescues, dogfights, and fiery crashes. The studio anticipates certain dire circumstances and even provides hospital facilities to patch up stunt fliers, but fly straight. If you foul up too often, you'll flunk out of the competition.

Besides just flying around the island scouting locations for stunts, flying in the Stunt Pilot of the Year competition is probably the best way to acquaint yourself with the environs. Each stunt in the competition is controlled by a script similar to the ones used to film entire movies. You'll have a limited number of takes to accomplish the stunt, but each failed attempt costs you

and the studio money. Besides, you should perform dangerous stunts as few times as possible.

In the competition, you'll shoot down a World War II Zero, snag a balloon gondola using a wingtip, pilot a hang glider into a medieval castle, land in a burger stand parking lot, egg-bomb the police from the cockpit of an angry duck, and much more. Through the competition, you'll encounter a few of the many planes that stock the prop department's hangars—everything from the Boeing 747 to the SR-71A Blackbird, the Sopwith Camel to the pterodactyl. Each of these aircraft handles much as you would expect it to, though to allow for seat-of-the-pants flying, the controls seem distilled down to a bare minimum.

The simulator itself is top-notch, especially considering the number of planes available. Except for the organic craft, each vehicle offers a detailed cockpit view along with

the traditional left, right, rear, and spotter plane perspectives—and what a view! On a speedy 80486, you won't notice any stick sluggishness even with 100-percent detail and dithering options active. These and other simulation characteristics are controlled from a pop-up panel accessible throughout the game.

The island itself is small enough to cross in a Curtiss June Bug without too much monotony, but it's probably the largest back lot Hollywood has ever seen. Practically any action sequence imaginable can be made here.

Stunt Island's educational value doesn't lie in its nifty flight simulator, though the chance to fly the 45 available planes is worth the purchase price. Actually, Stunt Island gives you the chance not only to fly stunts but to engineer and script them yourself.

From the Set Design screen, you can select any island location as your site.



Once you have a site in mind, stock your set! You may place up to 40 props on the set at one time, but only the first 8 will act as cameras. Of these, slot 1 belongs to the stunt plane, and slot 2 to the spotter plane. The rest of the slots can hold any object and be placed anywhere.

The cameras can take the form of objects, visible or invisible. Even the stunt craft and the spotter plane can become any object. From the hundreds of props, you might find the letter W makes an excellent and unique spacecraft—and why not? It's your movie. Why not film an invasion sequence as angry consonants storm the earth? Props range from historic landmarks, such as Big Ben and the Eiffel Tower, to the more mundane, such as road signs and boulders.

Positioning objects on the set and imparting them with motion characteristics such as pitch, yaw, and roll takes seconds using the pop-up control panels. If you can imagine in 3-D, planning an interesting set takes very little time; if not, the superb 3-D modeler puts everything onscreen for you as you place it, from the perspective you choose.

As mentioned, pilots complete stunts according to parameters set up by scripts. A script consists of events that you define using a set of intuitive pull-down menus within the Set Design screen. For example, you might want the pilot to guide his Bristol Bulldog between two trees to the left of a road. From the menus you can define the area between the two trees as a collision window. Then, whenever the aircraft passes through the window, an event has oc-

curred, and the program will follow further instructions you give for that event. These instructions can check time limits and aircraft speed, change the shape of objects, and trigger animation or sound. This abbreviated list only hints at the potential hidden under the Event option. Any stunt you can imagine, you can script here, and the process is much less taxing than writing even a simple program in BASIC.

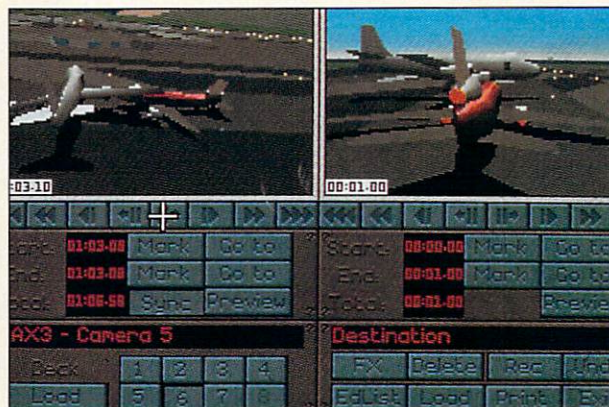
At the screening room, you can view the dailies—so called for their timeliness. If you choose to record a free flight instead of a stunt, you'll see a pilot's perspective of the flight. If, however, you fly a stunt with scheduled cuts from camera to camera and choose Auto Editing, you'll see the sequence unfold much the way it was intended, complete with point-of-view changes to props besides the aircraft and, of course, multiple shots of the same stunt. You can position the seven cameras with impunity. After all, in the virtual world of Stunt Island, both the cameras and the film are free, so you can use more than the average film budget could afford.

No studio can complete a motion picture without this postproduction essential: editing. Stunt Island gives you the opportunity to try your hand at a variety of techniques, such as cutting on action or using parallel action to heighten tension—and it also allows you to make some terrible decisions and put together a grade D film out of grade A takes. Essentially, the editing studio consists of eight video recorders that, if you use eight cameras when flying the

stunt, will hold up to eight separate rolls of processed film. These recorders can also load stock footage from other stunts, should you care to open the vaults.

To edit footage, you just mark the beginning and end of the footage you'd like to use in your film, using the logically labeled onscreen buttons. Next, copy the footage to the destination VCR. As you switch from source deck to source deck, fast-forwarding and rewinding, you soon develop a feel for construct-

IBM PC or compatible (16-MHz 386SX or faster), 2MB RAM, VGA, hard drive with 13MB free; supports most sound cards,



ing believable action sequences. The most valuable lesson that Stunt Island's editing room can teach neophyte filmmakers is that inspired editing can sometimes salvage the worst footage. For this to happen, editors must practice, and a few good books on editing could prove invaluable.

Aimed at film buffs and flight-simulator fans, Stunt Island seems too rare and too powerful to simply be called a game. With its straightforward approach to moviemaking, it could find a home in film school editing classes, and it just might inspire the next Spielberg—possibly you. □

joystick or mouse recommended—\$59.95

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Circle Reader Service Number 392

GAME INSIDER

Shay Addams

BIGGER GAMES, SMALLER GAME MAKERS

Since Links 386 Pro started the trend, everything from flight sims to chess, from war games to adventures is sporting SVGA graphics. A few of these include Buzz Aldrin's Race into Space (simulation), Empire Deluxe (strategy), Rags to Riches (business simulation), Battletchess 4000 (chess), Car and Driver (racing simulation), Trump Castle III (gambling), AV-8B: Harrier Assault (flight sim/war game), SVGA Air Warrior (flight simulation), the V for Victory series (war games), and Gateway II: Homeworld (adventure).

Among the most recent releases to show off SVGA graphics is Gateway II: Homeworld, Legend Entertainment's second graphic adventure based on Frederick Pohl's series of science-fiction novels. Instead of following the novels' plot line, designers Mike Verdue and Glen Dahlgren relied on the environment of the stories to create a fresh episode in the Gateway saga.

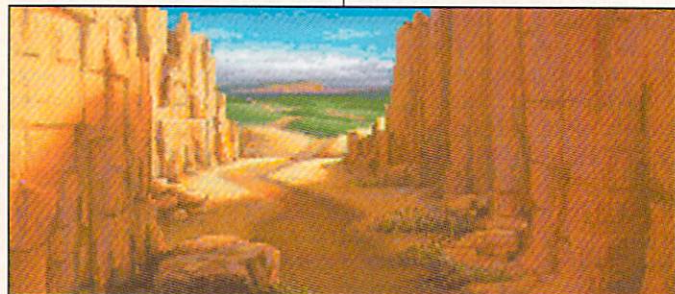
In this one you will travel the stars in your quest for the home planet of the Heechee,

a mysterious race of beings on the far side of the universe. If you enjoy puzzles based on operating high-tech gadgetry and devices, Gateway II is the way to go. Many of the puzzles revolve around such objects, and some have their own custom interfaces that eliminate the need for typing or even picking words from a menu.

Gateway II features more of everything that distinguished the first Gateway—digitized sounds, animation, and other

tered Lands. SSI may even opt to do only a CD-ROM version of M. That's because many of the space-consuming graphics would have to be trimmed or cut completely from a floppy-based version. SSI was one of three major developers that downsized in late spring. It lost 10 percent of the staff but, according to a spokesperson, it will still release 15 new titles this year as scheduled.

Sierra and MicroProse also reduced their staffs by 10 per-



special effects. The puzzles will be just as difficult, so Legend includes a free hint book in the package.

Legend is currently adapting another classic series—fantasy instead of science fiction this time—as an adventure. The Xanth novels of Piers Anthony are the basis for Companions of Xanth, due out about this time. Legend also publishes Steve Meretzky's Spellcasting quests, but the original Madman of Adventure is up to something completely different in his next game. It will still be a comedy, though: Meretzky's last shot at a "serious" adventure was A Mind Forever Voyaging, which some players dubbed A Game Forever Voyaging. Look for it any day now.

But don't keep looking for the PC version of M, SSI's science-fiction adventure. It's been postponed until next year, along with the Super NES version of Dark Sun: Shat-

cent. Sierra had some hits last year, but reportedly took a beating due to the high startup costs of The Sierra Network. Though MicroProse reported record revenues for the year, unfortunately it also posted record expenses.

Science-fiction scenarios continue to dominate the games scheduled for release as summer winds down and autumn kicks in. Two more science-fiction scenarios should be docking at a spaceport near you this month, each offering a different slant on spaceships and aliens.

Tsunami Media's Protostar, which is in the same vein as Starflight, will be ten times bigger. Tsunami calls Protostar "... our most graphically stunning game so far." That's saying a lot, considering the lush graphics of Ringworld.

Origin's Privateer, set in the Wing Commander universe, is also scheduled to show up about this time. □

From the classic Xanth series, Legend is developing Companions of Xanth, a fantasy adventure, for summer release.



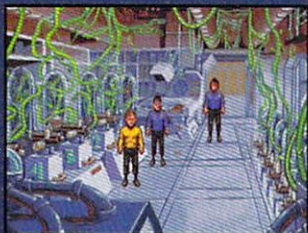
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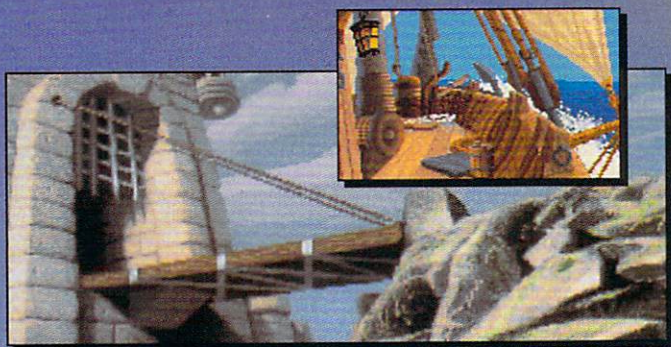
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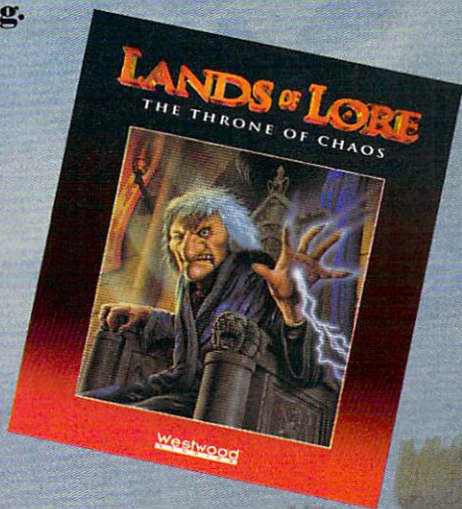
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Circle Reader Service Number 132

ENTERTAINMENT CHOICE

Holographic images and fluid gameplay help give this intense space-combat simulator its high replay value.

Scott A. May

X-WING

It took some time and a lot of effort, but the Force is finally with us! X-Wing roars onto computer screens as the further realization of a dream that began in 1977, with the introduction of George Lucas's *Star Wars*. Though initially intended as a campy homage to Hollywood's pulp adventure serials, the film instead carved a permanent niche in popular culture. Ironically, while the cinematic effects pioneered by Industrial Light and Magic have moved light-years beyond Lucas's original vision, today's powerful personal computers are only recently catching up. You could say, then, that X-Wing has actually been 16 years in the making. Spend some time with this landmark simulation and you'll agree—it was well worth the wait.

LucasArts' creation invites obvious comparisons to Origin's best-selling *Wing Commander* series. Both are similarly structured sci-fi epics, enhanced by cinematic segues, explosive sound effects, and in-your-face 3-D action. The two products differ, however, in direction and substance. *Wing Commander* could best be described as an arcade-style space shoot-'em-up. X-Wing, on the other hand, strives to be the first authentic space-combat simulator. It succeeds brilliantly.

The game draws its greatest inspiration from the original *Star Wars* saga, charting the formation of the Rebel Alliance against the evil Empire and the construction of the genocidal *Death Star*. A lengthy animated introduction sets the stage, with additional background information pro-



vided in the richly illustrated manual. Movie fans may be disappointed that such mainstays as Luke Skywalker and Han Solo are nowhere to be found. Instead, you become the lead character, fulfilling a destiny written in the stars.

All action is initiated from the space port on the Rebel flagship *Independence*. After pilot registration—incorporating the game's unobtrusive, manual-based copy protection—you're presented with several paths to follow. Pilot Proving Ground is the logical first stop for rookie space pilots, as this is where you'll learn the fine art of flying the X-Wing, Y-Wing, and A-Wing Rebel ships.

You're run through a series of holographic images that appear as a maze of floating gate platforms, twisting and turning into 3-D space. Each round must be completed within a set time limit, which becomes shorter the further you progress. This section offers your first taste of the game's realistic 3-D flight model and the remarkable control afforded by zero gravity. Complete

all eight courses in a given ship, and receive an honorary flight badge.

The next step in your training leads to the Historical Combat simulator, where you participate in re-creations of actual Rebel missions. Six missions of increasing difficulty are available for each ship type, allowing you to practice various skills in a series of combat, rescue, and reconnaissance scenarios. This is also the best opportunity to familiarize yourself with each ship's tactical strengths and weaknesses. Purely a simulation, with no impact on your pilot status, Historical Combat provides invaluable hands-on experience in almost every imaginable confrontation.

As they say, however, there's nothing quite like the real thing. At the heart of the program are the grueling tours of duty, three in all, for a total of 38 missions. You begin the game with the title of Flight Cadet, with the opportunity to advance five levels to the rank of General of the Alliance Fleet, earning various medals and awards along the

way. Mission types range from simple patrols and brief interdictions to full-scale attacks and defensive stand-offs. Make it to the final mission, and you'll re-create Luke Skywalker's bone-chilling trench run on the massive *Death Star*. Completed missions are automatically added to the historical simulator.

Preflight instructions are appropriately futuristic, featuring holographic map displays outlining mission objectives, obstacles, and way points. Missions are timed and must be completed within extraordinarily strict guidelines. Unlike *Wing Commander*, where the story continues as long as your pilot survives, failure to follow exact rules here results in a failed mission. Unfortunately, these rules are murky at best and are downright enigmatic at higher levels.

This brings up X-Wing's most controversial point: Instead of being a free-form combat simulation, it is rigidly structured, with only predetermined outcomes. Such restrictions leave no margin for error, thus discouraging spontaneity and creative solutions. On the other hand, the game forces you to stretch the boundaries of skill and imagination beyond what simple arcade shoot-'em-ups can offer. Though this causes X-Wing to be often outrageously difficult, the result is replay value far higher than that of previous efforts in the genre.

Gameplay is tight, yet fluid, aided by spectacular graphics and sound effects. Cockpit designs are handsomely rendered in 256-color bitmap overlays, with 17 different view angles. Main features include forward and rear sensors with color-coded identifi-

cation and quick placement of surrounding craft. The central combat multiview monitor helps you identify enemy ships, as well as scan for shield status, damage, and sections vulnerable to attack.

One of the most useful skills you must learn is how to shift your ship's energy among engines, shields, and weapon regeneration. An R2 Astromech droid serves as your copilot, reporting damage, performing repairs, and providing a communications link with other ships. It also allows in-flight access to sector maps and a review of mission directives.

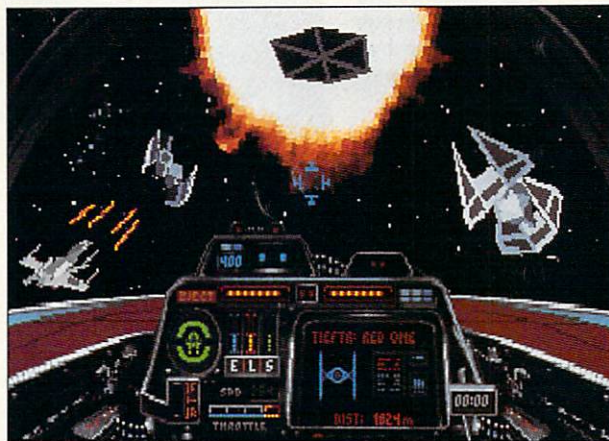
Weapon systems increase proportionally in power and number with each upgrade in ship design. X-Wings are armed with laser cannons and proton torpedoes, while the medium-range Y-Wings come equipped with additional icon cannons. The heavy-duty A-Wings pack the biggest wallop, boasting an array of devastating concussion missiles. Weapons fire with a satisfying burst of light and sound. Destroyed alien ships ignite in breathtaking bitmap explosions. The fiery destruction of larger ships is particularly well done, starting with a chain reaction of small eruptions and climaxing in a thunderous fireball.

Outside views of all ships are rendered in solid-fill polygons, a design decision that pays off with superb 3-D modeling and a smooth, rapid frame rate, even on slower machines. Although the publisher recommends an 80386-based system, user-defined graphics detail allows the game to run surprisingly well on a fast 80286 machine. In addition to LucasArts' iMUSE

interactive soundtrack, users with Sound Blaster-compatible sound cards will also enjoy crisp digitized speech. Few sounds are as chilling, however, as the unholy roar of TIE fighters screaming across your path.

Perhaps the game's most dynamic and helpful accessory is the in-flight recorder, identical to one used in *Secret Weapons of the Luftwaffe*. Combat footage can be played from almost any point of view, during missions or afterward in the space port film

IBM PC or compatible (80386 compatible recommended); 1MB RAM (additional features supported with expanded memory); 256-color VGA; hard drive; high-density floppy drive; joystick or mouse (joystick recommended); supports Sound



room. Use it to study unsuccessful missions to learn from your mistakes. Use the highly maneuverable free-floating camera as a sophisticated reconnaissance tool, exploring areas of this virtual reality otherwise unseen from your cockpit view.

Intense combat action and levels that rapidly increase in difficulty may keep X-Wing beyond the reach of casual fighter jocks. But for those with the skill and tenacity worthy of a Rebel space pilot, X-Wing brings the excitement born in a galaxy far, far away a little closer to home. □

Blaster, Ad Lib, Roland, Pro AudioSpectrum, and compatible sound cards; General MIDI supported—\$69.95

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Circle Reader Service Number 393

GAMEPLAY

Paul C. Schuytema

CREATE AND CONTROL

Do we have an innate desire to better humanity? Perhaps an entrepreneurial drive? Or is it simply an egotistical desire to play God? Whatever drives us, controlling a world with broad, sweeping gestures that affect untold numbers of people is deeply satisfying. Fortunately, with the aid of several excellent games, we can satisfy the lust for total power without any of the potentially dangerous repercussions.

Experience the power of being a god—admired and hated—in one of these fascinating simulations.



Populous II

Populous II: Trials of the Olympian Gods (Electronic Arts) is a true player-as-God game set against the pantheon of ancient Greece. You assume the prowess of a son of Zeus and control the fate of a civilization of loyal worshipers. The game endows you with true Olympian abilities, allowing you to raze the land with the click of a mouse button. An unfaithful enclave resides along the coast? No problem, simply lower the ground into the sea and be rid of it.

In Populous II you possess the ability to endow a leader, from Adonis to Odysseus, with heroic stature, enabling him to fight with valor and inspire the moral fortitude and wonderment of his people.

You can mold the world to suit your tastes as well as command the devotion and actions of the petty humans occupying it.

Moving a notch down from the godlike powers of Popu-

lous II, Civilization (MicroProse) is a tried-and-true game of civilization building. The game gives you complete logistical control over a budding tribe of Homo sapiens which has just made the move from hunter-gatherers to village settlers. It's up to you to guide and develop this fledgling civilization first to world prominence and, eventually, to space migration to Alpha Centauri.

In a wonderfully intuitive interface, you move from detailed control screens representing single cities to a cartogra-



Civilization

pher's-eye view of the whole explored world. Every detail is at your control, from what advancements to pursue to what fields to irrigate to where to lay down the railways.

You get a hands-on, what-if experience of developing an entire culture from the ground up. You literally create the world and administer laborious tasks, such as building infrastructure or protecting the realm, to the citizens. You can even cause a revolution that causes the civilization to shift from one form of government to another.

SimCity for Windows (Maxis) is the latest edition of the best-selling city simulator. Even more specific in focus than Civilization, SimCity concentrates your attention on developing and managing a growing city. By fully utilizing Windows' power to display simultaneous windows of information, SimCity allows you to monitor the lay of the land and the

block-by-block details of the city, as well as a host of graphs charting development—or decline.

You still have a sense of playing God—or perhaps *boss* would be a better term—as you face block-by-block development of the city. Ground must be bulldozed, power plants must be built, and suspension wires need to be constructed. Roads must be laid to provide optimum traffic flow, and police and fire districts must enforce the peace and safety of the citizens. All of this costs money, of



SimCity

course, so taxes must be raised and spent.

Managing the design and development of a city or attempting to control one of the real-world cities included in the game, you get a feel for the interlocking nature of human society and how one move affects many variables. In addition to the man-made variables, you must plan for and contend with natural disasters such as flooding and earthquakes—all the while keeping an eye on the mood of the populace.

Power mongering: It's an enticing and disturbing human trait. Thanks to these great games, we can work through our delusions of megagrandeur on the privacy of our own PCs. Then all we must deal with is the very real potential of addiction. In the words of Edmund Burke, "Those who have once been intoxicated with power . . . can never willingly abandon it." □

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Episodes two through six are sold separately and can be purchased by calling Apogee's toll-free number, shown above.

Circle Reader Service Number 300

Not Recommended for Younger Viewers Due to Realistic Depictions of Violence

Wolfenstein 3-D requires an IBM or 100% compatible computer with 640K RAM, a VGA graphics card, and a hard disk drive. Extended memory (XMS), expanded memory (EMS), joystick, and mouse are optional. IBM is a registered trademark of International Business Machines, Inc. Sound Blaster is a registered trademark of Creative Labs, Inc. AdLib is a registered trademark of AdLib, Inc.

APOGEE

P.O. Box 476389
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id
SOFTWARE





Wars of the Distant Past

War, an aqueduct, a castle, and a samurai sword—these three are icons of the bygone days that we can now experience on our PCs. The distant past was a time of radically different cultures, primitive technologies, and, of course, war. In the Roman Empire, cohorts (divisions of a Roman Legion) patrolled the provinces, repelling the barbarians and maintaining the emperor's sovereignty. In feudal Europe, barons battled barons for papal favors, the wealth of the land, and a chance to be crowned king. In feudal Japan, the code of honor known as Bushido governed the samurai, who fought across rice fields to strengthen the power of their lords.

We can read about distant history because the actions of the movers and shakers of the time are recorded. But what was it really like? What was it like to make decisions in a time in which values and goals were radically different from those of today? Now we can find out. Several excellent computer games take us back through the centuries and allow us to learn history through action and strategy and to struggle for success much as the royalty of the time had to struggle to obtain and maintain power. Beyond being lessons in history, the games we'll look at offer serious challenges, forcing players to adopt strategies that fit within the context of the times they simulate.

Caesar

This game from Impressions takes us back to the first century B.C., when the first Roman emperor, Augustus Caesar, came into power. You begin the game with the title of citizen. You are the governor of a remote province of the empire. You must develop and nurture the province to prosperity in order to receive a promotion and relocation to another, more valuable province. With careful planning, proper tributes, and a warlike strategy, you can achieve the ultimate goal: being crowned emperor.

You're forced to focus mostly on the capital city of the province and to guide its development. When the game begins, the province is barren; you find only a few small villages dotting the countryside. A fort rests where the capital will be built, and a cohort is ready for patrol duty. The capital is built from the ground up, with the social and

By **Paul C. Schuytema**

political heart of all major Roman cities, the forum, at its center. Using an interface somewhat reminiscent of SimCity but far more detailed, you lay down roads and place residences, which begin as small tents. Water, certainly one of the prime requirements for any civilization, must be made accessible, and reservoirs can be built to trap the water. Aqueducts can be laid to bring water into the fledgling city, and a fountain will make the water accessible.

You continue to develop the city, enlisting the aid of your advisers at the forum. They give you advice such as which industries will likely flourish in the province and the proper allocation of the plebs in the work force. Bath houses, plazas, hippodromes, coliseums, and schools can all be built.

The city-building aspect of Caesar is a fascinating voyage into the world of the Roman Empire. Impressions has gone to great lengths to make sure that the type of structures and the development of the city are in line with the historical and archaeological facts. As the city grows, you must build larger forums to effectively govern the growing acreage. You get a real sense of being there.

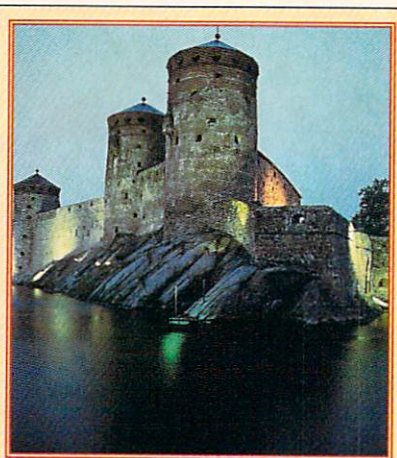
However, Caesar goes far beyond the construction of a city. By utilizing the forum's advisers, you gain insight into the multitude of variables affecting life in a Roman province, from conscription service to developing stronger cohorts.

You must also develop the entire province, linking the small villages to your capital via provincial roads and linking your capital to the imperial highway system. The game allows you to construct grand, sweeping walls and battlements, and you can build additional forts that in turn create new cohorts.

Eventually, barbarians will rush in and attempt to capture your capital, and the cohorts must then be sent to attack. You control the formations of the units, and as a conflict progresses, losses in numbers as well as morale are documented.

Soon, Impressions will release Cohort II, which you will be able to link to Caesar. This will provide you with man-by-man control of the battle using Impressions' microminiatures gaming system.

As a city management program, Caesar certainly succeeds, but as an entire game of provincial management in the Roman Empire, it is exciting and addicting—not to mention exhausting.



Medieval Castles

The medieval castle was not a structure meant primarily for defense; its purpose was to dominate. A castle could easily influence lands within a 25-mile radius, since 30 miles was within a day's march for the average foot soldier.

During times of attack, peasants, livestock, and property could be brought into the castle for protection. The castle walls, as well as the height advantage for archers and for dumping all nature of things upon attacking forces, meant that an attacker would need at least a four-to-one advantage to have any hope of taking a castle.

A castle was not merely the site of courtly love and stately banquets. The average castle generated the clamor that our large factories produce, and people would have to shout if they hoped to be heard over the chopping and hammering. A castle, as opposed to earlier, fortified towns, was not community property; it was a personal possession of the king, the queen, or a baron.

Contrary to what many might think, the castle was economical to build. Labor was cheap and often free, and raw materials needed only to be amassed. In building a castle, the greatest cost was time. After the plague, though, the situation changed, and labor prices rose because of the shortage of skilled craftsmen.

Castles II: Siege & Conquest

A medieval simulation based on fourteenth-century France, this Interplay game begins on January 1, 1312, just after the king of Bretagne (the mythical France in the game) dies without

an heir. The kingdom is divided into territories controlled by rival lords who are all vying for the throne. To become king, you must unite enough territories to secure your strength and then petition the Pope for the right to wear the crown.

Castles II is a surprisingly addicting game of logistics and aggressive acumen, making it a task-based game. This means that you initiate an action (which takes time to complete) and then wait for the results. There are three different general sets of tasks: administrative, military, and political. An example of an administrative task is gathering timber resources, while a military task might be recruiting forces, and a political task might entail sending a diplomat to demand a tithe from a rival lord.

Managing tasks may seem dry at first, but there is a real challenge inherent in the logistical distribution of task points to maintain an optimal efficiency. While tasks are the main means of controlling the game, you also have the opportunity to design, from the ground up, any of the castles you wish to build. The castle design portion of the game is intriguing, and you can place low or high walls, square or round towers, gates, moats, and keeps. You can choose to build the castle walls first or construct the keep first. If you design a truly magnificent castle, you can save the design for future use.

In Castles II, not only is a castle a defensive tool, but it also assists in nearly every aspect of the game. A large enough castle will keep neighboring territories from revolting and can double the production rate of the territory's commodity.

Combat can be handled as a computer simulation, or you can choose to make all tactical decisions on your own, controlling each knight, archer, or infantry unit individually.

Diplomacy and careful planning are the keys to victory, but your fortune may change unexpectedly due to some developing plot or rival alliance. Also, good relations with the papacy are imperative, since only the Pope can legitimize the crown.

Castles II is a good-looking game in which most of the action occurs on a single screen. The only time the screen shifts views is during a tactical battle or when you choose to visit a territory to build a castle or check on its progress. The game also features a series of video clips which accompany important actions, most taken from the sweeping black-and-white epics of the 1930s and 1940s.

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Circle Reader Service Number 201

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Conquered Kingdoms

QQP's ancient history entry is a medieval war game in the same vein as the popular Perfect General series. You battle either the computer or another player (live or via a modem connection) in a game of geographical conquest.

In Conquered Kingdoms, you control units which represent a group of individuals such as archers or knights. Each scenario begins with the selection of troops, using points to buy units and place them on the multiscreen map.

The game progresses in turns, enabling each side to move. Then, the battles are resolved. At first, Conquered Kingdoms seems a cryptic and abstract war game, but after several turns, the depth truly comes through. Resources need to be captured and managed, as do castles and towns. By carefully managing resources, you can create reinforcements that can be placed in any castle you hold.

Conquered Kingdoms is a game of details and careful planning, and a single scenario can easily last many hours. The excitement of controlling an entire army, piece by piece, in a giant medieval chess match, grows with every turn, and the ability to control units in a semitactical sense allows for strategies regarding formations and the development of lines of strength. By making the scale much larger than an actual one-to-one correspondence, you have the opportunity to react to and use a myriad of terrain types and to cover a lot of land in little time.

QQP is noted for games that possess simple yet sophisticated interfaces, and Conquered Kingdoms is no exception. Virtually every action can be handled by intuitive mouse clicks, and the program takes care of all of the dirty work (like movement restrictions) by means of various terrain types and enemy lines of sight. The game truly allows you to concentrate on organic strategy rather than on rules or icon manipulation.

Because of the depth and challenge of Conquered Kingdoms, it will be a long, long time before you'll be able to master all the scenarios and the incredible complexity of the artificial intelligence of the computer opponents. Playing against a human opponent is even more rewarding, and it's especially exciting when you are playing by modem and seeing only the results of your opponent's actions (but you might want to find a local opponent or play through

CompuServe's MTM service to save on phone charges for the lengthy calls). You can even play opponents by E-mail, utilizing a special save feature of the game.

Conquered Kingdoms also has an option that, while not exactly true to historical fact, allows you to control fantasy units such as trolls, dragons, and wizards.

Relive ancient
history as you
struggle for power
in one of these
addicting games of
strategy.

Conquest of Japan

A tactical simulation of samurai conquest from Impressions, Conquest of Japan brings sixteenth-century Japan to life. The game consists of a battle between two daimyos (lords) on the main Japanese island of Honshu, each controlling five cities—and each wanting total control of all ten cities. One player can compete against the computer, or two players can go head to head.

The game is somewhat reminis-

cent of the excellent Milton Bradley board game Shogun, but it features an extremely detailed combat system. The overall strategies of the game are straightforward: The game begins with the recruiting of five armies and the decision as to what portion of the forces to leave behind to defend the cities.

Movement of the armies is a simple one-step-at-a-time sequence until two armies run into each other. During the course of the campaign, the towns collect revenues that can be used to recruit more troops.

Conquest of Japan comes alive, though, when two armies meet for battle. Utilizing Impressions' own microminiatures system, the battle is played out at a truly tactical level. The first step for a battle is to select one of the traditional troop formations, from the all-around *Ganko* (birds in flight) to the defensive *Gyorin* (fish scales). The view shifts to an overview of the battlefield, and orders can be given in nearly any combination or detail imaginable.

The interface allows commands to be given to individuals, to a group (such as a line of spearmen), or to the army as a whole. Communication is important on the battlefield, and groups of troops must have a signalman to follow your orders. If a signalman is killed, another must be assigned, or you risk losing the units due to noncommunication.

During the battle, all manner of information is available to you, such as morale and current attack strength. Perhaps the most powerful feature of the battlefield controls is the ability to alter, split, and regroup your forces into any of 24 formations.

The incredible depth of tactical control takes a while to get used to, but complex and effective battle strategies are the result of a little patience. You can achieve the genuine feeling of commanding a sixteenth-century samurai army.

In the Present Tense

By combining many levels of gameplay with historical accuracy, these games can truly be windows into several very exciting eras of our ancient past. Each of these games plays within the rules of its respective time period, allowing you to step back and enjoy the decisions and challenges of those times while learning about the limitations and advantages of a multitude of tactics and technologies. A weekend spent in ancient Rome, medieval Europe, or feudal Japan can become an educational addiction. □

Buyer's Guide

Caesar—\$59.95

Cohort II—\$29.95

Conquest of Japan—\$59.95

Impressions

7 Melrose Dr.

Farmington, CT 06032

(203) 676-9002

**Castles II: Siege &
Conquest—\$59.95**

Interplay Productions

17922 Fitch Ave.

Irvine, CA 92714

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64/128 VIEW

A veteran 128 publication turns its editorial eye on the 64 with the launching of *Twin Cities 128/64*.

Tom Netsel

Gazette celebrated its tenth anniversary when the July issue rolled off the presses. That's almost 120 issues. (We missed a couple during the summer of 1990.) *RUN* made it to issue 99 before it closed its final page.

Computer magazines come and go, and those that hitch their editorial wagons to one machine often experience a meteoric ride. Some flash onto the scene, burn brightly, and then fizzle away; while others maintain a steady glow.

Gazette started its association with the 8-bit Commodores by focusing on the VIC-20 and the 64, adding coverage of the Plus/4, 16, and 128 when those machines came along. When the 64 and 128 emerged as the leaders, we followed the numbers and concentrated our coverage on those machines. Surveys tell us that 70 percent of you own 64s.

Few publications have devoted coverage exclusively to the 128. *Twin Cities 128* was the exception. Founded by Loren Lovhaug in 1985, *TC 128* was primarily a technical publication that appealed to 128 programmers. It had its fans, but they were not enough to keep it in operation. It folded in 1991.

And then along came John W. Brown, president of Parsec. He bought the rights to the magazine a few months later and resumed publication. Coverage at that time was still limited to the 128.

When *RUN* died last year, Brown figured that his publication should offer some support to 64 owners

in addition to the 128 crowd. So with issue number 33, Brown launched the new *Twin Cities 128/64*. Produced on a 128-D with a laser printer, *TC 128/64* devotes about half of its 56 pages to each machine. Look for reviews, articles, GEOS info, and technical pieces, but don't expect a large number of type-in programs.

The cost for U.S. subscribers is \$24 for six issues. The magazine and companion disk cost \$40. To subscribe or for more information, write to Parsec, P.O. Box 111, Salem, Massachusetts 01970-0111. You can also write for a free copy of the magazine.

In addition to *Twin Cities 128/64*, Parsec offers a variety of disks, fonts, GEOS graphics, and other products for 64 and 128 users. SIDplayer fans should note that COMPUTE has sold the exclusive distribution rights to the book and disk to Parsec. That book/disk combination should be repackaged and for sale by now.

In "Upgrading Without Changing Platforms" (June 1993), it was reported that Parsec had dropped plans to produce a board that would let a 128 operate at 6-12 MHz. Well, that wasn't entirely accurate. Brown told me that the company working on the prototype had dropped it, but he still intends to produce it—and one for the 64 as well.

Brown says the product is now an external cartridge, CMD compatible, that will plug into the expansion port. It will probably use a 65C816 chip and operate at 12 MHz. The cost is expected to be about \$200. □

GAZETTE

64/128 VIEW

G-1

A veteran 128 publication now covers the 64, too.
By Tom Netsel.

REACH OUT AND WRITE

G-3

Telecommunications can ease the loneliness of writing.
By Karl R. Witsman.

REVIEWS

G-10

KeyDOS ROM Version 2 and Risers and Sliders.

FEEDBACK

G-14

Questions, answers, and comments.

PD PICKS

G-16

Mille Bornes and Maximum Overdrive.
By Steve Vander Ark.

MACHINE LANGUAGE

G-18

Delete extra Returns that cause file to crash.
By Jim Butterfield.

PROGRAMMER'S PAGE

G-20

Celebrate this column's fifth anniversary.
By Randy Thompson.

BEGINNER BASIC

G-22

Using BASIC to solve a homework assignment.
By Larry Cotton.

GEOS

G-23

Import graphics into your geoPublish documents.
By Steve Vander Ark.

D'IVERSIONS

G-24

How the Multimedia Road Warrior got his name.
By Fred D'Ignazio.

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The Automatic Proofreader (64/128)	G-40



A blue feather is positioned diagonally across the upper half of the image. The background is a dark, textured blue. At the bottom, there are several black ink splatters of varying sizes.

Reach Out And Write

Writing is a solitary activity, but it
doesn't have to be a lonely one
if you use your computer to network
with other writers.

By Karl Witsman

If you're a writer, you know what kind of power a computer gives you—power that you never had with a typewriter. But if you use your 64 only for word processing or the occasional game of Space Invaders, you haven't explored its most powerful use. There's a great force out there just waiting for you to tap into it with your computer and modem. It's called networking, and it can multiply your computing power and help your writing!

Most folks using computers have heard of BBSs or bulletin board systems. The popular notion of a BBS run by a teenaged hacker may have some validity, but many systems are run by serious computer enthusiasts, computer clubs, schools, and businesses. Some are created for fun; others have a more serious intent. All require a modem to connect your computer to a telephone line.

Running any BBS can be troublesome and is definitely time-consuming for the owner or system operator (sysop). These are labors of love, since most BBSs bring in no money. Sysops usually appreciate any help they can get, even if it's only through the messages posted by callers, but volunteers can help in other ways as well. Many boards have areas devoted to special topics, and often these areas are directed by outside sysops. I have volunteered on more than one of my local boards to form a writers' area. This is a place where local writers can converse about literary topics, and this is the place where networking comes into play.

A Writer's BBS

To share the fun and information, try to find a BBS in your local area. If you can't locate one with a writer's SIG, here are some you might want to try. Several of these BBSs have specific writing areas. All allow access up to at least 2400 bps and run 24 hours.

- Almost Paradise, Oakwood, Illinois; (217) 354-4711. The sysop is Christy Blew. Leave a message for Karl Witsman, user number 56. If I can find more BBS/writing information, I'll reply with it here.
- Electronic Pen BBS, Harrington Park, New Jersey; (201) 767-6337.
- Data Central, Indianapolis, Indiana; (317) 543-2007.
- Heartland Free-Net, Peoria, Illinois; (309) 674-1100.
- Unique and Nifty BBS, Crawfordsville, Indiana; (317) 364-9600.
- Voyager BBS, East Lansing, Michigan; (517) 641-4367.

For additional BBS sources, try these publications or bulletin boards.

- *BBS Callers Digest*, 701 Stokes Road, Medford, New Jersey 08055. Its BBS is The Livewire at (609) 235-5297.
- *Boardwatch Magazine*, 5970 South Vivian Street, Littleton, Colorado 80127. Its BBS number is (303) 973-4222.
- *Infomat Online Weekly PC News Magazine*. For information about BBSs everywhere, call (913) 478-9239.

Write Here

On a BBS, writers can discuss anything, such as the mechanics of manuscript preparation, agents, who uses/hates outlines, how to query about possible articles, or how to deal with deadlines. Some topics are even more involved, such as "Where does this sex scene fit into the story?" or "How do I show my character's thinking processes?" For questions that have no simple answers, the opinions of other writers can often prove helpful. If you're not a member of a writing group that meets in person, this electronic connection may be the only way to pick the brains of others in your field.

Three Approaches

There are three main ways to converse on a BBS. The first is simply to leave a message in a general message area and let other callers read and respond to it. In most cases, other callers can respond on the same message area or send you a private reply through electronic mail.

The second method of exchanging information with other computing writers is through SIGs (Special Interest Groups). As their name implies, these areas concentrate their focus on a specific topic of interest and one could be devoted to writers.

Echo, Echo

The third, and most sophisticated, method of communicating on local BBSs is Echo messaging. Echoes are a number of BBSs that form a net-

Writers' Forums

The commercial online services offer a variety of opportunities for writers to meet and exchange ideas. Here's a sampling of what's available.

GENie
401 N. Washington St.
Rockville, MD 20850
(800) 638-9636

Jack Smith, screen name *Writers.Ink*, runs the Writer's Roundtable. The nonfiction group meets Wednesdays at 9:30 p.m. General Writing meets Sundays at 9:30 p.m., and the Poetry Meeting is held on Tuesdays at 10:00 p.m. Romance Writing meets Thursdays at 9:00 p.m. All times are Eastern Time.

QuantumLink
8619 Westwood Center Dr.
Vienna, VA 22182-9897
(800) 782-2278

The Writers' Forum meets every Tuesday at 10:00 p.m. ET. Contact Karl Witsman, whose screen name is *KarlW3*.

The Writers' Forum consists of a very imaginative bunch. After the main topic has been thoroughly discussed, the group talks about current writing projects and other topics.

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Poetry Conference meets Tuesdays at 9:00 p.m. ET, and the Creative Writing Workshop is held Monday nights at the same time. Contact persons are Ralph Roberts, whose screen name is *Author*, and Michael A. Banks, whose screen name is *Kzin*.

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work. Most of these networks are set up by sysops who know sysops in other towns. Using this system, a writer in Connecticut might leave a message on his or her local BBS. Around 3:00 a.m., the Connecticut BBS might call a BBS in New York and exchange messages, being careful to keep the writing messages separate from those dealing with computers, sports, and other topics. The New York BBS might then call a BBS in Ohio and repeat the process. In this way, the messages echo around the country.

When I call my local board, I can read the message posted by the Connecticut writer and respond to it. Writers all around the country have an opportunity to respond, and these responses are entered into the network. In a day or so, after the BBSs exchange messages again, the Connecticut writer can read the responses, as can all of the other writers on the network.

One such echo is the National Writers Echo. I was a local monitor here in Danville, Illinois, on the Friendship BBS, which was run, before his death, by Terry Claybaugh. Through this network, I exchanged messages with many writers of varying degrees of fame, including Billie Sue Mosiman (author of *Wire*) and John DeChancie

(author of the Starrigger series and the Castle Perilous series).

Such free exchanges of information and opinions with other working writers can expand your knowledge and help you keep track of up-to-the-minute publishing trends. All messages and mail are automatically date-stamped, so you can ignore old information and be aware of the most recent updates and changes.

REF# 432

POSTED: 04-20-91

FROM: Karl R. Witsman

TO: All

Writers, I'm steaming mad! The U.S. Copyright Office has raised the copyright fee from \$10 to \$20 to register our works! This may be fine for those who write nothing but books, but for those of us wishing to register short stories or articles, it's an outrage. Next time we must not let this happen; next time we must unite and apply our skills in written communication in letters to the Copyright Office, Congress, and the president. At five cents a word in a pulp publication, it takes a lot of words to earn \$20. Let them charge bigger fees for books, and even bigger fees for screenplays that are being produced into movies, but leave writers of features some slack. If you would like to vent your spleen, as

I just did, be sure to talk to the right people—those at the following address: Copyright Office, Library of Congress, Washington, DC 20559.

As you can see, a BBS can also be a good way to blow off steam and let others know how you feel about trends in the field. Let's face it, writing is a solitary profession, but it doesn't have to be lonely if you can reach out and telecommunicate with someone.

Bigger and Better

Commercial online services are the big alternatives to local boards. These are not custom networks, but gigantic groups serving thousands of subscribers with varying interests. As the word *subscriber* suggests, these services cost for membership.

Some examples of such services are DELPHI, CompuServe, Quantum-Link, America Online, GENIE, and BIX (Byte Information eXchange). Each service has its own pricing structure and fees, so a call to each would be a good idea for potential subscribers.

Practically all of the major services have at least one area designated for writers. In some, you post a message as you do on a local BBS and then return in a few days to read the replies. Many services also offer areas for immediate writing discussions. This

Publishers Go Online

Have you ever written an article and then spent months mailing it from publisher to publisher? Now you can submit your manuscripts electronically through a groundbreaking step in publishing by Manuscript Marketing Technologies Incorporated.

MMTI is not like other BBSs and online services. It offers writers a unique opportunity to submit articles or stories which are then offered to publishers electronically. More than 500 authors from all over the world have availed themselves of this service so far, as have 140 publishers from the U.S. and Canada.

Submissions can be made through special software for IBM compatibles which automates the process and records the article or story on disk. Macintosh users can use Microsoft Word format, which is then transferred to ASCII and then into the IBM-compatible program. Manuscripts submitted on paper are scanned through optical character recognition (OCR) software.

Publishers can call MMTI's computer and set the parameters for

what they're looking for in a manuscript. Let's say a publisher needs an article on homeless persons that's about 2000 words long. The publisher specifies the subject, length, and format (article, screenplay, book), and the software displays only those works meeting the criteria. Within the fiction category, there are 26 different parameters, and there are 323 categories in nonfiction.

When a publisher finds an article that meets the criteria, the manuscript can be locked so that no other publisher can get it. The service then gives the publisher information about how to contact the writer. The publisher and writer then work out a deal. Once the two parties come to an agreement, the publisher can download the work into the publisher's computer. Little or no paper changes hands. Only the original disk and contract have to be mailed.

If you're a writer who's spending a fortune on postage in mailing heavy manuscripts from publisher to publisher, this service might be the answer. It's also a good way to make simultaneous submissions for time-sensitive material. Each month, the

writer gets a report of how many times the article was read and why it might have been rejected. This gives the author a chance to judge if the work needs further revision.

The cost is an initial \$25.00 fee and \$10.00 per month. There is a storage charge of \$.0001 per word per day. (A 6000-word piece would run \$1.80 a month.) There is also a \$2.00 fee per disk. When compared to postage to mail the manuscript to 140 publishers, this is a very good deal. (Just sending a query letter to all these publishers would run \$40.60!)

For a full brochure and more information about its services, write to Manuscript Marketing Technologies, P.O. Box 234, Camden, South Carolina 29020. The telephone number is (803) 425-1675.

Remember, MMTI does not act as an agent, and it cannot offer you advice. The company merely offers storage and a distribution service. The software does not handle graphics or photos, but authors can leave a note in the manuscript if photos are available.

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type of system lets you type in a question or comment which is distributed immediately to all of the users who are signed on in the area. In this way, dozens of writers can respond to your comments or questions within seconds.

I host such an area called the Writers' Forum on QuantumLink, the Commodore-specific service. Up to 20 writers meet in realtime once a week in either a lecture or discussion format.

If you still wonder about how an online forum can help you with your writing, here are comments from some of the writers who frequent Q-Link's forum.

"The Writers' Forum keeps me motivated. When I run out of ideas, the group fires me up! It's a great place to talk to people all over the country who share a love of writing," says Marti Paulin.

"If I didn't have the online forum, I'd have to drive 20 miles each way at night to get to my local group," says Cheryl Turney.

"Where else can I talk with people as insane as I am, from all over the country? Seriously, the forum offers me a great place to talk about what a writer goes through, with people who understand," says Eric Lopkin.

"The forum fires my creative

juices—and adds to my degenerate vocabulary," says Donna Carlene.

"It's fun to chat with folks as poor and stubborn as I am," says Alex Tishchenko.

"I enjoy the writing contest. It forces me to come up with things on a regular basis," says Mike Cervini.

Even though I'm a forum leader and editor of "The Writer's Newsletter," I still learn something from speaking with other writers. We've also been fortunate enough to have guest speakers such as Arlan Andrews, Poul Anderson, and Lawrence Block drop in to answer questions and give writing tips. Occasionally an editor such as Eric Lopkin (Lopkin Publishing) or Tom Netsel (COMPUTE's Gazette) will stop by to offer advice. And remember, the Writers' Forum on Q-Link is only one such network. Imagine what joys await you elsewhere. (See "Writers' Forums" for additional information.)

Commissions and Submissions

On the national services, you never know when you might speak with an editor who's looking for someone to write an article, and it could be a topic with which you're familiar. At other times, an online conversation might

spark an idea that could lead to an article or story. This very article was partially queried and updated via E-mail and online meetings on QuantumLink.

Most services have online magazines or areas where you can submit work for others to read. This is also a great way to gain feedback on your writing.

Fiction is popular, and some areas ask you to post articles and nonfiction. Another area of considerable interest is poetry. Here, poets can post their works, and readers are encouraged to leave comments.

Number: 3/26 -Doze with Prose — Poetry

Date: 10:59 p.m. Tues., May 19, 1992

From: Paul #57

Title: More Poetry

Today

I remembered

Our old phone number.

Like a long ago children's rhyme

It came back to me.

I recall phoning late—

On the road, still

To tell you

I'm OK; I'm alive.

Sometimes breathless,

Sometimes angry,

You'd tell me

—hurry home.

A machine tells me that the number

Is disconnected

And I wonder

Who calls you now?

But more,

I wonder

Why I want to

Still.

—Paul May 27, 1990

Into the Future

Computers are the writing tool of the late twentieth century, but networks are playing a major role as writing moves into the twenty-first. If you write with a computer, you owe it to yourself to use this tool as something other than an electronic typewriter. Use it to exchange ideas with other writers, conduct research, submit articles and ideas to publishers, get feedback on your work, and more.

You could never have this amount of power with a typewriter alone, so harness this power and put it to work for you. Writing is an ancient art, but the tools and technology associated with it are still growing. Don't be left behind! □





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KEYDOS VERSION 2

Version 2 of KeyDOS Function ROM for the 128 is similar to DOS for IBM machines in that it lets you change drives easily and defaults to the chosen drive until changed again. KeyDOS ROM is a chip that contains 20 function key definitions and 20 utilities.

It includes Swapper, a utility that lets programmers work on one program in memory, call up KeyDOS to work in another program, and then go back to the original program. There's 1581 Visual Partitioner, RAMDOS, GEOS SuperRBoot, Video Manager, and Hexpert. The main advantage to the KeyDOS program is that it makes it easy to switch drives.

I was happy to find that installation was easy. It took 5 minutes to take the 128's case apart, 2 minutes to install the chip, 15 minutes to vacuum out cat hair—hey, might as well while you're there—and 4 minutes to put the case back together. Subtract 15 minutes from this if you don't own a cat. In other words, this doesn't take long to install, even for a nontechnician like me. On boot-up, the screen will say *HOLD ALT KEY DURING RESET OR SYS 65366 TO ACTIVATE KEYDOS ROM*. Position cursor over the SYS line, hold Alt, and press Return. You'll get a copyright notice from author Randy Winchester and a message telling you that KeyDOS is installed. Here's a list of how KeyDOS programs your function keys and some other changes.

f1—Load program
f2—Run program
f3—Disk catalog
f4—Run 64 program
f5—Type SEQ file
f6—Scratch file
f7—New active drive
f8—Scratch and save
Run—Boot disk/file
Help—Drive #

The Esc key offers many new commands when used in conjunction with other keys. Commands include Help, a compiler, a 1581 partitioner, a subdirectory key, a batch exec key, GEOS SuperRBoot, CBM RAMDOS, Diskmon, a monitor dump, Hexpert, a drive renumberer, an UNNEW command, a screen

dump, find and replace, an alternate screen, and more. KeyDOS is very useful for running a directory and for running some programs. It's also cool for checking out SEQ files. It allows you to scratch an old file and rewrite a new file in one easy command. If you load it when you first power up, you can examine what's on a disk without loading an extra program.

The program goes downhill from there. I had trouble with the lockups and syntax errors. I needed to reset the 128 almost every third time I attempted different commands. The program includes a demo disk, but it wasn't helpful. It lists nine programs and four sequential files, but I was either denied access or else the 128 locked up whenever I tried to load or run the programs.

Two programs, Write-SEQ-File and Write-List-File, for instance, both tell me that I have no room. I must delete a function key's programming and reprogram a key for these programs, but the manual isn't helpful in telling me how to do this. There are two separate function keys for running 64 and 128 programs. Unless you keep the 64 and 128 programs on separate disks, there's no way of telling a 64 program from a 128 program. Having both types on one disk gives me an error message and forces me to reboot every time I choose the wrong program.

The manual doesn't say which RAM expansion units work with KeyDOS. Since GEOS is the center of my world, I used geoRAM. I tried it and was told to put Desktop 2.0 on the REU, which I had already done. KeyDOS may work with another REU, but not with geoRAM.

Don't worry if programs or files scroll off the screen when a directory is being listed. Go into Utility with Esc-1, and you have a lot of help at your fingertips. KeyDOS has 18 utilities: forward, back, select, unselect, toggle selection, select all, copy, select drive, directory, new disk/list, print, quit, rename, scratch, type, unselect all, 1581 subdirectory, and drive command. Type, for example, sends SEQ files to the screen in PETSCII, true ASCII, and Screen mode.

This utility is great for renaming files, scratching files, and printing

files, but it requires you to call up the directory again. The program doesn't re-display the directory by itself, but this is a small point.

I gave an incorrect command to print, and then realized my printer was not hooked up. The program kept telling me to redo from the start or enter a device number. It would have been handier to default back to the program. As it was, I had to reboot yet again.

The compiler allows you to reassign functions to different function keys. You can save any new configuration to disk and reload it the next time you wish to use it. The 1581 Visual Partitioner lets you not only format a disk but also add a partition to a previously used disk.

The monitor dump sends the monitor output to either a PETSCII disk file or a PETSCII printer. Diskmon and Hexpert should be very useful for machine language programmers.

With KeyDOS you can renumber drives, reset drives, run new collect, rescue a deleted program, execute programs on the alternate screen, install a find/replace/scroll utility, execute a one-drive routine, and run Screen Edit, Clock Manager, and Video Manager.

With Video Manager, you can change the cursor's shape, flash rate, and blink rate. You can use an interlaced monitor, and you can select from 80 colors for text and background. The colors appear only as shades of gray on an RGB monitor. It's also possible to change the background and text to the same color, making the text invisible. This can cause panic city the first time you do it, before you figure out how to undo it. Be prepared for massive button pushing. I had to press f3 at least twice and sometimes three times before I could call up a directory. When I accidentally changed both text and background to the same shade of gray, it took three pushes to change the color. Of course, there's the good old reset button (unless your screen is totally gray). KeyDOS is a specialized product that will appeal to some users more than others. Average users like me probably won't find it as useful as programmers will. If you're a programmer, you'll probably love KeyDOS.

DONNA CARLENE

CMD Sets Pace for 1993 with New Products and Lower Prices

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RISERS AND SLIDERS

Step right up and grab a Slider! Hop on board and take a ride! No, I'm not talking about a new skateboard; I'm talking about a new game from MicroStorm that's called Risers and Sliders.

When I first heard the name, I must admit, the first thing I thought of was the children's game Chutes and Ladders. Then, I booted up the game and discovered a maze that vaguely resembles the mouse-shaped symbol that the Disney channel uses as a logo. Kid stuff, I thought again. However, when I began to play, I quickly saw how wrong I was. This game is definitely not geared to the preschool crowd.

Risers and Sliders is an arcade action game that offers 50 increasingly difficult levels of play. The game's title comes from the red-colored Risers and the blue Sliders that you use to move swiftly around the screen. The Risers move your character up and down; the Sliders move you from side to side. There are also wedge-shaped Sliders that are a cross between the other two transports. They move more or less diagonally on the screen. Of course, you can also walk your character from side to side, but he can't jump or climb. Using combinations of the transports and walking, your goal is to move through the mazes, gather all the diamonds in each, and build up your score.

It's not nearly as easy as it sounds. Learning how to move around takes practice. You have to move your man over the transport and press the fire button while moving the joystick handle in the direction you want to travel. If you have good joystick skills, you'll probably learn the game faster than I did. I have a tendency to overshoot the mark when I'm using a joystick. Do, that in this game, and you'll fall to your death. Even my joystick jockey teenager had to make several attempts before clearing a level.

For one thing, there's the pesky little critters called moths that can sneak up

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on you. They move around the screen unfettered by transports and can pounce rather unexpectedly. Their bite is deadly to you, and you have only three lives to lose. You can evade the moths, or you can attempt to kill them. You do that by smashing them with your transporter. It's worth attempting a kill since you'll earn an extra life if you manage to dispose of 12 of them. You'll also add five points to your score for each one of the moths you eliminate.

Another danger when traveling through the mazes is falling. Be careful where you step! One false step and—BOOM! You've lost a life. In the more advanced mazes you'll also need to know whether or not it's safe to take the diamonds. You'll soon discover how disastrous it can be if you guess wrong. By the way, you get one point for every diamond that you collect. Whenever you earn 200 points, you will get another life.

The screen border helps you keep track of how well you're doing. In addition to the typical score information, the border flashes whenever you earn an extra life. It flashes blue for earning a bonus life on points and red for earning a life for slaying those pesky moths. You'll want to get as many lives as possible because the dangers increase as you advance in the game.

With 50 levels, this game is quite a value. Some levels are complicated; some are deceptively simple. Each has its own dangers. The game's designer, Daniel Lightner, knew how challenging the game was, so he programmed in bonus points for you at the end of every level. You'll get 600 points if you finish a maze in one try, 400 points for two tries, and 200 points for three attempts. If it takes you more than three attempts, you get zip. I played a lot of practice rounds (my name for games in which I died) before I earned any bonuses. Maybe you'll do better. The game will keep you busy for several hours.

That reminds me. Did I mention the clock? Well, that's another little surprise the designer added as a booby trap. You have to complete each of the mazes in five minutes or less. Now five minutes may sound like a lot of time to you, but you'll be surprised how quickly it will pass. Trust me on that. I lost more than one life running around the mazes, avoiding moths, and forgetting about the time. I soon learned to keep a closer watch on my time.

Lightner tried to pack the screens with as many diamonds and obstacles as he could. However, I believe he could have done a better job on the graphics. Risers and Sliders doesn't re-

ally utilize the screen as well as it could have. The transporters are depicted as minuscule squares just a couple of pixels wide. Only their colors designate them as anything special. The moths are a couple of tiny, interconnected loops. The fact that they were moving told me they were supposed to be the deadly moths. Even your character is little more than a stick man that moves. I've seen better graphics on a 64.

The attraction in Risers and Sliders, however, isn't the art. The difficulty of the game is its charm. I suspect once you discover this program, you'll keep coming back for more.

MARTI PAULIN

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Circle Reader Service Number 415

TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and The Automatic Proofreader are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each Gazette Disk and are printed in all issues of Gazette through June 1990.

If you don't have access to a back issue or to one of our disks, write to us, and we'll send you free printed copies of both of these handy programs for you to type in. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope. Send a self-addressed disk mailer with appropriate postage to receive these programs on disk.

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Bug-Swatter

Steven Bakke noticed that Fastball (January 1993) highlights the wrong item when he makes a selection from the menu. To correct this problem, load but do not run the program. Then, type *POKE 2133, 201* and press Return. Save this corrected version with another filename.

James T. Jones of Klondike, Texas, points out an error in the April "Programmer's Page." When you run Sequential File Printer, you'll get a *FILE OPEN* error message if you select the Print File option. To correct it, change line 190 to read as follows.

```
190 PRINT#4,A$:: GOTO 160
```

In the May issue, we published a review of Video Digitizer that is distributed by RIO Computers. At the end of the review, we inadvertently published the company's old address. The correct address is RIO Computers, 3310 Berwyck Street, Las Vegas, Nevada 89121; (702) 454-0335. We regret the error.

In "Screen Gems" (May 1993), several readers spotted typographical errors in various program listings. Bill Gisonda of Bethpage, New York, noted that lines 230 and 240 of Brownian Symmetry should be numbered 250 and 260 respectively. Also, lines 150 and 230 should read as follows.

```
150 IF Y > 100 THEN 80
230 DRAW, (160=X)/N,100-Y
```

Donald Klich of Mount Prospect, Illinois, spotted other typos, which just goes to show what can happen when typesetters have to enter listings without the aid of The Automatic Proofreader. Curve Explosion would look better if line

10 were entered as follows.

```
10 COLOR 1,2: COLOR 0,1:
COLOR 4,1
```

In Trig Show, lines 270 and 280 had some problems with an extra colon and a missing Return. The lines should read as follows.

```
270 IF BB=0 THEN DRAW ,
X*25.5,100-FNY(X)*30
280 NEXT: WAIT 212,1:
RETURN
```

In January 1993, we printed a request from a 128 user in Syria who would like to correspond with other Commodore users around the world. Here is his correct address.

Ahmad Husam Mukhalalati
P.O. Box 10392
Aleppo, Syria

Chess Ranking

I would like to start a chess club, and I have been looking for a program that calculates club members' chess rankings. Could you give me some help with a program?

VINCENT SULEWSKI
SOUTH HADLEY, MA

Here is a simple program that calculates rankings after players have completed either one or a series of games. As players compete, they should keep track of the number of games they play; their opponents' rankings; and their overall score for wins, ties, and losses.

```
AS 10 PRINT"{CLR}"
GX 20 INPUT"NUMBER OF GAMES PLAYED";G
MF 30 DEFNFX=(99↑(X/800))/(1+(99↑(X/800))):REM{2 SPACES}RATING FORMULA
PX 40 INPUT"YOUR RATING";R
KA 50 PRINT"OPPONENTS' RATINGS?"
CE 60 FORB=1TOG
KE 70 INPUT O
CP 80 X=R-O
FP 90 IF X<-800 THEN X=-800
```

```
ED 100 D=D+FNF(X)
GH 110 NEXT
RB 120 INPUT"YOUR SCORE";S:S=S-D
DR 130 IF R<2100 THEN 170
JD 140 IF R<2400 THEN 160
JP 150 S=S*16:GOTO 220
MP 160 S=S*24:GOTO 220
HM 170 S=S*32:IF R+S+.5>INT(2099) THEN 220
MM 180 IF G<4 THEN G=4
XH 190 IF S>32+(3*(G-4))AND R+S+S-(32+(3*(G-4)))<2100 THEN 210
KS 200 GOTO220
HJ 210 R=R+S+S-(32+(3*(G-4))):GOTO230
GC 220 R=R+S
GE 230 PRINT:PRINT"YOUR NEW RATING IS";INT(R+.5)
EE 240 PRINT:PRINT"AGAIN?"
HQ 250 GET A$: IF A$="" THEN EN 250
RA 260 IF A$<>"Y" THEN EN D
CD 270 GOTO10
```

A full-featured chess ranking calculator that keeps track of an entire club's standings would be too large to supply here. If a chess fan who programs would like to submit an original program, we'll consider it for publication in the "Programs" section.

Scratched Commas

In the March 1993 "Feedback," you told how to scratch a filename that appeared in a disk directory as a comma. Your methods are fine, but there is a much simpler method. Simply enter the following line.

```
OPEN15,8,15."SO?":CLOSE15
```

This question mark wildcard will erase any file whose name consists of but a single character.

AL WILDERMUTH
RIVERSIDE, CA

Thanks to Al and all the other readers who replied with this simple solution that slipped Gazette's collective mind. Just check the directory first to see if there are any single-

Updates and corrections to earlier programs, a program that calculates chess rankings, and more

character files on that disk that you wish to retain. If so, rename them before deleting.

Interest Calculations

As an active participant in IRA distributions, I was very interested in IRA Minimum Distributions (April 1993). I was attracted to lines 980, 990, and 1000 where the interest calculations take place.

Years ago, I got involved in interest calculations, especially after I read in a mathematical journal that it was impossible to calculate daily compound interest (yield) except by the one-day-at-a-time method, as used in the article.

As an engineer, I find the word *impossible* to be incomprehensible, so I devised a means for making long-term calculations easy. As published, the calculation for a sample 20-year projection and its 20-year payout schedule takes nine minutes and 42 seconds. With my revision, the same calculation takes only 7 seconds.

Insert REM after line numbers 980, 990, and 1000 to preserve the original code and then enter this line.

```
985 SP=SP*EXP(1)↑(365.25
*LOG(1+R/365.25))+.001:
SP=INT(SP*100)/100:
RETURN
```

The 365.25 allows for the extra day in a Leap Year.

LES WILLIS
DELAND, FL

Machine Language

Over the years, your magazine has carried a column for machine language programming; however, I haven't seen any instructions on how to actually implement the information. Is a special program required?

EARL WOODMAN
DILDO, NF
CANADA

When you start learning machine language, the first thing you need is an assembler. An assembler is to machine language what the BASIC programming language is to programming in BASIC. It translates your commands into numbers that the computer can understand and use.

Since it's difficult to write a program entirely in numbers, an assembler replaces the sequence of numbers with standardized mnemonics, commands that humans can more easily remember and understand. Here's an example.

```
10 * = 880
20 LDA #147
30 JSR 65490 40 RTS
```

In this short program, when you enter SYS 880, the computer's screen clears. The 147 is the number which clears the screen. LDA is a mnemonic that means Load the Accumulator, a special area in the computer. So 147 goes into the accumulator, and the program moves on to the next instruction. JSR means that the program then Jumps to Subroutine at 65490, which is the address in ROM which prints whatever character is currently in the accumulator. The screen clears, and the program moves on to RTS. This command, Return from Subroutine, causes the computer to leave machine language and return to BASIC.

This program is called source code, but you cannot run it as you would a BASIC program. The assembler takes this code and turns it into object code, poking numbers 169, 147, 32, 210, 255, and 96 into memory locations 880-885

The computer doesn't have any idea what to do with LDA, but when LDA is converted into 169, it knows

to load the accumulator. It's also easier to remember LDA than 169. The 32 means JSR, 210 and 255 is a two-byte address that represents 65490, and 96 returns the computer to BASIC (RTS).

For those who don't have an assembler, we often print the code in the form of a BASIC loader. The computer's ML instructions are in the DATA statements.

```
10 FOR A = 880 TO 885
20 READ D: POKEA,D
30 NEXT
40 SYS 880
50 DATA 169,147,32,210,255,96
```

As with most Commodore software, finding a good commercial assembler such as Commodore Macro Assembler, Buddy 64, or Merlin64 may be difficult these days, but a number of public domain programs are available. Gazette's own BASSEM (April and May 1990) is still available on the Best of Gazette Utilities Disk (\$13.95).

Resume Typing

I have some suggestions which might help Jack Christlaw, who was having difficulty entering programs in one typing session.

Whenever I wish to stop typing, I save what I have using the number of the next BASIC or ML line of code as the filename. This assures that I'll never use the same filename twice and I'll always know where to begin again. I also always use a fresh disk with only MLX or Proofreader on it.

ARNOLD JONES
STONE RIDGE, NY

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A question about machine language, and a tip about saving partial programs

PD PICKS

Steve Vander Ark

MISCHIEVOUS 64 AND MORE

QuantumLink isn't the only place to find shareware and public domain files, but it's probably the *best* place. Q-Link has more files than anybody else—plain and simple.

I have a copy of its catalog of files, a burly tome close to two inches thick and heavy enough to keep the door to my computer room shut against my one-year-old. This hernia-inducer makes a valiant effort to list all 35,000 of Q-Link's programs and files. Yes, *35,000!* Make no mistake; if you're serious about your Commodore, you belong on the Q.

If you aren't a Q-Linker, though, you can find good PD programs on any BBS that supports the Commodore. The Rogue River BBS in Grand Rapids, Michigan, has all the files mentioned in this column. The phone number is (616) 361-8267. Of course, all programs mentioned here are also on Gazette Disk. Here are my PD picks for this month.

Mille Bornes

Original author unknown.
QuantumLink filename: MILLE_BORNES.3; uploaded by RolFB.

I seldom play Mille Bornes. My wife and I bought it about ten years ago, and it's a great game. The problem is that I play it for blood, which is the way my wife plays Monopoly. That's why we don't play Monopoly either. So when I found this one-player card program buried in the 64 games section of Q-Link, I got all excited. Now I could stomp someone at Mille Bornes without having to sleep on the couch!

This version of Mille Bornes isn't glamorous. It's entirely text with gameplay true to the original. You take turns with

the computer, playing or discarding cards from your hand, trying to accumulate distance toward a goal of 1000 miles. Along the way you play cards against the computer's hand and try to inflict your opponent with all sorts of calamities, including flat tires and accidents. You see where attitude can creep into the game.

According to comments posted on Q-Link about this game, some of its more obscure rules aren't supported in this version. I wouldn't know, since I don't play the original enough to remember any of the more obscure rules! All I know is that this little gem of a game is addicting.

The computer is a bland adversary, of course. I miss the scowl I used to get from my wife when I would gleefully slap down an accident card. She doesn't play Mille Bornes on our 128 much. She's too busy playing Monopoly on the IBM.

Maximum Overdrive

By Dan Komaromi.
QuantumLink filename: OVERDRIVE; uploaded by DigiDan.

I'm not sure what category to put this piece of programming genius into—it's certainly not a game. But what the heck: Here it is, and it's absolutely my favorite 64 download of all time. Like I just said, it's not a game. It's not a utility either, really. It doesn't exactly keep you glued to your monitor; in fact, it works the best when you aren't even around.

Let me explain. Maximum Overdrive is the sneakiest bucket of surprises you'll ever dump on your unsuspecting 64. When you first run it, you are presented with a menu of interesting-sounding options. Once you make your choice, your beloved Commodore computer disappears and is replaced by nothing less than its

evil twin. Oh, it looks just fine—same blue screen, same friendly blinking cursor, same everything. But, oh, what horrors lurk within!

For example, when you enter an innocent LOAD command, the computer might snap back with *LOAD IT YOURSELF!* With another setting, your usually complacent 64 reacts to a keypress by snarling that it's trying to sleep. It then turns off its monitor.

There's a startlingly impressive self-destruct mode which really grabs your attention if you have the volume cranked up. There's even an option which looks for all the world like you've accidentally connected with NORAD computers somewhere and have launched a few missiles.

The author, who calls himself DigiDan on Q-Link, has had his programs published in several magazines, and his expertise shows in the slick interface as well as in the nifty screen tricks. He includes some extra touches, such as allowing you to disable the Run/Stop key and type in your own bits of nastiness for the In-sult section. Komaromi employs some excellent raster interrupt effects, a good dose of SID chip sound magic, and an oversized helping of cleverness to make your 64 go off its electronic rocker.

The general idea is to set up your computer with one of these fake startup screens when you are going to be away from your keyboard. Should some unsuspecting victims try to use it, they'll be left wondering how they managed to make the whole system go kablooie when they just typed a simple command. I'm not sure why I like this program so much because I don't have anyone to pull these tricks on, but I get a bang out of watching them run.

I know. Get a life!

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MACHINE LANGUAGE

Jim Butterfield

FILE-END TRIMMER

Last time, we learned that a file that ends with more than one return can cause trouble when used with the BASIC INPUT# statement. Now, let's write a program to detect and correct this problem.

A BASIC program will poke the ML code into place. Phase 1 then checks the file, and phase 2 copies the file, chopping any extra returns.

The detection phase uses a brief ML program at \$2200, decimal 8704. The file is corrected, if needed, by a longer ML program at \$2217, decimal 8727. This is the code we'll examine here.

File-copying programs must deal with ST, the status word, found at address \$90. We must read the ST value right after we reference a file so that it won't be changed by some other file activity.

Our program reads from one file and writes to another. We must check ST (for end-of-file) after each read. We have an input character to dispose of, so we may need to write to the output file before we act on the end-of-file signal.

We'll test ST right after performing an input and push the test results to the stack. Later, we'll act on those results.

Here's a second puzzle. Our task is to remove extra return characters from the file end. But, as we read the file, we don't know if we're near the end. We must not copy returns until we know it's safe.

When we read a return character from the input stream, we won't output it. We'll count it, using location \$2100 as a counter. If we find more text, we'll output the correct number of returns before continuing. I'll comment on selected parts of the program.

Initial code zeroes the counter at \$2217. We enter the main read loop, and the input

stream switches to logical file 1.

We grab a character and test the ST variable, pushing the result to the stack with PHP.

```
2221 JSR $FFE4
      LDY $90
      PHP
```

We skip ahead if we didn't get a return. Return needs special work: We count it and then check to see if we're at the end of the input file. That information is on the stack, remember? If we're not at end-of-file, we keep reading.

```
CMP #$0D
BNE $2237
INC $2100
PLP
BEQ $2221
```

If it's a return at the end of the file, we push the test results back on the stack and zero the counter to get rid of the excess returns.

```
PHP
LDY #$00
STY $2100
```

The program reaches \$2237. Either we've received a character (still in the A register) which is not a return, or we're at end-of-file. Push the input character to the stack, disconnect the input stream, and hook the output stream to logical file 2.

```
2237 PHA
      JSR $FFCC
      LDX #$02
      JSR $FFC9
```

Is the return counter 0? If so, skip the next bit.

```
LDX $2100
BEQ $2250
```

Location \$2245 sends the returns using a loop. We'll omit that code. The next step outputs the character that was

received.

```
2250 PLA
      JSR $FFD2
      JSR $FFCC
```

We check the end-of-input condition, still on the stack. We either loop or quit.

```
PLP
BEQ $221C
RTS
```

Here's the whole program in the form of a BASIC loader.

```
ES 100 PRINT "FILE END TRIMMER
- JIM BUTTERFIELD"
XR 110 DATA 162,1,32,198,255,1
69,0,141,0,33,32,228,25
5
GS 120 DATA 164,144,240,246,14
1,1,33,76,204,255
AQ 130 DATA 169,0,141,0,33,162
,1,32,198,255
HQ 140 DATA 32,228,255,164,144
,8,201,13,208,12
HM 150 DATA 238,0,33,40,240,24
0,8,160,0,140,0,33
PC 160 DATA 72,32,204,255,162,
2,32,201,255,174,0,33
RX 170 DATA 240,11,169,13,32,2
10,255,202,208,248,142,
0,33
KH 180 DATA 104,32,210,255,32,
204,255,40,240,194,96
RS 200 FOR J=8704 TO 8794
EJ 210 READ X:T=T+X
BP 220 POKE J,X
AE 230 NEXT J
SG 240 IF T<>11245 THEN STOP
XF 300 INPUT "NAME OF FILE";FS
JQ 310 OPEN 15,8,15
FJ 320 OPEN 1,8,2,FS
GB 330 INPUT#15,E,ES:IF E<>0 T
HEN PRINT ES:STOP
QH 340 SYS 8704
SB 350 CLOSE 1
SD 360 CLOSE 15
GC 370 IF PEEK(8449)<>13 THEN
{SPACE}PRINT "FILE DOES
NOT END WITH <RETURN>."
:END
SE 380 IF PEEK(8448)<>13 THEN
{SPACE}PRINT "FILE ENDS
WITH A SINGLE <RETURN>."
:END
XS 390 PRINT "FILE ENDS WITH M
ULTIPLE <RETURN> CHARS."
XB 400 INPUT "SHOULD I CLEAN I
T UP?";XS
HF 410 XS=LEFT$(XS,1)
AF 420 IF XS<>"Y" THEN END
AD 430 INPUT "NAME OF REVISED
{SPACE}FILE";RS
AH 440 OPEN 15,8,15
DS 450 OPEN 2,8,3,"0":"+RS+",S,
W"
MK 460 INPUT#15,E,ES:IF E<>0 T
HEN PRINT ES:STOP
PF 470 OPEN 1,8,2,FS
CP 480 INPUT#15,E,ES:IF E<>0 T
HEN PRINT ES:STOP
QE 490 SYS 8727
QM 500 CLOSE 1
PP 510 CLOSE 2
EQ 520 CLOSE 15
```

Read a file
with BASIC's INPUT#
statement and
chop any extra
Returns that
may cause a crash.

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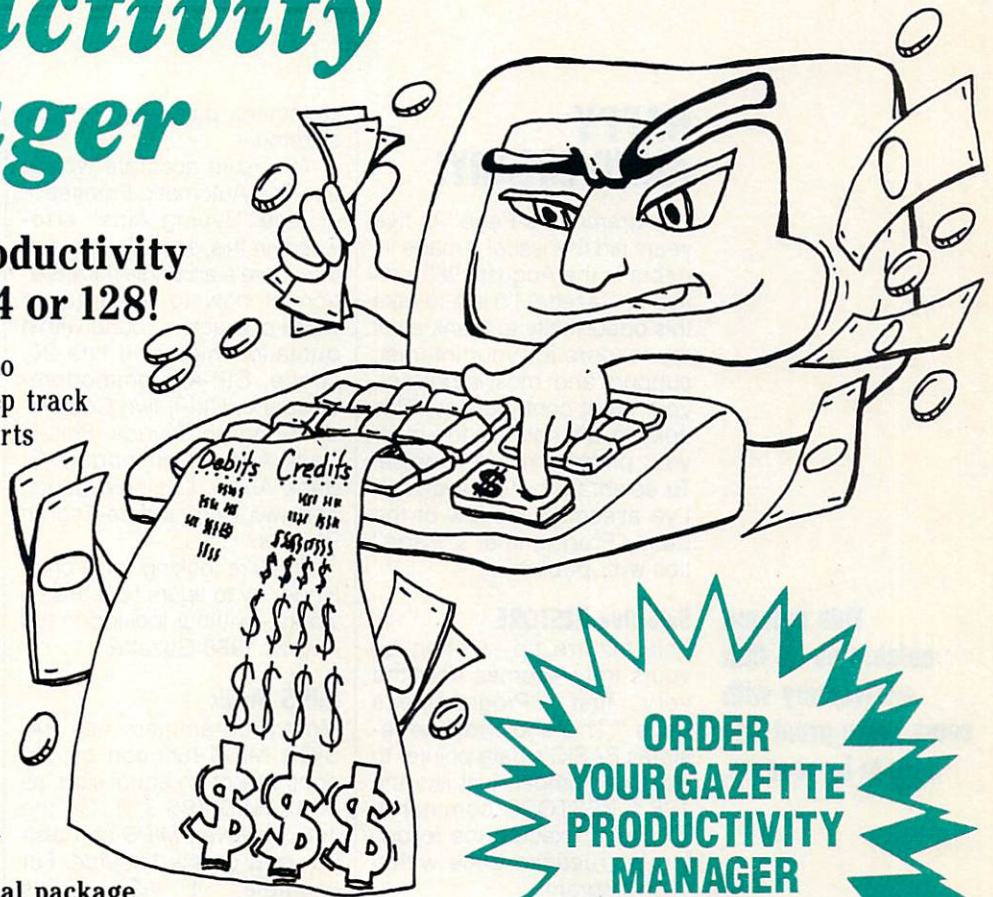
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PROGRAMMER'S PAGE

Randy Thompson

HAPPY ANNIVERSARY!

"Programmer's Page" is five years old this issue! It made its debut in the August 1988 edition of Gazette. I'd like to take this opportunity to thank all of my readers for your interest; support; and, most important, your great contributions. This column, after all, is a forum for your programming expertise. To celebrate our anniversary, I've assembled a few of the best "Programmer's Page" tips ever published.

This column celebrates its fifth anniversary with some more great tips sent in by readers.

Selective RESTORE

This bizarre tip—written by yours truly—comes from the very first "Programmer's Page." This short routine restores BASIC's data pointer to any line number, just like the 128's RESTORE command. To use it, execute the following instructions once within your program.

```
BD 10 POKE 784,108:POKE 785,12
      2:POKE 786,0
PQ 20 DEF FN RS(N)=USR(N)+POS(
      " {A} {U} {T} {2 E} E< {G} <
      L' {2 E}" )
```

Then, add the following command to your program.

X=FN RS(line number)

In this case, *line number* is the line number of the DATA statement at which you want your program to READ. In other words, RESTORE to this line. The line number can be a number, variable, or even an expression such as 1000+I*10. If you want, you can replace X with a variable. Just be warned that the value of the variable used will be scrambled.

Be especially careful when entering line 20. A single typo could cause the computer to lock up when the program is run. Note that there are no spaces between the USR

statement, plus sign, or POS statement.

To ensure accurate typing, use The Automatic Proofreader; see "Typing Aids" elsewhere in this issue. To help further, here's an English translation of how to enter those weird characters found within quotation marks in line 20: space, Ctrl-A, Commodore-U, space, Ctrl-T, two Commodore-English Pounds, Shift-F, Back Arrow, Commodore-G, Back Arrow, L, single quote, and two Commodore-English Pounds.

If you're looking for a challenge, try to figure how this tip works—without looking in the August 1988 Gazette.

MID\$ Magic

Most programmers use BASIC's MID\$ function on the right side of an equal sign, as in A\$=MID\$(B\$,3,1). On the 128, however, MID\$ can also be used on the left side. For example, if A\$ equals 123456789 and B\$ equals ABC, the instruction MID\$(A\$,4,1)=B\$ sets A\$ equal to 123ABC789, while the instruction MID\$(A\$,4)=B\$ sets A\$ equal to 123ABC789.

Using this technique, you can stuff one character or a group of characters into the middle of another string without juggling LEFT\$ and RIGHT\$ functions. Credit for this useful string-handling advice goes to Michael Verdigué of Lawton, Oklahoma.

Unscrollable Lines

Here's a short machine language subroutine from Sean Ganess of Woodside, New York, that protects the top two lines from being scrolled off the screen. You can still print text to these lines and erase them by clearing the screen, but they are unaffected by scrolling text. You might want to use this feature to display such things as your location

in an adventure game or to show the disk drive status in a utility program.

```
FR 10 GOSUB 3000:END
GF 3000 FOR I=828 TO 875:READ
      {SPACE}D:POKE I,D:C=C+
      D:NEXT
XK 3010 IF C<>6370 THEN PRINT
      {SPACE}"ERROR IN DATA
      {SPACE}STATEMENTS":END
CF 3020 SYS 828:POKE 59639,1:P
      OKE 64982,53:POKE 1,53
HQ 3030 RETURN
FJ 3040 DATA 160,0,132,38,169,
      224,133,39,177,38,145,
      38,200,208,249,230,39,
      165
QA 3050 DATA 39,201,0,208,241,
      160,0,132,38,169,160,1
      33,39,177,38,145,38,20
      0,208
KJ 3060 DATA 249,230,39,165,39
      ,201,192,208,241,96,0
```

To use this program, simply GOSUB 3000 whenever you want to protect the top two screen lines. This subroutine needs to be executed only once when your program is first run.

Missing Data

Neglecting to put numeric data between the commas in a DATA statement is the same as including the digit 0. For example, check out the following program.

```
10 FOR I=1 TO 10: READ D:
   PRINT D:NEXT
20 DATA .....
```

Line 20 produces the same results as the following.

```
20 DATA 0,0,0,0,0,0,0,0,0,0
```

If you are reading string data—as in the command READ D\$—the missing data is interpreted as a null string. This tip came courtesy of Doug Ross of Merrickville, Ontario, Canada.

Send your programming tips to *Programmer's Page*, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We pay \$25-\$50 for each tip that we publish. □



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BEGINNER BASIC

Larry Cotton

BUCKS IN A POT

Let's get back to reviewing BASIC statements, specifically FOR-NEXT loops. Here's a quick review. FOR-NEXT (or FOR/TO/STEP/NEXT as the *Commodore 128 Programmer's Reference Guide* calls it) executes repetitive loops.

We've seen how each FOR-NEXT loop requires seven separate and distinct elements and how STEP can be less than 1, more than 1, or a negative value. (Omitting STEP yields a step size of +1.) Here are some simple examples.

```
10 FOR J = 1 TO 4
20 PRINT J
30 NEXT
```

```
10 FOR J = .5 TO 3.5 STEP .5
20 PRINT J
30 NEXT
```

```
10 FOR J = 10 TO 1 STEP -2
20 PRINT J
30 NEXT
```

A very common use for FOR-NEXT is to load arrays. We've studied arrays in this column before, but if you don't understand or remember them, we'll get back to them soon. For now, just think of an array as a group of pigeonholes that need numbers stuffed into them. The pigeonholes usually have names such as A(1) or B(4). Here's how to fill a small one-dimensional array using a FOR-NEXT loop.

```
10 FOR J = 1 TO 10
20 A(J) = 25
30 NEXT
```

This simple pigeonhole stuffer will make each variable A(1) through A(10) equal to 25. Here's how you can make the variables equal the counter as it's increased.

```
10 FOR J = 1 TO 10
```

```
20 A(J) = J
30 NEXT
```

You can read DATA statements and place them into the arrays, too.

```
10 FOR J = 1 TO 7
20 READ Q
30 A(J) = Q
40 NEXT
50 DATA 12, 2, 52, 41, -3, 3.5,
-7.34
```

After this program runs, A(1) will be 12, A(5) will be -3, and so on.

Let's take another look now at nested FOR-NEXT loops. Here's an example.

```
10 FOR A = 1 TO 3
20 FOR B = 3 TO 4
30 PRINT "A="A,"B="B
40 NEXT B
50 NEXT A
```

The A loop is the outer one, and it loops a total of three times. The B loop is the inner one, and it loops twice for each value of A. The use of the variable names after NEXT is optional, but it can help keep things straight.

Now, let's get to the meat of this month's column. The other day, a friend called to ask for help with his third-grade son Derek's homework.

The problem, as we understood it, was to calculate how many combinations of twenties, tens, and fives could be in a pot of \$200. Naturally, I don't need much inspiration to write a BASIC program. So I wrote one to solve the problem, and it just happened to use nested FOR-NEXT loops. Here it is.

```
10 PRINTCHR$(147)
20 INPUT"HOW MUCH IS IN THE
POT";P
30 TW=P/20
40 FORI=0 TO TW
50 R=P-I*20
60 TE=R/10
```

```
70 FORJ=0 TO TE
```

```
80 C=C+1
```

```
90 NEXTJ
```

```
100 NEXTI
```

```
110 PRINT:PRINT"THERE
ARE"C"COMBINATIONS."
```

Line 20 asks the user for a pot value. Enter the number only, not a dollar sign. Line 30 finds the maximum number of twenties (TW) which can be in the pot. Then we start a loop in line 40 which counts up from no twenties to TW.

Lines 50 and 60 calculate the maximum number of tens there can be in the pot for any given number of twenties. Our inner loop (J) begins at line 70 and counts up from no tens to the maximum number of tens for each value of I, the twenties counter.

Inside the inner FOR-NEXT loop is another counter (C in line 80) which simply increments every time the inner loop is used. For each number of tens for a given number of twenties, there will be a certain number of fives necessary to arrive at the total pot. Therefore, we've counted all the possible combinations!

If there were ones in the pot, you would need another FOR-NEXT loop which would increment (or decrement) the fives while holding the twenties and tens constant. The number of combinations would become staggering.

This seemed like a tough problem for a third-grader to solve. We discovered later that the actual assignment was to find just *some* of the possible combinations—not all of them! Anyway, it was an interesting problem and a good excuse to write a BASIC program. By the way, there are 121 possible combinations of twenties, tens, and fives in a pot of \$200. With larger pots, watch the time it takes to calculate the combinations grow exponentially. □

How many combinations of fives, tens, and twenties can you find that will total \$200?

IMPORTING GEOS GRAPHICS

Two of my favorite subjects are graphics and geoPublish, and last month I talked about both. I described differences between geoPaint's bitmapped graphics and geoPublish's object-based ones.

This fundamental difference between the two formats is important for you to understand, lest you find yourself confused and frustrated. Once you get the hang of object-based graphics, though, you'll love the freedom that they give you to experiment and to create.

Working with geoPublish, you'll most likely want to use clip art with your documents. Most of this art will be in bitmap format, which means that it's stored as a fixed set of dots laid out to form an image. This graphics don't use the same format as those created by geoPublish itself, but that doesn't mean that you can't use them. You can import these bitmaps very easily.

Each mode of geoPublish has an import tool. In both Page Graphics and Master Page modes, the bitmap appears where you click the cross hairs on the page. Once imported, the bitmap is an object on its own layer, just like any other object on the page. Remember, if you enlarge this image, you won't be adding more dots to the image; you'll only be making the existing dots bigger. As a result, an enlarged bitmap looks blocky and jaggy. GeoPublish offers a smoothing option which helps by rounding off some of the sharp edges, but this doesn't always make it look better.

In Page Layout mode things work a little differently. You can still resize an image and change its attributes, but

the way you move a bitmap onto your page is unique to this mode. In Page Layout mode you create rectangular areas (regions) on the page in which to place text or, in this case, bitmaps. Before you can import an image, you must define an area in which the image will be located. This region can contain only the graphic or text file you specify for it. If you place a region on top of another region, you won't be able to see through the one on top. And if you place the region on top of a text region, the text will adjust around it.

This is very useful for mixing text and graphics on a page. You can create a large text region, then create graphics regions on top where you want the bitmaps to appear. The text will flow around those regions as pretty as you please.

In Page Graphics mode, however, if you place a graphic in the middle of a text area, the two will just overlap. This also can be a useful technique if you change the pattern of the bitmap to gray instead of black, allowing the text to stand out. But if you want text to flow around graphics, you'll want to import those graphics in Page Layout mode.

Remember that I said that the regions you create in Page Layout mode are rectangular. The text will flow around that rectangular area, not around the edges of the image itself. There's no built-in way to make text flow around an irregular edge. You can simulate this effect by creating a number of text regions, each sized to hold a few lines of text and each fitted to the edges of the graphic image. The problem occurs if your graphic was imported in Page Layout mode. This mode won't let you cross its straight region edges with your text regions.

If you import the image in Page Graphics mode it won't be visible in Page Layout mode at all, which means it'll be next to impossible to fit a text region next to it with any precision. Probably the easiest way to simulate text flowing around an irregular graphic is to create text which has a built-in flow created by pressing the Return key at the end of the lines in strategic places, then fitting the graphic to it in Page Graphics mode.

There is one other way to get graphics onto your geoPublish page. You can first import them into a geoWrite document which you then import into your geoPublish document. The graphic gets imported as well as the words. It even keeps its formatting within that text area (centered, for example). This method works particularly well if you want the graphics to be tied to the text, such as in a fancy headline or a letterhead. Of course, you're stuck with geoWrite's rather limited photo scrap size.

Let's think bigger for a minute. It can be a bit of a hassle to import photo scraps when they're limited to the size of the geoPaint window. There are utility programs which will let you clip photo scraps as large as an entire page. One of the best, called Scrap Can, comes as a bonus on the geoCanvas disk from Creative Micro Designs. A shareware example is Scrap It (Q-Link filename: SCRAP IT, uploaded by TerryV7). These utilities will in effect let you convert an entire geoPaint page into a geoPublish page, although the whole thing is then a single large object. You can also convert a geoPublish page from a series of layered objects into a large bitmap (in other words, convert it into a geoPaint document) with the program Paint Pages, which comes in the GEOS 2.0 package. □

Get the most from geoPublish by importing bitmapped graphics and clip art.

D'IVERSIONS

Fred D'Ignazio

MULTIMEDIA ROAD WARRIOR

My name is Fred D'Ignazio, but most people know me as the Road Warrior. For the past ten years, I've journeyed to more than 100 school districts in North America, Europe, and Australia as a multimedia evangelist—a Johnny Appleseed of new technology.

My mission began in the mid-1980s in a kindergarten classroom in Cahaba Heights, Alabama. I had conceived a concept of classroom learning known as the multimedia sandbox. Children and teachers in the sandboxes scavenged common items from around their schools such as a computer, a tape recorder, a record player, a tiny musical keyboard, a VCR, a TV, a camera, and so on. I then taught them how to use \$5 Radio Shack cables to connect these items into a children's multimedia publishing center.

The idea caught on like wildfire in the Jefferson County, Alabama, schools. Pretty soon we had 13 multimedia sandbox schools and almost 100 children, parents, and teachers who were learning to assemble, troubleshoot, and operate these scavenged multimedia workstations.

In early 1986 I was invited as a featured speaker to one of the foremost national conferences for computer-using educators. To prepare for the national debut of the multimedia sandbox, I asked the conference organizers for the basic elements of a scavenged workstation (a computer, VCR, camcorder, and so on) along with presentation devices such as a video projector and a speaker system for a room full of hundreds of adults. I arrived at the conference fully expecting all the equipment to

be assembled for me. After all, the Jefferson County kids and teachers had mucked around with this stuff for months.

Boy, was I surprised! None of my stuff was ready. Technicians were scratching their heads and telling me that it was impossible to plug a computer's video-out jack into a VCR and that it was not appropriate to use a common tape recorder as an audio input device for a VCR. There were none of the Radio Shack cables and adapters that I required to integrate the little devices into a multimedia workstation.

But I toughed it out. I reassured everyone that such things were being done every day by five-, six-, and seven-year-olds in Alabama. Then, I rushed out of the hotel and ran across town to a Radio Shack and quickly purchased \$25 worth of cables and adapters.

Back at the conference hotel, I hurriedly plugged cables to the equipment and computer. A short time later, hundreds of people arrived for the demonstration of my multimedia sandbox. I turned on the video projector. Uh-oh! The bulb burnt out. I turned on the large speaker that the hotel had provided for my sound system. No sound. No one could hear or see my stuff.

I'd brought an hour's worth of videotapes and computer slides created by the Alabama children on their scavenged multimedia workstations. They included multimedia story problems for math class; multimedia book reports and biographies; and multimedia science projects featuring animated black holes, beating hearts, and dancing skeletons. I also had a wonderful presentation by a team of kindergartners and sixth-graders titled "What Is a Principal?"

I couldn't show any of it. I was stunned. What had be-

come simple for us in my kindergarten classroom in rural Alabama was impossible to demonstrate in a world-class technology conference in one of America's largest cities.

I survived that experience by calling my audience to the front of the room to see my stuff on a little TV and computer screen and to listen carefully to the puny sounds coming out of my portable speaker.

That's the day I first became a multimedia Road Warrior. I vowed that I would never be caught off guard again.

Since then, I've traveled with all of my multimedia supplies squashed into four durable Road Warrior bags. I carry the two smaller ones on board each plane and check the two larger bags. If the two larger bags don't show up at my destination, I can do a "Multimedia Lite" presentation with the cables and stuff from the two carry-on bags. If I'm fortunate and the airlines doesn't lose the two bags that I've checked, I can put on a whiz-bang "Multimedia Classic" presentation full of rocket ships blasting off, kindergartners' digital videos, and New Age music composed by deaf children.

So if you're in an airport in the coming months, watch for me. I'm the small bearded man, rushing from one airport gate to the next, carrying two small duffel bags, trailing green and red Radio Shack cables, and spilling stacks of CD-ROMs and disks on the floor behind me.

It's a dirty, sweaty job, but some day, people will look at their gleaming multimedia TVs and remember the early days of multimedia, back to the days of spaghetti-like cables, the multimedia boxes that never seemed to work together. If you jog their memories, they may even recall a little man with a vision—the guy they called the Road Warrior. □

Who is that little guy rushing through airports with duffel bags stuffed with more parts than a small electronics store?

32 SPRITES

By Bill Soudan

As far as games go, most 64 users are aware that they normally are limited to having eight sprites (or MOBs, Movable Object Blocks) to manipulate. There are programs, however, that can double or even triple the eight-sprite limit, but these programs often impose restrictions or cause annoying flicker—making the extra sprites almost worthless.

Thirty-two Sprites lets you quadruple the 64's sprite limit without losing any flexibility, while keeping flicker to the barest minimum. Thirty-two Sprites can handle up to 32 sprites at a time, and each sprite can be placed anywhere on the screen!

Thirty-two Sprites is a BASIC program that lets you create a customized machine language routine for up to 32 sprites. To help avoid typing errors, enter 32 Sprites with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you run it.

Getting Started

Load and run 32 Sprites. After a short pause, a main menu will come up. This is where you can customize almost every aspect of 32 Sprites. To change an item on the menu, type in the number in front of the parameter you want to change and press Return. If the parameter can be turned on and off, the program will first prompt you for the desired setting. Next, the program will ask you the new memory location. You can enter the new location in either hex (by preceding it with a dollar sign) or in decimal. You may simply press Return if you wish to leave the program at its default location.

Menu Selections

The first item in the menu is Starting Address. This simply specifies the memory location where the machine language code for 32 Sprites will begin in memory. The next eight menu items correspond to the computer's sprite registers. Each of these can be turned on or off, and each can also place the shadow registers anywhere in memory.

Because there are only enough registers in the VIC chip for eight sprites, 32 Sprites must set aside a section of

memory to handle 32 sprites. The hex and decimal addresses listed next to each of the sprite parameters indicate where in memory the shadow registers of that particular parameter will start.

You can place these shadow registers anywhere in memory. For example, the default Y position shadow registers start at 52992 (\$CF00). To change sprite 1's Y position, simply poke 52992 (\$CF00) with the desired Y position. Each consecutive memory location controls the next consecutive sprite number. To change sprite 2's Y position, poke 52993 (\$CF01) with the desired number. This continues to location 53023 (\$CF1F), which controls sprite 32's Y position.

Temp Page

The next menu item is Temp Page. This is a workspace in memory, 256 bytes long, required to sort the sprites from the least Y position to the greatest Y position. All 256 bytes are used, and this area of memory should not be used by any other program.

Order Table

Order Table is the next menu item. This is a 32-byte area needed by 32 Sprites to hold the order of the sprites after they are sorted.

Extra Y Table

Because 32 Sprites uses interrupts to function, changing a sprite's Y position while the VIC chip is drawing will cause that particular sprite to flicker and possibly will cause other sprites to flicker as well. The Extra Y Table is a copy of the Y position shadow registers, and it is used by the interrupt routine to prevent flicker. Again, this 32-byte area should not be used.

How Many Sprites?

The last menu item lets you determine the maximum number of movable object blocks or sprites that you want to use at one time. This number can be changed to 16, 24, or 32. Note that changing this register changes the length of the shadow registers. If 32 Sprites is set to 16 sprites, only 16 shadow registers are needed. This should always be set to the maximum number of sprites which you plan to use in your program.

Generating 32 Sprites

After you've set the parameters for your sprites, it's time to generate 32 Sprites, which is a machine language routine. This is item 14 on the menu.

A minute or two after selecting this option, the program will generate the code and supply you with its starting and ending addresses in both decimal and hex and with information on how to enable and disable 32 Sprites. The program will ask you if you'd like to save the ML routine to disk. Respond with Y or N.

If you wish to save 32 Sprites to disk, press Y and the program will prompt you for a filename. Type in your choice of a filename and hit Return. Make sure a disk is in the drive. Be careful because the program doesn't check for disk errors.

After the program is saved or after pressing N at the save prompt, the program will ask if you want to print an information sheet. The info sheet is simply a listing of the starting and ending addresses of the ML routine; the SYS addresses that enable and disable 32 Sprites; and a copy of the main menu parameters, with the on/off status and address. If you'd like a copy, turn on your printer and press Y. Once the print-out is completed or after hitting N, the program will clear the screen and end. The 32 Sprites machine language is now in memory and ready to be used.

Your Own Programs

With 32 Sprites, you can now write your own BASIC programs that contain up to 32 sprites. Before calling the SYS address to start 32 Sprites, your program must clear out the shadow registers; otherwise, a screen full of garbage sprites will appear on the screen when 32 Sprites starts. You can do this by poking 0s into the shadow registers with something like the following.

```
100 FOR J=0 TO 31: POKE 52992+J,0: NEXT
```

This line will set each sprite's Y position to 0. Don't forget to do this to any other shadow registers which are being used, too.

Once all registers have been cleared and/or set up as desired, use SYS and the starting address of the machine language program. Thirty-two

Sprites will enable raster interrupts, clear out the temp page, and begin to operate.

The best way to handle the shadow registers is to define a variable at the beginning of the program with the registers' location. Here's an example.

110 YPOS=52992: REM Y POSITION SHADOWS

Then to change any given sprite's Y position, use the POKE command.

120 POKE YPOS+5,100: REM SPRITE 6'S YPOS

Note that you subtract 1 from the sprite's actual number. To change sprite 32's Y position, you'd add 31 to the YPOS. To change sprite 1's Y position, you could use YPOS plus 0, or simply YPOS.

The shadow registers of High X bit, X expand, Multicolor, and Priority operate a bit differently. Each of these registers can be either off (by poking them with a 0) or on (by poking them with any number other than 0).

Each of the sprite parameters you turned on before generating 32 Sprites with its BASIC generator can be changed for each sprite by using the corresponding shadow register. Note that 32 Sprites doesn't change any registers in the VIC chip which you turned off before generating 32 Sprites.

For example, multicolor can still be used even if you didn't turn it on from 32 Sprite's main menu. However, because you told 32 Sprites to leave the register off, its shadow registers won't work, and you won't be able to tell 32 Sprites which sprites are multicolor and which are not. But you can change the actual register in the VIC chip.

For example, if you decide beforehand that you are going to design all of your sprites in multicolor mode, you could turn off the multicolor shadow registers before generating and then tell the VIC chip to display all sprites that it draws in multicolor by using POKE 53276,255.

32 Sprites won't interfere with the multicolor register, and the VIC will display all eight sprites as multicolor. In order to display more sprites, 32 Sprites

tricks the VIC into displaying either two, three, or four sets of eight sprites on the same screen. The VIC believes it's displaying eight sprites in all, and it displays them in multicolor.

Thirty-two Sprites can handle up to the maximum number of sprites you set for it on the main menu. Every single sprite can be displayed anywhere on the screen. Displaying more than eight sprites on a horizontal row could cause flickering and some distortion. Thirty-two Sprites operates at its best when the sprites are spaced out along the y-axis. Careful designing of game screens will prevent too many sprites on one row.

You may have noticed there wasn't a shadow register which turns a sprite on or off. To do this with 32 Sprites, simply set the corresponding sprite's Y position to 0. This tells 32 Sprites you don't wish to have that sprite drawn.

Hints and Tips

While greatly enhancing the 64's graphics capabilities, 32 Sprites is a machine language routine which does take up processor time. The more sprites displayed on the screen and the more parameters set to on, the slower the computer runs. The best way to conserve speed is to cut down on the number of sprites. Of course, whenever you need all 32 sprites, this will not be possible.

The other way to increase the speed of the computer is to turn off any unneeded sprite parameters. In 32 Sprites' machine language routine, only the parameters turned on are updated by the program. The rest are left to the VIC chip to handle. Although it takes a minimal amount of time to copy a value from a shadow register to the corresponding VIC register, it becomes noticeable when you multiply this time by 32.

The parameters which bog down the computer the most are the High X bit, X expand, Multicolor, and Priority. Do without them whenever you can. Although the High X bit cannot usually be done without, Priority is rarely used and can usually be set to off.

The next way to conserve processor time is to place the sprites nearer the top of the screen. Thirty-two Sprites begins at the top of the screen and search-

es down until it finds the number of sprites for which it was set. By placing the sprites closer to the top, 32 Sprites will have to do less searching and use less processor time.

You may notice some distortion of the tops and bottoms of the sprites when you're using 32 of them. This is because the computer may be too slow to update the VIC registers as fast as needed when the sprites are in certain positions. The best way to avoid this is to leave the top and bottom row or two of the sprite definitions blank.

Because 32 Sprites is a raster interrupt, it does change the interrupt vector at \$0314-\$0315. Machine language programmers can still use another interrupt, as long as it doesn't use another raster interrupt. Every $1/60$ second, like the normal timer interrupt, and after all the sprites on the screen have been drawn, 32 Sprites jumps to the normal interrupt routine, usually located at \$EA31. This JMP is located at the starting address plus \$61. It can easily be changed to jump to your own interrupt routine instead. Just remember to end your interrupt with JMP \$EA31.

Although 32 Sprites provides improved sprite capability and flexibility, it's not infallible. Placing the sprites in certain positions can often cause flicker or cause some sprites to disappear. The best way to prevent flicker is to design playing screens which space the sprites out along the y-axis.

Since the VIC chip is actually limited to eight sprites, 32 Sprites divides all of the sprites into eight-sprite chunks and displays each chunk as one group. You still cannot display more than eight sprites on a horizontal line because of the VIC chip's limitations. If you decide to put more than eight on one row, 32 Sprites will do its best to display more than eight sprites per horizontal line.

How It Works

Thirty-two Sprites works by use of the VIC chip feature called raster interrupts. The computer screen is redrawn every $1/60$ second. After one screen is drawn but before the next one begins, 32 Sprites quickly sorts the sprites in order from lowest Y position to highest Y position. On the screen, that is from

the sprite closest to the top to the one closest to the bottom.

The program then displays the top-most eight sprites and tells the VIC chip to let 32 Sprites know when these sprites have been drawn. Once the VIC chip alerts 32 Sprites, the screen is only partially redrawn. The topmost eight sprites have been drawn, but the rest of the screen hasn't been drawn yet. So 32 Sprites puts the next eight sprites into the VIC's registers, and they are drawn. This process repeats for each series of eight sprites.

A Demonstration

To give you some idea of 32 Sprites's power, try this demonstration program. The demo consists of a BASIC program and machine language sprite data. Before you can run the demo, however, you must generate 32 Sprites. Load and run the main BASIC program. Once the menu comes up, type 14 and hit Return. When the program asks you if you want to save to disk, answer Y and type in 32 for the filename.

This is the name the demo searches for when it runs. Don't print out the information sheet at this time.

To help avoid typing errors, enter the demo with The Automatic Proofreader. Save the program before you try to run it.

Sprite data is written in machine language. Enter it with MLX, our machine language entry program. Again, see "Typing Aids." When MLX prompts, respond with the following addresses.

Starting address: C3A0

Ending address: CAFF

Since the demo automatically loads this data, save it with the filename 32 DEMO.ML. Make sure that this file and 32 are all on the same disk as the demo. Control the demonstration with a joystick plugged into port 2.

32 Sprites

KX 100 REM COPYRIGHT 1993 - COMPUTE PUBLICATIONS - ALL RIGHTS RESERVED
 HB 110 REM WRITTEN BY BILL SOUDAN
 MA 120 REM
 KC 130 POKE53281,0:POKE53280,0:PRINT"{CLR}":ZP=191
 XX 140 PRINT"{CYN}{CLR}{H}{N}

```
{BLU}{G}{CYN}
{14 SPACES}32 SPRITES"
MP 150 POKE1063,103:POKE55335,6
DK 160 PRINT"{BLU}{39 T}{LEFT}{INST}{T}"
FP 170 PRINT:PRINTTAB(15)"{3}MAIN MENU"
RG 180 PRINT:DIM P$(12),P(12,1),H$(16)
CE 190 X$="0123456789ABCDEF"
RJ 200 FORJ=1TO16:H$(J-1)=MID$(X$,J,1):NEXT
RQ 210 FORJ=0TO12:READP$(J):NEXT
EG 220 DATA "STARTING ADDRESS","Y POSITION","X POSITION","HIGH X BIT"
EP 230 DATA "X EXPAND","COLOR","MULTICOLOR","PRIORITY","POINTER"
DX 240 DATA "TEMP PAGE","ORDER TABLE","EXTRA Y TABLE","MAX # OF MOBS"
PM 250 FORJ=0TO12:READ P(J,0),P(J,1):NEXT
FK 260 DATA 3,49152,3,52992,1,53024
HE 270 DATA 1,53056,2,53088,1,53120
QC 280 DATA 2,53152,2,53184,1,53216
GB 290 DATA 3,52736,3,52672,3,52704
EM 300 DATA 3,32
JM 310 FORP=0TO12:GOSUB1200:NEXT
RC 320 PRINT"{YEL}14}{CYN}GENERATE {WHT}32 SPRITES"
HR 330 W$="{HOME}{21 DOWN}"
EB 340 GOSUB1360:PRINTW$;:INPUT"{3}YOUR CHOICE";C$
AA 350 C=VAL(C$):IFC<10RC>14THEN340
JG 360 IFC>12THEN470
RA 370 IFC<1,0)=3THEN420
AF 380 GOSUB1360:PRINTW$;:PRINT"{3}SELECT: ";P$(C-1);"{WHT}1.{3}ON{2 SPACES}{3}2.{WHT}{2 SPACES}OFF"
GD 390 GETA$:IFA$<>"1"ANDA$<>"2"THEN390
AR 400 IFA$="1"THENP(C-1,0)=1
BJ 410 IFA$="2"THENP(C-1,0)=2
CR 420 GOSUB1360:PRINTW$;:ML$="-1":INPUT"{3}NEW MEMORY LOCATION";ML$
JF 430 IFLEFT$(ML$,1)="$"ANDLEN(ML$)=5THEN$=ML$:GOSUB1340:ML=D:GOTO450
JA 440 ML=VAL(ML$):IFML<0ORML>65535THEN460
MG 450 P(C-1,1)=ML
SS 460 P=C-1:GOSUB1200:GOTO340
JF 470 IFC=14THEN510
CJ 480 GOSUB1360:PRINTW$;:PRINT"{3}SELECT: {WHT}1.{3}16 {WHT}2.{3}24 {WHT}3.{3}32"
EP 490 GETA$:IFA$<>"1"ANDA$<>"2"ANDA$<>"3"THEN490
AG 500 P(12,1)=(VAL(A$)*8)+8:GOTO460
AF 510 REM GENERATE ML CODE
HQ 520 AD=P(0,1)
KK 530 GOSUB1370
DM 540 PRINT"{HOME}{11 DOWN}{CYN}"TAB(12)"GENERATING ML..."
KB 550 DEF FNH(X)=INT(X/256)
KR 560 DEF FNL(X)=X-(FNH(X)*256)
MM 570 PRINT"{DOWN}"TAB(9)"INITIALIZATION CODE..."
GF 580 MP=0:GOSUB1440
KG 590 FORJ=1TOP(12,1)/8:PRINTTAB(12)"RASTER HANDLER";J:GOSUB1560:NEXT
BB 600 AD=AD-34:DA$="A9FA8D12D0A9008D00004C31EA":GOSUB1430
XK 605 POKEAD-5,FNL(P(0,1)+100):POKEAD-4,FNH(P(0,1)+100)
JD 607 GOSUB 1907
HK 608 DI=AD:DA$="78A9318D1403A9EA8D1503A9008D15D08D1AD0A9818D0DDCA9008D0DDCA993"
HJ 609 DA$=DA$+"20D2FF5860":GOSUB1430
HP 610 GOSUB1370:PRINT"{HOME}{7 DOWN}"TAB(16)"COMPLETE."
AS 620 PRINTTAB(5)"{2 DOWN}BEGINNING ADDRESS: ";D=P(0,1):GOSUB1300
PF 630 PRINTP(0,1);" $"+A$:PRINTTAB(5)"ENDING ADDRESS: {3 SPACES}";:D=AD:GOSUB1300
JA 632 PRINTAD;" $"+A$
QJ 635 PRINT"{DOWN} ENABLE 32 {SPACE}SPRITES: {3 SPACES}";:D=P(0,1):GOSUB1300
JP 636 PRINT"SYS";P(0,1);"(JMP {SHIFT-SPACE}$"+A$+)"
QM 637 PRINT" DISABLE 32 SPRITES: {2 SPACES}";:D=DI:GOSUB1300
FX 638 PRINT"SYS";DI;" (JMP {SHIFT-SPACE}$"+A$+)"
AM 640 PRINTTAB(13)"{2 DOWN}SAVE 32 SPRITES ML?"
KP 650 GETA$:IFA$<>"Y"ANDA$<>"N"THEN650
RE 660 IFA$="N"THEN710
KS 670 GOSUB1370:PRINT"{HOME}{7 DOWN}"TAB(5)"ENTER FILENAME: ";OPENL,0:INPUT#1,F$:CLOSE1
```


PROGRAMS

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JD 680 PRINT:PRINTTAB(15),"
      {2 DOWN}SAVING...."
DQ 690 SYS57812 FS,8,1:POKE193
      ,FNL(P(0,1)):POKE194,FN
      H(P(0,1)):POKE174,FNL(A
      D+1)
XM 700 POKE175,FNH(AD+1):SYS 6
      2957
KG 710 GOSUB1370:PRINT"(HOME)
      {10 DOWN}"TAB(10)"PRINT
      OUT INFO SHEET?"
RP 720 GETAS:IFAS<>"Y"ANDAS<>"
      N"THEN720
SC 730 IFAS="N"THENPRINT"{CLR}
      ":END
KM 740 GOSUB1370:PRINT"(HOME)
      {10 DOWN}"TAB(14)"PRINT
      ING...."
MR 750 OPEN4,4,7:PRINT#4:PRINT
      #4:PRINT#4
KE 760 PRINT#4,SPC(23)"32 SPRI
      TES"
QH 770 PRINT#4:PRINT#4:PRINT#4
DG 780 PRINT#4,SPC(23)"STARTIN
      G ADDRESS:";D=P(0,1):G
      OSUB1300
GE 790 PRINT#4,P(0,1);" $"+AS:
      PRINT#4,SPC(23)"ENDING
      {SPACE}ADDRESS:
      {2 SPACES}";D=AD:GOSUB
      1300
CK 800 PRINT#4,AD;" $"+AS:PRIN
      T#4
QX 802 PRINT#4,SPC(19)"ENABLE
      {SPACE}32 SPRITES:
      {3 SPACES}";D=P(0,1):G
      OSUB1300
SA 804 PRINT#4,"SYS";P(0,1);"
      {SPACE}(JMP
      {SHIFT-SPACE}$"+AS+)"
HC 806 PRINT#4,SPC(19)"DISABLE
      32 SPRITES:{2 SPACES}";
      ;D=DI:GOSUB1300
ES 808 PRINT#4,"SYS";DI;" (JMP
      {SHIFT-SPACE}$"+AS+)"":
      PRINT#4:PRINT#4
BR 810 FORJ=1TO12:PRINT#4,SPC(
      16);P$(J);SPC(20-LEN(P$(
      J)));
AF 820 IFP(J,0)=3THENPRINT#4,"
      N/A";
MX 830 IFP(J,0)=2THENPRINT#4,"
      OFF";
GJ 840 IFP(J,0)=1THENPRINT#4,"
      ON ";
RR 850 PRINT#4,SPC(5);P(J,1);:
      D=P(J,1):GOSUB1300
RX 860 PRINT#4,SPC(10-LEN(STR$(
      P(J,1))));"$"+AS:NEXT
BQ 870 PRINT#4:CLOSE4:END
PJ 880 DATA 78,A9,<0+72,8D,14,
      03,A9,>0+72
FS 890 DATA 8D,15,03,A9,7F,8D,
      0D,DC,A9,01
EJ 900 DATA 8D,1A,D0,AD,11,D0,
      29,7F,8D,11
JB 910 DATA D0,A9,FA,8D,12,D0,
      A9,00,8D
SF 920 DATA <0+100,>0+100,A9,F
      F,A2,00,9D
FH 930 DATA <9,>9,E8,D0,FA,A9,
      FF,8D,15,D0
RR 940 DATA 58,60,01,02,04,08,
      10,20,40,80
DR 950 DATA FE,FD,FB,F7,EF,DF,
      BF,7F,A9,01
HK 960 DATA 8D,19,D0,AD,<0+100
      ,>0+100,0A
XB 970 DATA A8,B9,<0+101,>0+10
      1,8D,<0+95
SC 980 DATA >0+95,B9,<0+102,>0
      +102,8D
RQ 990 DATA <0+96,>0+96,4C,FF,
      FF,4C,31,EA
KM 1000 DATA 00,<0+111,>0+111,
      00,00,00,00
DH 1010 DATA 00,01,00,00,A2,00
      ,BD,<1,>1,C9,1D,90,0E,
      A8
GB 1020 DATA B9,<9,>9,30,04,C8
      ,4C,<0+121
DS 1030 DATA >0+121,8A,99,<9,>
      9,E8,E0,<C
MD 1040 DATA 90,E6,A2,00,A0,1D
      ,B9,<9,>9,10
BA 1050 DATA 4F,C8,B9,<9,>9,10
      ,49,C8,B9,<9
DK 1060 DATA >9,10,43,C8,B9,<9
      ,>9,10,3D,C8
XB 1070 DATA B9,<9,>9,10,37,C8
      ,B9,<9,>9,10
DD 1080 DATA 31,C8,B9,<9,>9,10
      ,2B,C8,B9,<9
SM 1090 DATA >9,10,25,C8,B9,<9
      ,>9,10,1F,C8
AA 1100 DATA B9,<9,>9,10,19,C8
      ,B9,<9,>9,10
AC 1110 DATA 13,C8,B9,<9,>9,10
      ,0D,C8,B9,<9
GH 1120 DATA >9,10,07,C8,C0,1D
      ,B0,AE,90,0F
CC 1130 DATA 9D,<A,>A,A9,FF,99
      ,<9,>9,E8,E0
RB 1140 DATA <C,90,A4,B0,18
RS 1142 DATA E0,08,B0,05,BC,<0
      +56,>0+56
EE 1144 DATA 88,2C,A0,FF,8C,15
      ,D0
CD 1149 DATA A9,FF,9D,<A,>A
BH 1150 DATA E8,E0,<C,90,F8,EE
      ,<0+100
BM 1160 DATA >0+100,A2,<C,CA
BX 1170 DATA BD,<1,>1,9D,<B,>B
      ,CA,10,F7,XX
PM 1180 END
DE 1200 POKE214,5+P:PRINT
BQ 1210 PRINT"{YEL}";P+1;"
      {LEFT} {CYN}"P$(P)
FF 1220 PRINT"{UP}"TAB(22);
QJ 1230 IFP(0,0)=1THENPRINT"
      {3}ON "
HA 1240 IFP(P,0)=2THENPRINT"
      {4}OFF"
MC 1250 IFP(P,0)=3THENPRINT"
      {RED}N/A{3}"
BJ 1260 PRINT"{UP}"TAB(26);P(P
      ,1);"{5 SPACES}"
SA 1270 D=P(P,1):GOSUB1300
AX 1280 PRINT"{UP}"TAB(34)"$";
      AS
BD 1290 RETURN
KF 1300 T=INT(D/4096):AS=H$(T)
      :D=INT(D-T*4096)
JA 1310 T=INT(D/256):AS=AS+H$(
      T):D=INT(D-T*256)
KA 1320 T=INT(D/16):B$=AS:AS=A
      $+H$(T):D=INT(D-T*16):
      B$=H$(T)+H$(D)+B$
JE 1330 AS=AS+H$(D):RETURN
QP 1340 D=0:FORJ=3TO0STEP-1:J1
      =ASC(MID$(D$,5-J,1))-4
      8:IFJ1>16THENJ1=J1-7
DA 1350 D=D+(J1*16↑J):NEXT:RET
      URN
JK 1360 FORX=21TO24:POKE781,X:
      SYS 59903:NEXT:RETURN
KB 1370 FORX=2TO24:POKE781,X:S
      YS59903:NEXT:RETURN
FB 1380 DA$="68F00D":GOSUB1430
QE 1390 POKEAD,185:POKEAD+1,FN
      L(P(0,1)+56-SB):POKEAD
      +2,FNH(P(0,1)+56-SB):A
      D=AD+3
EG 1400 DA$="0D"+AA$+"8D"+AA$+
      "F00BD009":GOSUB1430
FX 1410 POKEAD,185:POKEAD+1,FN
      L(P(0,1)+64-SB):POKEAD
      +2,FNH(P(0,1)+64-SB):A
      D=AD+3
CQ 1420 DA$="2D"+AA$+"8D"+AA$:
      GOSUB1430:RETURN
CJ 1430 MP=1:FORJJ=1TOLEN(DA$)
      STEP2:AS=MID$(DA$,JJ,2
      ):GOSUB1450:NEXT:MP=0:
      RETURN
XM 1440 READAS:IFAS="XX"THENRE
      TURN
KG 1450 IFLEFT$(AS,1)="<>"THEN1
      500
AX 1460 IFLEFT$(AS,1)=">"THEN1
      530
GS 1470 A1=ASC(LEFT$(AS,1))-48
      :A2=ASC(RIGHT$(AS,1))-
      48:IFA1>16THENA1=A1-7
QB 1480 IFA2>16THENA2=A2-7
SE 1490 POKEAD,A1*16+A2:AD=AD+
      1:ON -(MP=0) GOTOL440
      {SPACE}:RETURN
HK 1500 PL=0:IFLEN(AS)>2THENPL
      =VAL(MID$(AS,4))
RA 1510 WG$=MID$(AS,2,1):WG=VA
      L(WG$):IFWG$>"@>"ANDWG$
      <"D"THENWG=ASC(WG$)-55
HS 1520 POKEAD,FN L(P(WG,1)+PL
      ):AD=AD+1:ON -(MP=0) G
      OTOL440:RETURN
SP 1530 PL=0:IFLEN(AS)>2THENPL
      =VAL(MID$(AS,4))
ER 1540 WG$=MID$(AS,2,1):WG=VA
      L(WG$):IFWG$>"@>"ANDWG$
      <"D"THENWG=ASC(WG$)-55

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ER 1550 POKEAD,FN H(P(WG,1)+PL
):AD=AD+1:ON -(MP=0) G
OTO1440 :RETURN
BH 1560 POKEP(0,1)+101+J*2,FNL
(AD):POKEP(0,1)+102+J*
2,FNH(AD)
GF 1570 DA$="A200A0":IFJ=1THEN
DA$=DA$+"00":EP$="08":
SB=0
HF 1580 IF J=2THENDA$=DA$+"08"
:EP$="10":SB=8
DA 1590 IFJ=3THENDA$=DA$+"10":
EP$="18":SB=16
QR 1600 IFJ=4THENDA$=DA$+"18":
EP$="20":SB=24
BB 1610 DA$=DA$+"84BF":GOSUB14
30
AG 1620 IFJ=1THENB1=AD:GOTO166
0
QS 1630 B1=AD:DA$="B9":GOSUB14
30
AF 1640 POKEAD,FNL(P(10,1)-8):
POKEAD+1,FNH(P(10,1)-8
):AD=AD+2
AH 1650 DA$="300EA8B9<B>BA4BF1
86914CD12D0B0FB":GOSUB
1430
CJ 1660 DA$="B9<A>A":GOSUB1430
GP 1670 DA$="10034C0000A8":GOS
UB1430
SP 1680 DA$="B9<B>B9D01D0":GOS
UB1430
HK 1690 IFP(2,0)=1THENDA$="B9<
2>29D00D0":GOSUB1430
ES 1700 IFP(7,0)=1THENDA$="B9<
7>748":GOSUB1430
BF 1710 IFP(4,0)=1THENDA$="B9<
4>448":GOSUB1430
RQ 1720 IFP(6,0)=1THENDA$="B9<
6>648":GOSUB1430
GD 1730 IFP(5,0)=1THENDA$="B9<
5>548":GOSUB1430
PP 1740 IFP(3,0)=1THENDA$="B9<
3>348":GOSUB1430
XX 1750 IFP(8,0)=1THENDA$="B9<
8>8A4BF99":GOSUB1430
BB 1760 IFP(8,0)=1THENPOKEAD,F
NL(2040-SB):POKEAD+1,F
NH(2040-SB):AD=AD+2
HE 1770 IFP(3,0)=1THENAA$="10D
0":GOSUB1380
QH 1780 IFP(5,0)=1THENDA$="689
9":GOSUB1430
PE 1790 IFP(5,0)=1THENPOKEAD,F
NL(53287-SB):POKEAD+1,
FNH(53287-SB):AD=AD+2
EE 1800 IFP(6,0)=1THENAA$="1CD
0":GOSUB1380
XP 1810 IFP(4,0)=1THENAA$="1DD
0":GOSUB1380
FP 1820 IFP(7,0)=1THENAA$="1BD
0":GOSUB1380
QD 1830 PL=6:IFJ>1THENPL=25
AF 1840 POKEB1+PL,FNL(AD):POKE
B1+PL+1,FNH(AD):DA$="E
8E8C884BFC0"+EP$:GOSUB
1430
PQ 1850 D=254-(AD-B1)
QG 1860 IFD>129THENGOSUB1300:D
A$="D0"+RIGHT$(A$,2):G
OSUB1430:GOTO1880
BS 1870 DA$="F0034C":D=B1:GOSU
B1300:DA$=DA$+B$:GOSUB
1430
QS 1880 DA$="AD<A>A3010A8B9<B>
B38E9078D12D0EE00004CB
CFEA9008D0000A9FA8D12D
04C31EA"
QS 1885 GOSUB1430
MK 1890 POKEAD-33,FNL(P(10,1)+
8+SB):POKEAD-32,FNH(P(
10,1)+8+SB)
XA 1900 POKEAD-10,FNL(P(0,1)+1
00):POKEAD-9,FNH(P(0,1
)+100)
XG 1905 POKEAD-18,FNL(P(0,1)+1
00):POKEAD-17,FNH(P(0,
1)+100)
SQ 1907 POKEAD-2,FNL(P(0,1)+97
):POKEAD-1,FNH(P(0,1)+
97)
BK 1910 RETURN
FG 1920 B1=AD:DA$="B90000300EA
8B9<1>1A4BF186914CD12D
0B0FB":GOSUB1430
BE 1930 POKEB1+1,FNL(P(10,1)-8
):POKEB1+2,FNH(P(10,1)
-8):RETURN

```

32 DEMO

```

XR 100 REM 32 SPRITES DEMO
GA 110 REM
FP 120 PRINT"{CLR}{N}{H}":POKE
53281,0:POKE53280,0
EH 125 IFA=0THEN A=1:LOAD"32 D
EMO.ML",8,1
BE 127 IFA=1THEN A=2:LOAD"32",
8,1
JX 130 REM INITIALIZE 32 SPRIT
E REGISTERS
HH 135 DIM C(10)
EQ 140 Y=52992:X=53024:HX=5305
6:C=53120
KE 150 P=53216:PR=53275
AF 160 FORJ=0TO31:POKEY+J,0:PO
KEX+J,0:POKEHX+J,0:POKE
C+J,0:POKEPJ+J,14:NEXT
CS 170 FORJ=0TO63:POKE704+J,0:
POKE832+J,0:POKE896+J,0
:NEXT
QF 180 FORJ=3TO59:POKE832+J,25
5:NEXT
KD 190 POKEPR,255:SYS 50080:SY
S 49152:POKE53269,255
PJ 200 DT$="{HOME}{24 DOWN}"
SS 210 PRINTLEFT$(DT$,8);TAB(1
5){CYN}32 SPRITES"
JJ 220 PRINTTAB(9)"{7}CUSTOM 3
2-SPRITE RASTER"
EB 230 PRINTTAB(15)"CONTROLLER
"
RB 240 PRINT:PRINTTAB(9)"YOU C
AN DISPLAY UP TO 32"
JD 250 PRINTTAB(6)"SPRITES ON
{SPACE}THE SCREEN AT AN
Y"
QS 260 PRINTTAB(7)"TIME. EACH
{SPACE}SPRITE CAN MOVE"
CQ 270 PRINTTAB(9)"ANYWHERE ON
THE SCREEN."
RK 280 FORCL=1TO10:READC(CL):N
EXT:DATA 8,2,9,10,7,1,7
,10,9,2
AX 290 FORJ=31TO0STEP-1:POKEP+
J,13:FORCL=1TO10:POKEC+
J,C(CL):NEXT:NEXT
QC 300 GOSUB 1010
DF 310 GOSUB 1000
XM 320 PRINTLEFT$(DT$,12);TAB(
7)"YOU HAVE FULL CONTRO
L OVER"
PB 330 PRINTTAB(7)"EVERY SPRIT
E OPTION EXCEPT"
AS 340 PRINTTAB(13)"Y-EXPANSIO
N."
RQ 350 FORJ=0TO31:POKEC+J,INT(
RND(1)*15)+1:NEXT:GOSUB
1020
RD 360 FORJ=0TO31:POKEC+J,2:NE
XT:GOSUB1020
FG 370 FORJ=0TO63:POKE832+J,0:
NEXT
RR 375 FORJ=0TO31:A=INT(RND(1)
*3)+1:IFA=1THENPP=13
EQ 377 IFA=2THENPP=14
RS 378 IFA=3THENPP=11
JM 379 POKEP+J,PP:NEXT:CC=85
DA 380 FORJ=3TO59:POKE704+J,IN
T(RND(1)*256):POKE896+J
,CC:CC=255-CC:POKE832+J
,255
KP 385 NEXT
SK 390 POKE53285,7:POKE53286,1
0
FK 400 GOSUB1020:POKE53276,255
:GOSUB1020:GOSUB1020:PO
KE53276,0:GOSUB1020
BA 410 FORJ=0TO31:POKEP+J,13:N
EXT
ER 420 GOSUB1020:POKE53277,255
:GOSUB1020:POKE53277,0
FS 440 PRINTLEFT$(DT$,12);TAB(
5)"MOVE SPRITE #1
{2 SPACES}WITH JOYSTICK
"
JM 450 PRINTTAB(2)"IN PORT 2.
{2 SPACES}PRESS + AND -
TO CHANGE"
EF 460 PRINTTAB(3)"SPRITE NUMB
ER.{2 SPACES}PRESS C TO
CHANGE"
FJ 470 PRINTTAB(8)"COLOR. PRES
S Q TO QUIT."
BF 480 SYS 50272:POKE254,0:SP=
1
GE 490 POKE254,SP-1:PRINTLEFT$(
DT$,12);TAB(18);MID$(S
TR$(SP),2);" "
DG 500 GETA$:IFA$="+ANDSP<32T
HENSPP=SP+1:GOTO 490
EH 510 IFA$="-ANDSP>1THENSPP=S

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PROGRAMS

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P-1:GOTO 490
EJ 520 IFA$="C"THENPOKEC+SP-1,
      (PEEK(C+SP-1)+1)AND15
EG 530 IFA$<>"Q"THEN500
GS 540 POKE828,0:SYS 828
GG 999 END
DH 1000 FORJ=1TO24:POKE781,J:
      SYS 59903:NEXT:RETURN
DJ 1010 FORJ=1TO1000:NEXT:RETU
RN
PQ 1020 FORJ=1TO500:NEXT:RETUR
N
  
```

32 DEMO.ML

```

C3A0:78 A9 00 8D 62 C0 A9 C4 D5
C3A8:8D 63 C0 A2 00 8A 0A 0A 5A
C3B0:0A 0A 9D E0 C4 8A 4A 4A B0
C3B8:4A 4A 9D C0 C4 E8 E0 20 63
C3C0:90 EB 58 60 39 00 39 00 D8
C3C8:39 00 39 00 39 00 39 00 50
C3D0:39 00 39 00 39 00 39 00 58
C3D8:39 00 39 00 39 00 39 00 60
C3E0:39 00 39 00 39 00 39 00 68
C3E8:39 00 39 00 39 00 39 00 70
C3F0:39 00 39 00 39 00 39 00 78
C3F8:39 00 39 00 39 00 39 00 80
C400:A2 00 BD C0 C4 D0 24 BC 0D
C408:E0 C4 B9 00 C5 9D 20 CF 1F
C410:B9 00 C7 9D 40 CF B9 00 FD
C418:C9 9D 00 CF C8 D0 05 A9 28
C420:01 9D C0 C4 98 9D E0 C4 B7
C428:4C 50 C4 BC E0 C4 B9 00 DD
C430:C6 9D 20 CF B9 00 C8 9D 82
C438:40 CF B9 00 CA 9D 00 CF A9
C440:C8 C0 FE 90 07 A9 00 9D C3
C448:C0 C4 A0 00 98 9D E0 C4 39
C450:E8 E0 20 90 AD 4C 31 EA 7F
C458:00 00 00 00 00 00 00 00 E6
C460:78 A9 75 8D 62 C0 A9 C4 41
C468:8D 63 C0 A9 00 85 FD 85 DB
C470:FC 85 FE 58 60 A6 FE AD 8F
C478:00 DC 4A 90 03 FE 00 CF 6F
C480:4A 90 03 DE 00 CF 4A 90 06
C488:15 48 BD 20 CF 18 69 01 1B
C490:9D 20 CF 90 08 BD 40 CF 7B
C498:49 01 9D 40 CF 68 4A 90 04
C4A0:15 48 BD 20 CF 38 E9 01 B4
C4A8:9D 20 CF B0 08 BD 40 CF 95
C4B0:49 01 9D 40 CF 68 4C 31 C0
C4B8:EA 00 00 00 00 00 00 00 B7
C4C0:01 01 01 01 01 01 01 01 4A
C4C8:01 01 01 01 01 00 00 00 4B
C4D0:00 00 00 00 00 00 00 00 5A
C4D8:00 00 00 00 00 01 01 01 69
C4E0:3A 4A 5A 6A 7A 8A 9A AA E9
C4E8:BA CA DA EA FA 0A 1C 2C F8
C4F0:3C 4C 5C 6C 7C 8C 9C AC F9
C4F8:BC CC DC EC FC 0C 1C 2C FA
C500:A9 97 90 8B 86 83 7C 79 C5
C508:76 74 71 6F 6A 69 67 65 3E
C510:62 60 5D 5B 5A 58 58 56 81
C518:53 51 50 50 4E 4C 4B 49 34
C520:47 47 46 44 42 41 41 3F 07
C528:3F 3E 3C 3C 3A 3A 39 39 94
C530:37 35 35 34 34 32 30 30 89
C538:30 2F 2F 2D 2D 2B 2B 2B 87
C540:2A 2A 28 28 28 26 26 26 3F
C548:25 25 25 23 23 23 21 21 8F
C550:21 21 20 20 20 1E 1E 1E 8E
C558:1E 1E 1C 1C 1C 1C 1C 1B 64
  
```

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C560:1B 1B 1B 1B 1B 19 19 19 DD
C568:19 19 19 19 18 18 18 18 E4
C570:18 18 18 18 18 18 18 18 FB
C578:18 18 18 18 18 18 16 02
C580:18 18 18 18 18 18 18 0C
C588:18 18 18 18 18 18 18 14
C590:13 18 18 19 19 19 19 3B
C598:19 19 19 1B 1B 1B 1B 62
C5A0:1B 1C 1C 1C 1C 1E 1E B1
C5A8:1E 1E 20 20 20 21 21 B5
C5B0:21 23 23 23 25 25 25 59
C5B8:26 26 28 28 28 2A 2A D0
C5C0:2B 2B 2D 2D 2D 2F 30 30 DB
C5C8:30 32 32 34 35 35 37 37 A6
C5D0:39 39 3A 3C 3C 3E 3E 3F E8
C5D8:41 41 42 44 44 46 47 49 F4
C5E0:4B 4B 4C 4E 50 51 53 55 17
C5E8:56 58 5A 5B 5D 5F 60 62 42
C5F0:67 69 6A 6C 6F 71 76 79 46
C5F8:7C 80 83 86 90 97 A9 A9 9B
C600:A9 BA C0 CA CD D1 D4 D7 0D
C608:DB E0 E1 E5 E6 E8 EA EE F5
C610:F0 F2 F3 F5 F7 F8 FA FC 47
C618:FD FF 01 02 04 06 06 07 30
C620:09 0B 0C 0C 0E 10 10 11 19
C628:13 13 15 15 16 18 18 19 52
C630:19 1B 1B 1D 1E 1E 20 20 10
C638:20 22 23 23 23 25 25 27 14
C640:27 27 28 28 28 2A 2A 2C 1D
C648:2C 2C 2C 2D 2D 2D 2F 2F FA
C650:2F 31 31 31 31 32 32 32 E3
C658:32 34 34 34 34 34 36 36 EA
C660:36 36 36 36 37 37 37 37 FC
C668:37 37 37 37 39 39 39 39 14
C670:39 39 39 39 39 39 39 39 FD
C678:39 39 39 39 39 39 3B 08
C680:39 39 39 39 39 39 39 0E
C688:39 39 39 39 39 39 39 16
C690:39 39 39 37 37 37 37 37 DF
C698:37 37 36 36 36 36 36 36 E6
C6A0:34 34 34 34 34 32 32 32 20
C6A8:32 32 31 31 31 2F 2F 2F E8
C6B0:2F 2D 2D 2D 2C 2C 2C 2A 2E
C6B8:2A 2A 28 28 27 27 25 BE
C6C0:25 25 23 23 22 22 20 BA
C6C8:20 1E 1D 1D 1B 1B 19 18 F2
C6D0:18 16 16 15 15 13 11 11 2C
C6D8:10 10 0E 0C 0B 09 09 07 8A
C6E0:06 04 02 01 01 FF FD FA C1
C6E8:F8 F8 F7 F5 F3 F0 EE EB BC
C6F0:EA E8 E6 E1 E0 DC DB D7 33
C6F8:D4 CD CA C5 C0 BA A9 23 81
C700:00 00 00 00 00 00 00 8F
C708:00 00 00 00 00 00 00 97
C710:00 00 00 00 00 00 00 9F
C718:00 00 00 00 00 00 00 A7
C720:00 00 00 00 00 00 00 AF
C728:00 00 00 00 00 00 00 B7
C730:00 00 00 00 00 00 00 BF
C738:00 00 00 00 00 00 00 C7
C740:00 00 00 00 00 00 00 CF
C748:00 00 00 00 00 00 00 D7
C750:00 00 00 00 00 00 00 DF
C758:00 00 00 00 00 00 00 E7
C760:00 00 00 00 00 00 00 EF
C768:00 00 00 00 00 00 00 F7
C770:00 00 00 00 00 00 00 FF
C778:00 00 00 00 00 00 00 08
C780:00 00 00 00 00 00 00 10
C788:00 00 00 00 00 00 00 18
  
```

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C790:00 00 00 00 00 00 00 20
C798:00 00 00 00 00 00 00 28
C7A0:00 00 00 00 00 00 00 30
C7A8:00 00 00 00 00 00 00 38
C7B0:00 00 00 00 00 00 00 40
C7B8:00 00 00 00 00 00 00 48
C7C0:00 00 00 00 00 00 00 50
C7C8:00 00 00 00 00 00 00 58
C7D0:00 00 00 00 00 00 00 60
C7D8:00 00 00 00 00 00 00 68
C7E0:00 00 00 00 00 00 00 70
C7E8:00 00 00 00 00 00 00 78
C7F0:00 00 00 00 00 00 00 80
C7F8:00 00 00 00 00 00 00 88
C800:00 00 00 00 00 00 00 91
C808:00 00 00 00 00 00 00 99
C810:00 00 00 00 00 00 00 A1
C818:00 00 01 01 01 01 01 01 E8
C820:01 01 01 01 01 01 01 01 B1
C828:01 01 01 01 01 01 01 01 B9
C830:01 01 01 01 01 01 01 01 C1
C838:01 01 01 01 01 01 01 01 C9
C840:01 01 01 01 01 01 01 01 D1
C848:01 01 01 01 01 01 01 01 D9
C850:01 01 01 01 01 01 01 01 E1
C858:01 01 01 01 01 01 01 01 E9
C860:01 01 01 01 01 01 01 01 F1
C868:01 01 01 01 01 01 01 01 F9
C870:01 01 01 01 01 01 01 01 02
C878:01 01 01 01 01 01 01 01 0A
C880:01 01 01 01 01 01 01 01 12
C888:01 01 01 01 01 01 01 01 1A
C890:01 01 01 01 01 01 01 01 22
C898:01 01 01 01 01 01 01 01 2A
C8A0:01 01 01 01 01 01 01 01 32
C8A8:01 01 01 01 01 01 01 01 3A
C8B0:01 01 01 01 01 01 01 01 42
C8B8:01 01 01 01 01 01 01 01 4A
C8C0:01 01 01 01 01 01 01 01 52
C8C8:01 01 01 01 01 01 01 01 5A
C8D0:01 01 01 01 01 01 01 01 62
C8D8:01 01 01 01 01 01 01 01 6A
C8E0:01 01 01 01 01 00 00 00 6B
C8E8:00 00 00 00 00 00 00 00 7A
C8F0:00 00 00 00 00 00 00 00 82
C8F8:00 00 00 00 00 00 00 00 8A
C900:32 32 33 33 34 35 36 36 EB
C908:37 38 38 39 3A 3B 3B 3C 51
C910:3C 3D 3E 3F 3F 40 41 41 8B
C918:42 43 44 44 45 45 47 47 7F
C920:48 48 49 4A 4B 4C 4C 4D 29
C928:4D 4E 4F 50 50 51 52 52 A3
C930:53 54 55 55 56 56 58 58 97
C938:59 59 5A 5B 5C 5C 5D 5E 3D
C940:5E 5F 60 61 61 62 62 63 B9
C948:64 65 66 66 67 67 69 69 AF
C950:6A 6A 6B 6C 6D 6D 6E 6E 55
C958:6F 70 71 72 72 73 73 74 D1
C960:75 76 76 77 78 78 79 7A A5
C968:7B 7B 7C 7C 7E 7E 7F 80 5D
C970:80 81 82 83 83 84 84 85 E9
C978:86 87 87 88 89 89 8A 8B BD
C980:8C 8C 8D 8D 8F 8F 90 90 74
C988:91 92 93 93 94 95 95 96 F1
C990:97 98 98 99 9A 9A 9B 9C D5
C998:9D 9D 9E 9E A0 A0 A1 A1 8C
C9A0:A2 A3 A4 A4 A5 A6 A6 A7 0A
C9A8:A8 A9 A9 AA AA AB AC AD E5
C9B0:AD AE AF AF B0 B1 B2 B2 1C
C9B8:B3 B4 B5 B5 B6 B7 B7 B8 22
  
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C9C0:B9 BA BA BB BB BC BD BE FD
C9C8:BE BF C0 C0 C1 C2 C3 C3 34
C9D0:C4 C4 C6 C6 C7 C7 C8 C9 F5
C9D8:CA CA CB CC CC CD CE CF D5
C9E0:CF D0 D1 D1 D2 D3 D4 D4 4C
C9E8:D5 D5 D7 D7 D8 D8 D9 DA 0E
C9F0:DB DB DC DD DD DE DF E0 ED
C9F8:E0 E1 E1 E2 E3 E4 E5 E5 44
CA00:E5 E4 E3 E2 E1 E1 E0 E0 A5
CA08:DF DE DD DD DC DB DB DA C7
CA10:D9 D8 D8 D7 D7 D5 D5 D4 F7
CA18:D4 D3 D2 D1 D1 D0 CF CF C5
CA20:CE CD CC CC CB CA CA C9 DF
CA28:C8 C7 C7 C6 C6 C4 C4 C3 10
CA30:C3 C2 C1 C0 C0 BF BE BE DD
CA38:BD BC BB BB BA BA B9 B8 FB
CA40:B7 B7 B6 B5 B5 B4 B3 B2 6C
CA48:B2 B1 B0 AF AF AE AD AD F5
CA50:AC AB AA AA A9 A9 A8 A7 14
CA58:A6 A6 A5 A4 A4 A3 A2 A1 84
CA60:A1 A0 A0 9E 9E 9D 9D 9C 30
CA68:9B 9A 9A 99 98 98 97 96 4C
CA70:95 95 94 93 93 92 91 90 9C
CA78:90 8F 8F 8D 8D 8C 8C 8B 48
CA80:8A 89 89 88 87 87 86 85 64
CA88:84 84 83 83 82 81 80 80 C5
CA90:7F 7E 7E 7C 7C 7B 7B 7A 60
CA98:79 78 78 77 76 76 75 74 7C
CAA0:73 73 72 72 71 70 6F 6F DD
CAA8:6E 6D 6D 6C 6B 6A 6A 69 88
CAB0:69 67 67 66 66 65 64 63 1D
CAB8:62 62 61 61 60 5F 5E 5E F5
CAC0:5D 5C 5C 5B 5A 59 59 58 A0
CAC8:58 56 56 55 55 54 53 52 35
CAD0:52 51 50 50 4F 4E 4D 4D 8E
CAD8:4C 4C 4B 4A 49 48 48 47 F8
CAE0:47 45 45 44 44 43 42 41 4D
CAE8:41 40 3F 3F 3E 3D 3C 3C A6
CAF0:3B 3B 3A 39 38 38 37 36 15
CAF8:36 35 34 33 33 32 32 39 B0

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Bill Soudan manipulates sprites in Girard, Pennsylvania.

MIDWAY COMMAND

By Michael Sedlezky

Midway Command is a two-player strategy game for the 64. You and a friend assume the roles of American and Japanese naval commanders during World War II.

Experience the Battle of Midway as each of you orders your powerful carrier forces into battle with each other. Your flotilla is made up of battleships, cruisers, destroyers, and aircraft carriers. There are 14 vessels per side. Winning the game is accomplished by sinking your enemy's carrier. Your ships battle each other with cannon shells.

Midway Command is written entirely in machine language, but it loads and runs like a BASIC program. To enter it, use MLX, our machine language entry pro-

gram. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

Starting address: 0801

Ending address: 1680

The game is played on a grid that resembles a standard checkerboard. Each occupied square contains a marker that indicates a ship. The American marker is black, and the Japanese marker is white.

Use your joystick in port 2 to position the game's cursor to select a square of your choice. As the cursor moves over a square, a view of the ship is displayed along with its type and two scale bars.

Ship Strength

One scale represents the ship's strength. This scale represents the amount of damage the ship can withstand. As the scale decreases in size, the ship is in danger of sinking. Damage inflicted on any ship cannot be repaired.

Ship Firepower

The firepower scale represents the amount of damage the ship's guns will inflict on an enemy vessel's strength. This scale will increase if this ship fires the blow that sinks an enemy ship. As a ship gains experience, it becomes a deadlier fighting vessel.

Playing the Game

The game is played in turns. Each player has the option either to move or to attack. The American commander starts first. You choose one of your ships by selecting it with the cursor and then pressing the fire button. You then have the option either to move or to fight by pressing a function key. Follow on-screen directions.

You finish a turn by selecting a target square. The cursor is a green shade if the target square is within legal boundaries. In order for you to move onto a square, it must be unoccupied and within range. The border flashes red if you attempt an illegal move.

Moving and Firing

All ships can move at least one square in any direction. Destroyers can move two.

To attack, you must select an enemy ship that is within firing range. Each ship has different ranges, and you can fire in any direction. The carrier cannot fire. A destroyer can fire a distance of only one square. Cruisers can fire two squares only; they cannot fire one square. A battleship can fire one or two squares. The battleship is your strongest piece, followed by the cruisers and then by destroyers. Protect your carrier at all times.

Game Hints

Whenever possible, force the enemy to move into your range of fire so you can get first shot. Use your cruiser or battleship to finish off an enemy so you can increase your stronger piece's firepower.

Fight cruisers with destroyers. Use the destroyers' two-square advantage to jump to an adjoining square where the cruiser can't fire on you.

If your opponent takes a defensive strategy, analyze the setup and probe the weakest side with your destroyers. Attack from different sides and try to draw the ships out of position.

MIDWAY COMMAND

```

0801:0C 08 01 00 9E 20 33 33 48
0809:32 39 00 00 00 00 27 1D EB
0811:13 09 1D 27 27 27 1D 1D 30
0819:27 27 27 27 00 00 26 24 4E
0821:22 28 24 26 26 26 24 24 69
0829:26 26 26 26 00 19 03 00 67
0831:00 80 00 FA 0B 0F 0C 00 BD
0839:00 00 00 00 00 00 8F 00 68
0841:00 00 00 00 00 00 00 00 51
0849:00 00 00 00 00 00 00 00 59
0851:00 00 18 00 00 82 80 00 6F
0859:AA 40 02 7C 80 05 FF 40 2F
0861:00 7C 00 00 00 00 00 00 90
0869:00 00 00 00 00 00 00 00 79
0871:00 00 00 00 00 00 00 00 81
0879:00 00 00 00 00 00 87 00 98
0881:00 00 00 00 00 00 00 00 91
0889:00 00 00 00 00 00 00 00 99
0891:01 00 00 03 00 00 33 00 B8
0899:03 FF 00 79 FF 00 3F FF 41
08A1:FF FF FF 3F FF FF 0F FF C3
08A9:FF 07 FF FF 00 00 00 00 7B
08B1:00 00 00 00 00 00 00 00 C1
08B9:00 00 00 00 00 00 80 00 CA
08C1:00 00 00 00 00 00 00 00 D1
08C9:80 00 00 C0 00 00 80 00 27
08D1:00 D0 00 00 90 00 00 D7 72
08D9:C0 00 FF 9C 00 FF FF 80 94

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PROGRAMS

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08E1:FF FE 30 FF FF FF FF FF B7
08E9:FF FF FF FE 00 00 00 00 E9
08F1:00 00 00 00 00 00 00 02
08F9:00 00 00 00 00 00 80 0B
0901:00 00 00 00 00 00 00 13
0909:00 00 00 00 00 00 00 1B
0911:00 00 00 00 00 00 00 23
0919:00 01 00 00 1F 7F 0C CF 4A
0921:3F FF FF 1F FF FF 0F FF E2
0929:FF 07 FF FF 00 00 00 00 FC
0931:00 00 00 00 00 00 00 43
0939:00 00 00 00 00 00 80 00 4C
0941:00 00 00 00 00 00 00 53
0949:00 00 00 00 00 00 00 5B
0951:00 80 00 00 90 00 00 D3 DB
0959:00 00 FF 9C 00 FF FC 00 2F
0961:FF FF 00 FF FF FE FF FF 6F
0969:FE FF FF FC 00 00 00 00 CA
0971:00 00 00 00 00 00 00 83
0979:00 00 00 00 00 00 80 00 8C
0981:00 00 00 00 00 00 00 93
0989:00 00 00 00 00 00 00 9B
0991:00 00 00 00 00 00 00 A3
0999:00 01 00 00 03 00 00 0F 13
09A1:00 06 7F 01 FF FF 00 7F B4
09A9:FF 00 3F FF 00 00 00 00 A3
09B1:00 00 00 00 00 00 00 C3
09B9:00 00 00 00 00 00 80 00 CC
09C1:00 00 00 00 00 00 00 00 D3
09C9:00 00 00 00 00 00 00 00 DB
09D1:00 00 00 00 00 00 00 00 E3
09D9:00 00 00 00 00 C0 00 00 EE
09E1:F8 00 00 FD CC 00 FF FF B6
09E9:80 FF FF 00 00 00 00 00 3C
09F1:00 00 00 00 00 00 00 00 04
09F9:00 00 00 00 00 00 80 00 0D
0A01:00 00 00 00 00 00 00 00 15
0A09:00 00 00 00 00 00 00 00 1D
0A11:00 00 00 00 00 00 01 00 27
0A19:00 6D FF FF FF 0F FF FF C4
0A21:FF FF FF FF FF FF 7F FF 34
0A29:FF 3F FF FF 00 00 00 00 0D
0A31:00 00 00 00 00 00 00 00 45
0A39:00 00 00 00 00 00 80 00 4E
0A41:00 00 00 00 00 00 00 00 55
0A49:00 00 00 00 00 00 80 00 5E
0A51:00 80 00 00 B0 00 00 F6 02
0A59:C0 00 FF FF FF FF FF F0 BE
0A61:FF FF FF FF FF FF FF FF 75
0A69:FE FF FF FC 00 00 00 00 CC
0A71:00 00 00 00 00 00 00 00 85
0A79:00 00 00 00 00 00 80 00 8E
0A81:00 00 00 00 00 00 00 00 95
0A89:00 00 00 00 00 00 00 00 9D
0A91:01 00 00 00 00 00 01 00 2E
0A99:00 05 00 00 FF 00 00 3F 28
0AA1:00 0F FF FF C3 FF 7F FF 96
0AA9:FF 7F FF FF 00 00 00 00 9D
0AB1:00 00 00 00 00 00 00 00 C5
0AB9:00 00 00 00 00 00 8F 00 EC
0AC1:00 00 00 00 00 00 00 00 D5
0AC9:00 00 00 C0 00 00 80 00 EA
0AD1:00 C4 00 00 AC 00 00 CF 4A
0AD9:00 00 AC 70 00 FE E0 00 48
0AE1:FF FF 00 FF FC 0F FF FF 1A
0AE9:FF FF FF FE 00 00 00 00 ED
0AF1:00 00 00 00 00 00 00 00 06
0AF9:00 00 00 00 00 00 8F 00 2D
0B01:00 00 00 00 00 00 00 00 1F
0B09:00 00 00 00 00 00 00 00 1F
0B11:00 00 00 00 00 00 00 00 27
0B19:08 01 00 04 03 00 33 CF 02
0B21:7F 0F FF 7F FF FF 3F FF 31
0B29:FF 0F FF FF 00 00 00 00 03
0B31:00 00 00 00 00 00 00 00 47
0B39:00 00 00 00 00 00 8F 00 6E
0B41:00 00 00 00 00 00 00 00 57
0B49:00 00 03 00 00 00 00 00 5F
0B51:00 80 00 00 C0 00 00 D8 66
0B59:00 00 98 90 00 F8 E2 00 35
0B61:FF FC 00 FF FF F0 FF FF 7A
0B69:F0 FF FF F0 00 00 00 00 07
0B71:00 00 00 00 00 00 00 00 87
0B79:00 00 00 00 00 00 8F 00 AE
0B81:00 00 00 00 00 00 00 00 97
0B89:00 00 00 00 00 00 00 00 9F
0B91:00 00 00 00 00 00 00 00 A7
0B99:00 00 00 01 00 00 01 B8
0BA1:00 00 9D 00 00 7F 00 3F A8
0BA9:FF 00 1F FF 00 00 00 00 A3
0BB1:00 00 00 00 00 00 00 00 C7
0BB9:00 00 00 00 00 00 8F 00 EE
0BC1:00 00 00 00 00 00 00 00 D7
0BC9:00 00 00 00 00 00 00 00 DF
0BD1:00 00 00 00 00 00 80 00 68
0BD9:00 00 00 00 40 00 00 F0
0BE1:60 10 00 E2 E7 00 FF FE 98
0BE9:00 FF FE 00 00 00 00 00 DF
0BF1:00 00 00 00 00 00 00 00 08
0BF9:00 00 00 00 00 00 8F 00 2F
0C01:00 00 00 00 00 00 00 00 19
0C09:00 00 00 00 00 01 00 00 25
0C11:01 00 00 03 00 00 03 00 DF
0C19:00 17 FF FF FF 42 1C 7F B7
0C21:43 3F FF FF FF 7F FF A9
0C29:FF 3F FF FF 00 00 00 11
0C31:00 00 00 00 00 00 00 00 49
0C39:00 00 00 00 00 00 8F 00 70
0C41:00 00 00 00 00 00 00 00 59
0C49:00 00 00 00 00 00 00 00 61
0C51:00 00 00 00 80 00 00 82 EF
0C59:A5 28 FF FF FE FF F8 44 7C
0C61:FF FC 44 FF FF FF FF FF 41
0C69:FE FF FF FE 00 00 00 00 F0
0C71:00 00 00 00 00 00 00 00 89
0C79:00 00 00 00 00 00 8F 00 B0
0C81:00 00 00 00 00 00 00 00 99
0C89:00 00 00 00 00 00 10 F1
0C91:00 00 00 00 00 10 00 00 EA
0C99:28 00 00 38 00 00 7C 00 42
0CA1:00 6C 00 00 38 00 00 38 CE
0CA9:00 00 00 00 00 00 00 00 C1
0CB1:00 00 00 00 00 00 00 00 C9
0CB9:00 00 00 00 00 00 80 00 D2
0CC1:00 00 00 00 00 01 00 00 DB
0CC9:00 04 00 00 00 00 00 00 8A
0CD1:00 00 10 00 00 28 00 00 8C
0CD9:38 00 00 7C 00 00 6C 00 AE
0CE1:00 7C 00 00 6C 00 00 38 B4
0CE9:00 00 00 00 00 00 00 00 02
0CF1:00 00 00 00 00 00 00 00 0A
0CF9:00 00 00 00 00 00 80 00 13
0D01:A9 FF 85 FE 85 FC A9 D2 D6
0D09:85 FF A9 22 85 FD A0 00 A2
0D11:8C 0E DC A9 33 85 01 B1 8E
0D19:FE 91 FC C6 FC C6 FE D0 F4
0D21:F6 C6 FD C6 FF A5 FF C9 F4
0D29:CF D0 EC A9 37 85 01 A9 13
0D31:01 8D 0E DC 8D 0B CF A9 A0
0D39:18 8D 18 D0 A2 32 BD 80 AC
0D41:0E 9D 07 21 CA D0 F7 A9 EF
0D49:93 20 D2 FF 20 D7 11 A9 BB
0D51:0B 8D 35 08 20 90 13 A2 87
0D59:0D BD A9 0E 9D 19 04 A9 82
0D61:07 9D 19 D8 CA 10 F2 20 B3
0D69:F7 15 A9 00 8D 12 CF 8D DB
0D71:13 CF 8D 19 CF 8D 2D CF 2B
0D79:8D 2E CF 8D 76 16 A2 0D 17
0D81:A0 1B 20 A5 0F 20 3A 10 8E
0D89:AD 12 CF D0 DD A9 00 8D 29
0D91:19 CF AD 0C CF F0 11 20 27
0D99:47 0E 20 C3 11 A9 09 8D E9
0DA1:35 08 20 90 13 4C AF 0D 9B
0DA9:20 AD 1F 4C 9B 0D A9 04 6E
0DB1:8D 24 CF 20 2D 0E AD 23 B7
0DB9:CF F0 14 A2 8B A0 53 20 4A
0DC1:86 10 20 E4 FF C9 85 D0 78
0DC9:F9 20 10 16 4C 01 D0 A9 76
0DD1:01 8D 2E CF 8D 76 16 A2 A7
0DD9:0D A0 A7 A9 00 8D 12 CF 5C
0DE1:8D 13 CF 8D 19 CF A9 10 C5
0DE9:8D 2D CF 20 A5 0F 20 3A F5
0DF1:10 AD 12 CF D0 D9 A9 00 FF
0DF9:8D 19 CF AD 0C CF F0 11 88
0E01:20 47 0E 20 C3 11 A9 0B 83
0E09:8D 35 08 20 90 13 4C 18 BD
0E11:0E 20 AD 10 4C 04 0E A9 2B
0E19:14 8D 24 CF 20 2D 0E AD A3
0E21:23 CF F0 05 A2 99 4C BE 04
0E29:0D 4C 6B 0D A9 00 8D 23 A8
0E31:CF AD 24 CF BD 50 78 29 1F 77
0E39:CD 24 CF F0 08 CA 10 F3 CD
0E41:A9 01 8D 23 CF 60 AE 11 C4
0E49:CF BD 50 78 8D 14 CF BD 68
0E51:90 78 9D 00 78 BD D0 78 5C
0E59:8D 29 CF A9 00 9D 50 78 AA
0E61:9D D0 78 AE 04 CF 8E 07 FD
0E69:CF AD 76 16 8D 08 CF 9D D2
0E71:00 78 AD 14 CF 9D 50 78 B0
0E79:AD 29 CF 9D D0 78 60 AA 5E
0E81:55 AA 55 AA 55 AA 55 AA F2
0E89:55 AA 55 AA 55 AA 55 AA FA
0E91:55 AA 55 AA 55 AA 55 FF 58
0E99:FF 81 99 BD BD 99 81 FF 7C
0EA1:FF FF FF FF FF FF FF FF BD
0EA9:0D 09 04 17 01 19 20 03 30
0EB1:0F 0D 0D 01 0E 04 20 10 1B
0EB9:0C 05 01 13 05 20 13 05 42
0EC1:0C 05 03 14 20 01 0D 05 EA
0EC9:12 09 03 01 0E 20 13 08 C0
0ED1:09 10 06 31 20 20 06 09 E0
0ED9:12 05 20 07 15 0E 13 20 DB
0EE1:06 37 20 20 0D 0F 16 05 AA
0EE9:20 13 08 09 10 20 20 14 C1
0EF1:01 12 07 05 14 20 13 11 9C
0EF9:15 01 12 05 20 06 31 20 0F
0F01:03 0F 0E 14 09 0E 15 05 17
0F09:20 20 20 20 06 09 12 09 C6
0F11:0E 07 20 13 09 12 20 20 1E
0F19:20 01 20 04 09 12 05 03 69
0F21:14 20 08 09 14 20 13 08 32
0F29:05 20 09 13 20 13 09 0E 91
0F31:0B 09 0E 07 20 01 0D 05 6D
0F39:12 09 03 01 20 17 09 0E 90
0F41:13 20 20 20 0A 01 10 01 6C
0F49:0E 20 17 09 0E 13 20 20 07
0F51:20 0A 01 10 01 0E 05 13 80
0F59:05 20 13 08 09 10 06 09 82
0F61:12 05 20 10 0F 17 05 12 BF
0F69:20 13 14 12 05 0E 07 14 82

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0F71:08	20	15	0E	0F	03	03	15	BE	11A1:8D	15	D0	AE	04	CF	BD	D0	80	13D1:03	CF	C9	7E	D0	06	20	B5	23
0F79:10	09	05	04	20	03	01	12	E3	11A9:78	09	80	9D	D0	78	20	E0	BD	13D9:14	4C	ED	13	AD	03	CF	29	4E
0F81:12	09	05	12	20	20	02	01	33	11B1:14	A0	0A	20	CA	11	88	10	05	13E1:02	D0	06	20	C9	14	4C	ED	25
0F89:14	14	0C	05	13	08	09	10	63	11B9:FA	A9	00	8D	06	D4	8D	04	3F	13E9:13	4C	A7	13	AE	07	CF	AD	B1
0F91:20	03	12	15	09	13	05	12	C4	11C1:D4	60	A9	96	85	FE	4C	CE	94	13F1:08	CF	9D	00	78	20	6E	14	F8
0F99:20	20	04	05	13	14	12	0F	BC	11C9:11	A9	23	85	FE	C6	FF	D0	7F	13F9:AD	04	CF	29	3F	8D	04	CF	8C
0FA1:19	05	12	20	20	86	10	A9	B6	11D1:FC	C6	FE	D0	F8	60	A0	07	A2	1401:8D	07	CF	20	E0	14	AE	04	66
0FA9:00	8D	10	CF	8D	19	CF	20	BA	11D9:84	FD	A9	04	85	FE	A9	26	D4	1409:CF	BD	00	78	8D	08	CF	AD	E9
0FBL:9A	13	AE	04	CF	BD	50	78	86	11E1:85	FF	A2	00	8E	04	CF	8E	CD	1411:10	CF	F0	1B	AD	0D	CF	CD	14
0FB9:8D	2C	CF	F0	EA	29	10	CD	9C	11E9:05	CF	8E	06	CF	A0	07	18	DB	1419:0F	CF	90	03	4C	28	14	AD	D7
0FC1:2D	CF	F0	E3	8E	11	CF	8E	AD	11F1:A5	FF	69	03	85	FF	9D	40	EB	1421:0E	CF	CD	0F	CF	90	19	A9	8A
0FC9:19	CF	8E	2B	CF	BD	D0	78	7C	11F9:CE	A5	FE	69	00	85	FE	9D	15	1429:0A	8D	13	CF	4C	62	14	BD	EA
0FD1:8D	2A	CF	4A	4A	4A	29	07	B4	1201:00	CE	E8	88	10	E9	18	A5	7C	1431:50	78	F0	07	29	10	CD	2D	80
0FD9:8D	1E	CF	A9	00	8D	0C	CF	F8	1209:FF	69	60	85	FF	A5	FE	69	E9	1439:CF	D0	05	A9	0A	4C	62	14	13
0FEL:8D	30	CF	85	C6	A2	29	A0	D8	1211:00	85	FE	C6	FD	10	D6	A2	63	1441:AD	30	CF	F0	15	AD	0D	CF	9E
0FE9:37	20	86	10	20	E4	FF	C9	DB	1219:3F	A9	01	8D	09	CF	A9	07	22	1449:F0	10	C9	04	F0	0C	AD	0E	88
0FF1:85	D0	26	AD	2C	CF	29	7F	19	1221:8D	0A	CF	A9	00	9D	80	CE	69	1451:CF	F0	07	C9	04	F0	03	4C	51
0FF9:4A	4A	4A	4A	4A	8D	0D	CF	30	1229:9D	C0	CE	9D	C0	CF	9D	50	D0	1459:28	14	A9	00	8D	13	CF	A9	D1
1001:8D	0E	CF	0A	8D	0F	CF	EE	3D	1231:70	8D	23	CF	AD	09	CF	49	D0	1461:0D	8D	77	16	9D	00	78	20	C1
1009:0F	CF	AD	2C	CF	29	0F	AA	09	1239:01	8D	09	CF	A8	B9	36	08	FF	1469:6E	14	4C	9A	13	A2	3F	A0	43
1011:BD	E2	12	F0	03	8D	30	CF	98	1241:9D	00	78	9D	90	78	CE	0A	2B	1471:00	BD	40	CE	85	FE	BD	00	A1
1019:60	C9	88	D0	CF	A2	03	A0	A9	1249:CF	10	D0	AD	09	CF	49	01	F0	1479:CE	85	FF	BD	50	78	F0	04	90
1021:01	8C	0C	CF	AD	2C	CF	29	4A	1251:8D	09	CF	A9	07	8D	0A	CF	65	1481:A9	24	91	FE	A5	FF	18	69	70
1029:80	F0	04	A0	02	A2	05	8C	81	1259:CA	10	C8	A2	0D	BD	9C	12	D4	1489:D4	85	FF	BD	00	78	91	FE	5D
1031:0D	CF	8C	0E	CF	8E	0F	CF	E4	1261:9D	E0	CF	A8	BD	B8	12	99	9F	1491:CA	10	DE	60	AD	05	CF	F0	17
1039:60	A2	0D	8E	10	CF	A0	45	03	1269:50	78	A9	01	99	00	78	BD	94	1499:09	CE	04	CF	CE	05	CF	CE	70
1041:20	86	10	20	9A	13	AE	04	99	1271:D4	12	99	D0	78	BD	AA	12	E6	14A1:0D	CF	60	AD	05	CF	C9	07	2D
1049:CF	EC	11	CF	F0	1D	AD	13	16	1279:9D	F0	CF	A8	BD	C6	12	99	F3	14A9:A0	09	EE	04	CF	EE	05	CF	BE
1051:CF	D0	18	AD	0C	CF	D0	0D	B9	1281:50	78	A9	00	99	00	78	BD	9C	14B1:EE	0D	CF	60	AD	06	CF	F0	AA
1059:BD	50	78	F0	0E	29	10	CD	8D	1289:D4	12	09	40	99	D0	78	CA	8D	14B9:0E	AD	04	CF	E9	08	8D	04	60
1061:2D	CF	D0	07	60	BD	50	78	A9	1291:10	CF	A9	01	8D	07	CF	8D	AD	14C1:CF	CE	06	CF	CE	0E	CF	60	F1
1069:D0	01	60	A9	0A	8D	20	D0	70	1299:08	CF	60	00	01	03	04	06	E3	14C9:AD	06	CF	C9	07	F0	0F	AD	A8
1071:A0	07	20	CA	11	88	10	FA	1A	12A1:07	09	0A	0B	0C	0D	0E	13	41	14D1:04	CF	18	69	08	8D	04	CF	D7
1079:AD	35	08	8D	20	D0	8D	12	09	12A9:14	38	39	3B	3C	3E	3F	31	4B	14D9:EE	06	CF	EE	0E	CF	60	AE	03
1081:CF	20	90	13	60	8C	28	CF	2A	12B1:32	33	34	35	36	2B	2C	A1	ED	14E1:04	CF	BD	00	78	8D	25	CF	D8
1089:A0	0D	BD	07	0E	99	69	04	1E	12B9:42	43	04	45	A6	A7	A8	49	13	14E9:BD	50	78	29	0F	D0	03	4C	B4
1091:A9	0F	99	69	D8	99	B9	D8	8D	12C1:4A	AB	AC	AD	AE	B1	52	53	9A	14F1:D8	15	AA	BD	1E	08	8D	18	41
1099:CA	88	10	EE	AE	28	CF	A0	88	12C9:14	55	B6	B7	B8	59	5A	BB	3B	14F9:CF	BD	0E	0A	AA	A0	09	BD	63
10A1:0D	BD	B7	0E	99	B9	04	CA	16	12D1:BC	BD	BE	0B	15	27	04	15	AE	1501:7D	0F	99	D3	05	A9	25	99	D0
10A9:88	10	F6	60	AD	15	D0	09	63	12D9:0B	0B	15	15	0B	0B	0B	EE	1509:83	05	99	AB	05	A9	03	99	92	
10B1:01	8D	15	D0	A2	61	A0	6F	B0	12E1:0B	00	00	01	00	00	01	00	9D	1511:D3	D9	99	9B	DA	99	3B	DB	18
10B9:20	86	10	A0	05	20	CA	11	E6	12E9:00	00	01	01	00	00	00	00	3E	1519:A9	0A	99	EB	DA	99	8B	DB	BC
10C1:88	10	FA	20	70	11	A0	19	AD	12F1:A9	04	85	FF	A9	00	85	FE	F3	1521:AD	35	08	99	83	D9	99	AB	6C
10C9:20	CA	11	88	D0	FA	20	09	13	12F9:A2	17	A9	02	8D	02	CF	A9	48	1529:D9	A9	FF	8D	1B	D0	B9	5F	72
10D1:11	AE	04	CF	AD	20	CF	F0	22	1301:21	8D	01	CF	A0	17	A9	02	EE	1531:0F	99	9B	06	B9	69	0F	99	48
10D9:05	A9	01	4C	FF	10	20	52	9E	1309:8D	00	CF	AD	01	CF	91	FE	34	1539:3B	07	A9	20	99	EC	06	99	20
10E1:11	AE	11	CF	AD	2A	CF	9D	A8	1311:CE	00	CF	10	0D	AD	01	CF	8A	1541:8C	07	CA	88	10	B9	AD	25	3D
10E9:D0	78	AE	04	CF	A9	00	9D	69	1319:49	03	8D	01	CF	A9	02	8D	1D	1549:CF	29	40	F0	08	A0	00	AD	2D
10F1:50	78	8D	25	CF	BD	90	78	6B	1321:00	CF	88	10	E6	CE	02	CF	93	1551:18	CF	4C	5E	15	A0	0F	AD	E1
10F9:9D	00	78	8D	08	CF	AD	25	D0	1329:10	0D	A9	02	8D	02	CF	AD	B1	1559:18	CF	18	69	08	8D	F9	07	8E
1101:CF	9D	D0	78	20	E0	14	60	21	1331:01	CF	49	03	8D	01	CF	A5	DA	1561:18	69	01	8D	FA	07	A9	21	53
1109:A9	01	8D	20	CF	AD	27	CF	47	1339:FE	18	69	28	85	FE	A5	FF	08	1569:8D	F8	07	A9	FF	8D	02	D0	1F
1111:ED	1E	CF	8D	27	CF	30	0C	69	1341:69	00	85	FF	CA	10	BD	A9	88	1571:A9	17	8D	04	D0	A9	12	8D	07
1119:AD	25	CF	29	F8	0D	27	CF	02	1349:00	85	FE	85	FC	A9	04	85	25	1579:0E	D0	8D	00	D0	A9	6B	8D	22
1121:8D	25	CF	60	A9	00	8D	20	DB	1351:FF	A9	D8	85	FD	A9	17	8D	A7	1581:03	D0	8D	05	D0	8D	0F	D0	0F
1129:CF	8D	25	CF	A2	61	A0	7D	91	1359:10	CF	A0	17	B1	FE	29	01	DD	1589:8D	01	D0	8C	28	D0	8C	29	64
1131:20	86	10	AD	2A	CF	29	07	8C	1361:AA	BD	36	08	91	FC	88	10	35	1591:D0	8C	2E	D0	A9	07	8D	27	C5
1139:8D	2A	CF	DE	1E	CF	AD	1E	3F	1369:F3	A5	FE	18	69	28	85	FE	4A	1599:D0	A9	85	8D	10	D0	AD	25	64
1141:CF	C9	08	D0	02	A9	07	0A	9A	1371:85	FC	A5	FF	69	00	85	FF	A4	15A1:CF	29	80	F0	05	A9	86	4C	45
1149:0A	0A	0D	2A	CF	8D	2A	CF	10	1379:18	69	D4	85	FD	CE	10	CF	14	15A9:AD	15	A9	06	8D	15	D0	AD	95
1151:60	A0	0E	20	CA	11	20	CA	35	1381:10	D8	AD	35	08	8D	20	D0	76	15B1:25	CF	29	07	AA	8D	27	CF	A1
1159:11	20	CA	11	EE	01	D0	EE	82	1389:8D	21	D0	20	6E	14	60	20	7F	15B9:A9	25	9D	8C	07	CA	10	F8	FA
1161:03	D0	EE	05	D0	EE	0F</																				

PROGRAMS

```

1601:8D 74 16 A9 1F 8D 14 03 C8
1609:A9 16 8D 15 03 58 60 78 45
1611:AD 73 16 8D 14 03 AD 74 09
1619:16 8D 15 03 58 60 CE 78 E0
1621:16 10 4C A9 0F 8D 78 16 36
1629:AD 7A 16 49 01 8D 7A 16 6B
1631:8D FF 07 29 01 8D 79 16 DE
1639:A0 00 AD 19 CF F0 16 AA 16
1641:BD 00 CE 18 69 D4 85 D4 26
1649:BD 40 CE 85 D3 AE 79 16 F8
1651:BD 75 16 91 D3 AE 04 CF C6
1659:BD 00 CE 18 69 D4 85 D4 3E
1661:BD 40 CE 85 D3 AD 77 16 09
1669:49 08 91 D3 8D 77 16 4C 6E
1671:31 EA 00 00 05 00 05 00 23
1679:00 32 00 00 00 00 00 32
  
```

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CHASE

By Jon Pitlingsrud

You're at home, quietly studying with a friend, when a fanfare of noise erupts from your 64. It announces the arrival of a message from aliens who have taken control of your computer. The communiqué informs you that the advanced race has sent the two of you something important: a game! Before you know it, you and your friend are in deadly competition on the game's playing field.

Chase is an arcade-style, two-player game for the 64 that requires two joysticks. The game consists of two programs: Chase, a BASIC loader; and Chase ML, a machine language program. To help avoid typing errors, enter Chase with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you try to run it.

Chase ML is written in machine language. Use MLX, our machine language entry program, to enter it. When MLX prompts, respond with the following starting and ending addresses.

Starting address: 2795
Ending address: 3484

Be sure to save the ML program with the filename CHASE ML on the same disk as Chase. Chase automatically loads this program when it runs and searches for that filename.

The Rules

When you run Chase, you'll see the message from the aliens. After you've read it, press any key, and you and your opponent will be on the playing field. One player operates the red disk and the other the yellow one.

You'll see your weapons on the field. They resemble footballs. Each weapon is colored to match one of the players. The idea simply is to pick up your weapon and touch your opponent, thereby destroying him.

While the rules may be simple, executing the game plan isn't. Your opponent will be trying to avoid you until he is armed. As powerful as these weapons are, they have a few quirks. You can hold them for only a few seconds before they fly from your grasp and land on another part of the screen.

As you chase after your weapon, you may reach your opponent's first. If you touch your opponent's weapon, it will jump to a random location on the screen. To make the chase more interesting, each field has a number of obstacles scattered about it.

To quit the game and see a tally of each player's kills, press the Q key. From the score screen, press either of the joystick fire buttons to resume.

CHASE

```

CS 10 REM COPYRIGHT 1993 - COM
    PUTE PUBLICATIONS INLT L
    TD - ALL RIGHTS RESERVED
RB 12 IFA=0THENA=1:LOAD"CHASE
    {SPACE}ML",8,1
HQ 14 POKE56,39:CLR:A=RND(-TI)
    :C=65520
FD 16 S=54272:D=56576:E=53272:
    F=53265
MC 18 POKEF,0:POKE53280,0:POKE
    53281,0
PM 20 FORL=0TO23:POKES+L,0:NEX
    T
HQ 22 PRINT"{CLR}{6}{DOWN}";:A
    $="!#$%&()*+,-,CHR$(34)
EA 24 POKES+24,15:POKES+18,128
BB 26 POKES+6,255:POKES+2,255:
    POKES+4,83
HB 28 POKES+15,RND(0)*5+1
BC 30 POKED,PEEK(D)OR3:POKEE,2
    8:POKEF,27
JG 32 FORW=0TO3:FORL=0TORND(0)
    *4
QX 34 PRINTMIDS(AS,INT(RND(0)*
    11+1),1);
MC 36 POKES+1,PEEK(S+27)/8:FOR
    T=1TO50:NEXT
CX 38 NEXTL:PRINT" ";:NEXTW
  
```

```

ER 40 PRINTCHR$(13)CHR$(145)TA
    B(18);
MB 42 READB$:IFB$<>"Z"THENPRIN
    TB$:GOTO32
HH 44 READB$:PRINTB$:POKES+18,
    0:POKES+4,0
AD 46 POKE198,0:WAIT198,1
DJ 48 :
RR 50 POKE820,0:POKE821,0:SYS1
    0133
XS 52 POKEF,0:PRINT"{CLR}"
GD 54 POKE781,9:POKE782,9:POKE
    783,0:SYSC
RQ 56 PRINTTAB(9)"{GRN}////////
    ///////////"
RJ 58 PRINTTAB(9)"{RED}PLAYER
    {SPACE}ONE'S SCORE:";
EQ 60 A=PEEK(820):PRINTA:PRINT
HP 62 PRINTTAB(9)"{YEL}PLAYER
    {SPACE}TWO'S SCORE:";
XC 64 B=PEEK(821):PRINTB:PRINT
    :PRINTTAB(9)
QA 66 IFA>BTHENPRINT"{GRN}
    {3 SPACES}PLAYER ONE WIN
    S["
AE 68 IFA<BTHENPRINT"{GRN}
    {3 SPACES}PLAYER TWO WIN
    S["
JR 70 IFA=BTHENPRINT"{GRN}
    {2 SPACES}THE GAME IS TI
    ED."
HS 72 PRINTTAB(9)"/////////"
    ///////////"
GP 74 POKE781,24:POKE782,8:POK
    E783,0:SYSC
GK 76 A$="PRESS FIRE TO PLAY A
    GAIN"
RG 78 POKED,PEEK(D)OR3:POKEE,2
    8:POKEF,27
AG 80 PRINTTAB(8)"{GRN}";
GE 82 A=40:GOSUB90:IFB=1THEN50
QR 84 PRINTTAB(8)"{BLK}";
FE 86 A=10:GOSUB90:IFB=1THEN50
SK 88 GOTO80
EJ 90 PRINTAS;"{UP}":B=0:X=1
HM 92 IF(PEEK(56320)AND16)=0TH
    ENB=1
CK 94 IF(PEEK(56321)AND16)=0TH
    ENB=1
CH 96 IFB=0THENX=X+1:IFX<>ATHE
    N92
SG 98 RETURN
EM 100 DATA LIVE BROADCAST WIT
    H
HM 102 DATA GAZETTE'S TACHYON
AK 104 DATA IMPULSE COPYRIGHT
CQ 106 DATA CIRCA 1993. . .@@@
    @@@@
BA 108 DATA GREETINGS FROM THE
GM 110 DATA PLANET +$%*&$( ).
    @@@@
JH 112 DATA WE ARE WELL PLEASE
    D
XE 114 DATA TO BRING YOU THIS
JF 116 DATA GAME PLAYED BY THE
BF 118 DATA COOL GUYS AND GALS
BA 120 DATA ON INHABITED PLANE
  
```


TS
 CJ 122 DATA THROUGHOUT THE KNO
 WN
 CH 124 DATA STELLAR SYSTEM.@@@
 @@@@
 FX 126 DATA WITHIN MOMENTS THI
 S
 ER 128 DATA TWO PLAYER MARVEL
 DB 130 DATA WILL BE TRANSFERRE
 D
 AS 132 DATA TO YOUR REMOTE 64.
 @@@@
 GS 134 DATA FORTUNATELY ENOUGH
 HA 136 DATA FOR YOU- WE HAVE M
 ADE
 CK 138 DATA IT POSSIBLE TO PLA
 Y
 JM 140 DATA ON YOUR PRIMITIVE-
 JA 142 DATA ALBEIT JUGGERNAUT-
 FR 144 DATA COMPUTER INTERFACE
 .@@@
 CA 146 DATA COINCIDENTALLY- TH
 E
 RS 148 DATA AUTHORS ALSO HAPPE
 N
 BX 150 DATA TO BE AMONG YOU.@@
 @@@@
 QJ 152 DATA THEIR NAME'S ARE.
 {SPACE}.
 RA 154 DATA TODD PILTINGSRUD A
 ND
 SX 156 DATA JON{2 SPACES}PILTI
 NGRUD.@@@@
 EM 158 DATA IF YOU HAPPEN TO R
 UN
 AK 160 DATA INTO THEM- TELL TH
 EM
 FS 162 DATA TO PHONE HOME.@@@
 @@@@
 EJ 164 DATA Z,END OF MESS
 AGE

CHASE MI

2795:A9 0A 8D 24 2E 8D 6F 2E E3
 279D:8D 7D 2D 8D DC 2D A2 00 71
 27A5:8E 22 2E 8E 6D 2E 8E 7B 2F
 27AD:2D 8E DA 2D 8E 1A D0 E8 CB
 27B5:8E 19 D0 20 B1 28 20 9B B7
 27BD:2B 20 9F 2B AD 1E D0 AD 95
 27C5:1F D0 A9 01 8D 1A D0 AD 41
 27CD:1E D0 8D B4 2C 4A 8D B3 B5
 27D5:2C 90 2A A2 00 20 E1 2B 3D
 27DD:E0 02 D0 18 EE 22 2E A9 BE
 27E5:0A 8D 27 D0 A9 64 8D 7B 04
 27ED:2D AD 15 D0 29 FB 8D 15 57
 27F5:D0 4C 02 28 E0 03 D0 05 3C
 27FD:78 20 9F 2B 58 4E B3 2C C6
 2805:90 31 A2 01 20 E1 2B E0 0E
 280D:03 D0 18 EE 6D 2E A9 0A 86
 2815:8D 28 D0 A9 64 8D DA 2D 27
 281D:AD 15 D0 29 F7 8D 15 D0 27
 2825:4C 38 28 E0 02 D0 08 78 98
 282D:20 9B 2B 58 4C 38 28 E0 D3
 2835:00 F0 0F A9 7F 8D 00 DC 4D
 283D:AD 01 DC C9 BF D0 88 4C 7B
 2845:8F 28 AD 7B 2D F0 02 A9 AF
 284D:01 AE DA 2D F0 02 09 02 9B
 2855:29 03 F0 DF C9 03 F0 DB 2F

285D:20 CE 2C A2 CE 4A 90 09 EA
 2865:8E F9 3F 8E FD 2F EE 34 0B
 286D:03 4A 90 09 8E F8 3F 8E D9
 2875:FB 2F EE 35 03 AD FB 2F B6
 287D:0D FD 2F D0 F8 A9 32 8D 27
 2885:FA 2F AD FA 2F 10 FB 4C 82
 288D:95 27 78 A2 00 8E 15 D0 E0
 2895:8E 1A D0 8E 04 D4 8E 0B 52
 289D:D4 8E 12 D4 A9 31 A2 EA CD
 28A5:8D 14 03 8E 15 03 A9 81 94
 28AD:8D 0D DC 60 A9 7F 8D 0D 1D
 28B5:DC 8D 0D DD A9 F8 8D 12 B5
 28BD:D0 A9 0C A2 2D 8D 14 03 57
 28C5:8E 15 03 A9 00 8D 20 D0 E4
 28CD:8D 21 D0 A2 07 8E 28 D0 05
 28D5:8E 2A D0 E8 8E 26 D0 E8 38
 28DD:8E 25 D0 A2 02 8E 27 D0 6C
 28E5:8E 29 D0 AD 12 D0 C9 FB 20
 28ED:D0 F9 A9 00 8D 11 D0 AD 5A
 28F5:16 D0 09 10 8D 16 D0 A9 B7
 28FD:FC 8D 18 D0 AD 00 DD 09 72
 2905:03 8D 00 DD A9 0F 8D 15 D3
 290D:D0 8D 1C D0 A2 CC 8E F8 1A
 2915:3F 8E F9 3F E8 8E FA 3F 94
 291D:8E FB 3F A9 28 8D 00 D0 80
 2925:8D 02 D0 A9 80 8D 01 D0 80
 292D:8D 03 D0 A9 02 8D 10 D0 F2
 2935:A9 30 8D 05 D4 8D 0C D4 34
 293D:A9 F0 8D 06 D4 8D 0D D4 7E
 2945:A9 00 8D 01 D4 8D 08 D4 EF
 294D:A9 11 8D 04 D4 8D 0B D4 72
 2955:A9 8F 8D 18 D4 A9 00 A0 81
 295D:3C 85 02 84 03 A9 82 A0 1C
 2965:2B 20 6E 2B 0A 8D F3 29 6D
 296D:20 85 2A A9 82 A0 2B 20 1E
 2975:6E 2B 18 69 04 8D F2 29 C8
 297D:A9 87 A0 2B 20 6E 2B 85 E3
 2985:02 0A 0A 65 02 85 02 A9 C6
 298D:00 85 03 06 02 26 03 06 B6
 2995:02 26 03 06 02 26 03 A9 8B
 299D:2E 65 02 85 02 A9 3C 65 8D
 29A5:03 85 03 A9 8C A0 2B 20 33
 29AD:6E 2B 18 65 02 85 02 90 16
 29B5:02 E6 03 A9 82 A0 2B 20 CA
 29BD:6E 2B AA E8 86 04 AE F3 8B
 29C5:29 BD F4 29 85 05 BD F5 FE
 29CD:29 85 06 A6 04 20 50 2A AC
 29D5:AE F3 29 BD FE 29 85 05 2A
 29DD:BD FF 29 85 06 A2 01 20 69
 29E5:50 2A CE F2 29 D0 91 A9 4D
 29ED:1B 8D 11 D0 60 00 00 08 6B
 29F5:2A 08 2A 2C 2A 2C 2A 2C E9
 29FD:2A 26 2A 26 2A 4A 2A 4A AF
 2A05:2A 4A 2A 56 57 57 57 57 C9
 2A0D:58 5C 5E 5F 5E 5F 5D 5C ED
 2A15:5E 5F 5E 5F 5E 5F 5F AA
 2A1D:5E 5F 5D 5C 5E 5F 5E 5F 76
 2A25:5D 59 5A 5A 5A 5A 5B 3E A0
 2A2D:3F 3F 3F 3F 40 42 3E 3F 93
 2A35:3F 3F 41 42 42 3E 3F 3F E2
 2A3D:41 42 42 42 3E 3F 41 42 E2
 2A45:42 42 42 3E 41 43 44 44 5B
 2A4D:44 44 45 A0 00 B1 05 91 E9
 2A55:02 C8 C4 04 D0 F7 8C 84 B9
 2A5D:2A A0 05 B1 05 AC 84 2A B8
 2A65:91 02 18 A9 28 65 02 85 01
 2A6D:02 A9 00 65 03 85 03 A9 61
 2A75:06 65 05 85 05 A9 00 65 53
 2A7D:06 85 06 CA D0 CD 60 00 22
 2A85:AA BD 20 2B 85 04 BD 21 2E

2A8D:2B 85 05 B1 04 99 00 D8 F3
 2A95:99 00 D9 99 00 DA 99 00 2A
 2A9D:DB C8 D0 F1 C8 B1 04 8D ED
 2AA5:22 D0 C8 B1 04 8D 23 D0 E0
 2AAD:C8 B1 04 8D 1C 2B 18 A9 93
 2AB5:04 65 04 85 04 90 02 E6 8B
 2ABD:05 A0 00 B1 04 8D 1E 2B 95
 2AC5:C8 B1 04 8D 1F 2B 18 A9 C3
 2ACD:02 65 04 85 04 A9 00 A8 C4
 2AD5:65 05 85 05 A0 00 A2 01 6A
 2ADD:B1 04 30 04 AA C8 B1 04 32
 2AE5:29 7F C8 8C 1D 2B A0 00 67
 2AED:91 02 C8 CA D0 FA 18 98 8C
 2AF5:65 02 85 02 90 02 E6 03 AB
 2AFD:AC 1D 2B CC 1F 2B D0 06 40
 2B05:CE 1E 2B D0 CF 18 98 65 32
 2B0D:04 85 04 A9 00 65 05 85 07
 2B15:05 CE 1C 2B D0 A3 60 00 AD
 2B1D:00 00 00 2A 2B 2A 2B 58 C6
 2B25:2B 58 2B 58 2B 0E 0E 02 C1
 2B2D:08 01 02 C8 C9 0C 03 CA E3
 2B35:CB CC 01 02 CD CE 0B 08 AC
 2B3D:C6 26 00 C7 C7 26 00 C6 9A
 2B45:01 04 C6 26 00 C7 01 02 7B
 2B4D:CF D0 0C 03 D1 D2 D3 01 F3
 2B55:02 D4 D5 0E 0E 03 03 01 01
 2B5D:04 BE 26 3F C0 17 04 C2 4B
 2B65:26 00 C1 01 04 C3 26 44 D6
 2B6D:C5 48 98 48 20 BE 0E 68 76
 2B75:A8 68 20 28 BA 20 9B BC 0B
 2B7D:A4 64 A5 65 60 83 20 00 9B
 2B85:00 00 85 10 00 00 00 85 13
 2B8D:28 00 00 00 89 13 80 00 91
 2B95:00 88 2F 00 00 00 A2 00 39
 2B9D:F0 02 A2 02 8E E0 2B A9 59
 2BA5:96 A0 2B 20 6E 2B 18 69 90
 2BAD:35 48 A9 91 A0 2B 20 6E 5F
 2BB5:2B 18 69 1A AE E0 2B 9D 63
 2BBD:04 D0 68 9D 05 D0 98 69 37
 2BC5:00 0A 0A E0 02 D0 01 0A 4D
 2BCD:8D E0 2B AD 10 D0 3D DD 7F
 2BD5:2B 0D E0 2B 8D 10 D0 60 82
 2BDD:FB 0D F7 00 A9 00 8D CB 65
 2BE5:2C 8E B5 2C 8A 0A AA AD EE
 2BED:CB 2C 0A A8 4A CD B5 2C 22
 2BF5:F0 5D AD B4 2C 39 C4 2C 19
 2BFD:F0 55 38 BD 01 D0 F9 01 45
 2C05:D0 B0 04 49 FF 69 01 99 48
 2C0D:BD 2C 38 BD 00 D0 F9 00 69
 2C15:D0 8D CC 2C 08 AD 10 D0 7D
 2C1D:39 C4 2C D0 03 A9 00 2C C0
 2C25:A9 01 8D B6 2C AD 10 D0 B8
 2C2D:3D C4 2C D0 03 A9 00 2C D2
 2C35:A9 01 28 ED B6 2C B0 0F 5D
 2C3D:C9 FE F0 13 18 AD CC 2C C6
 2C45:49 FF 69 01 4C 56 2C C9 5D
 2C4D:01 F0 04 AD CC 2C 2C A9 D6
 2C55:FF 99 BC 2C EE CB 2C AD 1B
 2C5D:CB 2C C9 04 D0 8C A2 03 21
 2C65:8E CB 2C A9 00 8D B8 2C 2C
 2C6D:CA 10 FA A2 03 A9 00 A0 18
 2C75:07 48 BD B8 2C 8D CC 2C 04
 2C7D:68 2C CC 2C 30 8D D9 BC 8F
 2C85:2C B0 06 8E CD 2C B9 BC 19
 2C8D:2C 48 98 4A 68 B0 01 CA 98
 2C95:88 10 DE AE CD 2C A9 80 EF
 2C9D:9D B8 2C CE CB 2C D0 CB E1
 2CA5:A2 03 BD B8 2C F0 03 CA 49
 2CAD:10 F8 8E B7 2C 60 00 00 7C
 2CB5:00 00 00 00 00 00 00 0E

PROGRAMS

2CBD:00 00 00 00 00 00 01 17
 2CC5:00 02 00 04 00 08 00 00 FE
 2CCD:00 A0 0F 8C 05 D4 8C 0C 99
 2CD5:D4 A0 0A 8C 06 D4 8C 0D 74
 2CDD:D4 A0 96 8C 0E D4 A0 20 89
 2CES:8C 10 D4 A0 03 8C 11 D4 6E
 2CED:A0 81 8C 04 D4 8C 0B D4 8C
 2CF5:A0 40 8C 12 D4 A0 02 8C 1B
 2CFD:FA 2F 78 A0 8D 8C 14 03 82
 2D05:A0 2F 8C 15 03 58 60 20 B8
 2D0D:29 2D 20 88 2D 20 E7 2D BA
 2D15:20 2F 2E 20 7A 2E 20 F8 D8
 2D1D:2E 68 A8 68 AA A9 01 8D CF
 2D25:19 D0 68 40 AD 15 D0 29 DD
 2D2D:04 D0 4A AD 7B 2D F0 05 59
 2D35:CE 7B 2D D0 40 AD 7D 2D 69
 2D3D:C9 0A D0 0F A9 02 8D 27 A1
 2D45:D0 20 9B 2B A9 00 8D 7D 1C
 2D4D:2D F0 05 CE 7C 2D D0 25 67
 2D55:A9 06 8D 7C 2D AE 7D 2D CB
 2D5D:BD 7E 2D 8D 00 D4 E8 BD 97
 2D65:7E 2D 8D 01 D4 E8 8E 7D F0
 2D6D:2D E0 0A D0 08 AD 15 D0 D6
 2D75:09 04 8D 15 D0 60 00 06 66
 2D7D:A0 39 35 3E 2A A5 1F 1F FA
 2D85:15 00 00 AD 15 D0 29 08 8B
 2D8D:D0 4A AD DA 2D F0 05 CE 4C
 2D95:DA 2D D0 40 AD 7D 2D C9 4E
 2D9D:0A D0 0F A9 07 8D 28 D0 3D
 2DA5:20 9F 2B A9 00 8D 7D 2D 56
 2DAD:F0 05 CE 7C 2D D0 25 A9 04
 2DB5:06 8D 7C 2D AE 7D 2D BD 5C
 2DBD:0D 2D 8D 07 D4 E8 BD DD 18
 2DC5:2D 8D 08 D4 E8 8E 7D 2D 12
 2DCD:E0 0A D0 08 AD 15 D0 09 22
 2DD5:08 8D 15 D0 60 00 06 0A 60
 2DDD:6B 2F A2 25 31 1C D1 12 10
 2DES:00 00 AD 22 2E F0 35 AD 65
 2DED:24 2E C9 0A D0 07 A9 00 B5
 2DFS:8D 24 2E F0 05 CE 23 2E CC
 2DFD:D0 22 A9 06 8D 23 2E AE E2
 2E05:24 2E BD 25 2E 8D 04 85
 2E0D:E8 BD 25 2E 8D 01 D4 E8 D7
 2E15:8E 24 2E 2E 0A D0 05 A9 DC
 2E1D:00 8D 22 2E 60 00 06 0A 1D
 2E25:1F 15 A5 1F 3E 2A 39 35 3F
 2E2D:00 00 AD 6D 2E F0 38 AD 69
 2E35:6F 2E C9 0A D0 07 A9 00 A4
 2E3D:8D 6F 2E F0 05 CE 6E 2E 7F
 2E45:D0 25 A9 06 8D 6E 2E AE 1A
 2E4D:6F 2E BD 70 2E 8D 07 D4 36
 2E55:E8 BD 70 2E 8D 08 D4 E8 A5
 2E5D:8E 6F 2E E0 0A D0 08 A9 FD
 2E65:00 8D 6D 2E 8D 08 D4 60 4C
 2E6D:00 06 0A D1 12 31 1C A2 D9
 2E75:25 6B 2F 00 00 AD 1F D0 EA
 2E7D:4A 48 90 1A AD F2 2E 8D E7
 2E85:00 D0 AD 10 D0 29 FE D0 03
 2E8D:F3 2E 8D 10 D0 AD F4 2E 77
 2E95:8D 01 D0 4C AF 2E AD 00 69
 2E9D:00 8D F2 2E AD 10 D0 29 7F
 2EA5:01 8D F3 2E AD 01 D0 8D E7
 2EAD:F4 2E 68 4A 48 90 1A AD 28
 2EB5:F5 2E 8D 02 D0 AD 10 D0 98
 2EBD:29 FD 0D F6 2E 8D 10 D0 D7
 2EC5:AD F7 2E 8D 03 D0 4C E2 6C
 2ECD:2E AD 02 D0 8D F5 2E AD 48
 2ED5:10 D0 29 02 8D F6 2E AD 06
 2EDD:03 D0 8D F7 2E 68 4A 48 11
 2EE5:90 03 20 9B 2B 68 4A 90 29

2EED:03 20 9F 2B 60 28 00 80 9E
 2EF5:28 02 80 AD 00 DC 29 0F A6
 2EFD:49 0F AA AD 10 D0 29 01 0A
 2F05:8D 8C 2F 18 AD 00 D0 7D 41
 2F0D:6B 2F 8D 00 D0 AD 8C 2F 24
 2F15:7D 76 2F 8D 8C 2F AD 10 1B
 2F1D:D0 29 FE 0D 8C 2F 8D 10 2B
 2F25:D0 18 AD 01 D0 7D 81 2F 66
 2F2D:8D 01 D0 AD 01 DC 29 0F 64
 2F35:49 0F AA AD 10 D0 4A 29 AD
 2F3D:01 8D 8C 2F 18 AD 02 D0 50
 2F45:7D 6B 2F 8D 02 D0 AD 8C 37
 2F4D:2F 7D 76 2F 0A 8D 8C 2F 33
 2F55:AD 10 D0 29 FD 0D 8C 2F A7
 2F5D:8D 10 D0 18 AD 03 D0 7D BA
 2F65:81 2F 8D 03 D0 60 00 00 3A
 2F6D:00 00 FE FE FE 00 02 02 99
 2F75:02 00 00 00 00 FF FF FF D4
 2F7D:00 00 00 00 00 FE 02 00 DB
 2F85:00 FE 02 00 00 FE 02 00 E3
 2F8D:CE FA 2F D0 08 A9 80 8D 7A
 2F95:04 D4 8D 0B D4 AD FB 2F 12
 2F9D:F0 21 CE FC 2F D0 1C A9 05
 2FA5:05 8D FC 2F EE F8 3F AD 04
 2FAD:F8 3F C9 D2 D0 0D A9 00 CC
 2FB5:8D FB 2F AD 15 D0 29 FE D7
 2FBD:8D 15 D0 AD FD 2F F0 21 CC
 2FCS:CE FE 2F D0 1C A9 05 8D 5D
 2FCD:FE 2F EE F9 3F AD F9 3F D8
 2FD5:C9 D2 D0 0D A9 00 8D FD 1F
 2FDD:2F AD 15 D0 29 FD 8D 15 60
 2FE5:D0 AD 1B D4 8D 01 D4 8D 70
 2FED:08 D4 68 A8 68 AA A9 01 5F
 2FF5:8D 19 D0 68 40 00 00 05 09
 2FFD:00 05 2C 00 00 00 00 23
 3005:00 00 00 00 00 7C 06 7E E1
 300D:C6 7E 00 C0 C0 FC C6 C6 CA
 3015:C6 FC 00 00 00 7E C0 C0 54
 301D:C0 7E 00 06 06 7E C6 C6 5C
 3025:C6 7E 00 00 00 7C C6 FE 07
 302D:C0 7C 00 0E 18 18 7E 18 24
 3035:18 18 00 00 00 7E C6 C6 F5
 303D:7E 06 FC C0 C0 FC C6 C6 58
 3045:C6 C6 00 38 00 78 18 18 68
 304D:18 7C 00 06 00 06 06 63
 3055:06 06 7C C0 C0 CC D8 F8 B9
 305D:CC C6 00 78 18 18 18 C6
 3065:18 7C 00 00 00 C6 FF FF 0C
 306D:DB C3 00 00 00 FC C6 C6 F4
 3075:C6 C6 00 00 00 7C C6 C6 31
 307D:C6 7C 00 00 00 FC C6 C6 A8
 3085:FC C0 C0 00 00 7E C6 C6 FA
 308D:7E 06 06 00 00 FC C6 C0 B1
 3095:C0 C0 00 00 00 7E C0 7C 7E
 309D:06 FC 00 18 18 FE 18 18 C6
 30A5:18 0E 00 00 00 C6 C6 C6 05
 30AD:C6 7E 00 00 00 C6 C6 C6 80
 30B5:7C 38 00 00 00 63 6B 7F 46
 30BD:3E 36 00 00 00 C6 6C 38 F6
 30C5:6C C6 00 00 00 C6 C6 C6 7D
 30CD:7C 38 F0 00 00 FE C0 38 E4
 30D5:60 FE 00 1C 1C 1C 1C 8D
 30DD:1C 00 1C 00 00 00 00 CF
 30E5:00 00 00 00 00 00 00 46
 30ED:00 00 00 00 00 00 00 4E
 30F5:00 00 00 00 00 00 00 56
 30FD:00 00 00 00 00 00 00 5E
 3105:00 00 00 7C C6 C6 C0 18 71
 310D:30 30 1F 06 06 7C C0 C0 3C
 3115:7C 06 06 C0 C0 CE DB DB D8

311D:73 03 03 0C 07 03 7E 30 8C
 3125:18 0C F8 3C 66 66 0C 18 76
 312D:33 36 FC 60 30 18 0C 06 5C
 3135:73 DB 6E 0E 1C 38 00 00 B8
 313D:00 00 00 CC 66 66 77 77 9F
 3145:66 66 33 18 30 66 66 66 AA
 314D:06 7C 00 00 00 FE 06 E6 C0
 3155:3E 18 1E 00 FE 18 30 FC 56
 315D:06 FC 00 00 3E F0 38 F0 19
 3165:3F F3 00 00 00 00 00 64
 316D:38 38 70 00 00 00 00 08
 3175:38 38 00 00 00 00 FF FF 0E
 317D:00 00 00 7C C6 DE F6 C6 02
 3185:C6 7C 00 18 18 78 18 18 D6
 318D:18 FF 00 7C C6 06 1C 70 BA
 3195:C0 FE 00 7C C6 06 3C 06 AC
 319D:C6 7C 00 0E 1E 36 E6 FF FA
 31A5:06 06 00 FE C0 FC 06 06 88
 31AD:C6 7C 00 7C C6 C0 FC C6 54
 31B5:C6 7C 00 FE C6 0C 18 18 39
 31BD:18 18 00 7C C6 C6 7C C6 0B
 31C5:C6 7C 00 7C C6 C6 7E 06 C6
 31CD:C6 7C 00 00 00 00 00 00 B2
 31D5:00 00 00 00 00 00 00 38
 31DD:00 00 00 00 00 00 00 40
 31E5:00 00 00 00 00 00 00 48
 31ED:00 00 00 00 00 15 15 1A E8
 31F5:1A 1B 1B 00 00 55 55 AA 3A
 31FD:AA FF FF 00 00 54 54 A4 54
 3205:AA E4 E4 E4 E4 E4 E4 49
 320D:EA E4 E4 1B 1B 1B 1B 02
 3215:1B 1B 1B 1B 1A 1A 1A 15 6D
 321D:15 00 00 FF FF AA AA 55 61
 3225:55 00 00 E4 E4 A4 A4 54 D9
 322D:54 00 00 54 5C 58 78 68 9E
 3235:E8 28 28 2B 29 2D 25 1D
 323D:35 15 D7 00 0A 2A 2B 2D F8
 3245:35 15 D5 0D B5 D5 57 5C 25
 324D:70 C0 00 5C 7A EA AA 00 B4
 3255:00 00 00 00 AA AA AB 0D 1E
 325D:00 00 00 0D B5 D5 57 5C A2
 3265:00 00 00 5C 7A EA AA 01 65
 326D:00 00 00 00 0A A8 A8 68 33
 3275:68 28 28 28 28 29 29 2A 02
 327D:2A 0A 00 00 00 00 AA A4
 3285:AB AD 35 00 00 00 35 D5 12
 328D:57 5E 70 00 00 00 70 EA 0F
 3295:AA AA 00 00 00 00 AA A4
 329D:AB AD 35 00 03 0D 35 D5 76
 32A5:57 5E 70 57 54 5C 78 E8 BE
 32AD:A8 A0 00 00 00 AA 80 80 BA
 32B5:8F 8C 8C 00 00 AA 00 00 41
 32BD:FF 00 00 00 00 AA 02 02 D2
 32C5:F2 32 32 8C 8C 8F 80 80 63
 32CD:AA 00 00 00 00 FF 00 00 87
 32D5:AA 00 00 32 32 F2 02 02 16
 32DD:AA 00 00 8C 8C 8C 8C 8C 9C
 32E5:8C 8C 32 32 32 32 32 59
 32ED:32 32 32 2A A8 83 3F FD B0
 32F5:D5 54 42 A8 2A C2 FC 7F 03
 32FD:57 15 81 00 00 00 00 83
 3305:00 00 00 00 00 00 02 6D
 330D:AA 80 0A AA A0 0A 55 A0 4D
 3315:29 55 68 29 7D 68 29 FF E4
 331D:68 29 FF 68 29 7D 68 29 C1
 3325:55 68 0A 55 A8 0A AA A0 4A
 332D:02 AA 80 00 00 00 00 4F
 3335:00 00 00 00 00 00 00 9B
 333D:00 00 00 00 00 00 00 A4
 3345:00 00 00 00 00 00 00 AB


```

334D:00 00 00 00 00 00 00 00 B3
3355:00 00 00 00 28 00 00 AA A7
335D:00 02 96 80 00 AA 00 00 C9
3365:28 00 00 00 00 00 00 00 DF
336D:00 00 00 00 00 00 00 00 D3
3375:00 00 00 00 00 00 00 00 DB
337D:00 00 02 00 00 00 00 00 24
3385:00 00 00 00 00 00 00 02 ED
338D:8A 80 0A AA A0 0A 54 A0 BB
3395:29 55 68 28 7D 60 29 FF 35
339D:68 09 FF 68 29 7C 68 29 36
33A5:55 68 08 55 20 0A AA A0 46
33AD:02 A2 80 00 00 00 00 00 CD
33B5:00 00 00 00 00 00 00 00 1C
33BD:00 00 08 00 00 00 00 00 25
33C5:00 00 00 00 00 00 00 02 2E
33CD:0A 80 0A 8A A0 0A 50 A0 B1
33D5:29 54 68 20 7D 40 08 FF F1
33DD:60 09 FF 68 29 70 68 20 39
33E5:54 68 08 54 20 0A 82 20 25
33ED:02 A2 80 00 00 00 00 00 0E
33F5:00 00 00 00 00 00 00 00 5C
33FD:00 00 08 00 00 00 00 00 65
3405:00 00 00 00 00 00 00 02 6F
340D:0A 00 02 8A A0 08 50 A0 C9
3415:29 54 28 20 70 40 08 3F 02
341D:60 00 CF 40 29 70 68 20 AF
3425:54 68 08 14 20 00 82 00 1A
342D:02 A0 00 00 00 00 00 00 BE
3435:00 00 00 00 00 00 00 00 9D
343D:00 00 08 00 00 00 00 00 A6
3445:00 00 00 00 00 00 00 02 AF
344D:0A 00 02 88 A0 08 50 80 C9
3455:29 14 28 20 70 40 08 33 26
345D:60 00 CC 00 28 70 68 20 83
3465:44 48 08 14 20 00 82 00 4A
346D:02 20 00 00 00 00 00 00 DE
3475:00 00 00 00 00 00 00 00 DD
347D:00 00 08 00 00 00 00 00 E6

```

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MEMORY MONITOR

By Kenneth R. Warrick

Several weeks ago, I was in a room filled with more than 200 people, demonstrating a program that did a lot of string building. After a while, the program came to a screeching halt by the inevitable garbage collection process.

For more than a minute, I had all these people cooling their heels while my trusty 64 did its housekeeping. I thought to myself how helpful it might be to keep a running check on the amount of string storage space still available.

Of course, this number is what we are looking for when we execute the BASIC FRE command. But since FRE performs garbage collection first, it doesn't tell us how much space has been taken up by obsolete string fragments. An onscreen monitor that would keep track of space

available would be just what the doctor ordered!

That's what Memory Monitor for the 64 does. It's a machine language utility that keeps track of the amount of free memory remaining and prints it in the upper left corner of the screen.

Typing It In

Memory is a BASIC loader that creates Memory Monitor when it runs and saves the machine language program to disk with the name Memory Monitor. To help avoid typing errors, enter Memory with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you try to run it.

Before I get into the program itself, here's a little of the process that went into its creation.

Sparked by the creative muse, I thumbed through my copy of *Mapping the Commodore 64 and 64C* to find the location of the pointers at the beginning and end of RAM that's available for string storage. The end of the BASIC array storage area (+1) marks the first byte of the string storage area. This address is stored at 49-50 (\$31-\$32). Creating numerical variables takes up memory, moving this number upward and reducing the amount of space left available for strings.

As strings are created, storage begins at 40959 (\$9FFF) and moves downward toward the address found in \$31-\$32. Thus the low end of currently used string space marks the highest address still available for string storage. This address is kept at 51-52 (\$33-\$34). By subtracting, we could find our number.

We don't want our monitor to take up any precious RAM, so we shouldn't write a long BASIC routine to do the job. A machine language routine that's hidden away would be best.

Our routine should run unattended in the background without having to be called repeatedly from our BASIC program. The Kernal has in its bag of tricks a routine which every 1/60 second interrupts whatever BASIC is doing to increment the clock, control flashing of the cursor, update whatever needs to be on the screen, and check the keyboard buffer for any keypresses. By wedging our routine in ahead of all

these housekeeping chores, our task could be taken care of automatically.

Getting back to our little subtraction problem, subtracting the address found at \$31-\$32 from the address found at \$33-\$34 obtains our number in the form of two bytes in the mathematical format of base 256. How do we convert this to decimal format that humans can understand? Programmers familiar with Kernal routines will recall the routine LINPRT found at 48589 (\$BDCD) which is normally used to convert the two-byte BASIC line numbers to decimal and print their ASCII representation to the current output device. That should take care of this project in short order.

Wrong! The interrupt routine has a strict time schedule that will only allow us to wedge in a fairly short routine. Anything longer will crash! That is just what LINPRT is—too long. Back to the drawing board!

By writing an efficient routine that utilizes a large (2048 byte) lookup table, we can meet the time schedule. Those of us who hate mile-long lists of DATA statements will like how short our loader is. Our lookup table is created for us by some fancy mathematics in lines 30-60.

The program searches the first part of our lookup table for the screen POKE codes (which for the digits 0-9 are the same as their ASCII codes) for multiples of 256 (represented by the high byte obtained from our subtraction) in decimal format. The results are parked in a five-byte holding area at \$C800-\$C804.

The second part of the lookup table has the values of 0-256 (represented by the low byte) to be added into our five bytes. Later we correct for any of these sums that exceed 9 and make appropriate carries. Then, poke to the screen, color it white, and exit to the normal interrupt routine.

After reading the code for the working routine from DATA statements and poking it into place, our loader creates the lookup table. It then saves the entire bundle to disk with the filename MEMORY MONITOR by calling the Kernal routine SAVE at 65496.

Once Memory Monitor is on your work disk, you can load it with the ,8,1 extension and run it with SYS 51205.

PROGRAMS

You can also load and run the routine from within a BASIC program with the following line.

```
10 IF J=0 THEN J=1: LOAD "MEMORY MONITOR",8,1 20 SYS 51205
```

The manipulation of J prevents endless loop recycling since a LOAD command from program mode automatically executes a GOTO the first program line. While this may be done easily at the beginning of a BASIC program, locating it anywhere else would require a first line of IF J=1 THEN XXX, with XXX the line with the SYS command.

Here's an easier one-liner that may be located anywhere in your program.

```
10 POKE 780,0: OPEN8,8,8,1,"MEMORY MONITOR": SYS 65493: CLOSE 8: SYS 51205
```

To turn off Memory Monitor and return to guessing how much memory is left, enter SYS 51326.

MEMORY

```
DM 1 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
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HA 5 PRINT"{DOWN}WAIT 60 SECON
DS...":PRINT"CREATING MEM
ORY MONITOR"
MC 10 FORI=51205 TO 51338:READ
A:CK=CK+A:POKEI,A:NEXT
SC 20 IFCK<>16246THENPRINT"ERR
OR IN DATA STATEMENTS":E
ND
SX 30 FORN=0TO255:J$=RIGHT$( "0
0000"+MID$(STR$(256*N),2
),5):FORK=1TO5
JB 40 POKE48896+256*K+N,ASC(MI
D$(J$,K,1)):NEXT
RJ 50 FORN=0TO255:J$=RIGHT$( "0
00"+MID$(STR$(N),2),3):F
ORK=1TO3
XK 60 POKE50176+256*K+N,VAL(MI
D$(J$,K,1)):NEXT:NEXT:OP
EN8,8,8,"MEMORY MONITOR"
DM 70 POKE250,0:POKE251,192:PO
KE780,250:POKE781,138:PO
KE782,200:SYS65496
JK 80 DATA 120,169,18,141,20,3
,169,200,141,21,3,88,96,
56,165,51,229,49,133,251
,165
BA 90 DATA 52,229,50,168,185,0
,192,141,0,200,185,0,193
,141,1,200,185,0,194,141
,2
HR 100 DATA 200,185,0,195,141,
3,200,185,0,196,141,4,2
```

```
00,24,164,251,185,0,197
,109,2
QQ 110 DATA 200,141,2,200,185,
0,198,109,3,200,141,3,2
00,185,0,199,109,4,200,
141,4
SF 120 DATA 200,160,5,162,0,13
4,252,162,0,185,255,199
,24,101,252,201,58,144,
4,24
HG 130 DATA 105,246,232,153,25
5,3,169,1,153,255,215,1
36,208,227,76,49,234,12
0,169
SC 140 DATA 49,141,20,3,169,23
4,141,21,3,88,96
MC 150 PRINT"[DOWN}ACTIVATE ME
MORY MONITOR WITH SYS 5
1205"
```

Kenneth R. Warrick is a physician who lives in Charleston, South Carolina.

CUBIC

By Stephen A. Bakke

Cubic is a logic puzzle for the 64. It resembles a brightly colored cube whose six sides can be twisted to mix up the colors. When the puzzle starts, the colors are mixed randomly. The object of the puzzle is to maneuver the colored pieces so that each side consists of but one of the six colors.

Presenting six sides of a cube on-screen at one time can be a problem. To get around this difficulty, Cubic unfolds the cube and displays the sides next to one another on the screen.

Cubic is written in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond to the following starting and ending addresses.

Starting address: 0801
Ending address: 0EE8

Be sure to save a copy of the program before exiting MLX. Although Cubic is written in machine language, it loads and runs like a BASIC program. Operator input is controlled exclusively by a joystick plugged into port 2.

Getting Started

The top screen line is Cubic's status line. It displays the program name, number of turns taken, and the best score achieved. Below it are six squares

that represent the sides of a cube. Each square consists of 16 smaller squares of various colors arranged in four columns by four rows.

To solve the puzzle, swap rows and columns of squares between the sides of the cube until all squares within each of the six sides contain a single color. Columns run up and down and are numbered 1 on the left through 4 on the right. Rows extend left and right and are numbered 1 on the top through 4 on the bottom.

The bottom screen line is used for operator input. Four inputs are required to exchange a row or column between two sides of the cube. Push the joystick left or right to highlight Row for row or Col for column. Press the fire button to enter your selection.

The next entry determines the row or column. Push the joystick left or right to change the row or column number. Press the fire button when the desired number is displayed.

Then select the cube number from which the swap is desired and press the fire button. Next, select the cube number to which the swap is desired and press the fire button again. The swap will occur, the number of turns will be incremented, and the bottom line will clear in preparation for the next move.

The puzzle is solved when each cube contains only squares of the same color. The screen will remain unchanged while the border cycles through various colors until you press the fire button. After you press the button, the best score will be set, the number of turns will be reset, and the six sides will be scrambled in preparation for another game.

CUBIC

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 A9 80 8D 91 AD
0811:02 A9 15 8D 18 D0 20 4C 98
0819:08 20 30 09 20 E8 0A 20 A4
0821:80 0D 20 07 0A 20 F4 0D F0
0829:20 1A 0B A9 00 8D D1 0E B3
0831:8D D2 0E 20 D9 0D 20 73 37
0839:0A EE D6 0E 20 6F 0D 4C EA
0841:FB 0C A0 00 C8 D0 FD CA B6
0849:D0 F8 60 A2 00 8E 20 D0 81
0851:8E 21 D0 20 44 E5 A2 00 0C
0859:A0 05 18 20 F0 FF A9 5F 3A
0861:A0 0E 20 1E AB A2 18 A0 E3
0869:05 18 20 F0 FF A9 80 A0 5D
0871:0E 20 1E AB A9 3A A0 00 86
```



```

0879:A2 04 86 F8 A2 15 86 F7 AA 0AA9:D3 0E 20 A6 09 AD CC 0E 40 0CD9:7F 91 F7 E6 F7 A6 F7 E0 AE
0881:91 F7 A2 1F 86 F7 91 F7 CD 0AB1:8D D3 0E 20 CB 09 20 F6 FE 0CE1:CD D0 F2 60 A9 02 8D C9 B3
0889:A2 07 86 F8 A2 C8 86 F7 4A 0AB9:0A 68 AA E8 8A E0 04 D0 81 0CE9:0E A9 50 8D C8 0E 60 A9 3F
0891:91 F7 A2 CC 86 F7 91 F7 B8 0AC1:D8 60 18 AD CD 0E 6D D2 8C 0CF1:50 8D C9 0E A9 02 8D C8 E8
0899:A2 D4 86 F7 91 F7 A2 DD 10 0AC9:0E 8D CD 0E AD CE 0E 69 11 0CF9:0E 60 A9 00 48 AA BD B8 87
08A1:86 F7 91 F7 A9 0C 8D 86 C3 0AD1:00 8D CE 0E 18 AD CF 0E 29 0D01:0E 8D CD 0E BD BE 0E 8D B2
08A9:02 A9 30 8D CA 0E A9 00 E5 0AD9:6D D2 0E 8D CF 0E AD D0 D6 0D09:CE 0E A9 00 8D C8 0E 20 0F
08B1:48 AA BC D8 0E BD DE 0E E8 0AE1:0E 69 00 8D D0 0E 60 A9 59 0D11:33 0D EE C8 0E 20 7D 09 67
08B9:EE CA 0E AA 18 20 F0 FF 83 0AE9:65 8D 0E D4 8D 0F D4 A9 1F 0D19:20 33 0D 20 7D 09 20 33 37
08C1:A9 CA A0 0E 20 1E AB 68 87 0AF1:11 8D 12 D4 60 18 AD D1 12 0D21:0D 20 7D 09 20 33 0D 68 5A
08C9:AA E8 8A C9 06 D0 E1 A9 38 0AF9:0E 6D C9 0E 8D D1 0E 60 BA 0D29:AA E8 8A C9 06 D0 CD 4C 1C
08D1:00 48 AA BD 43 0E 8D C9 5C 0B01:AD CA 0E F0 13 48 18 AD A9 0D31:9E 0D A9 00 48 8D D1 0E 3D
08D9:0E BD 3D 0E 8D C8 0E 20 B4 0B09:D2 0E 6D C8 0E 8D D2 0E A0 0D39:20 8F 09 20 49 0D 68 AA 64
08E1:EC 08 68 AA E8 8A C9 06 2D 0B11:68 AA CA 8A E0 00 D0 ED 9E 0D41:E8 E8 8A C9 08 D0 ED 60 B7
08E9:D0 E7 60 A9 00 48 AC C9 47 0B19:60 20 E5 0C 20 79 0C 20 04 0D49:A0 00 AE D1 0E F0 08 B1 9C
08F1:0E AE C8 0E 18 20 F0 FF D1 0B21:CA 0C AD 00 DC 29 0F C9 C8 0D51:F7 CD D3 0E D0 F0 60 AE 68
08F9:A9 49 A0 0E 20 1E AB AC A3 0B29:07 F0 16 C9 0B F0 EA AD FD 0D59:C8 0E F0 03 4C 50 0D B1 19
0901:C9 0E EE C8 0E AE C8 0E B0 0B31:00 DC 29 10 D0 EC 20 FA 1A 0D61:F7 8D D3 0E 60 68 68 68 14
0909:18 20 F0 FF A9 54 A0 0E 3B 0B39:0D A2 FF 20 43 08 4C 4E A1 0D69:68 68 68 4C 29 08 A2 00 52
0911:20 1E AB EE C8 0E 68 AA 19 0B41:0B 20 F0 0C 20 AF 0C 20 BB 0D71:A0 16 18 20 F0 FF AE D6 22
0919:E8 8A C9 04 D0 CF 60 18 5A 0B49:94 0C 4C 23 0B A9 CD 85 88 0D79:0E A9 00 20 CD BD 60 A2 CF
0921:AD CC 0E 0A 6D CC 0E 69 C3 0B51:F7 A9 07 85 F8 A9 01 8D 05 0D81:00 A0 20 18 20 F0 FF AE BC
0929:0E 29 0F 8D D3 0E 60 A9 88 0B59:CA 0E 09 30 91 F7 A0 00 44 0D89:D7 0E A9 00 20 CD BD 60 5C
0931:00 8D CC 0E 48 AA BD B8 42 0B61:DC 29 0F C9 07 F0 19 C9 A6 0D91:18 AD D6 0E CD D7 0E B0 79
0939:0E 8D CD 0E BD BE 0E 8D E2 0B69:0B F0 30 AD 00 DC 29 10 F7 0D99:03 8D D7 0E 60 20 91 0D 28
0941:CE 0E 20 20 09 EE CC 0E EF 0B71:D0 EC CE CA 0E 20 FA D0 A5 0DA1:A9 00 8D D6 0E 20 18 A0 7B
0949:20 67 09 20 7D 09 20 67 20 01 0B79:A2 FF 20 43 08 4C B5 0B 01 0DA9:05 18 20 F0 FF A9 9C A0 DF
0951:09 20 7D 09 20 67 09 20 0F 0B81:EE CA 0E AD CA 0E C9 05 85 0DB1:0E 20 1E AB A0 00 C8 C0 B0
0959:7D 09 20 67 09 60 AA E8 0F 0B89:D0 02 A9 01 8D CA 0E 09 8A 0DB9:10 D0 02 A0 01 8C 20 D0 A5
0961:8A C9 06 D0 CF 60 A9 00 4C 0B91:30 91 F7 A2 4B 20 43 08 B6 0DC1:98 48 A2 FF 20 43 08 68 15
0969:48 8D D1 0E 20 8F 09 20 8F 0B99:4C 5F 0B CE CA 0E AD CA B0 0DC9:A8 AD 00 DC 29 10 D0 E6 83
0971:A6 09 68 A8 C8 C8 98 C9 15 0BA1:0E D0 02 A9 04 8D CA 0E C7 0DD1:A0 00 8C 20 D0 4C 17 08 BD
0979:08 D0 ED 60 18 AD CD 0E A8 0BA9:09 30 91 F7 A2 4B 20 43 C7 0DD9:A9 20 A0 00 A2 CD 86 F7 36
0981:69 50 8D CD 0E AD CE 0E BD 0BB1:08 4C 5F 0B A9 D5 85 F7 23 0DE1:A2 07 86 F8 91 F7 A2 D5 F6
0989:69 00 8D CE 0E 60 18 AD BE 0BB9:A9 01 8D D4 0E 09 30 91 6A 0DE9:86 F7 91 F7 A2 DE 86 F7 8C
0991:CD 0E 6D D1 0E 85 F7 85 D4 0BC1:F7 AD 00 DC 29 0F C9 07 2D 0DF1:91 F7 60 A9 0C 8D 18 D4 15
0999:F9 AD CE 0E 69 00 85 F8 1E 0BC9:F0 19 C9 0B F0 30 AD 00 2C 0DF9:60 A9 10 8D 05 D4 A9 30 D8
09A1:69 AC 85 FA 60 A2 00 18 99 0BD1:DC 29 10 D0 EC CE D4 0E 0A 0E01:8D 06 D4 A9 0A A2 00 18 8D
09A9:BD C4 0E 65 F7 85 F7 85 2F 0BD9:20 FA D0 A2 FF 20 43 08 99 0E09:69 05 E8 E0 0A D0 F8 8D 59
09B1:F9 A5 F8 69 00 85 F8 69 51 0BE1:4C 18 0C EE D4 0E AD D4 A3 0E11:01 D4 A9 25 8D 00 D4 A9 2A
09B9:AC 85 FA AD D3 0E A0 00 D5 0BE9:0E C9 07 D0 02 A9 01 8D AD 0E19:21 8D 04 D4 A2 14 20 43 DF
09C1:91 F7 91 F9 E8 E0 04 D0 10 0BF1:D4 0E 09 30 91 F7 A2 7F 4B 0E21:08 A9 00 8D 04 D4 8D 05 18
09C9:DE 60 A2 00 18 BD C4 0E 07 0BF9:20 43 08 4C C2 0B CE D4 6B 0E29:D4 8D 06 D4 8D 00 D4 8D C4
09D1:65 FB 85 FB 85 FD A5 FC 72 0C01:0E AD D4 0E D0 02 A9 06 EE 0E31:01 D4 8D 17 D4 8D 16 D4 04
09D9:69 00 85 FC 69 AC 85 FE 29 0C09:8D D4 0E 09 30 91 F7 A2 C9 0E39:8D 15 D4 60 04 04 04 0E 48
09E1:AD D3 0E A0 00 91 FB 91 5B 0C11:7F 20 43 08 4C C2 0B A9 07 0E41:0E 0E 05 10 1B 05 10 1B B1
09E9:FD E8 E0 04 D0 DE 60 18 6C 0C19:DE 85 F7 A9 01 8D D5 0E 93 0E49:12 CF D0 CF D0 CF D0 CF B0
09F1:AD CF 0E 6D D1 0E 85 FB 35 0C21:09 30 91 F7 AD 00 DC 29 CB 0E51:D0 92 00 12 CC BA CC BA 41
09F9:85 FD AD D0 0E 69 00 85 AC 0C29:0F C9 07 F0 17 C9 0B F0 12 0E59:CC BA CC BA 92 00 1E 43 E3
0A01:FC 69 AC 85 FE 60 A9 00 A8 0C31:2E AD 00 DC 29 10 D0 EC B1 0E61:55 42 49 43 9F 20 20 20 F3
0A09:48 A9 00 8D D2 0E 8D D1 40 0C39:CE D5 0E 20 FA 0D A2 FF 43 0E69:20 20 20 54 55 52 4E 53 CA
0A11:0E 20 24 0A 20 73 0A 68 A4 0C41:20 43 08 60 EE D5 0E AD D9 0E71:20 20 20 20 20 20 42 45 F6
0A19:AA E8 8A C9 FF D0 E9 60 22 0C49:D5 0E C9 07 D0 02 91 F7 A2 5C 0E79:53 54 20 20 20 20 00 52 2E
0A21:CA CA 60 AD 1B D4 29 07 B9 0C51:8D D5 0E 09 30 91 F7 A2 52 0E81:4F 57 20 43 4F 4C 20 20 5F
0A29:20 56 0A AD 1B D4 29 07 84 0C59:4B 20 43 08 4C 25 0C CE E5 0E89:20 20 46 52 4F 4D 20 20 BB
0A31:AA 18 E0 05 30 03 20 21 7B 0C61:D5 0E AD D5 0E D0 02 A9 5C 0E91:20 20 20 20 20 54 4F 20 DC
0A39:0A 8A 8D D4 0E AD 1B D4 26 0C69:06 8D D5 0E 09 30 91 F7 A7 A7 0E99:20 20 00 50 52 45 53 53 74
0A41:20 07 AA 18 0E 05 30 03 01 0C71:A2 4B 20 43 08 4C 25 0C AD 0EA1:20 46 49 52 45 20 54 4F 50
0A49:29 21 0A 8A CD D4 0E F0 6E 0C79:A9 C5 85 F7 A9 07 85 F8 75 0EA9:20 50 4C 41 59 20 41 47 9C
0A51:EC 8D D5 0E 60 18 6A 8D A0 0C81:A9 00 A8 AA B1 F7 09 80 2E 0EB1:41 49 4E 2E 2E 00 A5 3D
0A59:CA 0E 90 0B A9 02 8D C9 53 0C89:91 F7 E6 F7 A6 F7 E0 C9 65 0EB9:B0 BB 35 40 4B 2C 2C 2C 57
0A61:0E A9 50 8D C8 0E 60 A9 B2 0C91:D0 F2 60 A9 C5 85 F7 A9 53 0EC1:2E 2E 2E 00 01 27 01 02 EE
0A69:50 8D C9 0E A9 02 8D C8 5C 0C99:07 85 F8 A9 00 8A AA B1 F9 0EC9:50 00 00 06 3B 2F 00 00 05
0A71:0E 60 AE D4 0E BD B8 0E AE 0CA1:F7 29 7F 91 F7 E6 F7 A6 FA 0ED1:00 00 0D 00 00 00 DE 09 56
0A79:8D CD 0E BD BE 0E 8D CE 7D 0CA9:F7 E0 C9 D0 F2 60 A9 C9 72 0ED9:14 1F 09 14 1F 03 03 03 38
0A81:0E AE D5 0E BD B8 0E 8D 5E 0CB1:85 F7 A9 07 85 F8 A9 00 93 0EE1:0D 0D 00 00 00 00 00 69
0A89:CF 0E BD BE 0E 8D D0 0E 03 0CB9:A8 AA B1 F7 09 80 91 F7 EB
0A91:20 01 0B 20 C3 0A A9 00 F2 0CC1:E6 F7 A6 F7 E0 CD D0 F2 72
0A99:A8 48 20 8F 09 20 F0 09 C4 0CC9:60 A9 C9 85 F7 A9 07 85 08
0AA1:B1 F7 8D CC 0E B1 FB 8D C7 0CD1:F8 A9 00 A8 AA B1 F7 29 90

```

Steven Bakke writes puzzling programs in Aurora, Colorado. □

AUTOMATIC PROOFREADER

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in Proofreader exactly as listed. Because the program can't check itself, be sure to enter each line carefully to avoid typographical errors or other mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy of the program before running it.

Next, type *RUN* and press Return. After the program displays the message *Proofreader Active*, you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, Proofreader displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line. Also, be sure not to skip any lines.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using Proofreader on the 128, do not perform any GRAPHIC commands while Proofreader is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while Proofreader is in memory.

Though Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

AUTOMATIC PROOFREADER

```
0 CLR
10 VE=PEEK(772)+256*PEEK(773):
   LO=43:HI=44:PRINT"{CLR}
   {WHT}AUTOMATIC PROOFREADER
   {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
   6:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
   6:FOR J=SA TO SA+166:READ B
   :POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
   RROR* CHECK TYPING IN DATA
   {SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
   B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
   RROR* RELOAD PROGRAM AND CH
   CK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
   ,22:POKE SA+18,23:POKESA+29
   ,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
   SA+150,PEEK(773):PRINT"
   {CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
   POKE (PEEK(LO)+256*PEEK(HI
   ))-1,0:NEW
120 DATA120,169,73,141,4,3,169
   ,3,141,5,3,88,96,165,20,13
   3,167
130 DATA165,21,133,168,169,0,1
   41,0,255,162,31,181,199,15
   7,227
140 DATA3,202,16,248,169,19,32
   ,210,255,169,18,32,210,255
   ,160
150 DATA0,132,180,132,176,136,
   230,180,200,185,0,2,240,46
   ,201
160 DATA34,208,8,72,165,176,73
   ,255,133,176,104,72,201,32
   ,208
170 DATA7,165,176,208,3,104,20
   8,226,104,166,180,24,165,1
   67
180 DATA121,0,2,133,167,165,16
   8,105,0,133,168,202,208,23
   9,240
190 DATA202,165,167,69,168,72,
   41,15,168,185,211,3,32,210
   ,255
200 DATA104,74,74,74,74,168,18
   5,211,3,32,210,255,162,31,
   189
210 DATA227,3,149,199,202,16,2
   48,169,146,32,210,255,76,8
   6,137
220 DATA65,66,67,68,69,70,71,7
   2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,13
   6,137
```

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, Gazette Disk offers bonus programs. This month we present three spreadsheet templates that are ready to load into SpeedCalc or GemCalc.

Bond Fund

By E.A. Ramirez
Guaynabo, PR

There are several ways to determine capital gains and losses for bond mutual funds, but the most advantageous to the taxpayer is by calculating the cumulative price per share before each transaction. This template does that. Its printout is suitable for submission to the IRS as an addendum to tax forms.

Mortgage Analyzer Decision Maker

By Dave Pankhurst
Montreal, PQ
Canada

With Mortgage Analyzer, you can see any year in the payback of a mortgage, check the balance owed, principal and interest paid, total mortgage cost, monthly payments, and more.

Having trouble making decisions? With Decision Maker, your 64 can help. List up to seven choices and the advantages of each one. Assign each advantage a numerical rating, and the computer will do the rest.

Don't forget that Gazette Disk now contains public domain programs and shareware. For a complete rundown of the PD programs on this month's disk, see "PD Picks."

You can have these programs and all of the type-in programs found in this issue—ready to load and run—by ordering the August Gazette Disk. The price is \$9.95 plus \$2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. You can order by credit card by calling (919) 275-9809, extension 283.

AST 4/33S MODEL 123B

The Cold War may have ended, but that doesn't mean they don't build battleships anymore.

The AST 4/33s model 123B 486SX computer system is a welcome change from the recent spate of ever-cheaper, ever-more-shortcuts-taken, no-name systems filling the pages of mail-order catalogs. At \$1,895 suggested retail with a street price of around \$1,700, the system is competitively priced and offers more features than average.

AST is a well-established American company. The company's Six Pack memory and clock enhancement board was one of the few viable ways to make the original IBM PC (the XT) truly usable in the early 1980s. In the years since, AST has enjoyed a reputation for building solid, reliable systems.

Of course, you may not have the room to dock a battleship on your desk. The one real drawback to the 123B is its larger-than-standard size: 15¼ × 6¼ × 16½ inches. The advantages of the unit could lead you to consider digging a larger harbor, though.

There are good reasons for the 123B's bulk. The computer gives you four full-sized expansion slots, as well as two 5¼-inch and two 3½-inch drive bays—all surrounded by a solid metal case. You have all sorts of room if you want to add additional drives, internal modems, and cruise missiles. Whatever.

Installation's simple. Plug the monitor into the back of the computer (the connector will only fit one place), attach the mouse and key-

board, then connect the power cords to the monitor and computer. Turn them on. That's it. Both DOS and Windows are preinstalled on the hard disk, and the AUTOEXEC.BAT file is programmed so that Windows comes up ready to use.

It may not look like it's



It may be built like a battleship, but the AST 4/33s model 123B 486SX runs like a clipper, offering speed and expansion room.

built for speed, but the 123B is fast and powerful. The one I tried came with a 120MB hard drive, 4MB of RAM, and a Super VGA display. The amount of RAM is easily upgradable. The only blip in an otherwise beautiful design is that while the SIMM outlets—where the additional memory chips get installed—are convenient, the sockets for adding video RAM can only be reached by removing the power supply temporarily. This, at least, is a simple task, and the rest of the system's conveniences make up for this minor inconvenience.

The documentation is excellent, with good illustrations of the procedures to follow for the various types of upgrades.

Some of the 123B's speed comes from a large 256K memory cache, coupled with a very fast Quantum 120MB hard disk. Com-

bine that with the quickness of a 486SX-33, and you'll find, as I did, that the system has very satisfactory throughput. Such Windows applications as CorelDRAW! and PageMaker—heavy system resource users—show nice zip. I was especially pleased with the quickness

CPU daughter board, and the old chip jumps right out. Insert the new chip, and the upgrade's done. This feature and the 123B's overall solidity will let you keep the machine current with technology for years to come, thus making it a better investment than computers that are harder to upgrade.

Yes, the 123B is built like a battleship (maybe that's what the B really stands for), but it's a fast, easily upgradable, and solidly reliable behemoth. I like it a lot.

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MICROSOFT MOUSE

It's no small thing to redesign an input device, especially one with more than 60 million users worldwide. Yet that's precisely what Microsoft has done with its new mouse. In doing so, the mouse design team addressed many questions that may not have occurred to users, and added features which, in retrospect, are natural and quickly become indispensable.

First things first: The new mouse looks different. For one thing, it's a bit larger and longer than its predecessor. More importantly, it has a shape. Gone is the familiar bar-of-soap design, replaced by a device with a graceful curve along its left side. Microsoft's mouse remains a two-button device, although the buttons are larger than on the classic mouse.

At first glance, the new shape may seem off-putting. My initial reaction was

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Circle Reader Service Number 163

REVIEWS

that the mouse was too large, that I would have to retrain my hand after years of using a classic mouse. The retraining took all of ten minutes. The curved shape makes the mouse fit the hand more comfortably, and its recentered weight helps it move more easi-



The new Microsoft Mouse represents a positive evolution of a familiar device.

ly. None of this should be too surprising: The curve—indeed, every aspect of the device—is the result of intensive research into hand anatomy, postures, and ergonomics. Believe me, Microsoft knows hands!

Hands of all types, actually. Despite the curve's location on the left side of the mouse, the device is designed to work well for either right- or left-handed users. Its size may make the mouse a bit difficult for small children, but it should be fine for teenagers on up.

Other hardware features worth noting include a new, heavier cable, one that's less likely to kink. The center of gravity and the balance for the mouse are noticeably improved, and the tracking ball rolls more smoothly.

As important as the hardware is the software, and it's here that the mouse shines most brightly. Many of the driver innovations are not only common sense, but also most welcome. A good example is the new "snap-to" feature, which automatically directs the cursor to the screen's default button.

Perhaps my favorite feature is the screen wrap. At last! Now, when you move the cursor off one side of the screen, it appears on the opposite side. A magnifier enables you to enlarge sections of the screen for closer examination, while another feature relocates the cursor at the center of the screen should it get lost.

After you get over the initial surprise of the mouse's new shape, you can see how sensible—even conservative—

most of Microsoft's decisions are. Yet it's tough to see what's been left out, unless it would be a completely wireless version. (It would be nice, upon reflection, to have the mouse available in more colors than Microsoft white, but that's less a design than a marketing criterion.) The mouse will, after the keyboard, remain the most important interface device for some time to come, and there's little doubt in my mind that Microsoft's new mouse represents an evolution, and a worthwhile evolution, in this device's usefulness and practicality.

KEITH FERRELL

Microsoft
(800) 426-9400
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Circle Reader Service Number 435

MANAGEPRO

Make no mistake: ManagePro is a tool for managers intent on managing people *and* information, and it places a premium on making that information available in a number of formats. Beyond the usual spreadsheet capabilities, it lets you access information about goals and the personnel in charge of meeting them in a variety of configurations: according to time lines, company-wide performance objectives, organizational charts, immediate action lists—even individual employee personnel files.

This is software that not only lets you track your people and your goals but takes pains to coach managers about their responsibilities, too. As it says in the tutorial, the creators of ManagePro believe there are four key steps in managing people toward collective goals: set the goals clearly; monitor progress; give feedback and coaching; and evaluate, recognize, and reward everyone's contributions toward the goals.

ManagePro is written with that philosophy in mind. There's a people-status board that prompts managers to check on employee progress and offer feedback. There's an Advice feature built in that lets you access basic how-to people management tips as you pull people along toward your goals. (Ironically, though, the advice is so rudimentary that you may wonder how useful it will be to managers who work for companies sophisticated enough to make optimal use of the software.) To top it all off, the creators of ManagePro go so far as to include a short pep-talk book, *Managing People: Your Competitive Edge in the '90s*.

In terms of architecture, the software is divided into two main headings:

Goals and People. The Goals side features a goal planner that elaborates on companywide objectives and spells out responsibility for meeting them, a goal-status board that offers big-picture tracking at a glance, and a timeline feature that lets you monitor target dates for making it all happen. The People side consists of a status board that offers color-coded prompts to make sure you're evaluating and communicating with employees, a performance data file that lets you compile performance appraisals, and a planner that connects the dots between people and objectives.

ManagePro is commonsensical; it's a breeze to install and use. The learning curve doesn't seem prohibitively steep, thanks in part to the excellent tutorial built into the software. But you may be a while fathoming its many powers. The makers recommend half an hour on the tutorial, but I lingered a little longer to learn my way around the extensive features, and I was glad I did. You may not need all that ManagePro can do, but you needn't be scared away—even if it has more power than you need right now.

STEVE PERRY

Avantos
(800) 282-6867
(510) 654-4600
\$395

Circle Reader Service Number 436

ARTHUR'S TEACHER TROUBLE

Arthur's Teacher Trouble is the second in Brøderbund's series of interactive CD-ROM storybooks called Living Books. It brings Marc Brown's children's book to the computer screen with musical accompaniment, interesting animated effects, and a voice to tell the story. In it, you'll find the same storyteller theme, lustrous high-resolution graphics, onscreen play, and multilingual narration found in Brøderbund's original Living Book, *Grandma 'n Me*.

But unlike *Grandma 'n Me*, which was rated for children ages 3–8, Arthur is for somewhat more advanced readers, ages 6–10. Like *Grandma, Arthur's* tale can be told in English or Spanish. Language is an option you select at the title screen, and from there you can also click on Preview to get a look at what's coming up in Brøderbund's next Living Book. Then you can select whether you want to have the story read to you or to play inside it.

If you have the story read, you see the text from Brown's story highlighted onscreen as it's read in Arthur's voice.

Children can read along, recognize the words, and follow the animated action as Arthur and his friends struggle through Mr. Ratburn's third grade class and prepare for the school's big September Spell-a-thon.

All this (and more) happens when you choose to play inside the story. Doing so takes you to an interactive mode which brings the elements on-screen to life when you click on them. Each screen is a page out of Brown's book, and the animated illustrations fairly duplicate those in the small bound copy that Brøderbund includes with the software.

At every turn, the reader gets introduced to subtle humor and imaginative activities that will delight children and charm adults. Arthur, like *Grandma 'n Me*, teaches as it entertains and lets children become players in the storybooks they read. These Living Books delight at so many levels they'll make you want to buy a CD-ROM player if you don't already have one for your home computer.

CAROL ELLISON

Brøderbund
(415) 382-4400
\$44.95–\$59.95

Circle Reader Service Number 437

DOCTOR SCHUELER'S HOME MEDICAL ADVISOR

Healthcare reform comes in various packages, and this one—Doctor Schueler's Home Medical Advisor (Windows 3.1 version)—is lively with colorful graphics, packed with information, and fun to use.

The aim of Home Medical Advisor is to nurture informed healthcare consumers—a lofty goal that might help us to carve away at a national cancer called healthcare costs. It's produced by Pixel Perfect and written by Stephen J. Schueler, chairman of the Department of Emergency Medicine at Holmes Regional Medical Center in Melbourne, Florida.

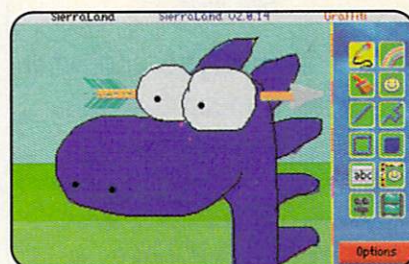
Home Medical Advisor is a handy resource that you don't have to be a computer whiz to use. In fact, children and adults alike enjoy Home Medical Advisor at the St. Louis Science Center, where the DOS version of this popular program is part of the Medical Technology Gallery.

From abdominal pain to zinc oxide poisoning, you can find information on it in seven linked files: Symptom, Disease, Injury, Poison, Drug, Test, and Health & Diet. You navigate the program with simple keyboard or mouse

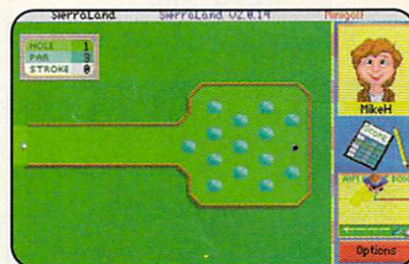
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Need a network at home?

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Want to speed up Windows?

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Don't like mice?

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What do you do when your computer won't boot?

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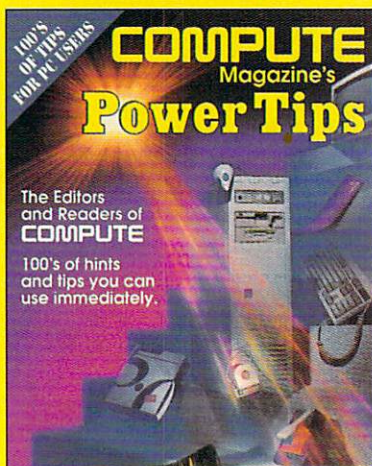
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What is TrueType and what does it mean for you?

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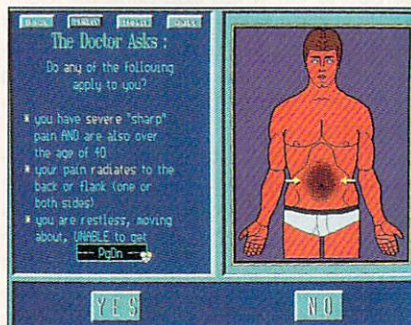


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REVIEWS

commands. You can access information by clicking on menu buttons that run along the bottom of the screen or by typing keywords in the dialog box for the Scan command.

The Windows version of Home Medical Advisor is a wonderfully souped-



The Windows version of Schueler's Home Medical Advisor is good for what ails you.

up model of the DOS version. Redraws are quicker, the color graphics spicier, and the information more complete. Now you can tell the doctor where it hurts in the Symptom File by using an anatomical drawing and simply clicking on the part of the body that's under the weather.

The Disease File offers detailed information about the signs, symptoms, evaluation, and treatment of more than 500 diseases (50 more than in the DOS version). The Injury File is a guide to more than 130 different injuries, the Poison File names some 500 poisons, and the Test File gives you the lowdown on 130 of the most frequently performed medical tests. The Drug File is much more extensive than in the DOS version, which covered about 800 prescription and nonprescription drugs; this version tackles 1200.

A new feature is the Health & Diet File, a cornucopia of tips for better living. It includes information on vitamins, nutrition, home safety, health, and travel, as well as a vaccination schedule for parents to refer to.

Look for the CD-ROM version—which promises to be even more visually exciting—in the fall. In the meantime, the Windows 3.1 version of Doctor Schueler's Home Medical Advisor is one way the ordinary person can get a handle on the healthcare issue.

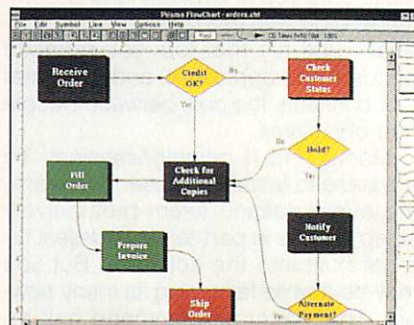
SHERRY ROBERTS

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\$87.50

Circle Reader Service Number 438

YOURWAY

"Manage your time and contacts," proclaims the tag line on the front of YourWay, a sophisticated and elegant variation on the old electronic-Rolodex theme. When you first call up this easy-to-install software, you see a card file laid out in front of you, surrounded along the edges by all the icons you'd



The complexities of YourWay pay off in its time and contact management capabilities.

expect: day, week, month, and task-planner windows; cut-and-paste features; and file-search features.

A built-in tutorial would've helped me digest more quickly the range of options YourWay offers, maybe, but the one in the manual does just fine. Don't expect to get through it too quickly, though. The simple stuff—like accessing and creating contact file cards, and attaching notes to them via the notepad accessory—is easy to learn and pretty self-evident. But functions like editing and file searching get pronouncedly more complicated. Nothing overwhelming, but you quickly get into territory that's less intuitive and less graphically friendly than the front end of YourWay.

But once you've mastered the ins and outs of card file maintenance and use of the planner windows, YourWay has a lot to offer. Want an alarm to notify you of lunches, meetings, or any other planned events? Easy. Worried about keeping your contact information organized? YourWay cross-references between the various planners and individual card files, so that if you set up a lunch with Tom Thomas on your daily events planner, a note of it will also appear on the notepad attached to his contact card. If you place a call to Mary Watkins at 10:25 on October 8, that'll be recorded too.

I found YourWay a little daunting at first, but I soon figured out that that was largely a graphic matter: Some of the information-configuration screens aren't immediately easy to grasp; they offer options that'll send you scurrying to the manual. Which is OK, because once you've learned it, the scheme

isn't particularly complicated.

The installation was easy, and so far, the manual has never let me down—it's written in plain language and features a good index. The only drawback is that a piece of software this high-powered has given me an inferiority complex about my list of contacts. If I'm going to stretch the capabilities of YourWay, I've got some serious networking to do.

STEVE PERRY

Prisma Software
(800) 437-2685
(319) 266-0260
\$99 (\$69 from catalog)

Circle Reader Service Number 439

SIMLIFE

SimLife, "The Genetic Playground," is a new addition to Maxis's line of simulations/games/toys, such as the popular SimCity, SimAnt, and SimWorld. SimLife's silicon-based computer world simulates many of the features of our very own carbon-based life. You build an ecosystem and fill it with life, then test your world by changing genetics and/or messing with the laws of physics. Toss in a disaster—drought, fire, flood, and so on—and see how your world adapts.

To play, you choose from six predetermined scenarios, such as exploring how a desert evolves into a forest or finding out what led to the extinction of dinosaurs. There's also an experimental scenario, where anything you say goes. (Flying llamas? No problem.) A topographical map shows you the world you're working on. Inside the map is a small rectangle called the Edit Window. Scroll the Edit Window over the map to find the section of the world you want to look at up close. A Windows-like menu system enables you to easily call up world creation and control parameters. For instance, are any of your plant and animal creations extinct, and if so, why? What can you do to save those left that are in trouble?

Life is complex, and SimLife has a lot of features, too—"more buttons than all the bellies in China," the manual declares. But, unlike life, SimLife has an entertaining and gentle online tutorial that introduces you to features one at a time. Additionally, you can limit or ignore many features so you won't get overwhelmed. The manual also offers a tutorial, reference, and educational bibliography. A lab book walks you through putting an experiment together and charting data.

SimLife gives you all sorts of interesting options. If you want to see what happens to your world and its inhabitants

in an evolutionary sense, for example, speed up the simulation, and the years and generations will zip by. If you're more interested in the day-to-day events during the life cycle of a plant or animal, all you do is slow the simulation down. With SimLife, you can do it all.

BETH C. FISHKIND

Maxis
(510) 254-9700
\$69.95

Circle Reader Service Number 440

VIRUSCAN, CLEAN-UP, VSHIELD

Every once in a while, a software company comes along that just seems to do everything the right way and at the right time. McAfee Associates is one of those companies. It has produced a line of virus detection, removal, and early-warning software that's head and shoulders above the competition.

I've used one form of virus protection or another since I was first exposed to computer viruses in college, but I always seem to come back to the McAfee products. The reasons are quite simple: They work, they work well, and they work simply.

I have encountered several viruses in my travels, what with being an avid user of bulletin board systems (BBSs) as well as a collector of shareware. Not only has VIRUSCAN (the virus detector) never missed one, but CLEAN-UP (the virus remover) has never failed to remove even the boot-sector viruses.

The really interesting thing about McAfee products is that you probably won't see them in your local computer store. They're distributed through the shareware or user-supported concept of distribution. This means that you use the software and, if you like it (that is, it's a useful utility that you use with some regularity), you pay the author some registration fee. If you don't like it, you just quit using it.

The other way you may get one of the McAfee products is if it comes with your computer. McAfee has signed bundling contracts with some computer manufacturers, such as Austin and Leading Edge.

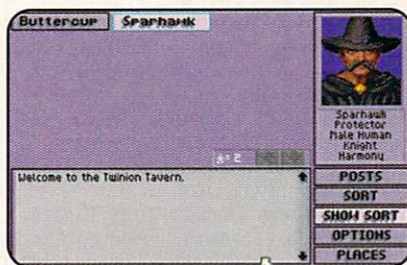
The programs come with very easy-to-read documentation that fully explains all of the options available. I feel that a specific word of warning is warranted, though: When installing the early-warning software VSHIELD, do so after all networking and disk-caching software and before any shells such as Windows or MS-DOS Shell.

Registration for personal use allows

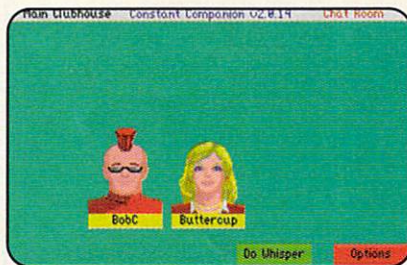
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REVIEWS

you free upgrades and phone technical support for a year. For business use, a site license is required. It entitles you to two years' worth of free upgrades and phone support.

Another trait I find admirable is that virus elimination is the company's only business. McAfee doesn't write DOS shells or word processors, just virus detection and elimination programs. This means that all of its efforts go into keeping viruses out of our machines. These programs prove that McAfee is doing its work well.

BRADLEY M. SMALL

McAfee Associates
(408) 988-3832
\$25—VIRUSCAN
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\$25—VSHIELD

Circle Reader Service Number 441

AMAZON: GUARDIANS OF EDEN

Rising from his desk, your boss, Wilbur Thornick, turns his back to you as he gives you the bad news. The expedition to the Amazon has been attacked, he tells you, his hands clasped behind his back, fingers twitching restlessly. Your brother is missing.

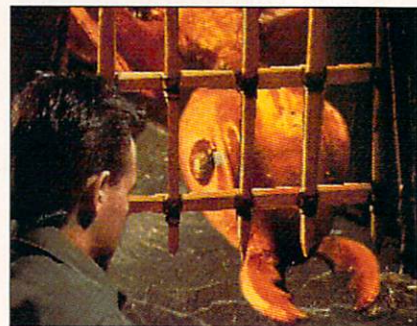
So begins Jason's (and your) adventure to find his missing brother, Allen, in Amazon: Guardians of Eden. What separates this from other adventure games is that the scene with Thornick is a minimovie. Amazon has traditional adventure-type screens in which you direct your adventurer to Look, Open, Get, etc., combined with full-motion video sequences and synchronized speech that's anything but typical. As one of my friends put it, "Cool!"

Naturally, there's a price to pay for such coolness. Eight megabytes of hard disk space is just the beginning. You can play Amazon with the minimum of hardware recommended, but to really get all that this program offers, you'll need a 386/33 computer, a sound card, and an SVGA monitor supporting 640 x 400 or 640 x 480 in 256 colors, with VESA compatibility.

Amazon's story is patterned after the campy old serials from the 1940s and 1950s, such as Flash Gordon, The Lost City, and Rocketman. Our story takes place in 1957, and you'll find vintage cars and TVs—as well as a vintage plot. The adventure is broken down into chapters, each with its own cliffhanger ending. To assist you on your quest to find your brother in the depths of the jungle, there's a player's

guidebook and a pop-up online help window.

The online help consists of three levels of clues, so you can make the adventure as challenging as you can handle. Begin with an intriguing, obscure hint. If that's not enough, there are two more levels of progressively



You won't find a cooler system-resource hog than Amazon: Guardians of Eden.

easier hints. But beware: The easier the hint, the more points docked from your overall game score.

BETH C. FISHKIND

Access Software
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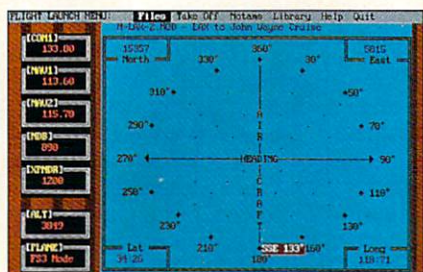
FLIGHT SIMULATOR ADD-ONS

While several companies produce add-on software for Microsoft's Flight Simulator, none is quite as prolific as Mallard. Recently, Mallard has released many new packages, including Air Traffic Controller (ATC) and Pilot's Power Tools (PPT).

ATC (originally called Tracon) is an impressive simulation that drops you into the seat of an air traffic controller, where it's up to you to get all aircraft in your sector safely to their destinations. To make the simulation as lifelike as possible, ATC's display includes a realistic-looking radar panel, complete with a continually circling radar sweep that updates critical data on the aircraft in your sector. In addition, menus across the top let you configure the simulation to your taste and skill.

As planes approach your sector, their flight plans appear in a pending queue to the right of the radar display. How you handle a flight depends on its flight plan. If a plane is just overflying your area en route to another location, you need do little more than keep it a safe distance from other flights and hand it off to the next controller. Take-offs, on the other hand, must wait on the ground until you release them.

Landings are the real challenge in ATC. You must guide the plane into the airport at the proper altitude and angle for its final approach. As if this weren't difficult enough, you frequently have several planes landing at the same airport, one after another. To add to the realism, digitized radio voices represent your com-



Air Traffic Controller puts you behind the radar screen of a busy airport.

mands and the pilots' replies. ATC, which includes both a DOS version and a Windows version featuring much-improved graphics, offers a gripping and educational simulation.

If you've lost control of the dozens, or even hundreds, of files comprising the many scenery disks and other add-on modules you use with Flight Simulator, you might want to try Mallard's Pilot's Power Tools. Using PPT, you can use PKZIP to compress most files you need for Flight Simulator into related archives, allowing you not only to save huge amounts of disk space but also to organize files into directories and related ZIP files. Most of the tools included in PPT manipulate these compressed files.

You might, for example, want to have a directory containing all the files, in ZIP format, from a specific scenery package. Then, to use the scenery, you simply select PPT's Copy Selected ZIPs & Run FS option and tell PPT the file types you need for that current Flight Simulator session. PPT does all the dirty work, uncompressing the files into your Flight Simulator Directory and running Flight Simulator in the mode you've selected. After the Flight Simulator session, PPT deletes the files it copied, and, if necessary, updates your ZIP file with whatever files you may have changed during the session.

Also included in this package is Mallard's Flight Planner. There are also utilities to analyze and edit Aircraft & Scenery Designer files, convert Flight Planner files into adventures for Mallard's Aircraft & Adventure Factory (AAF), and cross-reference various elements of an AAF adventure, plus even more. Pilot's Power Tools offers serious fliers precise and convenient control over their Flight Simulator sessions.

CLAYTON WALNUM

Mallard Software
(800) WEB-FEET
Air Traffic Controller—\$59.95
Circle Reader Service Number 443

Pilot's Power Tools—\$39.95
Circle Reader Service Number 444

PEACHTREE ACCOUNTING FOR WINDOWS 2.0

It's not often that an upgrade of an existing software product looks like an entirely new package. Such is the case, though, with Peachtree Accounting for Windows 2.0. Peachtree built this new version from the ground up, and it shows.

Peachtree Accounting is targeted at companies that employ up to 25 people, with revenues of less than a million dollars, though it's capable of handling much larger businesses. It was designed—like most other products in the entry-level accounting genre—to be used by people with little or no prior accounting experience. The program's new user interface will also accommodate individuals with little or no PC experience.

A simple, friendly tutorial walks the new user through setting up the company's books (13 sample Charts of Accounts are included), and an ongoing checklist outlines the logical steps required to utilize features appropriate for the user's business. "Smart Guides," which can be turned on or off, offer extra help at selected screens.

All of Peachtree Accounting's financial functions—Accounts Receivable/Invoicing, Accounts Payable, Payroll, Inventory, Job/Project Tracking, Bank Reconciliation, General Ledger, and Financial Reporting—are fully integrated, so data entered in one area automatically updates any other affected areas. And unlike with most other accounting packages, you don't have to go through complex month-end closing procedures; the program automatically assigns transactions to the proper period by reading the date.

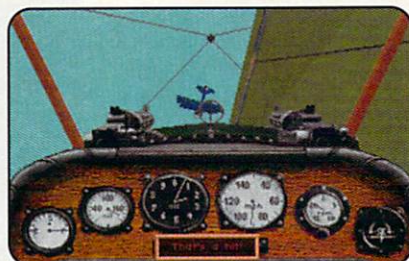
Peachtree Accounting is also the first accounting product to take full advantage of three powerful Windows functions: Multiple Document Interface (MDI), Object Linking and Embedding (OLE), and Dynamic Data Exchange (DDE). This means you can keep multiple windows open onscreen simultaneously, customize forms by inserting graphic objects from other applications, and exchange data with other programs.

Though the documentation and the final version weren't available at this writ-

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ing, the beta I saw looked more intuitive and full featured than any similar product I've seen. The program's new look incorporates state-of-the-art Windows conventions: descriptive icons, real-life representations of graphic forms, and visual flow charts that guide you through an accounting process.

One of the most potentially powerful new features of this upgrade is the Manager Series, which lets you "drill down" through the many levels of your cash, collection, and payables records, and provides graphical analyses and overviews of your company's financial status. Moreover, several new capabilities have been added to every major function of Peachtree Accounting, enhancing the product's flexibility, ease of use, and speed.

There's a lot of competition in the small-business accounting field, and a shake-out is inevitable. When the dust finally settles, however, Peachtree Accounting will likely still be around.

KATHY YAKAL

Peachtree Software
(800) 228-0068
(404) 564-5700
\$169 (\$79 for upgrade)

Circle Reader Service Number 445

DATA STOR 486-25SX

The Data Stor 486-25SX, built around the 486SX, 25-MHz, 32-bit microprocessor, is as powerful as it is fast and efficient.

While you'll want to note that this particular flavor of 486 has no math coprocessing capability built in, most common applications don't need one. If you required it at a later date, however, a coprocessor could always be added or the CPU could

be upgraded.

Above and beyond the standard 4MB of RAM, there are up to 32MB available by expansion. Expansion RAM is held in single inline memory modules (SIMMs), making upgrades and maintenance easy and efficient. A 64K hardware

ISA local bus slot, tied to the system's own memory bus and allowing direct access to the CPU by peripherals, accommodates local bus add-on cards. The local bus adapters run at the same speed as the CPU for consequent high performance.

To test speed and smooth-

Stor 486 showed enough improvement over its 386 equivalent to be the computer of choice if both were available and both were running the same software.

To obtain data not biased by my own interpretation, I also ran the Norton Utilities SYSINFO program and looked at the benchmark tests. What the benchmarks told me was essentially what I experienced—significant speed in both file access and processing. With the IBM XT 8088 running at 4.77 MHz as a base value of 1 in all indices, the Data Stor 486 has a computing index (CPU speed) value of 54, a disk-speed index of 7.5, and an overall performance-index value of 38.5. Compare this with the 386 values—which are, respectively, 34.8, 7, and 25.5—and you have a 50-percent improvement.

My review unit also came equipped with a Tseng 4000 local bus video board offering Super VGA capability, a high-resolution monitor, a 207MB hard drive, high-density 5¼- and 3½-inch floppy drives, and a Logitech Series 14 mouse. All of these were put through their paces, and nothing was found to be problematic or wanting. Also available for upgrades, but not included with the review unit, are fixed drives with capacities of up to two gigabytes, a Weitek math coprocessor, and, of course, multiple video displays and modems.

This computer is a member of a family of Data Stor 486 ISA Series computers. Depending on the flavor of 486 microprocessor you choose, clock speeds may be 25, 33, or 50 MHz. The computer is fully IBM compatible, attractive, well designed, and easy to use.



You're likely to find everything you need in the Data Stor 486-25SX, a computer that combines speed with power.

cache, using fast static RAM, is a part of the motherboard and can be upgraded to 256K.

Because each machine is configured based on the needs of the specific purchaser, there's no standard configuration for the Data Stor 486, other than the basic motherboard specifications: a 1 : 1 interleave IDE hard/floppy disk drive controller, a game port, a parallel port, and two serial ports.

Input and output is handled through AMI BIOS with on-board CMOS for storing the system configuration. An

ness of operation, I ran several common programs on the Data Stor 486 and a Gateway 2000 386DX/33. These included Windows applications such as MacDraft and Hollywood—which are heavily graphics and processing oriented—and DOS applications such as Dance of the Planets, Color Works, and DeluxePaint IIe, also heavily processing oriented. Dance of the Planets, in fact, needs a math coprocessor to run at its best, yet it moves along at an acceptable rate on the Data Stor 486. In all cases, the Data

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REVIEWS

There are three buttons at the front of the unit: a turbospeed button, a reset button, and the power button. Although a keyboard seems a mundane thing, it can make all the difference when you're using a computer, since it's the peripheral you have most immediate and lengthy contact with. The Data Stor 101 keyboard is IBM standard and has a terrific feel, with pleasing tactile feedback and a solid click.

Case dimensions are 16½ x 14½ x 7 inches. The interior is well laid out and is accessible with the removal of seven screws.

With attributes ranging from a fast operating speed to a keyboard with a nice feel, I found plenty to like about the Data Stor 486-25SX. It's a well-designed, powerful machine.

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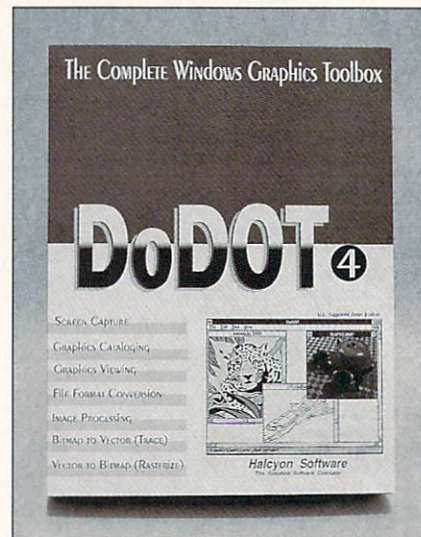
DODOT 4.0

If you do a lot work with graphics, you can surely benefit from a utility like Halcyon Software's DoDot 4.0. DoDot is a veritable Swiss Army knife of graphics utilities, consisting of five separate programs: DoDot, DoConvert, DoThumbnail, DoSnap, and DoView. They perform a host of graphics functions.

The main application, DoDot, allows you to fine-tune and transform images. One example might be converting color images to gray scale or black-and-white. It also lets you fax and scan images. DoConvert is a conversion utility that supports conversion among 50 different graphics formats, including other platforms, such as Macintosh and Sun. DoThumbnail lets you catalog thumbnails of images and search terms into an easily navigated database. DoSnap is a screen-capture utility that lets you save captures in several different formats. You can also choose between sending the capture to the Clipboard or to a graphics file. DoView is a graphics-viewing utility that allows you to view graphics by selecting them from the Windows File Manager or another file-management utility.

Most impressive is the speed with which each DoDot application performs its allotted task. I converted several 24-bit images to gray scale in half the time it takes other similar utilities. Conversion between file formats is also quick, and DoConvert is a batch converter, which means you can set it

up to convert several files and walk away to do other tasks while the computer works. I was disappointed, however, that you can perform only one type of conversion—say, CGM to PCX—per batch. Also, in my tests converting EPS logos to CGM, DoConvert dropped several letters, making the conversions useless. But most of the file conversions worked fine.



DoDot performs just about every graphics function you can think of.

DoThumbnail is one of the most versatile cataloging utilities I've ever seen. It catalogs graphics not only on your hard disk, but also on other sources, such as CD-ROMs and removable. When you access an image not residing on your hard disk, DoThumbnail tells you where to find it. Few of us have big enough hard disks to allow seldom-used graphics to occupy valuable real estate. DoThumbnail is also faster than CorelMOSAIC and some other cataloging utilities.

Halcyon markets DoDot as the Complete Graphics Toolbox. While this program is both powerful and useful, it lacks a few basic features, such as simple bitmap and vector editors, to be complete. Also, DoDot itself misbehaved on my system, crashing often and causing me to reboot. Halcyon representatives say they haven't experienced this problem. Granted, my system is more complex than many, but other Windows programs run fine on it.

Those few minor drawbacks aside, this is a great utility. In particular, DoDot is stronger at managing graphics than some other utilities.

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DOSUTILS

There comes a time in every disk's life where it suddenly begins to show problems, at least every once in a while. If you're lucky, you've been keeping regular backups and can safely reformat your hard disk. If you haven't, you'll need a product like DosUtils.

Sometimes just reformatting won't do the trick. Worse, the underused (and properly so) DOS VERIFY command doesn't do a very good job of verifying disk writes. What's more, DOS gives the hard disk several tries before it decides there's a problem writing to, or reading from, the disk. That why, for example, you might notice that a hard disk or a floppy has slowed down for no apparent reason before errors are reported. The disk may in fact have been defective for a while as DOS silently ignored the problem, stoically rereading or rewriting the disk until it got the job done.

DosUtils handles a wide variety of tasks. It lets you recover deleted files; acts as a kind of super-CHKDSK with its SCAN function; reads, writes, and searches the physical disk itself; changes file attributes; tests the disk controller; determines the speed of the disk controller; finds defects on the disk; and performs a number of related feats. It does these for all popular hard disk types: ST506 MFM and RLL, ESDI and IDE, and SCSI. It can low-level initialize the ST506 and ESDI, but not the IDE or SCSI. A companion product from Ontrack, Disk Manager, handles all drive types, including IDE and SCSI.

I've laid on the alphabet

soup for a reason: If you have no idea what kind of hard drive is in your computer or why you'd want drive diagnostics or a better CHKDSK, this product isn't for you. On the other hand, if you're the local power user and find yourself doing drive maintenance only be-

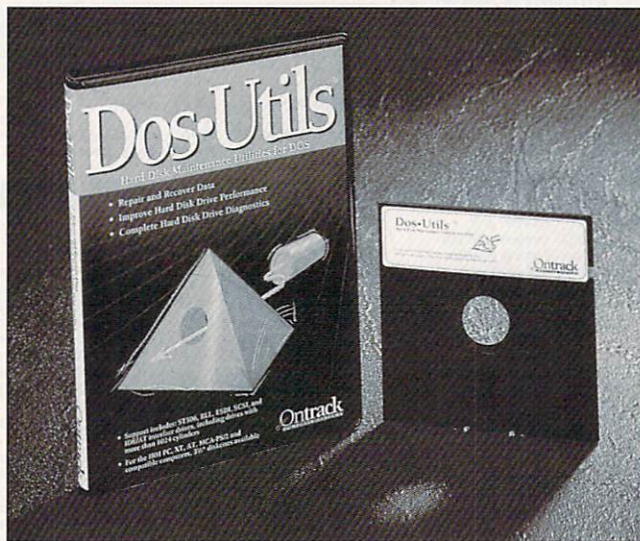
bag of tricks. Like CHKDSK, it cruises the entire disk in search of cross-linked files, bad sectors, and so on; but it roots deeper than CHKDSK. It's almost as fast, however, and well worth the very slight time penalty. It took only a few seconds longer than CHKDSK to

the manual, and I had to call tech support to find out what it does.

The documentation is slim and missing a lot of tutorial information that might sell more copies of DosUtils to slightly less experienced users. Many important functions are given no explanation at all—the programmer and the person who wrote the manual might have known what *Scans (Write-read) all UN-USED data clusters* meant, but I sure didn't. There are other significant problems with the manual. There's no index, the print is very small, and some useful illustrations are marred by their execution—they literally look as if they were done on a typewriter. I still found them quite useful, though, because they explain different configurations of cables and interface cards.

Is DosUtils worth your money? If you know you need it—if you need to revive hard disks on the job—probably so. If your computer is new, and you couldn't tell a cylinder from a file if it jumped out of your system unit and bit you, then you should save your money.

TOM CAMPBELL



DosUtils is a powerful program for maintaining hard drives, but it may be more powerful than casual users need.

cause everyone knows you can do it, DosUtils might just be the product you need.

One very useful feature in DosUtils' DiskLook utility is the ability to back up critical sections of the hard disk: boot record, BIOS parameter block, file allocation table, and root directory. Since most disk problems originate in those areas, backing them up frequently could well make or break your efforts to recover data when the disk starts to lose its mind. DOS doesn't give you any means of backing up just these items, and the BACKUP/RESTORE programs found in DOS are best left untouched.

The SCAN utility will also find its way into your daily

scan my 400MB of disk space.

I appreciated DosUtil's wide variety of command line options. While switches like Force XT mode or Force DOS 4 rules may sound like arcana, they're life-savers when you're working with a clone drive mechanism that didn't quite copy the programming interface correctly or you're working on a system that has acquired more than one version of DOS. (I once fixed a machine that was sputtering along with hidden system files from DOS 2.11, a COMMAND.COM from DOS 3.3, utilities from DOS 4.0, and some leftover files from DOS 3.0.) Unfortunately the Force DOS 4 rules option isn't explained anywhere in

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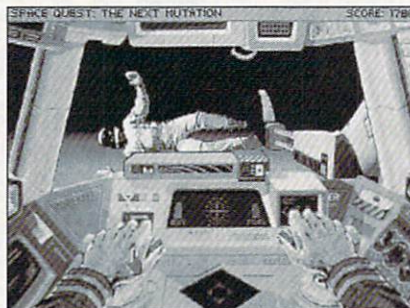
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REVIEWS

uates and, because of a computer error in his favor, receives his first assignment: to captain the garbage scow Eureka. Once on board, Roger faces an insolent crew and a perplexing mystery: Someone out there wants to put an end to StarCon.

As always full of wry and often irrelevant humor, this latest Space Quest



Space Quest V offers a neorealistic approach akin to Star Trek, plus humor.

installment goes further than any adventure game has gone before, perhaps with the exception of Star Trek, the 25th Anniversary Edition. The gags are uniformly hilarious, the animated shorts hysterical, and many of the problems you must solve seem ridiculous. Those constitute the differences between Space Quest V and something like Star Trek.

These two games hold in common a revolutionary approach to puzzle-solving: neorealism. For instance, to open a locked door, instead of employing a bizarre gimmick, you must take a hole punch found aboard the Eureka and punch a specific pattern in a business card.

The once-useless plastic card becomes a key that opens the door. You'll discover the necessary pattern through extreme and unusual circumstances, but those conditions make Space Quest V what it is: funny. The logic involved augments the slapstick and elevates the game well beyond the mundane horde of other adventures on the market—many from Sierra itself.

Space Quest V utilizes Sierra's impeccable interface, allowing for nearly transparent character actions. And, like most other Sierra games, this one features a nonstop and appropriate musical score. The graphics rank among the best standard 256-color VGA work done to date, while the animations rarely seem to "take over" and leave you with nothing to do but watch.

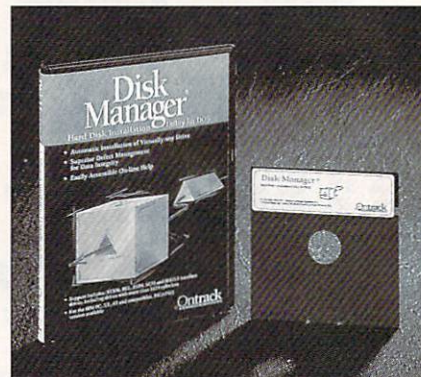
A number of Space Quest V puzzles do require absurd timing—even saving games won't alleviate your frustration

at Roger's 33rd death from pukoid spittle or the hours of dead-end maze-crawling. These tedious arcade sequences aside, anybody with a hankering to explore an alternate and spoof-filled universe must sign aboard the Eureka.

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It helps if you have a fairly high level of expertise to make the most of Disk Manager's disk-recover capabilities.

DISK MANAGER

Disk Manager saved my skin.

As a fairly competent programmer and an acknowledged power user, I tend to be pretty good at diagnosing problems, weighing the values of various solutions, and advising others on both hardware and software matters. So the other night when my system hung and the IDE hard drive died while I was racing for a deadline, I was calm and collected enough to do what few of my peers would do in that situation . . . I panicked. Some heretofore unknown Mr. Hyde leapt out from a deep crevasse within my soul and took over my consciousness. When I awoke, I realized I had done a FORMAT C: on my hard drive. This isn't a problem with most hard disks, but IDE drives are a noteworthy exception. Doing a low-level format is a no-no, rendering the disk unusable.

Unless you have the astounding Disk Manager, which saved my bacon at 3:30 the next morning. Disk Manager would be worth its price if only for that feature because the IDE manual mentions dispassionately that the only recourse to a formatted IDE is to send the drive back to its manufacturer. Not a good sign when it's 3:30 a.m. and your deadline is at 7:30. But Disk Manager does a lot more than just low-level-format IDE drives. It will do the same for any ST506, ESDI, IDE, or SCSI drive. It will add a soft extension to

An invitation to join

GILDA'S CLUB

where membership means that people with cancer and their families do not have to feel alone any more.



The house at 195 West Houston Street in New York City is to become the first of many homes of GILDA'S CLUB.

As she fought cancer, Gilda Radner said that it was in a psychosocial support setting for people with cancer and their families — with therapy, lectures, workshops and parties — that she found friendship, hope and a renewed sense of control of her life. And now, GILDA'S CLUB asks for your contribution to help establish centers like this nationwide. Gilda's last wish was that one day there would be such communities everywhere, free of charge to all. Please join Gene Wilder and the special friends of Gilda to help realize her wish.

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REVIEWS

your BIOS to tweak drives with more than 1024 cylinders, allow you to boot from up to four operating systems, repartition your disk, change the interleave and cluster sizes for each partition, and more. It even checks itself for a virus infection on startup.

The documentation is much too slim, relying almost solely on the online help, which isn't the greatest. It has no index and omits a lot of tutorial information that, say, the Norton Utilities and many similar programs offer. And some of the items simply aren't covered at all. For example, the Machine Information option gathers certain version data from the BIOS and DOS and displays it without explanation.

The online help gives only vague information about that particular feature, so I'll test you: Do you know what the "Model byte" is? I didn't think so. (It's a byte written into the BIOS by IBM; for example, 255 means it's an original PC, 254 designates an XT, and so on.) Not only that, but the model byte is given in hexadecimal or base 16 notation, so you're shown not the value 255, but FF, which is 255 in base 16.

Another problem is that the sequence of a particularly crucial set of operations (Initialize Disk Surface, Defect Management, and Verify Disk Surface) all listed on the same menu wasn't given in the online help and certainly not in the manual, so I had to learn by time-consuming (and potentially dangerous) trial and error. In other words, you'd better be a power user if you buy this product because the documentation doesn't take your hand and lead you through each step the way Norton does. (To be fair, Disk Manager's manual states that you're expected to be an advanced DOS user, and Disk Manager handles many cases that Norton doesn't. For example, it can read the disk even without a partition.)

But what Disk Manager does, it does very well. It dispatched with the low-level format of both my 212MB hard drives quickly and efficiently. Ditto for the resuscitation of the old Seagate hard disk on my seven-year-old AT, which I'd planned to shoot and bury in the backyard. It also determined correctly the disk types of several other machines I tried, although it lets you override parameters that you determine to be incorrect.

Other miscellaneous features are equally useful. For example, you can write-protect whole sections of your disk. While there's no password protection or encryption involved, this is

enough to prevent the casual or even accidental tampering that can trash a disk in seconds flat. Another fairly advanced feature is the ability to alter the cluster size of your hard disk (in English, that means you can choose between speed and more efficient use of hard disk space).

Disk Manager is a great companion to higher-level disk-recover tools like Norton or PC Tools. If you're comfortable enough around DOS and PC hardware to know whether you need it, Disk Manager does the job.

TOM CAMPBELL

Ontrack Computer Systems
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DOUBLERES 4

Get 600 dots per inch from a 300-dpi HP LaserJet Series II or III! That's the claim LPAC makes for its doubleRES 4. But the board does more than just improve the resolution of Windows printing; it also speeds up the process.

As a computing veteran with years of experience, I've heard my share of unfulfilled claims. As a result, I installed doubleRES 4 with a bit of skepticism.

For me, installation meant loading up the doubleRES 4 printer driver in the usual manner and inserting the doubleRES 4 board into the Optional I/O port of my LaserJet Series II printer. Both of these tasks were relatively painless. Completing the installation process required changing the LaserJet's configuration using the control panel on the printer. (This was probably the most difficult part of the process.)

With everything in place, I loaded a 20-page PageMaker 4.0 file, which included a variety of line drawings and used several Adobe fonts, as well as about six screen captures. I was very impressed with the increased printing speed. The doubleRES 4 board includes an Intel i960 microprocessor that does much of the work the computer usually does, speeding up printing.

Once I finished my initial test, I began exploring the options available with the doubleRES 4 printer driver. These included the capabilities of selecting either 300 or 600 dpi and choosing halftone quality printing options of 53, 71, 85, or 106 lines per inch, an important feature if you print halftones with a LaserJet.

I did have an opportunity to try LPAC technical support. I use a Gateway 2000 486 with an ATI video card that has an SVGA BIOS incompatible with the doubleRES 4 printer driver. LPAC did have an alternate driver that

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I downloaded from its BBS. The new driver solved a problem I was having printing PageMaker files with running heads.

I also had a very simple-to-explain problem printing from Quattro Pro for Windows: DoubleRES 4 simply didn't work with that program! LPAC has discussed the problem with Borland, and both companies are working on it. While I experienced no problems serious enough to scare me away from doubleRES 4, you should probably check to be sure that it will work with the software you need it for.

I did, however, successfully use doubleRES 4 with all the other programs I tried. Printing multiple-page documents with doubleRES 4 was about five times faster than with the standard driver at 300 dpi printing from PageMaker, Word for Windows, and WordPerfect for Windows. The quality of the printing was also improved, as you would expect with the increased resolution, although the visual differences to the naked eye depend on the font, style, and size of the characters, especially if you use Adobe fonts.

At \$599, doubleRES 4 isn't a cheap add-on. But if you need to upgrade your HP LaserJet for increased speed in Windows printing and for 600-dpi resolution (and still be able to print DOS applications at 300 dpi) and if doubleRES 4 will work smoothly with the applications you use, it's an excellent alternative to buying a new printer.

STEPHEN LEVY

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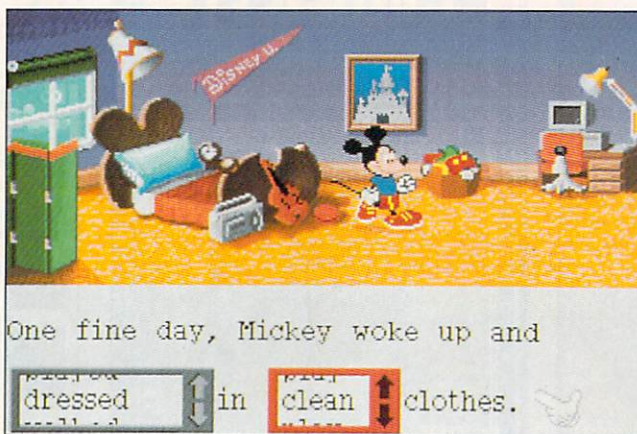
Circle Reader Service Number 451

106 COMPUTE AUGUST 1993

FOLLOW THE READER

Dick and Jane had better get a new agent. For people with access to computers, at least, educational software has made some old-school learning techniques

park. Spring for a Sound Source (an extra \$20 if you buy the Follow the Reader combination pack), and you can hear sound effects, as well as a narrator reading the sentences your child helps create. The program also supports other major sound boards, though I nev-



Tell Mickey Mouse where to go and he'll help you learn to read in *Follow the Reader*, a sequel to *Mickey's ABC's*.

seem as archaic as horse-drawn transportation. A leader in the field has been Disney Software, employing the most recognizable corporate symbols this side of Joe Camel to make learning fun and multidimensional.

In *Follow the Reader*, a sequel to *Mickey's ABC's* aimed at ages 5-8, Mickey Mouse and the usual suspects traipse through a series of gentle, child-guided adventures. The program is easy to install and use, requiring a 286 machine and only rudimentary mouse or keyboard skills. Each screen offers a sentence with one or two variable words, giving options for Mickey to do something where he is or to haul his oversized ears elsewhere and do something there.

Mickey can wash his ears in the bathroom, write a letter to a friend in his bedroom, or pick up trash in the

er was able to get it to work properly using my Covox Sound Master II.

It sounded great through the Sound Source, though. The graphics aren't quite as good as the sound, offering rich color but moderately jaggy illustrations. Jaggy or not, though, the characters move and make noises in a way that kept my five-year-old son happy. He had no trouble with the interface, and I'm confident that *Follow the Reader's* intuitive, no-wrong-answers method of instruction will boost his reading skills over time.

Good help for grownups comes from the well-illustrated manual and an extra activity guide for parents and teachers, the capping virtues of a satisfying package. For young readers, *Follow the Reader* offers a good lead.

EDDIE HUFFMAN

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Circle Reader Service Number 452

INTERNATIONAL SPORTS CHALLENGE

International Sports Challenge is another in a long line of sports simulations that attempt to reduce Olympic-level competitions to joystick tapping, twisting, and wiggling. In this omnibus contest you can compete in six events, including marathon running, diving, show jumping (horses), swimming, cycling, and shooting. Although all events must be played in a four-player mode, your computer will be thrilled to fill in for missing humans.

Unfortunately, *International Sports Challenge* has little to add to a leisure software market already glutted with superior titles. Fact is, this game is one frustration after another. The hassles begin from the moment you try to install it onto your hard drive, since the manual only includes instructions for running the game, not for installing it. Luckily, typing the usual *install* reads the needed instructions from the disk.

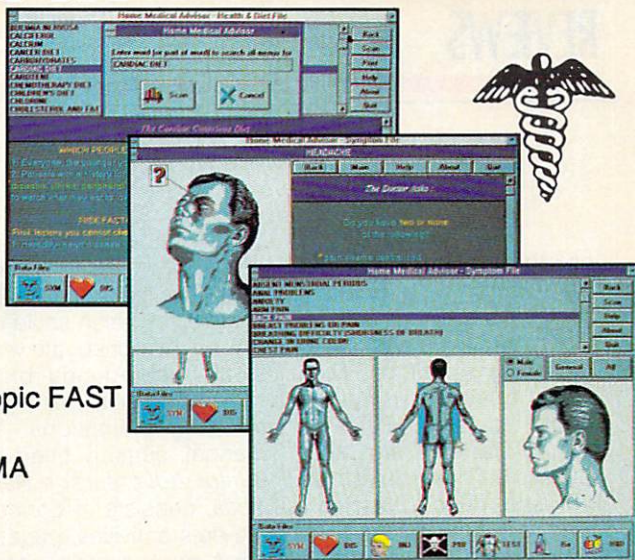
Installing the game is only half the battle, though. Once you get the title screen up, you have to figure out how the menu screens work. They, too, are not documented in the manual, except in the sentence "Simply follow the onscreen prompts." Too bad the onscreen prompts neglect to provide the information you need.

Once you get the game running, you face some of the most contrived controls

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seen in a sports game. In many events the controls are impossibly frustrating. In the diving competition, for example, you must first get the diver into the air by tapping the joystick button when a circlelike object expands to its largest size. The circle expands so quickly, however, that the results boil down to chance. Once your diver is airborne, you must try to line up two small balls on the circle in order to execute the dive properly. Forget watching your diver; if you even glance away from the control circle, your dive will be as professional as a belly flop.

The show-jumping event is equally frustrating. Here, you try to keep a horse on course, making its jumps in the assigned order. Although the 3-D graphics are OK, the horse is ridiculously difficult to keep on track, making the event more frustrating than it's worth. The other events suffer equally (I never did figure out exactly



Experience the kind of pleasure normally associated with dental work when you play International Sports Challenge.

how the swimming event worked), with the possible exception of the shooting match, which is nothing more than pointing and shooting.

Finally, although the game claims to support keyboard controls, there is no documentation on how those controls are implemented. If you don't own a joystick, plan to spend an hour

or two figuring out which keys work with which events—a nearly impossible task. Having a mouse won't save you, either, since the mouse works only intermittently. You have to wonder why they even bothered to include such meager mouse support.

In summary, this game's overly difficult controls, incomplete and confusing man-

ual, and borderline graphics and sound yield a leisure product that's more work than entertainment. I haven't had this much fun since I had a tooth pulled.

CLAYTON WALNUM

ReadySoft
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Circle Reader Service Number 453

PUTT-PUTT JOINS THE PARADE

If only we could relive our childhoods! Instead of deploying plastic army men or posing Barbie dolls, we'd play Putt-Putt Joins the Parade, an instructive charmer chock full of bells and whistles. Even if your problem-solving and reading skills don't require further development, you owe it to your kid ages 5-7 to bring home a copy of this Humongous Entertainment product.

Putt-Putt, a cute little talking convertible, wants to

join the Cartown Pet Parade—quite the gala affair. To participate, he must find a pet, pay for a car wash, and snag a balloon. Kids take the wheel, using the mouse to move Putt-Putt around Cartown and activate secret Click-Points. In urban areas, kids have plenty to do mowing yards, delivering groceries, and finding their way around town. Out on the open road, youngsters will find that almost every butterfly and flower animates when touched.

The problems Putt-Putt encounters won't stump an eager seven-year-old, but for younger adventurers, figuring ways around balky cows, tacks in the street, and busy intersections can take some time. Successfully solving such simple dilemmas results in rewards of clever animated sequences and clear digitized speech. Putt-Putt also manages to teach a few ethics lessons without preachiness. For example, Putt-Putt must locate a missing child. Kids might notice that the distraught mother has a red balloon perfect for the parade, but the game itself never mentions rewards for noble actions—until after they're performed. Putt-Putt finds the child and gets the balloon; kids just might learn that valorous action makes them feel better about themselves. Besides, doing the right thing is the only way to "win" the game. Throughout, Putt-Putt and friends talk to kids via quality digitized speech, offering hints and encouragement. Putt-Putt often reads words on signs aloud so that kids who can't read will be able to make valuable word/object associations.

Putt-Putt Joins the Parade seems to borrow from the Little Golden Books tradition of

charm with its anthropomorphic fire engines and automobiles, all of which smile jovially. As mentioned, the whimsical backgrounds bristle with Click-Points that trigger amusing animations. The manual, suitably titled *The Junior Adventurer's Handbook*, consists of connect-the-dots activities, pages to color, and counting games, to name just a few items. The Junior Adventurer's Toolkit completes the package with a Putt-Putt pencil, sharpener, and box of crayons—quite an assortment of goodies sure to delight any child.

So when the route chosen calls for a gentle introduction to computer interfaces and hours of light-hearted play, Putt-Putt looks like the king of the road.

DAVID SEARS

Humongous Entertainment
(800) 245-4525
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Circle Reader Service Number 454

ROBOCOP 3D

Inspired by Orion Pictures' science-fiction thriller, *RoboCop 3D* unfolds in the crime-infested streets of Old Detroit. Here, the OCP Corporation plans to construct a new urban paradise, Delta City. Numerous project delays, however, threaten to cost the company billions of dollars unless it begins immediate demolition of existing buildings. When residents refuse to leave their homes, OCP sends armed Urban Rehab units to violently expel all resisters. As *RoboCop*, you turn renegade to help the hapless citizens and risk brutal retribution from your greedy employer.

Gameplay consists of separate Arcade and Movie sections. Arcade mode offers

practice in five self-contained action scenarios: Driving, Street Fights, Hostage Rescue, Flying, and Hand-to-Hand Combat. Whether buzzing skyscrapers in simulated air combat, cruising the lunatic fringe in your police cruiser, or busting down doors to search buildings, you'll find that the designers successfully evoke the movie's gut-level sensation of danger and despair. Both driving and flying—in your experimental, combat-ready gyropack—offer the most visually dynamic action, while the so-called urban pacification scenarios prove utterly chilling. Only hand-to-hand fighting fails to excite, suffering from inadequate design and a clumsy control scheme.

Movie mode brings all game elements together in an open-ended adventure spiced with cinematic-style segues, subplots, and seedy peripheral characters. The only rules are to follow your prime directives: Protect the innocent, uphold the law, and serve the public trust. Failure to do so promptly ends your tour of duty. Movie mode offers enough variety, mystery,

and explosive action to ensure repeated play. The biggest drawback, lack of a save-game option, is sadly indicative of the game's European design.

Graphics are rendered with a pleasing blend of 256-color bitmapped static screens and fast-moving 3-D polygons. Though the game is considerably less detailed than others of its type, the first-person perspective and murky monotonies give this virtual world its dark, jagged edge. Missing from the IBM version, unfortunately, are the spine-tingling music and sound effects that enlivened the original Amiga edition. The only other major weakness is strictly a matter of taste: Thick with violence and harsh ambiance, the game could prove too grim.

Though decidedly not for all tastes, *RoboCop 3D* delivers enough diverse challenges and heavy atmosphere to make it Ocean's best movie conversion yet.

SCOTT A. MAY

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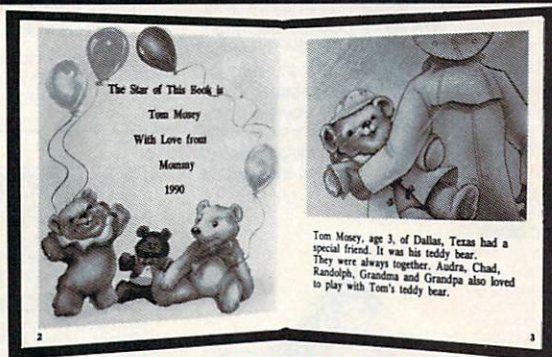
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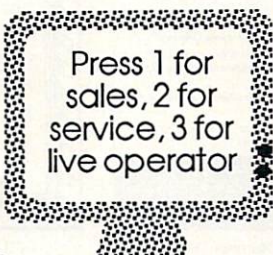
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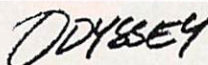
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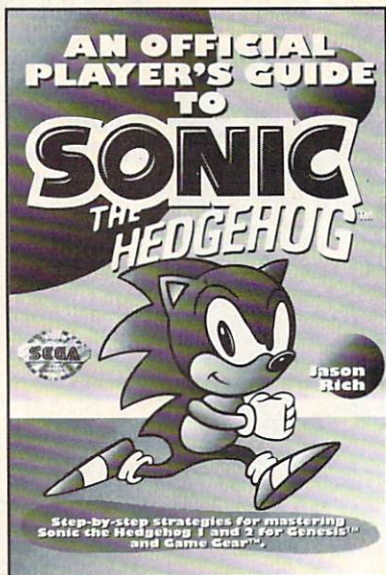
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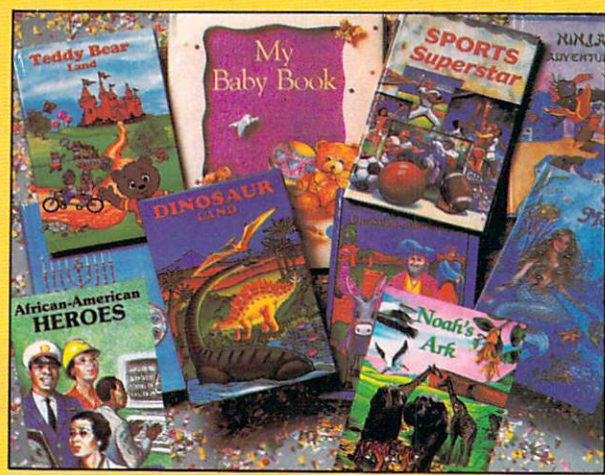
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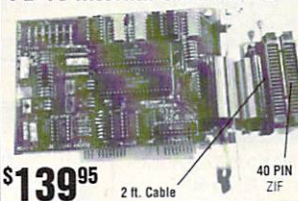
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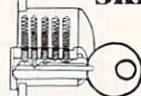
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MAKING THE BEST OF DOS

DOS 6 has caused quite a stir recently. Judging from the sales figures, it's clearly an upgrade that a vast number of DOS users want, but some people have reported problems, especially with two modules: DoubleSpace and MemMaker.

At COMPUTE, six editors have installed DOS 6. All have used MemMaker, three have installed DoubleSpace, and none have had any problems. But since problems have been reported, we advise caution. Here's some advice on how to save your system if you have problems with DOS 6's DoubleSpace or MemMaker.

First, MemMaker and DoubleSpace are complex applications. If you're not familiar with drive letters, paths, and memory addresses, don't install these programs yourself. Get a knowledgeable friend or co-worker to help you.

The best defense is a recent backup. So before you do anything else, make a backup of your hard disk.

After you make the backup, restore a few files to make sure the backup is reliable. This is extremely important. If you need to restore later, you want to know how to do it, and you want to be sure your backup is OK. Now, make a copy on floppies of the software you used to make the backup, put the backup and the software aside, and relax.

Let's tackle DoubleSpace first. This utility compresses and decompresses data on the fly and, for all practical purposes, nearly doubles the size of most hard disks. It will also slow down some 386 machines. We recommend at least a 25-MHz 386SX with a minimum of 2MB RAM (so you can run SMARTDrive or another disk cache) for installing

DoubleSpace.

The first step is to install DOS 6, if you haven't already done so. Do this, and use your system for a day or two before you try installing DoubleSpace or MemMaker. After you and your system have adjusted to DOS 6, defragment your hard disk.

Next, before you run DoubleSpace, make sure you're also running any software that normally creates virtual drives on your system (CD-ROM or network drives). This will help DoubleSpace choose a drive letter for its physical drive that won't conflict with your usual environment. At COMPUTE, we've had no problems running SMARTDrive when installing DoubleSpace, but it seems wise to disable SMARTDrive for the installation. Creating your DoubleSpace volume may take several hours, so be prepared.

Hopefully, everything will go smoothly. After the installation, you should be able to run SMARTDrive again without problems. If you do have problems, refer to the paragraph after the next.

Consider the next month a DoubleSpace-testing period. Back up your important files every day and look for any signs of trouble on your compressed volume. At least twice a day, run `DBLSPACE /CHKDSK` on the compressed volume to test it for integrity. If you notice lost clusters, don't panic. Try disabling SMARTDrive's write-caching feature with the line `smartdrv i`, where *i* is the letter of your physical drive. (You can easily reenabling write caching with the line `smartdrv i+.`)

If you do have severe problems with your DoubleSpace volume, you can recover by following these steps: Install DOS 6 on a freshly formatted floppy, boot from the floppy, reformat your hard disk using the `/s` switch, reinstall DOS 6 on your

hard disk, and restore your backup. If you want to go back to a previous version of DOS, install that version on the formatted floppy and then on your hard drive.

Now to MemMaker. First determine whether you need to run MemMaker at all. Do you have DOS programs that run out of memory? If you don't or if you're using Windows almost exclusively, you probably don't need to load device drivers and TSRs high.

If you do need to load some programs into upper memory, do it manually first. Load the largest drivers first and use the keywords `DEVICEHIGH` in `CONFIG.SYS` and `LOADHIGH` in `AUTOEXEC.BAT`. To see how much memory you've freed, use the command `MEM/C I MORE`.

Experiment with the order of the programs, too. This can make a big difference. If you can free enough memory this way, don't bother running MemMaker. If you can't free enough conventional memory, you'll want to run MemMaker, but first, do this: Create a subdirectory off your root directory called `BACKUP` and copy your `CONFIG.SYS` and `AUTOEXEC.BAT` files into it. (If you're running Windows, it's a good idea to copy your `WIN.INI` and `SYSTEM.INI` files here, too.) If there's trouble with MemMaker, you'll still have your original copies.

Now, run MemMaker and follow the onscreen instructions. After MemMaker is finished, check your memory situation again. If MemMaker garnered more conventional memory for you, fine. If it didn't, go back to your backups. If MemMaker locks up when it's running, reboot your computer and bypass your `CONFIG.SYS` file by pressing `F5` when you see `Now starting MS-DOS...` Next, copy your backups and reboot your computer. □

Keep this handy if you're installing DOS 6. To find out more about DoubleSpace, see "Windows Workshop" in the next issue.

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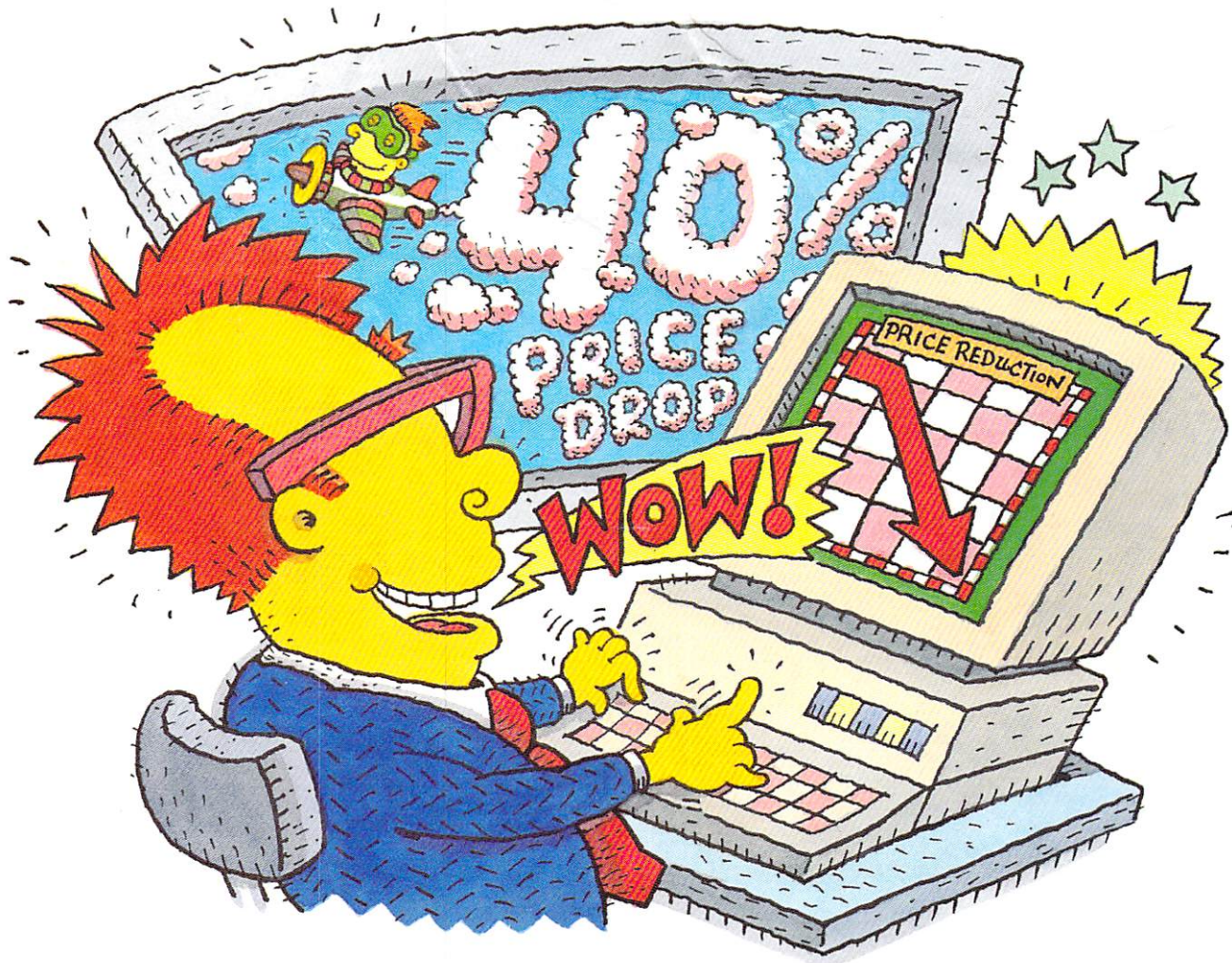
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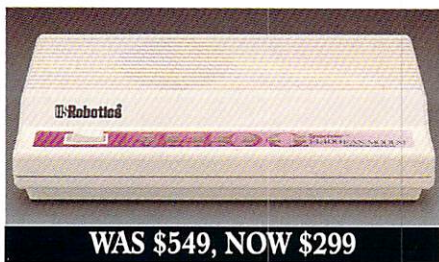
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