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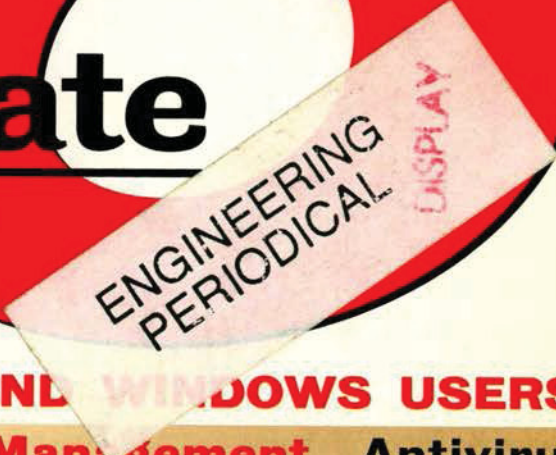
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# DOS 6

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# DOS 6

## *The Ultimate Software Bundle?*

by Jeff Prosis

Disk compression, memory management, file backup, virus protection—DOS has evolved to handle today's toughest computing challenges, but while Microsoft sets a new standard, power users will always want more.

**D**OS 6 is a fine example of Software Darwinism—software that has adapted, the best it could, to keep up with the times. Nothing in DOS 6 is particularly revolutionary; there are no showstopping technological breakthroughs. The 1MB barrier is still firmly in place.

Nonetheless, DOS 6 is vitally important for two reasons. First, through a series of minor additions and modifications, it competently answers a sizable portion of customer complaints about previous omissions and shortcomings. Second, and perhaps more important, it builds into the operating system many of the utilities on which we've come to depend. Built-in disk compression, memory management, file backup, and virus protection are the meat of this DOS revision. Considering the upgrade's \$129.95 price tag

(\$49.99 until May 31), you might be hard-pressed to match the same bang for the buck in any third-party software combination. But how do the DOS 6 utilities stack up against similar offerings from software makers? In this story, we compare DOS 6 to the leading third-party products in six important utility categories: disk compression, memory management, file backup, virus protection, disk caching and defragging, and configuration management. We also let *PC Magazine's* experts tell you what's still missing from DOS, as well as provide a list of tips to get you started.

The bottom line is that DOS 6 will make life easier for many users. Compression will be as simple as typing "DBLSPACE." Optimizing memory will require nothing more than entering "MEMMAKER." And because they are more accessible, these features will be used more than they've been in the past. Still,



power users who want to be out on the cutting edge, squeezing every bit of oomph from their operating systems, may find this release a bit tame. Remember, too, that MS-DOS 6 is sold only as an upgrade kit so you'll need to have an operating system already on your PC. And since Microsoft is licensing several flavors of DOS 6 to PC vendors, the version that comes with a new machine may not include the full suite of utilities. Here's a look at the major enhancements.

**EXPANDING DISK SPACE**

First and foremost among the new features is DoubleSpace,

which increases a disk's storage capacity by compressing the data on it. It's similar to third-party compression products such as Stacker, but it enjoys one significant advantage: It's an integral part of the operating system and not an add-on.

The DoubleSpace driver is stored on system-formatted disks along with the system files IO.SYS and MSDOS.SYS. It's loaded early in the boot process, eliminating many of the synchronization problems that afflict users of third-party products. For example, most disk-compression products require you to add a statement to CONFIG.SYS that

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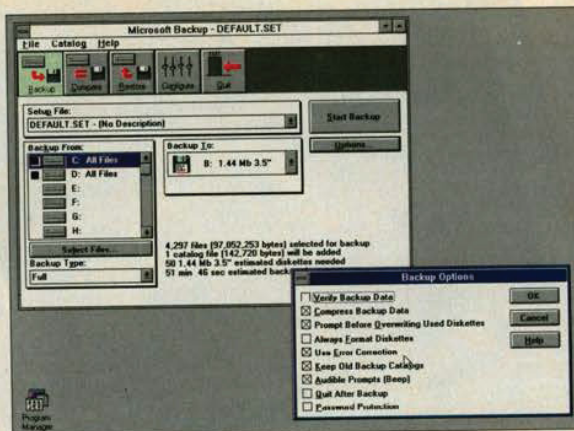
Photograph by Chris Gould

loads the compression driver. Until this driver is loaded, files stored on compressed drives are not visible, so the ordering of CONFIG.SYS commands is crucial. DoubleSpace eliminates this problem because compressed drives are "mounted" before CONFIG.SYS processing begins. You can even store CONFIG.SYS itself on a compressed drive or boot from a system-formatted floppy disk and still access compressed drives.

DoubleSpace typically delivers a compression ratio on the order of 1.8:1. It works on floppy disks as well as hard disks and offers you the choice of either compressing the existing files on a disk or leaving existing files alone and using only the free space on a disk for a compressed volume. DoubleSpace volumes are compatible with Windows and DOS utilities such as SmartDrive, CHKDSK, and Defrag, as well as third-party utilities, so you need not handle a compressed drive with kid gloves. DoubleSpace itself may be run from the command line or from an interactive, menu-driven control panel. For Stacker users, Microsoft makes a Stacker-to-DoubleSpace converter available. Significantly, compression and conversion are fully restartable processes, so you don't have to worry about losing everything on your hard disk in the event of an untimely power outage.

Are there any downsides to DoubleSpace? Only two. It increases the number of drive letters; compress the C: drive and you'll end up with two drive letters: one for the compressed drive and one for the uncompressed host drive. Also, the process of restoring a compressed drive back to uncompressed form is difficult.

**Our Contributors:** RICK AYRE is a technical director at PC Magazine Labs. CHRISTOPHER BARR is a senior editor (West Coast) of *PC Magazine*. BEN Z. GOTTESMAN is a project leader for the software team at PC Magazine Labs. BOB FLANDERS is president and senior systems analyst at NCI Systems in Annandale, Virginia. EDWARD MENDELSON, JEFF PROSISE, and BARRY SIMON are contributing editors of *PC Magazine*.



**DOS 6 includes DOS and Windows versions of Microsoft's Backup, Anti-Virus, and Undelete. It can automatically add icons to Program Manager and commands to File Manager.**

#### WHAT'S NEW IN MEMORY MANAGEMENT

The big news in memory management is MemMaker, which automatically configures 386 and 486 PCs to load TSRs and device drivers into upper memory. It analyzes your configuration and adds the commands to CONFIG.SYS and AUTOEXEC.BAT in order to create upper memory block (UMB) RAM and move residents of conventional memory up high. Even if you're a memory-management wizard who prefers to do things the

old way, you shouldn't cast MemMaker aside. It will detect some sources of conflict in upper memory that EMM386.EXE will not (such as late-activated adapter RAM buffers). And it considers all the permutations in determining where in upper memory to load TSRs and device drivers. Also, the Loadhigh and Devicehigh commands now accept switches telling them what region of upper memory to load a program or driver into.

EMM386.EXE has undergone major revisions. It now makes more UMB RAM available on most PCs, thanks to a more aggressive search routine. On IBM PS/2s, it maps UMBs over the space in the F000h segment containing ROM BASIC, increasing available UMB RAM even more. About half of EMM386.EXE now goes into upper memory (in DOS 5, all 9K of it went into conventional memory), and EMM386.EXE now acts as a Virtual Control Program Interface (VCPI) server at all times, allowing DOS-extended programs such as AutoCAD to run in a V86-mode environment even if EMM386.EXE was started with a NOEMS (no expanded or extended

#### HIGHLIGHTS

### DOS 6

**ON-THE-FLY COMPRESSION** is built into the DOS kernel. Type DBLSPACE and DOS 6 almost doubles the capacity of your hard disk.

**A MEMORY-MANAGEMENT** program called MemMaker automatically frees up conventional memory and writes your AUTOEXEC.BAT and CONFIG.SYS files for you.

**MICROSOFT ANTI-VIRUS** and Backup are built-in menu-driven programs with enough functionality for standalone users. But they won't put third-party utilities out of business.

**WINDOWS** versions of Backup, Anti-Virus, and Undelete are included.

**NEW START-UP** options enable you to bypass lockups by hitting F5 to clean boot your system. You can also step through CONFIG.SYS line by line or choose from a selection of configurations.

**TWO LAPTOP TREATS:** One program connects two PCs so you can transfer files; another conserves battery life on Advanced Power Management-compliant laptops.

**A LAWSUIT** was filed in late January against Microsoft by Stac Electronics, which alleges Microsoft's DoubleSpace uses technology patented by Stac. The complaint asks for a jury trial and monetary damages.

memory) switch. But perhaps the greatest improvement to EMM386.EXE is its ability to allocate expanded and extended memory from a shared pool, so you no longer have to choose between them at start-up.

The output from the Mem command has been changed to improve readability. Mem also supports two new switches: /F, which lists free space, and /M, which lists memory blocks that belong to a specified program.

#### NEW START-UP OPTIONS

Users who routinely edit their AUTOEXEC.BAT and CONFIG.SYS files to boot custom configurations for certain programs will appreciate DOS 6's multiple configuration options, which let you define a start-up menu in CONFIG.SYS and then choose the desired configuration each time you boot up. Menus can be customized by varying the screen colors and specifying default menu options and time-out values. You can even organize complex menus into hierarchical menus and submenus.

Two new start-up options will come in handy when a statement in CONFIG.SYS or AUTOEXEC.BAT causes lockups. Pressing F5 when DOS's start-up screen is displayed initiates a clean boot, which bypasses CONFIG.SYS and AUTOEXEC.BAT. Pressing F8 starts an interactive boot, which processes CONFIG.SYS line by line and lets you execute or skip each statement.

The new Choice command lets you write batch files that act on user input. You specify the valid input keys and Choice returns an ERRORLEVEL code that reflects the key that was pressed. You may also spice up CONFIG.SYS commands with a question mark to the left of the equal sign, so DOS will ask you if you want to execute a command.

#### BRIDGING THE DOS/WINDOWS GAP

DOS 6 comes with three new utilities that ship in both DOS and Windows versions: Microsoft Backup (a subset of The Norton Backup), Microsoft Anti-Virus (a subset of Central Point Anti-Virus), and Microsoft Undelete. Microsoft Backup is

### FEATURES PLUS

Join PC Magazine editors and Microsoft product executives in ZiffNet's Executives Online Forum for a discussion of DOS 6, from March 31 to April 4, 1993. You can follow the action by typing GO ZNT.EXEC at any CompuServe ! prompt.

an interactive, full-screen backup and restore program. It doesn't support tape drives or high-speed direct memory access (DMA) data transfers, but it does compress data to reduce the number of floppy disks required. Microsoft Anti-Virus provides active and passive protection against hundreds of known (and unknown) viruses, while Microsoft Undelete provides three levels of delete protection, DOS 5 has only two. The new option is *senry undelete*, which copies deleted files to a hidden directory. These files can be undeleted without restriction, if they haven't been purged to make room for other files. The setup program adds commands invoking these programs to File Manager's menus.

DOS 6 also comes with an enhanced SmartDrive similar to the one introduced with Windows 3.1. SmartDrive now caches floppy disks as well as hard disks, performs write caching as well as read caching, and offers a double-buffering option so it can be safely loaded high on systems with non-VDS (Virtual DMA Services) hard disk controllers that perform bus mastering. And to keep your disk running smoothly, DOS 6 comes with Defrag, a scaled-down version of The Norton Utilities' Speed Disk.

Other new and improved commands

in DOS 6 include Move, which moves files and renames subdirectories; Del-tree, which removes subdirectories, even if they contain files and other subdirectories; Numlock, which toggles NumLock on or off from CONFIG.SYS; and Microsoft Diagnostics (MSD), a system information utility similar to diagnostic products such as Quarterdeck's Manifest. The DIR command has been enhanced with a /C switch to display compression ratios for files stored on DoubleSpace drives. The Help command brings up a help system documenting every DOS command, replacing the documentation.

DOS 6 contains a pair of treats for laptop users. First, there's Interlink, which lets you cable two PCs together by serial or parallel port and access disk and printer resources of one from the console of the other. Second, there's a driver named POWER.EXE that enacts Advanced Power Management (APM) on laptops that support it. Microsoft claims that the driver can extend battery life by 25 percent on APM-compliant laptops and by 5 percent on non-APM models.

Shortly before Microsoft was to ship DOS 6, it decided to drop the network component known as Workgroup Connection and sell it separately for \$39.95. Microsoft reports that the component confused users; some thought they couldn't connect to a network without it. Others thought it promised a full DOS-based peer-to-peer networking system. In fact, it provides only a client connection to Windows for Workgroups, Windows NT, and LAN Manager networks.

### FACT FILE


#### MS-DOS 6.0 Upgrade Kit

Microsoft Corp., One Microsoft Way,  
Redmond, WA 98052; 800-426-9400,  
206-882-8080; fax, 206-936-7329

**List price:** Retail upgrade, \$129.95 (\$49.99 until May 31). Network license paks: 3-user, \$319.95; 20-user, \$2,080; 100-user, \$9,095.

**Requires:** 640K RAM, 5MB free hard disk space, (6.5MB for Windows users).

**In short:** DOS 6 can double your hard disk's capacity, automatically configure memory, protect against viruses, manage file backup, and more. Power users, however, will still turn to third-party utilities for advanced features.

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#### THE LAST STAND?

DOS 6 packs in so many bells and whistles that you may be left wondering where Microsoft could possibly go with version 7. An obvious course would be to build in a DOS Protected Mode Interface (DPMI) super server similar to the one in Windows, enabling specially written applications to access more than 1MB of memory. Other options include adding a Virtual 86-mode multitasker and task switcher so that "old" DOS applications could run concurrently, and adding support for installable file systems. But the computing world would be better served by a true 32-bit protected-mode operating system built for the 1990s than it

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would be by more band-aids and fixes to a 1970s-era system designed to run in real mode. Unofficial indications are that DOS 7 may contain elements of the Win32 kernel—without, of course, the graphical user interface.

Is this DOS's last stand? Don't bet on it. DOS currently runs on many tens of millions of PCs around the world, quietly getting the job done day in and day out. Even if Microsoft stopped supporting it tomorrow, DOS would be around for years to come. DOS 6 is just one more reason to stick with an old friend—and wait to see what future releases may hold.

## Hard Disk Compression

BY CHRISTOPHER BARR

Of all the new utilities included in DOS 6, DoubleSpace, the real-time disk compression utility that stores data in about half the previously needed space, has the most far-reaching implications. Those who were reluctant to use the compression in third-party products like Stacker and SuperStor PRO will appreciate the comfort factor of an operating system-resident disk compressor.

Actually, it's been safe for years. Stac Electronics' Stacker (800-522-7822) and AddStor's SuperStor PRO (800-732-3133) have been compressing disks safely for years now, and SuperStor PRO has been bundled with Novell's DR DOS 6.0 for more than a year.

So how different is Microsoft's disk compression from Stacker and SuperStor PRO? Not much, technically. And if you use Stacker or SuperStor PRO, you can continue to use them under DOS 6. But Microsoft has added a few compelling twists.

When you first type DBLSPACE at the DOS prompt, the software creates a hidden file, called a compressed volume file (CVF), on your hard disk. A device driver tricks the operating system into thinking that the file is a disk drive and gives it a new drive letter, D: for instance. The compression engine then intercepts the data headed for the CVF

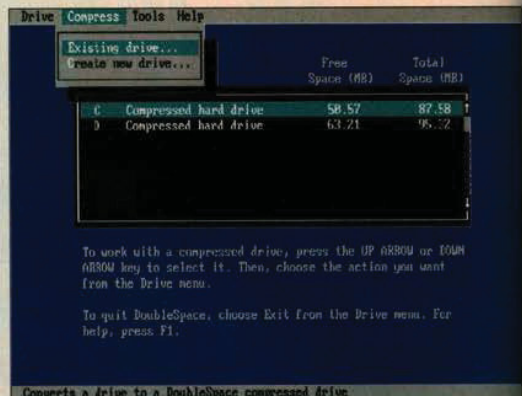
and compresses it before it's written to the disk, or uncompresses the data as it's read from the CVF.

Stacker and SuperStor PRO load their drivers through CONFIG.SYS and then swap the drives, renaming drive C: as drive D:, and vice versa. Dual copies of CONFIG.SYS and AUTOEXEC.BAT are kept on both drives.

Using technology licensed from Vertisoft Systems (and previously used in Vertisoft's DoubleDisk compression product), Microsoft has put disk compression into the DOS kernel. The DoubleSpace device driver is loaded when you boot up by IO.SYS instead of by CONFIG.SYS, giving DoubleSpace an advantage over the others because it swaps drives before CONFIG.SYS is processed.

Since the operating system knows where the compressed files are stored, it doesn't have to synchronize any changes made to your AUTOEXEC.BAT and CONFIG.SYS files as it does with Stacker or SuperStor PRO. You can type DIR/C within a compressed volume to display the file compression ratio.

As far as reliability goes, Microsoft appears to have made DoubleSpace



From this DoubleSpace menu, you can create, resize, format, and defragment compressed drives.

solid. Many of the traditional problems that plague compression users—such as when the loss of a line in your CONFIG.SYS file or of a driver from your hard disk means that you can no longer access the compressed drive—aren't there in DoubleSpace, because it is so tightly integrated into the DOS kernel. This also makes it easier for installation programs to find and modify CONFIG.SYS.

### THREE ROADS TO COMPRESSION

DoubleSpace, Stacker, and SuperStor PRO are more alike than different. All three use a variation of the Lempel-Ziv compression algorithm. Microsoft calls

## FEATURES COMPARISON

### Compression Utilities

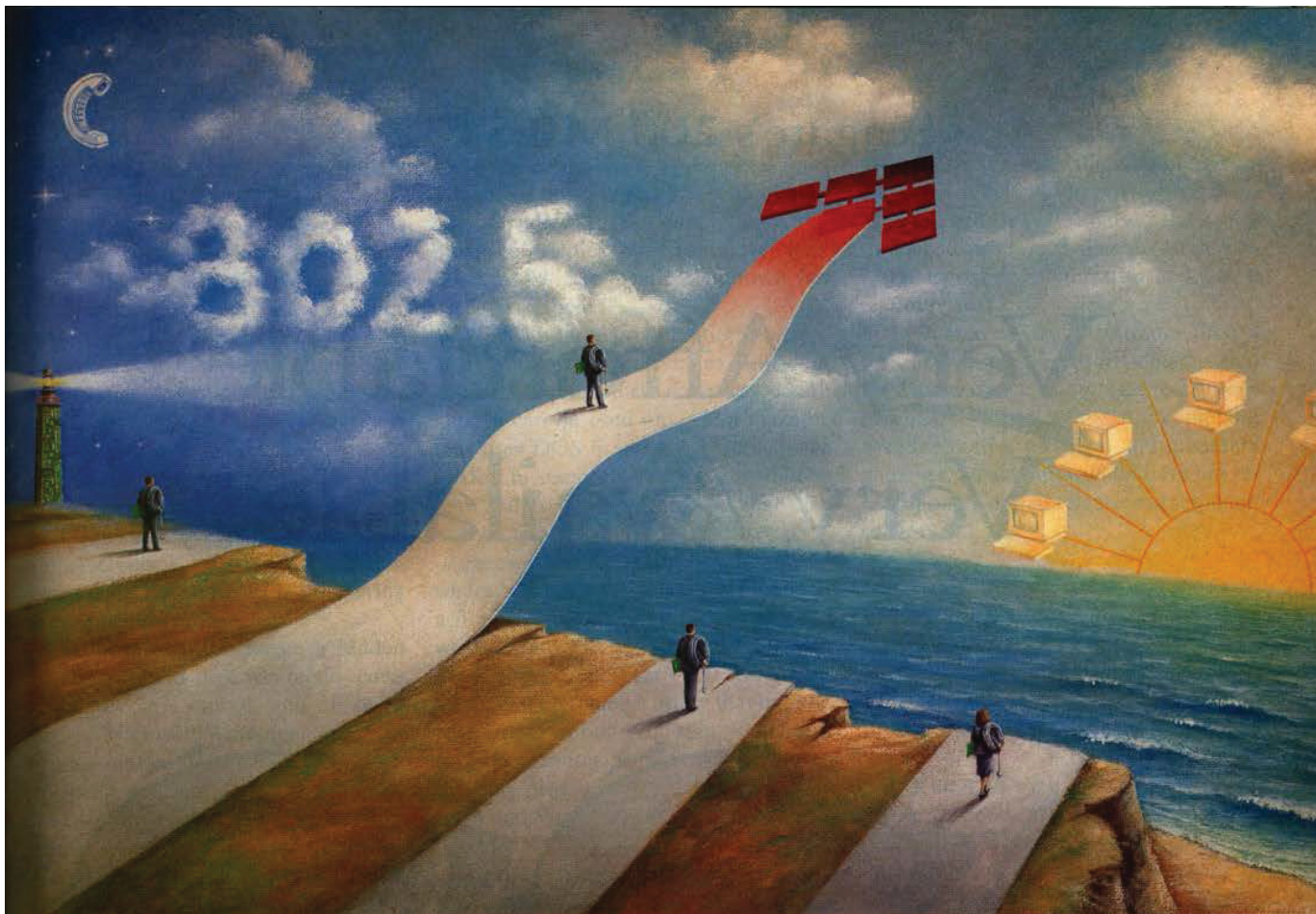
Each of these utilities supports several media types: Bernoulli Boxes, floppy disks, RAM disks, RLL hard disks, and SCSI hard disks. Each also includes defragger, diagnostic, and management utilities. None currently supports Windows NT or OS/2 2.0, although the next version of Stacker will support OS/2 2.0.

Products listed in alphabetical order

■ = YES   □ = NO

	DOS 6	Stacker, Version 3.0	SuperStor PRO
List price	\$49.99 till 5/31, then \$129.95	\$149.00	\$149.95
Compression algorithm	MRCF	Stacker LZS	Lempel-Ziv
Converts to another compression format	■	□	□
Hardware compression available	□	■	□
Automated uninstall routine	□	■	■
Optimizer	□	■	■
Size of device driver	43K	41K	41K
User can load driver high	■	■	■
Mounts a floppy disk drive under Windows	□	□	■
Maximum number of compressed drives	23	10	8
Size of largest drive	512MB	2GB	512MB





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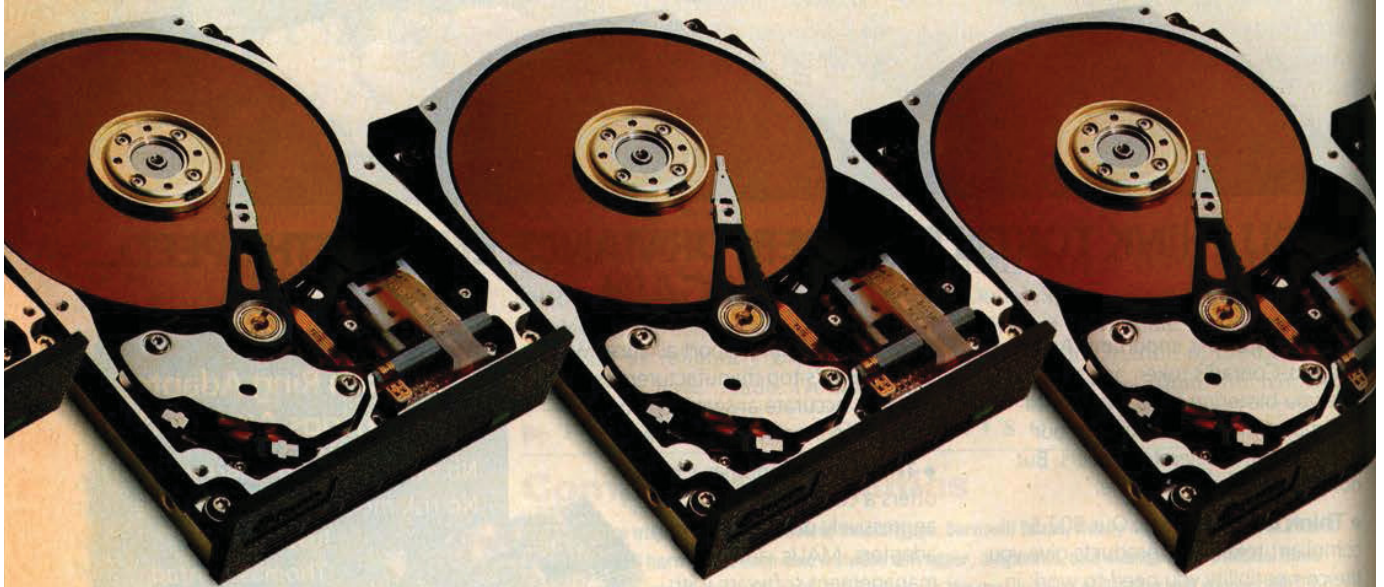
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COVER STORY  
DOS 6

its version the Microsoft Real-time Compression Format (MRCF), while Stac calls its version Stacker LZS and AddStor economically calls its version Lempel-Ziv. The algorithm searches a file for repetitive data and replaces it with a token that represents the contents. The resulting file can then be stored in about half the space required by the uncompressed file.

The Lempel-Ziv algorithm works on the fly, meaning that it compresses a file when you write data to disk, and decompresses data when you read from the disk. Lempel-Ziv is a "lossless" algorithm, which means that no data is lost during the compression process.

All three programs create a hidden file on your hard disk where the compressed files are stored, and all three place the Microsoft Windows permanent swap file into an uncompressed volume. The speed at which the files are compressed and the approximate 2:1 compression ratio are comparable among the three programs. Since we worked with a prerelease copy of DOS 6, we haven't reported actual compression test results here. They will appear in an upcoming issue.

All three programs come with utilities that defragment and manage a compressed volume, but there are some real differences among the programs. And all except DOS 6 are able to optimize compression. DoubleSpace and SuperStor PRO can compress only 256MB of data at a time, giving you 512MB of uncompressed data. Stacker can compress a 1GB drive, providing 2GB of uncompressed data.

The greatest weakness of DoubleSpace is that it does not have an automated uninstall feature as do Stacker and SuperStor PRO. To uninstall it, you must back up the data that is stored on the compressed drive, delete the drive, and restore the data to an uncompressed drive. Microsoft also makes available a feature that allows users to convert a Stacker volume to a DoubleSpace volume—a time-consuming process that works at about 10 to 15MB per hour.

The Windows interface is lame in all three products. DOS 6 contains a File Manager dialog box that reports the size and compression ratio of a hard disk that

has been compressed by DoubleSpace. The dialog box will also give a file-by-file compression ratio. But none of the DoubleSpace utilities operate under Windows; you'll have to exit Windows if you wish to run them.

While all three programs let you compress a floppy disk, each takes a different approach. Floppy disks compressed with DOS 6 can be used only on a machine that uses DOS 6 and has DoubleSpace loaded in memory. It's not possible to read the compressed files on that disk with earlier versions of DOS.

Stacker comes with Stacker Anywhere, a program that lets you compress a floppy disk and use it (both read and write) on any PC, even if the PC does not use Stacker. SuperStor PRO has a Universal Data Exchange utility that lets you read from but not write to a floppy disk on any computer. SuperStor PRO is also the only program with a utility for both DOS and Windows so there's no need to drop to DOS to mount the drive.

In the hopes of establishing a compression standard, Microsoft is licensing the MRCI API for free. The Microsoft Real-time Compression Interface API will allow third-party vendors to create software and hardware that work with DoubleSpace. Some of the first utilities are expected from Symantec Corp. and Central Point Software. Eventually, hardware makers will put MRCI into hardware, and we expect to see DoubleSpace-compatible compression boards on the market pretty soon.

Both Stac and AddStor are announcing new products that will address the changing landscape of data compression.

Shortly, Stac will offer an MRCI-compliant product for DOS 6 users that will supplant DoubleSpace. According to Stac, this new product will be safer and faster, and will create tighter compression than what Microsoft is offering in its DOS 6 package. Stac's new compressor will be bundled with a slew of utilities, and, like DoubleSpace, will have the advantage of hooking into the DOS 6 kernel.

AddStor is planning a new MRCI-compliant utility that

works directly with the DoubleSpace-compressed volumes to provide file management and give DOS 6 users the ability to share compressed files across a network, across communication links, and on floppy disks.

In January, Stac Electronics filed a lawsuit against Microsoft alleging that the DoubleSpace utility uses technology patented by Stac. While the complaint asks for both a jury trial and monetary damages, the lawsuit will not have any effect upon the initial release and shipment of DOS 6.

## Memory Management

BY RICK AYRE

While DoubleSpace may be the novelty of DOS 6, MemMaker, a program that automatically optimizes memory on 386 and higher computers, is equally appreciated. DOS 5 made it possible to use memory more efficiently. Now, DOS 6 makes it easy, safe, and automatic.

You probably know that your PC has upper memory—between 640K and 1MB—much of which is unused. DOS 5 comes with a device driver called EMM386.EXE that converts unused space into usable RAM. Using the Devicehigh and Loadhigh commands in CONFIG.SYS or AUTOEXEC.BAT, you can load files, drivers, and programs into upper memory.

Getting the right statement and syntax

Microsoft MemMaker

MemMaker has finished optimizing your system's memory. The following table summarizes the memory use (in bytes) on your system:

Memory Type	Before MemMaker	After MemMaker	Change
Free conventional memory:	588,112	630,816	42,704
Upper memory:			
Used by programs	0	59,184	59,184
Reserved for Windows	0	0	0
Reserved for EMS	0	0	0
Free	142,304	83,232	
Expanded memory:	Disabled	Disabled	

Your original CONFIG.SYS and AUTOEXEC.BAT files have been saved as CONFIG.UMB and AUTOEXEC.UMB. If MemMaker changed your Windows SYSTEM.INI file, the original file was saved as SYSTEM.UMB.

ENTER=Exit ESC=Undo changes

Type MEMMAKER at the DOS prompt and see immediate gains in the amount of memory available for applications.

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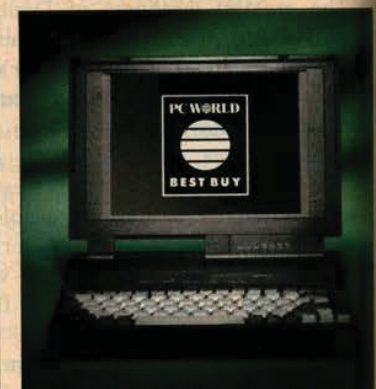
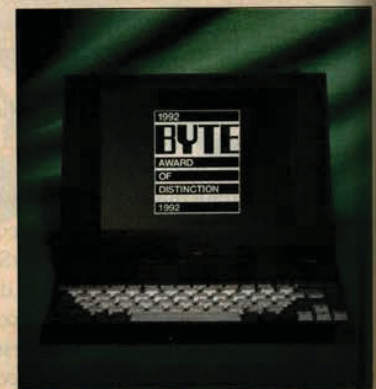
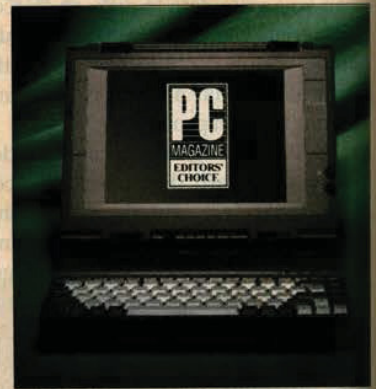
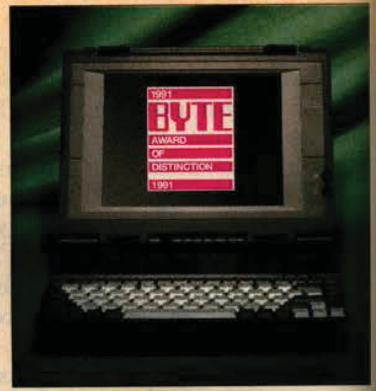
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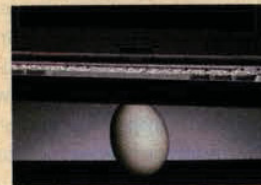
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at the right place at the right time is regarded by many normal people as PC voodoo. MemMaker automates optimization. Even before you start MemMaker, DOS 6 works your system's memory into shape. The improved EMM386.EXE conducts a search for free upper memory, and converts as much as 200K into usable RAM, as opposed to the 128K that DOS 5 recovers. And DOS 6 dynamically allocates expanded (EMS) and extended (XMS) memory from a shared pool, making it unnecessary to specify EMS memory needs at boot-up.

#### REAL MEMORY GAINS

To really see improvements in memory management, just type MEMMAKER at the DOS prompt. MemMaker seeks out unused upper memory, checks to see what you have loaded in CONFIG.SYS and AUTOEXEC.BAT, and then tries to load devices and programs into upper memory.

You can run MemMaker in batch mode, which requires no user intervention, Express mode, which requires little user intervention, or Custom mode, which offers advanced options. You can specify which drivers and programs to include in optimizations, determine how aggressively to scan upper memory, choose to use the monochrome region to run programs, and specify how to optimize upper memory for Windows. You can also choose whether or not to keep your EMM386's current exclude and include regions, and whether or not to move the Extended BIOS Data Area from conventional to upper memory.

MemMaker understands that upper memory is freed in blocks, so it uses block control to load programs into specific regions. It's also compression-aware, so it works with third-party compression products such as Stacker and SuperStor. It's also aware of programs such as SmartDrive that load themselves into upper memory automatically.

Finally, MemMaker is safe. It's designed so that no matter what kind of problem you encounter during optimization, the computer can recover without the need for specially-prepared boot-up disks. In fact, its recovery routines are among the cleanest we've encountered, and its undo feature is the best, bar none.

## ■ Twelve Tips to Get the Most Out of DOS 6

by Jeff Prosize

Once you've got DOS 6 up and running on your PC, you may wonder what you can do to make the best use of it. Some of the answers are obvious: Expand your disk space with DoubleSpace, protect yourself from viruses with the new antivirus utilities, and so on. But other solutions are not so obvious. Here are twelve tips to help you use DOS 6 to the fullest.

**Tip 1. Don't edit your start-up files to move TSRs and device drivers into upper memory; let MemMaker do it for you.** In DOS 5, converting CONFIG.SYS and AUTOEXEC.BAT to load TSRs and device drivers high was a chore for all but the most sophisticated users. In DOS 6, MemMaker will make all the necessary changes for you, and it will optimize upper memory usage by determining where to load TSRs and device drivers in order to achieve the optimal fit. MemMaker will also detect most adapter RAM conflicts that EMM386.EXE will not. This can help to avert the lockups that a default installation of EMM386.EXE causes on some PCs.

If your PC contains a network card, run MemMaker *after* logging on to the network. This will ensure that the card's RAM buffer is activated and will be recognized by MemMaker.

**Tip 2. Configure EMM386.EXE to provide an extra 24K of upper memory block (UMB) RAM.** DOS 6's EMM386.EXE driver typically creates more upper memory than its counterpart in DOS 5 manages because it scans the E000h segment of upper memory for unused address space. (DOS 5's EMM386.EXE did not.) It does not, however, scan the region from C000h

to C5FFh on most PCs, leaving, potentially, 24K of UMB space unused. Use the Microsoft Diagnostics utility that comes with DOS 6 to see if this region is devoid of ROM and adapter RAM. If it is, add an I=C000-C5FF switch to EMM386.EXE in order to create 24K more UMB RAM.

You can create additional UMB RAM on some systems by starting EMM386.EXE with a Highscan switch. If this locks up your PC, perform a clean boot with the F5 key and remove the Highscan switch. If Highscan works on your PC, MemMaker will supply the additional UMB RAM for you.

**Tip 3. Use the new Deltree command to remove subdirectories that aren't empty. Use the new Move command to move files.** In the past, removing a subdirectory that wasn't empty meant deleting the files in it first. If the subdirectory contained other subdirectories, they had to be emptied and removed too. The new Deltree command removes a subdirectory no matter what else it contains—even other subdirectories. The new Move command provides you with a fast way to move files from one location to another. It will also rename subdirectories—a job that required a foray into the DOS Shell in Version 5.

**Tip 4. Don't throw out DOS 5 just yet!** Although the list of programs, drivers, and utilities that will ship with DOS 6 wasn't finalized at press time, it appeared that DOS 5's Mirror and Recover commands would be dropped. This would be unfortunate; running Mirror with a /PARTN switch is a handy way to back up the partition tables on your hard disk, and Recover—though a potentially dangerous com-

mand—can salvage files that have developed bad sectors. Before you throw out DOS 5, it's probably a good idea to make copies of MIRROR.COM and RECOVER.EXE. Make a copy of the DOS 5's Unformat utility as well, because you'll need its /PARTN switch to restore partition tables backed up with Mirror. Since DOS 6 contains its own Unformat command (without the /PARTN switch), give the old one a new name, such as UNMIRROR.COM.

**Tip 5. Use COMMAND.COM's new /K switch to customize Windows.** COMMAND.COM now supports a /K switch, which executes a program and then proceeds to the command prompt. This is a great way to customize the DOS prompt in Windows. In the program information file that loads COMMAND.COM, use a /K switch to specify the batch file that you would like executed when a DOS prompt window is opened.

You can also use /K to execute a batch file other than AUTOEXEC.BAT at start-up. The command

```
SHELL=C:\DOS\COMMAND.COM
C:\DOS /P /K STARTUP.BAT
```

loads COMMAND.COM and processes STARTUP.BAT instead of AUTOEXEC.BAT. This is a great way to protect your start-up batch file from intrusive installation programs. It could, however, cause problems for installation programs that assume the file is named AUTOEXEC.BAT.

**Tip 6. Conserve RAM by moving DoubleSpace to upper memory.**

DOS 6's DoubleSpace driver DBLSPACE.BIN requires more than 40K of RAM. If you have sufficient UMB space available, you can move DBLSPACE.BIN to upper memory by adding the command

```
DEVICEHIGH=C:\DOS\
DBLSPACE.SYS /MOVE
```

to your CONFIG.SYS file. Note that

without this command, DBLSPACE.BIN remains in conventional memory, robbing your application programs of much needed RAM.

**Tip 7. Keep your hard disk running smoothly by running Defrag regularly.**

Over time, the files on a hard disk become fragmented, which can severely impede file system performance. (*Fragmented* means files are no longer stored in contiguous clusters on a disk, which results in more movement of the drive heads when a file is read or written.) Run DOS 6's Defrag utility regularly—every two months or so—and your hard disk will continue to run as fast as it did the day you brought it home.

**Tip 8. If Defrag runs out of memory, give it more with EMM386.EXE.**

If your hard disk contains many fragmented files, Defrag may quit with an "out of memory" error. If this happens, and you're running Defrag on a 386- or 486-based PC with a color video adapter, try loading EMM386.EXE with the statement

```
DEVICE=C:\DOS\EMM386.EXE I=A000-B7FF
```

and run Defrag again. Configured this way, EMM386.EXE can increase the largest executable program size to more than 700K. If your 386 or 486 has a monochrome video adapter, use I=A000-AFFF instead of I=A000-B7FF. Do not start a program that runs in graphics mode when EMM386.EXE is configured this way. Note that this technique will not work if your PC contains an extended Basic Input/Output System (BIOS) data area.

**Tip 9. Turn NumLock off with the new Numlock command.**

Ever since IBM made NumLock ON the default when it introduced the PS/2s in 1987, utilities that toggle NumLock OFF at start-up have been in high demand. In DOS 6, you can turn NumLock off by inserting a NUMLOCK=OFF command in your CONFIG.SYS file. The NUMLOCK=ON command turns it on.

**Tip 10. Use information in MEMMAKER.STS to fit more programs in upper memory.** MemMaker determines what regions of upper memory in which to load TSRs and device drivers in order to achieve the best fit. But it never alters the order in which they are loaded. If UMB space is tight, you may be able to cram more into upper memory by varying the load order. The trick lies in determining the best load order.

Here's how to do it. After running MemMaker, look at the MEMMAKER.STS file in the DOS directory. For each TSR or device driver that it loads, MemMaker records the installed size (FinalSize) and the maximum size (MaxSize). For the best fit, load programs with the largest differences between FinalSize and MaxSize first. For example, if your mouse driver has an installed size of 17K and a maximum size of 58K, load it before a TSR with a MaxSize equal to or only slightly greater than its FinalSize.

**Tip 11. Use POWER.EXE to conserve battery power on laptops.**

If your laptop supports Microsoft's Advanced Power Management (APM) specification, loading DOS 6's POWER.EXE device driver can extend battery life by as much as 25 percent. Even if your laptop doesn't support APM, POWER.EXE can extend a charge by as much as 5 percent.

**Tip 12. Store DOS in a subdirectory named DOS or MSDOS.**

It has always been a good idea to store DOS in a DOS subdirectory, but now there is a compelling reason to do so. If your AUTOEXEC.BAT file doesn't set the Prompt and Path environment variables (or if you perform a clean boot with the F5 key), DOS will automatically set PROMPT equal to \$P\$G and PATH equal to C:\DOS or C:\MSDOS. However, it will set these variables only if DOS is stored in a subdirectory named either DOS or MSDOS. You should be aware that other subdirectories are not searched. □

## ► FEATURES COMPARISON

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Automatically loads programs and drivers in UMBS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Allocates memory to EMS/XMS as needed	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Reclaims UMBS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Allows clean boot	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Instances DOS TSRs under Windows	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Reports TSR initialization size	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (not automatically)	<input checked="" type="checkbox"/>
Uses EMS page frame for initialization	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Undo command	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Acts as DPMI server	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

But DOS 6 does not blaze a new trail into the memory-management jungle. For years, other programs have been doing most of what MemMaker does. When it comes to automatic optimization, Helix Software's Netroom (800-451-0551), Qualitas's 386MAX (800-733-1377), and Quarterdeck Office Systems' QEMM-

386 (800-354-3222) play tricks that MemMaker isn't bold enough to attempt.

In designing MemMaker, Microsoft was safe rather than daring. You won't find the equivalent of 386MAX's ROM-Search, Netroom's NETSWAP, or QEMM's Stealth. And MemMaker does not offer any special techniques for opti-

mizing specific computers—as Qualitas's BlueMax does with PS/2s. With vendors hoping to outdo MemMaker altogether, you can expect to see some ambitious third-party upgrades. NetRoom 3.0, for instance, uses “cloaking” technology to stash its own customized PC BIOS and video BIOS in extended memory. (For

**Coming Attractions: Novell's DOS**

by Christopher Barr

When Digital Research was purchased by Novell in 1991, Microsoft's critics felt the MS-DOS stranglehold over operating systems would end. In their minds, what better home for DR DOS than Novell, a company that had tenaciously held its market share in network operating systems against Microsoft's Napoleonic advance? When no DOS was forthcoming, some derided Novell for squandering a treasure.

But DR DOS was only in suspended animation, and it's about to be revived with a new name and a slew of new features. As a part of Novell's Desktop Systems Group (DSG), along with NetWare Lite and NetWare for the Macintosh, DR DOS will be revised and shipped this fall with the name Novell DOS or NetWare DOS. It will be closely linked to NetWare and will include a number of technological im-

provements that should set high-water marks for innovation.

The most important new feature will be the universal NetWare client. This will let Novell's DOS connect to other versions of NetWare, including versions 2.x and 3.x and the upcoming Version 4.x. Novell's DOS will also provide peer-to-peer networking under DOS, operating in conjunction with a forthcoming version of NetWare called Personal NetWare.

The real gem in this new version's jewelry box of utilities may be the ability to multitask multiple DOS applications. While Quarterdeck Office Systems' DESQview has made that possible for a number of years, the feature had never been built into any version of DOS until now. The kicker is that Novell is releasing a new applications programming interface (API) called the DOS Protected Mode Ser-

vices (DPMS) API, which will let third-party developers write DOS applications that can be loaded and run in extended memory.

Though Novell's DOS will still include disk compression licensed from AddStor (makers of the SuperStor disk-compression product included in DR DOS, Version 6), its disk-caching software is newly purchased from Golden Bow Systems. Both utilities will be DPMS-aware, which means they can be loaded into extended memory, leaving a much larger amount of conventional memory free.

Novell's strategy is to provide all its customers with every operating system they may require. Given Novell's strong position in networking with NetWare, its recent purchase of Unix from AT&T, and the resurrection of DR DOS, the company seems to have all bets covered. □



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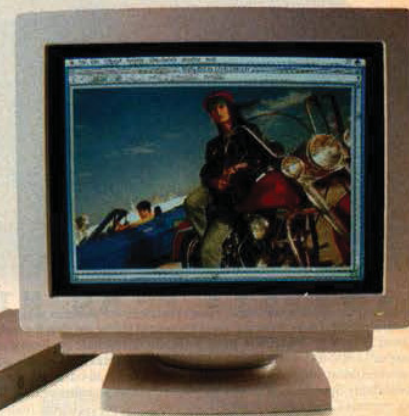
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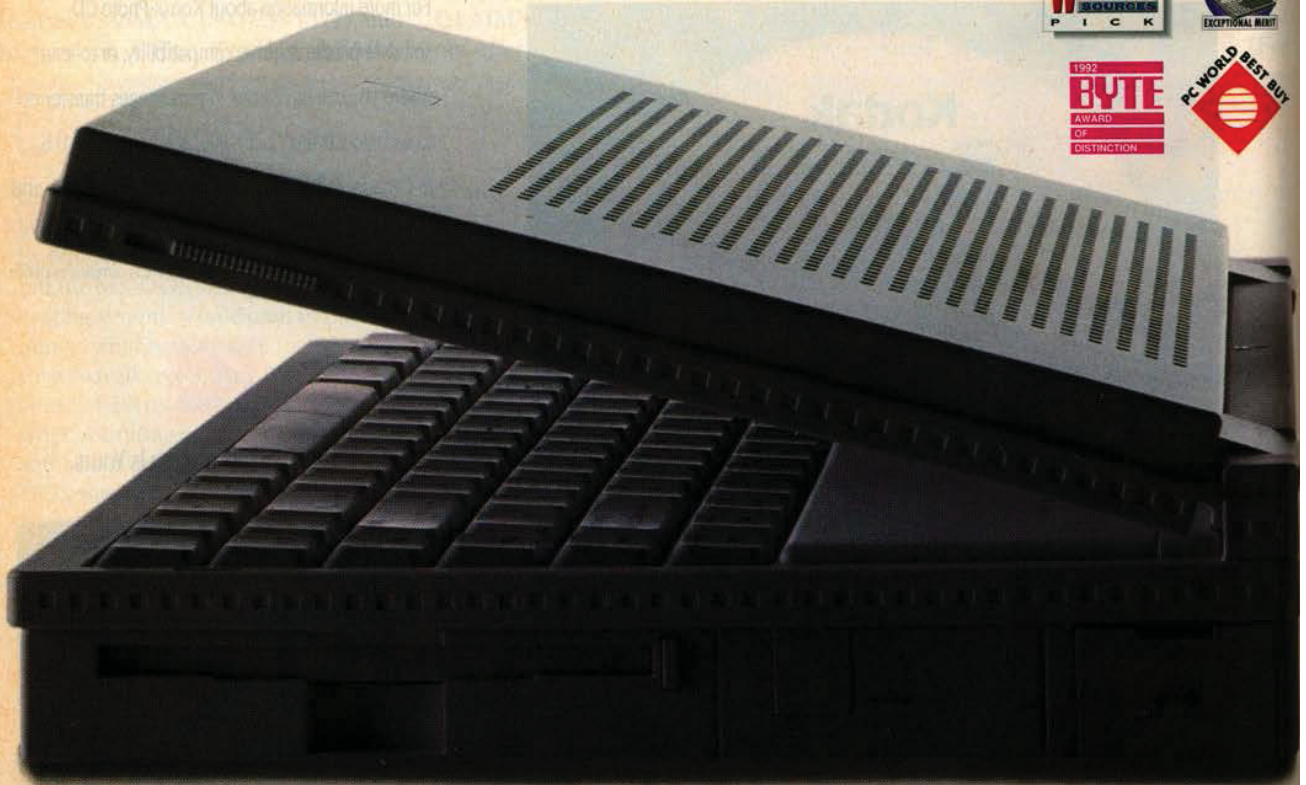


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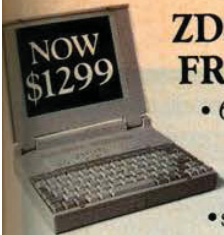


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more information, see this issue's Pipeline.) On many machines, though, MemMaker has more than enough technology to free up conventional memory.

# Backup

BY EDWARD MENDELSON

If you back up your files to floppy disks or to a network server, DOS 6 itself may be the only backup program that you will ever need. While it will eliminate any excuse for neglecting the regular backups that your data deserves, the power user may still want a third-party backup program that offers greater speed and flexibility.

Previous versions of DOS came with a command-line backup program whose arcane syntax, leaden performance, and restricted options seemed to be designed to discourage you from preserving your files.

The new DOS comes with two sleek menu-driven backup programs named

Backup for MS-DOS and Backup for Windows. Both make complex backup strategies straightforward and simple, and include error correction that lets you restore files from floppy disks that suffered damage after you used them for backups.

Both the DOS and Windows versions offer identical functions, and each can restore or verify backups made by the other. Both programs use file compression to reduce the time and number of disks needed for a backup. They let you select some or all files from one or more drives for your backups, and they let you restrict your selections by file dates. You can exclude all read-only, hidden, and system files, and you can tell the program to ignore any copy-protected files that you specify by name. Any selection of file specifications and other options can be saved in a default setup file, or in named setup files that you select from a menu



Finally, DOS has a backup program worthy of its name—menu-driven for full, incremental, and differential backups.

or from the command line.

DOS 6's backup programs allow three types of backups. The most familiar is a "full backup," which saves all the files that you select. (These files need not comprise a full disk; a "full" backup refers to the "full" set of files that you select for preservation.) Second is an "incremental backup," which saves only those files that have been changed since the

## FEATURES COMPARISON

### Backup Utilities

Products listed in alphabetical order

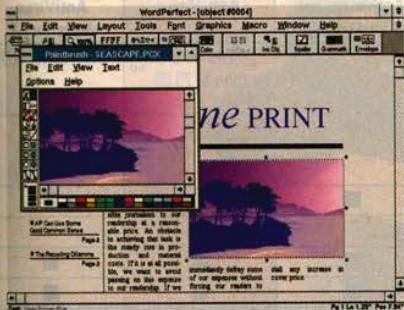
■ = YES □ = NO

	Central Point Backup	DOS 5	DOS 6	Fastback Plus	The Norton Backup
List price	\$129.00	\$99.95	\$49.99 till 5/31, then \$129.95	\$149.00	\$149.00
<b>Types of Backups Performed</b>					
Differential backups (files modified since last full backup)	■	□	■	■	■
Incremental backups can be added to disk with previous backup	■	■	□	■	■
Can back up files over or under specified size	□	□	□	■	□
Tape backups	■	□	□	■	■
Backs up NetWare file attributes	■ (version included in PC Tools only)	□	□	■	■
<b>Restore Features</b>					
Prompts user before overwriting newer file	■	■	■	■	■
Restores to different drive/directory	■	■ □	■	■	■
Restores files from DOS command line	■	■	□	□	■
Saves multiple user configurations	■	□	■	■	■
<b>Additional Features</b>					
Can resume interrupted backup	■	□	□	■	■
Windows version available	■ (\$129)	□	■ (included)	■ (\$149)	■ (\$149)
Estimates time and number of disks required	■	□	■	■	■
Offers password protection	■	□	■	■	■
Schedules automatic backups	■	□	□	■	■
Uses data compression	■	□	■	■	■
Uses macros	■ (version included in PC Tools only)	□	□	■	■

# WE INTERRUPT THE MOST SUCCESSFUL PRODUCT LAUNCH IN WINDOWS HISTORY FOR AN IMPORTANT NEW DEVELOPMENT.

Introducing WordPerfect® 5.2 for Windows.  
A better, easier, more powerful version of the original.

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text and graphics, for example) and advanced capabilities (it's mail-enabled, allows easy creation of envelopes and bulleted lists, and supports DDE and OLE).

Now, one year and 2.1 million copies later, there's a new release.

WordPerfect 5.2 is more powerful, with advanced features (zoom edit

and drag-and-drop

text and graphics, for example)

and advanced capabilities (it's mail-enabled, allows easy creation of envelopes and bulleted lists, and supports DDE and OLE).



It's also easier to use, with a souped up spellchecker, Grammatik™ 5 (the industry's best-selling grammar tool), Adobe Type Manager™ and 12 new fonts.

And it includes innovations you'll find nowhere else: QuickFinder, a versatile indexing and text retrieval system, and QuickMenu, a one-click shortcut to customized Button Bars™.

But we haven't changed what's made WordPerfect the sales leader. Release 5.2 is still compatible with WordPerfect 5.1 for DOS and Windows. And it's still backed by the best toll-free support in the business. Call (800) 526-2310 to order a free demo disk.



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# WordPerfect®

most recent backup, plus any added files that fit your original selection criteria for the full backup. Third is a "differential backup," which differs from an incremental backup by saving all files changed or added since the last full backup, even if they were previously backed up in incremental backups.

Once you've backed up your files, you can ask the program to compare files or restore them. Because a series of incremental and differential backups can include multiple versions of a file, you can select from a menu of different versions for comparing and restoring.

All of these features still may not satisfy you. Compared with the big three of third-party backup software—Central Point Software's Central Point Backup (800-445-4208), Fifth Generation Systems' Fastback Plus (800-766-7283), and Symantec Corp.'s The Norton Backup (800-441-7234)—Microsoft Backup, which is a subset of The Norton Backup, works relatively slowly and has no support for tape drives.

These third-party programs also use high-speed direct memory access (DMA) to the floppy disk controller, which allows them to back up files two to three times as fast as DOS 6, which lacks this high-speed floppy disk support.

If you have more than a few megabytes of hard disk to back up, you'll probably find floppy-disk backup intolerable. DOS 6's backup, like the third-party programs, lets you back up to a network server or any other device that you can identify with a drive letter. But DOS 6's program won't help if you want to back up to tape. Most tape drives come with their own software, but many users prefer the up-to-date interface provided by third-party utilities.

Unlike DOS 6, the third-party programs can back up Novell's network attributes, and come with schedulers that let you do unattended backups. You can protect DOS 6's backups with passwords that have to be entered before you can restore, but the protection is so weak that the password can be found on the floppy disks. In contrast, third-party programs let you encrypt your backups for even greater security.

If you don't have too many files to

preserve, DOS 6 will give you quite enough backup security. However, any of the major third-party packages will get the more demanding backup job done quickly and reliably. Since Microsoft Backup looks almost exactly like *PC Magazine's* most recent Editors' Choice backup package, The Norton Backup, the transition from DOS 6 to Norton may be easiest.

## Antivirus

BY BEN Z. GOTTESMAN

The inclusion of Microsoft Anti-Virus (MSAV) with DOS 6 is a serious blow to the standalone antivirus software market. While not as full-featured as two of our past Editors' Choice programs, Central Point Anti-Virus, Version 1.4 (upon which MSAV is based), or The Norton AntiVirus, Version 2.1, MSAV provides a sufficient amount of protection for most users. Microsoft's package, however, lacks some of the features that are best appreciated by network administrators who are the ones responsible for main-

taining a virus-free workplace.

Microsoft has included both DOS and Windows versions of MSAV, which scans for and removes viruses from your system. In addition, there is a TSR, VSAFE.COM, which provides ongoing protection against the introduction of viruses into your system. The TSR uses between 7K and 44K of conventional memory, depending on the availability of extended and expanded memory.

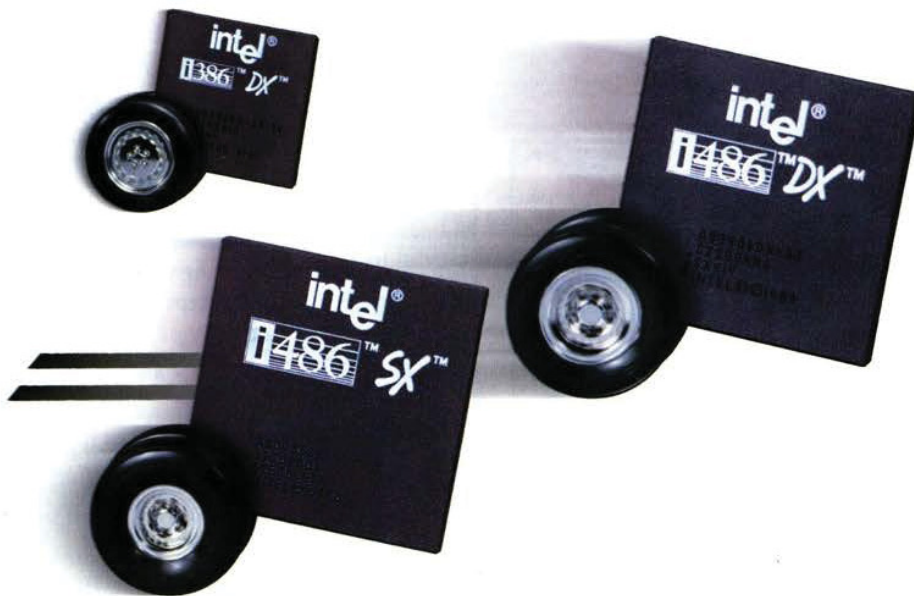
Both the DOS and Windows interfaces are clean and easy to use. If you are already familiar with Central Point Anti-Virus for DOS and Windows, you'll be immediately familiar with the MSAV interface. To check your system, simply select the drive you wish to scan and choose Detect (or Detect and Clean to remove viruses without pausing). The program will then look within each executable file for any of the 1,000 virus signatures in its database. And you can use integrity checking that will detect any change to a file, a common method of protection against unknown viruses. If the program encounters a virus, it will give you the option to remove it. The program should be able to accurately re-

### ► FEATURES COMPARISON

#### Antivirus Utilities

Products listed in alphabetical order	Central Point Anti-Virus for DOS and Windows	Microsoft Anti-Virus	The Norton AntiVirus, Version 2.1
■ = YES □ = NO			
List price: DOS and Windows versions	\$129.00 each	\$49.99 till 5/31, then \$129.95 for both	\$129.00 for both
Automatically scans at scheduled time	■	□	■ (Windows version only)
Creates emergency disk	■	□	■
Detection:			
Integrity checking	■	■	■
Signature scanning	■	■	■
Prevention:			
Creates boot sector image on hard disk	■	□	□
Available as a device driver	■	□	■
Available as a TSR	■	■	□
RAM requirements	3K-44K	7K-44K	2K-59K
Scans network drives	■	■	■
Alerts administrator to infections	■	□	■
Prevents log-on if device driver or TSR is not loaded	■	□	■
Customized alert messages	■	□	■
Prevents stop scan	■	□	■
Prevents user from modifying options	■	□	■

# At FastMicro, We Wanted to Show How Fast an i486DX2 Was ...

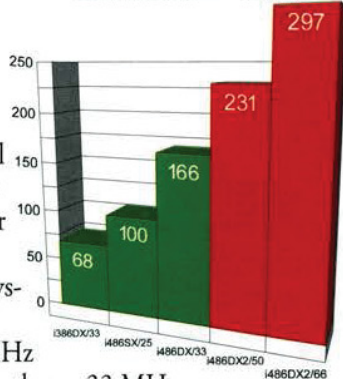


# Double Your Power with FastMicro's 486/Pro2!

**Imagine! 40% to 80% faster than a 33MHz 486DX**

Want the fastest 486 performance? Get a FastMicro 486/Pro2 with an Intel i486DX2. A 50 MHz i486DX2 is 39% faster than a 33 MHz i486DX in the same system, but it costs only \$100 more. The 66MHz i486DX2 is 79% faster than a 33 MHz i486DX! Actual impact on total system performance will vary depending on your type of application.

Microprocessor Performance Intel iCOMP™ Index



How is a DX2 different from a standard DX? It utilizes Intel's speed doubler technology. The PC is divided into two parts: external

functions (outside the 486 microprocessor) and internal functions (inside the 486 microprocessor). The external functions operate at half the i486DX2's speed (33MHz external for a 66MHz i486DX2). The internal functions operate twice as fast. An internal 'bus interface' controls the inter-

nal and external speed differences.

Is the system really much faster if the processor has to wait for the rest of the system? Absolutely, because the central part of the system runs twice as fast as it normally would. It's like if airplanes flew twice as fast. The in-flight portion would take half as long, but you & your bags would still get on and off the plane at the regular rate!



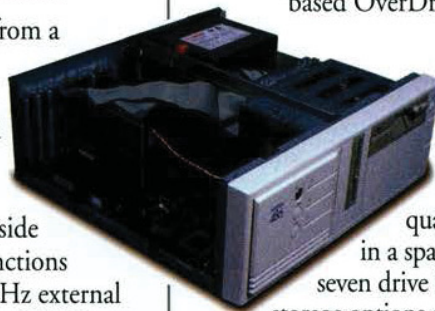
## Upgrade to Pentium Based Overdrive Technology!

Not only do you get a highest performance 486 technology today, but you can upgrade it tomorrow! Put a FastMicro 486/Pro2 system on your desk and when you're ready for even



more power, you can pop in an Intel OverDrive™ processor and boost performance even more! FastMicro makes the upgrade easy with an advanced 238 Pin ZIF (Zero Insertion Force) socket. You just change some system settings then lift the lever and upgrade your processor. Notice the extra row of pins around the i486DX2?

Those are reserved for a future upgrade to Pentium™ based OverDrive™ technology.



## Advanced Case Design

Our desktop case is uniquely engineered to provide the highest quality and maximum expandability in a space saving design. It has a total of seven drive bays to accommodate all of the storage options our customers tell us they want to be able to add in the future. It also has extra protection against electrical interference, unlike the weaker systems others sell. It also includes a power supply that's U.L. recognized.

## Dual Intelligent Cooling Fans!

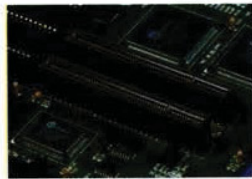
Every desktop FastMicro PC comes with dual cooling fans. It has a main fan that's quieter than fans in ordinary PCs - plus it includes a special second fan that comes on only when the system gets warm. A cooler system lasts much longer - a concern particularly when using a harder working i486DX2.





# Dual VESA Standard

Settle for everything! While a few computer companies give you VESA local bus and even fewer give you a VESA standard monitor, FastMicro includes both!



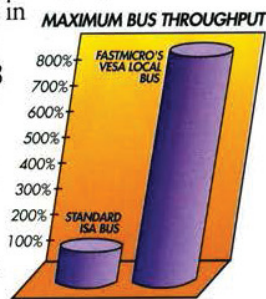
## VESA Standard Local Bus!

Why settle for slow Windows video? FastMicro includes a high performance

Windows accelerator combined with a VESA standard local bus!

Why is Local Bus faster? The i486 is a high speed 32 bit processor. Video cards plug into a slot in your PC, called a bus connector. The standard PC bus was designed for an 8 MHz 286, therefore it's confined to 8 MHz and 16 bit. FastMicro's VESA Local Bus runs up to 33MHz and 32 bit. Turn on your 486/Pro2 and watch Windows scream!

Why VESA? VESA Local Bus is a standard, unlike a proprietary local bus. You can upgrade your system in the future with third party VESA standard local bus peripherals. With your 486/Pro2 from FastMicro, you're not locked in.



## Plus True Color Video!

No video card delivers more! FastMicro gives you the maximum number of colors possible for scanning, graphics, presentations and desktop publishing. Many systems can only do 256 colors, some can do 32,000 colors,

FastMicro takes you to the limit with 16.7 million colors maximum! Plus FastMicro has all the latest VESA video options.

FastMicro Combines VESA Local Bus Performance with Windows Acceleration & over 16 Million Colors!



## VESA Standard Flicker-Free Monitor!

VESA Standard Refresh Rates at 640x480, 800x600, & 1024x768!

Non-Interlaced monitors are not created equal. A non-interlaced monitor with less than a VESA standard refresh rate will flicker at high resolution modes! The resolution is the number of pixels (or 'dots') on the screen, the refresh rate is the speed in which the monitor redraws the screen. Don't be fooled.

Your new 486/Pro2 system from FastMicro includes VESA standard refresh rates at supported resolutions! Compare and settle for less, if other systems don't say it, they won't do it!

## 20% Larger Display with Edge-to-Edge Video!

In addition to eliminating annoying flicker when running high resolution modes, FastMicro doesn't make you look at characters either! Our new VESA standard display include Edge-To-Edge video! 14" monitors are not created equal. see, 14" is strictly the tube size, not the display area. FastMicro



Standard Non-Interlaced Monitors



FastMicro Edge-To-Edge Video!

486/Pro monitors user adjustable for width, height, and position - just set to your preference and for

You get more available screen area than many 15" monitors

Edge-To-Edge video is really a lifesaver when running at 800x600 or 1024x768 Super VGA modes!

## Extra Ram & Storage

Some companies give you a 120, 170, or 200 Megabyte and four megabytes of memory, FastMicro gives you much more!

## Western Digital 256Mb Drive.

It's like getting an extra 44MB for free! FastMicro now includes Western Digital's Caviar AC2250. It combines a 256MB capacity, less than 13ms average seek time

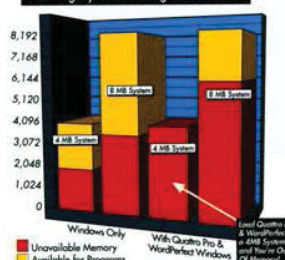


WESTERN DIGITAL

and an adaptive multi-segmented 64K cache. Add a data rate of 6MB/Sec. and a mean time between failures of 250,000 hours and you'll have years of worry-free high performance. You can also choose Western Digital's AC2340 for \$150 extra. the same specifications, except for a 341MB capacity.

## Eight Megabytes of Memory

Four Megabytes Isn't Enough for Windows!



Running Windows? Don't run out of memory! When Windows runs low on memory, it starts using your hard drive like RAM. Memory is 200+ times faster than a hard drive - don't get caught short! FastMicro includes a total of eight megabytes of RAM in your 486/Pro system.

# FastMicro 486/Pro Series - Don't Settle for Less!



4DX2/50

\$2099

4DX2/66

\$2299



- i486DX2™ Processor with 8K Internal Cache.
- High Speed 128K External Static RAM Write-Back Cache.
- Zif Socket Upgradable to OverDrive™ Processors.
- 8 megabytes of high speed RAM.
- 256mb 12ms Western Digital Caviar™ IDE hard disk (Upgrade to 341MB for \$150).

- VESA Local Bus SVGA Windows Accelerator Card with 16.7 Million Colors Maximum.
- VESA Standard Non-Interlaced 14" Super VGA color monitor with 800x600 @ 72hz & 1024x768 @ 70hz and Edge-To-Edge Video.
- Dual Intelligent Cooling Fans.
- 1.2mb 5.25" & 1.44mb 3.5" Teac floppy drives.
- Clock calendar, parallel port, game port and two serial ports.
- 8 expansion slots, 2 occupied.
- Fourth Generation Desktop Case.
- 200 Watt UL Recognized Power Supply.
- Microsoft DOS and Windows 3.1
- Microsoft Serial Mouse.
- Choice of Two Major Software Applications: WordPerfect for Windows, Quattro Pro for Windows, Paradox, PC Tools and/or Graphics Works for Windows.

## Legendary FastMicro Service

FastMicro backs up all FastData PC's with the most comprehensive service in the business. Seven day a week toll-free technical support is included for as long as you own your FastData PC. In the unlikely event a part should fail during the one year warranty, we'll express ship you the replacement part. If we still can't resolve the problem, we'll send GE on-site or replace the system at no charge.



GE Computer Service

## Satisfaction Guaranteed

Four times a year, we'll send you our informative catalog featuring over five hundred PC products at low FastMicro prices. FastMicro is truly your one-stop shop! We'd love to add you to the FastMicro family of satisfied customers. Every FastData 486 PC comes with our 30 day money back satisfaction guarantee.



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But if you're like the majority of our customers, you'll be very satisfied. After all, at FastMicro, we want you as a customer for life - not just today.

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# Also Includes a Double Software Bonus Too!

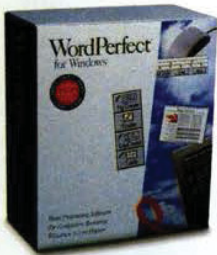
## Start with Windows & a Genuine Microsoft Mouse!

With FastMicro 486/Pro2 systems you get more! Of course you get the latest versions of Microsoft DOS and Windows pre-installed. But unlike most of our competitors, we include a true Microsoft mouse, not the lowest price mouse we could find.



## Take Two - Get up to \$700 Worth of Software

The best computer deserves the best software and FastMicro includes some of today's hottest software at no extra charge! Choose any two of the following titles and you'll get the latest versions ready to run. Some products come in special FastMicro packaging and manuals (retail boxes shown) and you get full manufacturer support.



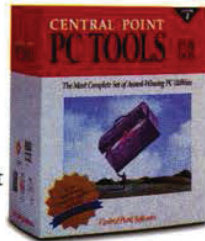
## WordPerfect for Windows

WordPerfect is the #1 selling word processing software and the Windows version is loaded with features. It includes the ability to create & edit tables, equations, lists and graphics. You can even edit graphics created

with other programs! Plus, it works with your WordPerfect for DOS files and uses familiar WordPerfect commands so your transition to Windows is easy.

## PC Tools 8.0

The latest version of the top selling utility software! PC Tools 8.0 adds an all new DOS desktop with integrated application menu & manager, file viewer & manager, scheduler, and desk accessories. You also get Central Point's award-winning backup and a hot new version of Anti-Virus. PC Tools also includes DiskFix, FileFix, Undelete, Unformat, Disk Edit, Defragmenter, Cache and more! Central Point Commute lets you remotely run Windows or DOS applications and you get new RamBoost Memory Optimizer too!



## Quattro Pro for Windows

"Quattro Pro for Windows is worth the wait" proclaims PC Magazine. QPW uses spreadsheet notebooks to easily organize your spreadsheets. Click your right mouse button and Object Inspectors lets you change attributes instantly! Speedbars give you those one-click shortcuts that change depending on what you're working on!



Interface Builder lets you build applications without programming. "QPW comes with a separate Database Desktop application - a beautifully designed query-by-example tool," says PC Magazine. "QPW's graphs are gorgeous and include rotatable 3-D types as well as options to adorn them." Need we add more?

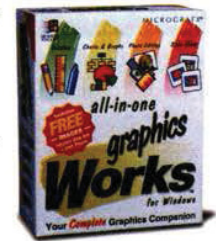


## Paradox 4.0

Paradox is the most advanced relational database ever created for the PC. Now it's the fastest. For first time users or application developers, Paradox provides the ease of use and power you need! New Application Workshop, Paradox's application generator, lets you easily develop custom applications. Paradox also has automatic multiuser support and is network ready. Combine this with the full suite of development tools and SQL connectivity and Paradox is the database of choice!

## Graphics Works for Windows

With five applications in one, Graphics Works from Micrografx gives you complete graphic tools for Windows. Includes Windows Draw! - the hot selling package that lets you create graphics compatible with your other Windows programs. It also includes new Photo Magic! - the photo editing software that comes with hundreds of photos you can use as-is or modify and use in your documents (plus you'll have photo realism on-screen with FastMicro's true color video). You get a charting tool and the leading organization charting software for Windows. Plus you get a bonus CD with over 1,000 photos and 10,000 pieces of clip art you can use as-is or customize with Graphics Works!



Why settle for less?  
FastMicro includes the real thing: a Microsoft Mouse.

© 1993 FastMicro, Inc. 4405 E. Baseline Rd. Phoenix, AZ 85044. fax 602-431-8300 All major credit cards accepted. Prices and money back guarantee do not include 3% shipping. i486, the Intel Inside Logo, iCOMP, and OverDrive are trademarks of Intel Corporation. All other trademarks acknowledged. Due to volatile memory costs, prices are subject to change before you order.

# FastMicro 486 Plus for Just \$1,199!

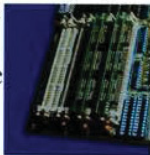
## An Ideal Starter System.

Ideal for personal use or a network node, the FastMicro 486/Plus is full featured and low priced. It includes a genuine Intel i486SX 25MHz microprocessor and many other great features.

We took all the standard features of our popular \$999 486SX system and added great Windows capabilities. We started by replacing the monitor with a crisp Windows-ready .28 dot pitch SVGA 1024 monitor. We then added Microsoft Windows and a Microsoft Mouse. And finally we included your choice of one powerful software application: WordPerfect for Windows, Quattro Pro for Windows, Graphics Works for Windows, or PC Tools for DOS!

## Loaded with Memory & Storage

FastMicro also includes four full megabytes of high-speed SIMM memory! You can even expand the memory to a total of 32MB. Of course, how can you also expect to get a hard drive at this price? Well, FastMicro includes a quality Conner hard drive with an unbelievable 85MB capacity. Plus, since it's a standard IDE drive, you can easily add a second hard drive later.



**CONNER**



## Upgradable to OverDrive Processors!

The best part of this system is that you get legendary FastMicro upgradability too! Besides upgrading the memory and drive, you can upgrade later to a faster Intel processor. This system is completely Intel OverDrive™ compatible; which means you can upgrade your FastData 486 system all the way to a 66 MHz 486DX2! And like all FastMicro systems, you can upgrade monitors, drives, etc. when you order.



## Plus, It's from FastMicro!

Pay less and get more! FastMicro backs up this system with seven day a week toll-free technical support and express parts replacement at no extra charge. And should you have an unusual problem, we'll send GE on-site service or replace the system at no additional cost! We also include BBS support and a 30 day money-back satisfaction guarantee too!



GE Computer Service



**4SX/25 \$1,199**

- i486SX™ 25mhz Processor with 8K Internal Cache & 64K Static Ram Cache.
- 486 OverDrive™ Processor Upgradable.
- 4 megabytes of high speed RAM.
- 85 mb 17ms IDE hard disk,.
- 1.44mb 3.5" floppy drive.
- Mini-Tower Chassis.
- 14" SVGA monitor, .28mm Dot Pitch & 1024x768 resolution.
- 16 bit 512K SVGA card.
- Clock calendar, parallel port, game port and two serial ports.
- MS DOS, Windows & Microsoft Mouse.
- Choice of one application from list above.

**FASTMICRO**

**1-800-821-9000**

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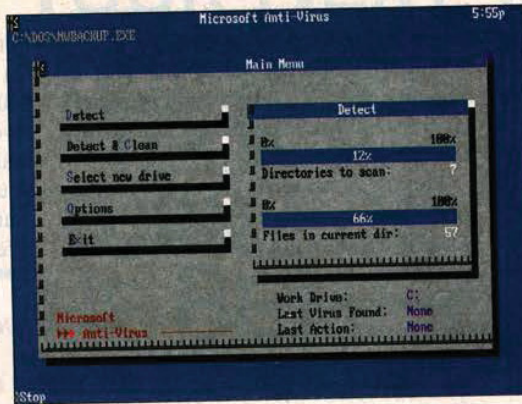


## COVER STORY DOS 6

move most known viruses while keeping the original portion of the file intact.

There is no way to scan individual directories from either the DOS or Windows programs, but there are several command-line options that make this possible. The Windows version of MSAV also supports limited drag-and-drop. You can drag and drop individual files from File Manager into MSAV, but not directories or multiple files. If you need a more selective scan from within Windows, you can always run MSAV for DOS from a Windows DOS prompt.

The VSAFE TSR will attempt to prevent infections by checking all files for viruses as they are opened, copied, or executed. If a virus is detected, an alarm will sound, and a window will pop up on your screen. Under DOS, you are given the option to stop, continue, or update the file's checksum. Under Windows, a dialog box will offer you options to stop and continue. The TSR is the same as the one found in Central Point Anti-Virus. The Norton AntiVirus uses a device



If you already know Central Point Anti-Virus you'll find the interface in Microsoft Anti-Virus familiar.

driver instead of a TSR. The advantage of this approach is that protection can begin before any other programs are executed.

### THE FULL-FEATURED PROGRAMS

Programs like Central Point Anti-Virus and The Norton AntiVirus go beyond MSAV and provide options for controlling the virus-protection process. For example, you can customize the warning messages, prevent users from terminat-

ing scans before they are complete, or send an alarm to the network administrator when a virus is encountered. Both Central Point and Norton can even prevent the user from logging into the network if he does not have a memory-resident virus-detection utility loaded.

We were disappointed with the lack of virus detection during the installation of the DOS 6 upgrade. Nearly every antivirus program will first scan memory and the hard disk for viruses before proceeding with installation. This simple check is completely missing from DOS 6 (in order to save installation time, according to Microsoft). Also, unlike most antivirus programs, MSAV includes no method of creating an emergency disk in case vital system data is lost. Emergency disks contain such data as copies of the boot sector, partition table, and CMOS and DOS system files.

Central Point will be handling upgrades to Microsoft Anti-Virus. The DOS 6 package includes two coupons for signature library upgrades for \$9.95 each.

## •DOS 7 Wish List

by Barry Simon

There was a time when DOS was easy to pick on. But now that we don't have EDLIN to kick around anymore and the backup program is finally worthy of the name, DOS's shortcomings are less glaring. Nevertheless, DOS users are still stuck with two big problems: the 1MB barrier and the slow, inefficient, and fragile file allocation table (FAT) file system.

But what about the less cosmic stuff that still affects users every day? At the top of the list are the command line and the DOS Shell. Neither one has changed in DOS 6. DOS 5 introduced DOSKEY, with its command history and aliases, but far better command-line enhancers are available, such as PCED (Cove Software, 410-992-9371, \$54.50) and 4DOS (JP Software, 800-368-8777, \$69). Unlike these programs, DOS has no command/file completion,

which, for example, would let you type "au," hit a file-completion key, and get the full name, "AUTOEXEC.BAT," filled in. And there's no way to put the time or date into an alias.

The DOS Shell could also stand some improvements. Its file organization is limited to two directories, and it does not offer a way to search for text within files. Also, it has only ASCII and hexadecimal file viewers. The DOS Shell's task switcher swaps only to disk and does not make the faster swaps to extended or expanded memory. And it has no way to start several sessions automatically.

Isn't it time for Microsoft to integrate CD-ROM support into the DOS kernel and load into the high memory area (HMA)? At last, the MSCDEX CD-ROM driver ships with DOS, so you don't have to hassle with getting a new version from your CD-ROM

vendor. But the changes to the driver are minimal, and SmartDrive still doesn't cache CD-ROM drives.

EDIT, also unchanged from DOS 5, is much better than EDLIN, but it's still not as good as the editors that ship as sample code with most compilers! At a minimum, EDIT should open several files at once, include an undelete feature, and offer better search capabilities.

Some of the features found in 4DOS's enhanced version of COMMAND.COM round out the wish list: a command-line text viewer better than Type, smart wildcards that understand "[\*.\*]" means files with an *l* in their names, an environment editor, paths more than 127 characters long, and an "except" command that allows you to perform actions such as copying all files except for the file you specify. □