



To: Brad Chase  
From: Richard Freedman  
Re: A First Look at DR DOS 6.0  
Date: October 17, 1991

As you requested, the MS-DOS team has taken an in-depth look at DR DOS 6.0. This document summarizes our findings.

It's divided into two sections. The first compares testing and compatibility between DR DOS 6.0 and MS-DOS 5. The second takes a detailed look the key features in DR DOS 6.0.

MS 0079337  
CONFIDENTIAL

## TESTING AND COMPATIBILITY

This section discusses differences in compatibility and testing between MS-DOS 5 and DR DOS 6.0. We were surprised by number and severity of the incompatibilities we found. In short, it looks like they took DR DOS 5.0, which was already problematic enough to have been through three releases in eight months, made some minor changes, added in some third party utilities, and called it 6.0.

### Testing

In hindsight, it was worth testing MS-DOS 5 for a year at 7000 sites: even after shipping 2,000,000 MS-DOS 5 Upgrades in the first 90 days, the number and the nature of the calls still indicate that product is rock solid. And although we debated at length the risks of documenting what we learned from the beta, many customers I've spoken with have thanked us for all the information we put into the README.TXT and APPNOTES.TXT files, and for shipping the Novell and Disk Manager updates.

By contrast, Digital Research released at least 3 versions of DR DOS 5.0 in 8 months (6/90, 8/90, 2/91; there were rumors of secret interim releases), and released DR DOS 6.0 in 9/91. Customers tell us the beta was tough to get; I estimate they beta tested at 300 sites.

Also, although it had known problems like any new operating system, DR DOS 5.0 did not have a README. For example, Lantastic and LAN Manager customers who complained to Digital Research received a fax acknowledging the problems (see Appendix C), but obviously only after they had labored to find known bugs. DR DOS 6.0 does come with a README, but it only lists information for two applications, AutoCAD and Windows.

### Implementing API's

This is a direct quote from Digital Research's sysop on Compuserve: "DRDOS is not totally compatible with MSDOS. There are too many undocumented functions and calls." We ran some random function call tests and did in fact find api's they hadn't implemented. We don't know if they've implemented all the undocumented but published api's, but it's clear that DR DOS isn't DOS; it's just another operating system that runs DOS applications, like OS/2 or Xenix.

In addition, Digital Research chose not to implement some *documented* api's in MS-DOS 5. For example, they did implement the task swapper api, but they didn't implement the UMB api's that Norton 6.0, PC Tools 7.0, Attachmate, etc. use to automatically load themselves into UMBs. After all, Norton considered this functionality important enough to highlight it in an ad ("Norton programs automatically LOADHI using DOS 5.0's memory manager"), as did PC Tools ("Automatic utilization of DOS 5.0's high memory"). DR DOS 6.0 reduces the functionality of these programs by not supporting these api's.

### Software Vendor Testing

Another reason why DR DOS isn't DOS is because from my research, software vendors feel they have to test separately on DR DOS. And many aren't. So even if DR DOS runs with a current version of an application, there's no guarantee it will run with future versions.

Case and point is a statement Corey Smith made in an article from Infoworld (October 14, 1991) on the release of PC Tools 7.1:

The company has clearly positioned PC Tools to work with Microsoft's DOS 5.0 and has never promised compatibility with DR DOS 6.0, according to Smith.

If DR DOS 6.0 were a "fully DOS-compatible operating system," like their marketing collateral says, then Corey wouldn't have to promise compatibility with it. It would just work.

### Conforming to Existing Standards

MS-DOS 5 also conforms to other standards. For example, you can load MS-DOS 5 high using any memory manager, like QEMM or 386Max, in place of HIMEM.SYS. However, you cannot load DR

DOS 6.0 high using another memory manager - you must also use their HIDOS.SYS. DR DOS 5.0 had the same limitation. This means you must use two memory drivers, which increases both conventional memory overhead (by 5K) and the chance for random hangs caused by memory driver conflicts.

Undelete is another example. In MS-DOS 5 we delete files using the same method as previous versions of MS-DOS, and so utilities like PC Tools and Norton can undelete files deleted under MS-DOS 5. Central Point and Symantec also consider this functionality important enough to advertise.

Digital Research added undelete to DR DOS 6.0, but using a non-standard implementation. When you delete a file DR DOS marks it as "pending delete," that is, deleted but save the file's space on the disk. To truly delete it and free up space, you use the DELPURGE command. That's fine. The problem is that DR DOS marks "pending delete" files using a non-standard method.

One implication is that utilities like Norton and PC Tools cannot undelete these files. Another implication is more serious. Suppose you use a removable disk under DR DOS 6.0, like a floppy or Bernoulli cartridge, and delete some files on it. In typical sneaker net fashion you take the disk to an MS-DOS machine to copy some files. First, you check the free disk space using CHKDSK. Since DR DOS has flagged pending delete files in a non-standard way, the MS-DOS CHKDSK gets confused and reports these files as lost clusters. You run CHKDSK /F to free those clusters, which are eventually reused. After returning to the disk to your DR DOS 6.0 system, you eventually DELPURGE the pending delete files to free the clusters used by them. But recall that these clusters were previously freed and then reused. In other words, DELPURGE corrupted your disk because DR DOS marked deleted files in a non-standard way, making DR DOS 6.0 particularly dangerous in a mixed MS-DOS / DR DOS 6.0 environment.

The problem is worse on a DR DOS 6.0 - OS/2 dual-boot system. After deleting files under DR DOS, you then boot OS/2. Its MS-DOS standard CHKDSK also gets confused, and then rebooting and running DELPURGE under DR DOS corrupts the hard disk itself.

#### Compatibility

Digital Research themselves position DR DOS 6.0 as another operating system, in their own words a "fully DOS-compatible operating system." The irony, of course, is that they're not DOS-compatible.

I say this because the tests run by the independent lab, XXCAL, turned up a series of problems. I've highlighted some of them below. DR DOS 6.0 broke some major applications, like WordPerfect and Windows, and the test I specified was quite similar to the suite XXCAL ran on MS-DOS 5. Of course we tested using the default configuration installed by DR DOS 6.0, and only changed it to troubleshoot. Each of these problems was confirmed in-house. The details are in Appendix A.

#### DR DOS 6.0 default configuration hangs Windows in standard mode

Windows would not run in standard mode with the default settings as configured by install. Windows ran in standard mode only if we changed the settings on PC Kwik (PC Kwik is the new cache that comes as part of DR DOS 6.0). The necessary settings were not documented; we found them by experimentation.

The same test ran successfully using the default settings on PC Kwik if it were loaded on top of MS-DOS 5 and its memory managers instead of DR DOS 6.0

Windows also ran successfully using MS-DOS 5 and Smartdrive.

#### WordPerfect 5.1 Installation hangs with PC Kwik loaded on 80286

After invoking the Install program, the system hung while copying the first file. Install ran successfully after disabling PC Kwik.

The same test ran successfully using the default settings on PC Kwik if it were loaded on top of MS-DOS 5 and its memory managers instead of DR DOS 6.0

MS 0079339  
CONFIDENTIAL

The same test ran successfully using MS-DOS 5 and Smartdrive.

PC Labs Benchmarks 5.6 hard hangs during DOS File Access test with PC Kwik loaded on 80286

After starting PC Labs Benchmarks and running the BIOS Disk Seek and DOS Disk Access tests to completion, the DOS File Access test hard hung the system. After removing HIDOS.SYS, which forces DR DOS 6.0, PC Kwik and cache storage to reside in conventional memory, the test ran to completion.

The same test ran successfully using the default settings on PC Kwik if it were loaded on top of MS-DOS 5 and its memory managers instead of DR DOS 6.0

The same test ran successfully using MS-DOS 5 and Smartdrive.

Windows 3.0 Setup hangs with PC Kwik loaded on 80286

After invoking the Setup program, the system hung while copying the first file on an 80286. Setup ran successfully after disabling PC Kwik.

The same test ran successfully using the default settings on PC Kwik if it were loaded on top of MS-DOS 5 and its memory managers instead of DR DOS 6.0

The same test ran successfully using MS-DOS 5 and Smartdrive.

DELWATCH slowdown problem

With the DELWATCH delete tracking software loaded (the default), after a period of time file i/o slowed down by at least a factor of 3, and sometimes by a factor of 10.

Unable to unload Sidekick 2.0

Sidekick, when loaded as a TSR, could not be unloaded from memory from the Service menu or from the command line. No workaround was found except to remove EMM386.SYS.

The same test ran successfully using MS-DOS 5 and EMM386.EXE.

**A LOOK AT THE KEY FEATURES IN DR DOS 6.0**

Of the features Digital Research added to DR DOS 6.0, most were in MS-DOS 5, but a few are new. It looks to us like a 5.1 release, and it also looks like they made adding new features a priority as opposed to testing them.

Memory Management

In their comparison sheet entitled "DR DOS 6.0 vs. MS-DOS 5 Upgrade", Digital Research lists the following free memory numbers:

	DR DOS 6.0	MS-DOS 5
Running on an 8088	612K free	521K free
Running on an 80286	628K	555K
Running on an 80386	627K	613K

These numbers are quite misleading since they measure the exception case as opposed to the rule. First, the 8088 numbers assume a LIM 4.0 board has been installed, when in fact few 8088 systems have true LIM 4.0 boards (as opposed to LIM 3.2 boards) installed. Second, the 80286 numbers assume a NEAT or LEAP system, while Chips & Technologies told us they estimate only 10% of the 80286 installed base is NEAT or LEAP-based. None of the top 80286s by installed base - IBM PC AT, PS/2 30-286, PS/2 50z, and Compaq Deskpro 286 - are NEAT or LEAP-based.

MS 0079340  
CONFIDENTIAL

Memory comparisons are never perfect since every system is different, but there are more realistic and less realistic scenarios. To try and be as realistic as possible, we ran the following memory numbers on a leading system in each class by installed base. The test configurations are in Appendix B.

	DR DOS 6.0	MS-DOS 5	MS-DOS 5 + Bluemax 6.0
<b>80386 PS/2 70 - From the DOS Prompt</b>			
Free memory below 640K	625K	613K	621K
<u>Free UMB memory</u>	<u>96K</u>	<u>128K</u>	<u>244K</u>
Total free memory below 1 mb	721K	741K	865K
<b>80386 PS/2 70 - Windows 3.0 DOS Box</b>			
Free memory below 640K	566K	597K	565K
<u>Free UMB memory</u>	<u>96K</u>	<u>128K</u>	<u>244K</u>
Total free memory below 1 mb	662K	725K	809K
<b>80286 - PC AT</b>	619K	621K	N/A
<b>8088 - PC XT</b>	565K	570K	N/A

Some points to note:

- I would have provided numbers for a Windows 3.1 DOS Box, except that I couldn't get it to run on DR DOS 6.0 on any machine.
- DR DOS 6.0 has less UMB space because they put their EMM driver (27K) in the UMBs as opposed to putting it into extended memory like MS-DOS 5.
- The UMB space on PS/2's is considerably worse than any other PC brand since ROM BASIC and the BIOS, which aren't used by DOS or any application, take up so much space. That's why Bluemax, which is optimized specifically for PS/2's, creates so much extra memory.
- Under Windows, Bluemax provides less memory under 640K than standalone MS-DOS 5 because Windows needs UMB space, and if none is available it uses conventional memory instead. Bluemax maps over so much UMB space that there's nothing left. That's why it's important to look at everything below 1mb instead of just the first 640K on an 80386.

In short, Digital Research's memory management claims versus MS-DOS 5 are misleading, and in many cases incorrect.

#### Compression

This is the key new feature in DR DOS 6.0. Digital Research licensed the technology, known as SuperStor, from AddStor, Inc., a small software startup in California. It could be a neat feature, except that the implementation is so poor.

Addstor implements compression by creating two volumes, C: and D:, on the C: partition. The D: volume is uncompressed, and contains files that must remain uncompressed like CONFIG.SYS and Windows swap files. The C: volume contains all other data (executables, data files, etc.) in compressed form, and is actually one giant file called SSPARTSS.SWP. Both C: and D: reside on the same partition even though they are separate volumes.

Some of the important implementation details are:

- SuperStor lacks robustness. Slight corruption of SSPARTSS.SWP, such as one break in the cluster chain, corrupts the entire compressed volume and all files on it. SuperStor appears to have no built-in error recovery.
- Addstor themselves recommend not using third-party defragmentation utilities on the compressed volume as it "may undo SuperStor's tightly woven file structure." In this context, "tightly woven" sounds like a euphemism for "fragile." And in response to a question about using third party utilities

MS 0079341  
CONFIDENTIAL

- on a compressed volume, the Digital Research sysop said "We have had scattered reports that other utilities have caused problems. All I can say is to make sure and have really good backups."
- Unlike Stacker, for example, none of DR DOS 6.0's utilities support compressed drives. Running DR DOS 6.0's CHKDSK on a damaged compressed drive reports no errors, and can even cause the compressed volume to become cross linked with the uncompressed volume residing on the same partition.
  - There are other side effects of placing both compressed and uncompressed volumes on the same partition. For example, suppose a user has sensitive data on their D: drive that they want to expunge using, say, Norton's WIPEINFO. This should be fine since the C: and D: drives are different drives, right? Of course, if you run WIPEINFO on D: you wipe out the entire partition, which includes all the compressed data also. Most customers won't be able to make subtle distinctions about what can and can't be done to compressed drives.
  - Even though it is hidden and read-only, SSPARTSS.SWP is treated like any other file. DR DOS 6.0's own commands - attrib and delete - let you delete it and lose an entire drive's worth of data. We were unable to undelete it. More plausibly, shells like XTree and PC Tools can display hidden files as the default. And from our experience (with WINA20.386), when a user sees a strange file in their root directory they sometimes delete it, particularly when, like SSPARTSS.SWP, it is not documented.

These scenarios are not hypothetical. Many DR DOS 6.0 users on CompuServe have reported losing entire compressed drives because SSPARTSS.SYS became corrupted.

Finally, the compression driver is big. On CompuServe, Digital Research confirmed that part of it must remain in conventional memory, and that its minimum conventional footprint is 28K. And because it can't be loaded high, it chokes Maximize in 386Max 5.1 and hard hangs the system on the second pass.

#### Disk Caching

Replacing the cache must have been a priority for Digital Research since the cache in DR DOS 5.0 was woeful. In most scenarios it was slower than MS-DOS 3.3, MS-DOS 4.01 and MS-DOS 5 uncached (this data is from "DOS 5: What's in it for you?", PC Magazine, 9/24/91).

The replacement in DR DOS 6.0 is a well-known third-party cache, PC Kwik, and from our testing it looks like the combination of PC Kwik and DR DOS 6.0 is not very compatible. And although it works sometimes if you tweak it enough, this is not easy to do. As the Digital Research sysop said to a user having trouble with PC Kwik, "There are so many switches. Maybe one will help."

We didn't test cache speed since it's been tested many times before. This quote is from "Caches Accelerate Windows 3.0 Speed" (PC Week, 2/18/91):

However, while PC-Kwik performed well on the write-intensive Windows database suite and DOS benchmarks, it turned in abysmal times on the read-intensive Windows application suite, even after considerable parameter adjustments...As a result, PC-Kwik should be used as a SMARTDRV replacement only by users of write-intensive database or CAD applications, not by users of read-intensive general purpose applications.

The bottom line is that, when it works, PC Kwik is faster with write-intensive applications, and Smartdrive is faster with Windows.

#### Installation

Unlike the MS-DOS 5 Upgrade, the DR DOS 6.0 Install program provides optional control over specific configuration options. This feature is nice for very advanced users. But regardless of whether you take the novice (default) or the advanced path in DR DOS 6.0's installation, you had better be very advanced because your configuration files will need fixing when you're done.

When installing DR DOS 6.0 as an upgrade, the following happened:

MS 0079342  
CONFIDENTIAL

- Important default settings don't work. For example, Install provides a specific option for installing PC Kwik for use with Windows. But those settings hang Windows and must be modified in some undocumented way for it to work.
- It mangles config.sys and autoexec.bat. Install inserts its own commands and ignores everything else in your configuration files by skipping over old lines. For example, on rebooting after installation we couldn't access the network or use the mouse since it had modified the autoexec.bat to skip these commands. We had a lot of cleaning up to do.
- It doesn't detect unformatted partitions. As we found during the MS-DOS 5 beta, many people unknowingly store data on unformatted partitions because it's legal under MS-DOS versions 3.3 and earlier. But MS-DOS 5 and DR DOS 6.0 can't access unformatted partitions. Consequently, the MS-DOS 5 Upgrade Setup detects these partitions and warns the user to back them up, format them, and restore the data before running Setup. DR DOS 6.0 doesn't. After installation these partitions are inaccessible.
- It hangs when upgrading certain OEM DOS versions, including NEC DOS 3.3 and AST DOS 3.3.

#### Task Swapper

Similar to what is in MS-DOS 5, from a quick look the Task Swapper has some nice features, like swapping directly to extended memory and cut-and-paste. When measured against a comparable MS-DOS 5 configuration (i.e. configured to swap to RAM disk using extended memory), speed was a toss-up between the two.

XXCAL ran some basic tests and was unable to swap Lotus 123 3.1 or AutoCAD, so its stability is questionable.

#### Security

As we've known for a while, truly useful security is difficult to provide since the FAT file system is an extremely open and well-known standard. DR DOS 6.0 adds login security, which prevents unauthorized access to one's PC, and not surprisingly, it's pretty easy to crack. It took one of the developers ten minutes using the Norton Disk Editor to figure it out.

#### Additional config.sys processing commands

Both DR DOS 5.0 and 6.0 extended the config.sys language to include the ability to branch, jump and accept keyboard input among other extensions, which is useful.

#### DOS Book

DOS Book is DR DOS 6.0's on-line documentation system. We liked DOS Book's ability to display in full and partial screen, and retain information on the screen after exiting.

We did find the implementation of DOS Book somewhat befuddling compared to the on-line system we've been designing. The organization of the 65 Basic topics was confusing since they aren't alphabetized, grouped or listed in any apparent order. There was also no search capacity.

#### Disk Defragmentation

It would be more useful if it weren't so slow. The common complaint on CompuServe is that it's quite slow compared to the defraggers in Norton and PC Tools. This wouldn't be so bad except that it's not recommended you use any other defragmentation utility on a DR DOS 6.0 compressed volume.

#### Undelete

Dangerously non-standard and very slow. See earlier in this document.

Also, while both delete-tracking TSRs - DELWATCH from DR DOS 6.0 and Mirror from MS-DOS 5 - are about 6K, Digital Research confirmed on CompuServe that 3K of DELWATCH must reside in conventional memory. Mirror can be loaded entirely into the UMBs.

MS 0079343  
CONFIDENTIAL

#### Unformat

In order for Unformat to work, you cannot unconditionally format the disk since that wipes it clean. Rather, you have to do a reversible quick format (also called a safe format in the documentation). This is the same as MS-DOS 5, and in both operating systems the default is to do a safe format.

From our own in-house testing, there is a bug not in Unformat, but in Format itself. On three out of five systems (PS/2 model 70, PS/2 model 50z, Compaq 386/20e), when we ran Format on the hard drive it said it was quick formatting, ostensibly the default, but then proceeded to do an unconditional format. So naturally we could not unformat the disk.

#### Uninstall

Like the uninstall in MS-DOS 5, the uninstall added to DR DOS 6.0 brings you back to the version of DOS you were using before you installed the new version.

However, the uninstall in DR DOS 6.0 does not DELPURGE pending delete files before uninstallation. So when you return to your previous version, your hard disk could become corrupted because of the non-standard way DR DOS 6.0 deletes files. See the earlier section "Conforming to Existing Standards" for more details on this problem.



## APPENDIX A - TEST CONFIGURATIONS

### DR DOS 6.0 default configuration hangs Windows in standard mode

#### XXCAL TEST

##### Hardware configuration

Name	IBM PS/2 Model 55sx
Processor	80386SX, 16MHz
Memory	640K base / 3328K extended / 0K expanded
Hard Drive	60 Mb Hard Drive
Floppy Drive	3.5" 1.44 Mb
ROM BIOS	11/02/88

##### config.sys

```
SHELL=:C:\COMMAND.COM C:\P /E:512
BREAK=ON
BUFFERS=20
FILES=30
FCBS=4,4
FASTOPEN=512
LASTDRIVE=E
HISTORY=ON,256,OFF,OFF,OFF
COUNTRY=001,,C:\DRDOS\COUNTRY.SYS
HIDOS=ON
DEVICE=C:\DRDOS\EMM386.SYS /F=NONE
/K=AUTO /B=FFFF /WINSTD
DEVICE=C:\DRDOS\PCKWIN.SYS
```

##### autotexec.bat

```
@echo off
:DRDOSBEG
PATH C:\DRDOS
VERIFY OFF
PROMPT [DR DOS] $P$G
SET TEMP=C:\TEMP
IF NOT "%TEMP%"==" " MD %TEMP% >NUL
DELWATCH C: /F:200 /B:1
DISKMAP C:
MEMMAX +U
SUPERPCK /EM /R:0
:DRDOSEND
```

##### Problem

After typing Win, the opening screen appears and the system hangs.

##### Regression

The test ran to completion after removing PC Kwik.

## MICROSOFT CONFIRMATION

### Hardware configuration

We confirmed the problem on a Compaq Deskpro 386/16. We used a stripped configuration:

```
config.sys                                auotexec.bat
BUFFERS=20                               C:\DRDOS\SUPERPCK /EM /R:0
FILES=30
DEVICE=C:\DRDOS\EMM386.SYS /F=NONE
/K=AUTO /B=FFFF /WINSTD
DEVICE=C:\DRDOS\PCKWIN.SYS
HIDOS=ON
```

### Regression

The /R parameter defines how much extended memory PC Kwik leaves for other applications. We confirmed that Windows hangs in standard mode with the default /R:0, as well as with /R:512. It ran when we used /R:1024.

Booting MS-DOS 5 off a floppy, we ran PC Kwik using an equivalent configuration:

```
config.sys                                auotexec.bat
BUFFERS=20                               C:\DRDOS\SUPERPCK /EM /R:0
FILES=30
DEVICE=A:\HIMEM.SYS
DEVICE=A:\EMM386.EXE
DEVICE=C:\DRDOS\PCKWIN.SYS
DOS=HIGH, UMB
```

We ran Windows successfully in standard mode using this configuration. It seems that DR DOS 6.0's memory management is the culprit and not PC Kwik. We also ran Windows successfully using Smartdrive.

Finally, we tested the memory lending feature of PC Kwik using its /L parameter. This feature is very useful because instead of statically reserving extended memory, it lets the cache and an application share memory as needed. Both PC Kwik and Smartdrive have this feature.

Using three different settings, /L:0, /L:512 and /L:1024, Windows hung each time using DR DOS 6.0. Running PC Kwik on top of MS-DOS 5, we were able to run Windows using any of these settings as well as under an equivalent configuration using Smartdrive.

WordPerfect 5.1 Installation hangs with PC Kwik loaded on 80286

**XXCAL TEST**

**Hardware configuration**

Name	IBM PS/2 Model 50z
Processor	80286, 10MHz
Memory	640K base / 1408K extended / 0K expanded
Hard Drive	30 Mb Hard Drive
Floppy Drive	3.5" 1.44 Mb
ROM BIOS	4/18/88

**config.sys**  
SHELL=:C:\COMMAND.COM C:\P /E:512  
BREAK=ON  
BUFFERS=20  
FILES=30  
FCBS=4,4  
FASTOPEN=512  
LASTDRIVE=E  
HISTORY=ON,256,OFF,OFF,OFF  
COUNTRY=001,,C:\DRDOS\COUNTRY.SYS  
HIDOS=ON  
DEVICE=C:\DRDOS\HIDOS.SYS /B=AUTO  
DEVICE=C:\DRDOS\PCWIN.SYS

**autotexec.bat**  
@echo off  
:DRDOSBEG  
PATH C:\DRDOS  
VERFIY OFF  
PROMPT [DR DOS] \$PSG  
SET TEMP=C:\TEMP  
IF NOT "%TEMP%"="" MD %TEMP% >NUL  
DELWATCH C: /F:200 /B:1  
DISKMAP C:  
MEMMAX +U  
SUPERPCK /EM /R:0  
:DRDOSEND

**Problem**

After invoking the Install program, the system hung while copying the first file.

**Regression**

The test ran to completion if either HIDOS.SYS or SUPERPCK were removed.

## MICROSOFT CONFIRMATION

### Hardware configuration

We confirmed the problem on the model 50z as well as an IBM PS/2 model 30/286. We used a stripped configuration:

<b>config.sys</b>	<b>autotexec.bat</b>
BUFFERS=20	C:\DRDOS\SUPERPCK /EM /R:0
FILES=30	
DEVICE=C:\DRDOS\HIDOS.SYS	
HIDOS=ON	

### Regression

We loaded SUPERPCK with no switches, and also tried various /R values from 0 to 1024. The greater the /R value, the more files it would copy before hanging. On random occasions we also got read and write errors, but installation never completed. We confirmed that after removing SUPERPCK or HIDOS.SYS the test runs to completion.

The same test ran successfully using the default settings on PC Kwik if it were loaded on top of MS-DOS 5 instead of DR DOS 6.0. We booted MS-DOS 5 from a floppy:

<b>config.sys</b>	<b>autotexec.bat</b>
BUFFERS=20	C:\DRDOS\SUPERPCK /EM /R:0
FILES=30	
DEVICE=A:\HIMEM.SYS	
DOS=HIGH	

The test also ran to completion with MS-DOS 5 and Smartdrive.

PC Labs Benchmarks 5.6 hard hangs during DOS File Access test with PC Kwik loaded on 80286

**XXCAL TEST**

**Hardware configuration**

Name	IBM PS/2 Model 50z
Processor	80286, 10MHz
Memory	640K base / 1408K extended / 0K expanded
Hard Drive	30 Mb Hard Drive
Floppy Drive	3.5" 1.44 Mb
ROM BIOS	4/18/88

**config.sys**

```
SHELL=:C:\COMMAND.COM C:\ /P /E:512
BREAK=ON
BUFFERS=20
FILES=30
FCBS=4,4
FASTOPEN=512
LASTDRIVE=E
HISTORY=ON,256,OFF,OFF,OFF
COUNTRY=001,,C:\DRDOS\COUNTRY.SYS
HIDOS=ON
DEVICE=C:\DRDOS\HIDOS.SYS /B=AUTO
DEVICE=C:\DRDOS\PCWIN.SYS
```

**autotexec.bat**

```
@echo off
:DRDOSBEG
PATH C:\DRDOS
VERIFY OFF
PROMPT [DR DOS] $PSG
SET TEMP=C:\TEMP
IF NOT "%TEMP%"="" MD %TEMP% >NUL
DELWATCH C: /F:200 /B:1
DISKMAP C:
MEMMAX +U
SUPERPCK /EM /R:0
:DRDOSEND
```

**Problem**

After starting PC Labs Benchmarks and running the BIOS Disk Seek and DOS Disk Access tests to completion, the DOS File Access test hard hung the system.

**Regression**

After removing HIDOS.SYS, which forces DR DOS 6.0, PC Kwik and PC Kwik's cache storage to reside in conventional memory, the test ran to completion.

MS 0079349  
CONFIDENTIAL

## MICROSOFT CONFIRMATION

### Hardware configuration

We confirmed the problem on these 80286 machines: IBM PS/2 model 25/286, IBM PS/2 model 50z, IBM PS/1 model 20/286, Unisys 286 and Epson Equity III+. We used a stripped configuration:

<b>config.sys</b>	<b>autotexec.bat</b>
BUFFERS=20	C:\DRDOS\SUPERPCK /EM /R:0
FILES=30	
DEVICE=C:\DRDOS\HIDOS.SYS	
HIDOS=ON	

### Regression

We loaded SUPERPCK with no switches, and also tried /R settings from 0 to 1024, and the problem was the same. When we removed SUPERPCK altogether (this invalidates the benchmark), the test ran to completion. We confirmed that after removing HIDOS.SYS the test runs to completion.

The same test ran successfully using the default settings on PC Kwik if it were loaded on top of MS-DOS 5 instead of DR DOS 6.0. We booted MS-DOS 5 from a floppy:

<b>config.sys</b>	<b>autotexec.bat</b>
BUFFERS=20	C:\DRDOS\SUPERPCK /EM /R:0
FILES=30	
DEVICE=A:\HIMEM.SYS	
DOS=HIGH	

The test also ran to completion with MS-DOS 5 and Smartdrive.

MS 0079350  
CONFIDENTIAL

Windows 3.0 Setup hangs with PC Kwik loaded

**XXCAL TEST**

**Hardware configuration**

Name	IBM PS/2 Model 50z
Processor	80286, 10MHz
Memory	640K base / 1408K extended / 0K expanded
Hard Drive	30 Mb Hard Drive
Floppy Drive	3.5" 1.44 Mb
ROM BIOS	4/18/88

**config.sys**  
SHELL=C:\COMMAND.COM C:\ /P /E:512  
BREAK=ON  
BUFFERS=20  
FILES=30  
FCBS=4,4  
FASTOPEN=512  
LASTDRIVE=E  
HISTORY=ON,256,OFF,OFF,OFF  
COUNTRY=001,,C:\DRDOS\COUNTRY.SYS  
HIDOS=ON  
DEVICE=C:\DRDOS\HIDOS.SYS /B=AUTO  
DEVICE=C:\DRDOS\PCKWIN.SYS

**autotexec.bat**  
@echo off  
:DRDOSBEG  
PATH C:\DRDOS  
VERFTY OFF  
PROMPT [DR DOS] \$P\$G  
SET TEMP=C:\TEMP  
IF NOT "%TEMP%"==" " MD %TEMP% >NUL  
DELWATCH C: /F:200 /B:1  
DISKMAP C:  
MEMMAX +U  
SUPERPCK /EM /R:0  
:DRDOSEND

**Problem**

After invoking the Setup program, the system hung while copying the first file. Setup ran successfully after disabling PC Kwik.

**Regression**

The test ran to completion if either HIDOS.SYS or SUPERPCK were removed.

## MICROSOFT CONFIRMATION

### Hardware configuration

We confirmed the problem on the model 50z as well as an IBM PS/2 model 30/286. We used a stripped configuration:

```
config.sys                                autotexec.bat
BUFFERS=20                                C:\DRDOS\SUPERPCK /EM /R:0
FILES=30
DEVICE=C:\DRDOS\HIDOS.SYS
DEVICE=C:\DRDOS\PCKWIN.SYS
HIDOS=ON
```

### Regression

As with WordPerfect we loaded SUPERPCK with no switches and also tried various /R values from 0 to 1024. Again, the greater the /R value, the more files it would copy before hanging. We confirmed that after removing SUPERPCK or HIDOS.SYS the test runs to completion.

The same test ran successfully using the default settings on PC Kwik if it were loaded on top of MS-DOS 5 instead of DR DOS 6.0. We booted MS-DOS 5 from a floppy:

```
config.sys                                autotexec.bat
BUFFERS=20                                C:\DRDOS\SUPERPCK /EM /R:0
FILES=30
DEVICE=A:\HIMEM.SYS
DOS=HIGH
```

The test also ran to completion with MS-DOS 5 and Smartdrive.

MS 0079352  
CONFIDENTIAL



DELWATCH slowdown problem

We originally learned of this problem when XXCAL informed us that Lotus 123 for Windows was hanging. We determined that it was not a hang, but rather that DELWATCH was slowing file i/o down so much that it only looked like a hang. 123/W did eventually load, but it took 3:05.

DELWATCH, the delete tracker, is installed by default. Development has concluded that the way it's designed, it works acceptably for a while, and then suddenly slows the machine down drastically. The slow-down occurs either once you have filled the disk with pending delete files, or once you have reached the limit on the number of pending delete files DR DOS 6.0 is tracking; the default is 200.

When the slow-down occurs, Windows loads so slowly that most people will believe their machine is hung. Even a simple action like saving a 10 line config.sys file with the DR-DOS 6.0 editor can take so long that the user will force a reboot. Here are some sample numbers:

	Using DELWATCH before slowdown	Using DELWATCH after slowdown
Loading Windows using a temp swapfile on C:	9 seconds	190 seconds
Xcopying 118 files from one directory to another	57 seconds	240 seconds

The test system was a PS/2 model 70 with a 52 meg partition for drive C: and 5mb of free disk space. We used the default delete tracking parameters (DELWATCH C: /F:200 /B:1). The results were the same whether or not PC Kwik was loaded.

All delete tracking software slows down file i/o. Mirror from MS-DOS 5 slows down file deletes by about 25%. But working with DR DOS 6.0 on three different machines showed that the faster the machine, the more noticable the delay since disk access was a greater percentage of the actual operation time. The slowdown on a PC XT was annoying; the slowdown on an HP Vectra 486 was excruciating.

The slowdown is consistent with the advice Digital Research has been giving on CompuServe, which is: If your system has inexplicably slowed down, remove DELWATCH.

Unable to unload Sidekick 2.0

**XXCAL TEST**

**Hardware configuration**

Name	IBM PS/2 Model 55sx
Processor	80386SX, 16MHz
Memory	640K base / 3328K extended / 0K expanded
Hard Drive	60 Mb Hard Drive
Floppy Drive	3.5" 1.44 Mb
ROM BIOS	11/02/88

<b>config.sys</b>	<b>autoexec.bat</b>
SHELL=C:\COMMAND.COM C:\ /P /E:512	@echo off
BREAK=ON	:DRDOSBEG
BUFFERS=20	PATH C:\DRDOS
FILES=30	VERIFY OFF
FCBS=4,4	PROMPT [DR DOS] \$P\$G
FASTOPEN=512	SET TEMP=C:\TEMP
LASTDRIVE=E	IF NOT "%TEMP%"==" " MD %TEMP% >NUL
HISTORY=ON,256,OFF,OFF,OFF	DELWATCH C: /F:200 /B:1
COUNTRY=001,,C:\DRDOS\COUNTRY.SYS	DISKMAP C:
HIDOS=ON	MEMMAX +U
DEVICE=C:\DRDOS\EMM386.SYS /F=NONE	SUPERPCK /EM /R:0
/K=AUTO /B=FFFF /WINSTD	
DEVICE=C:\DRDOS\PCKWIN.SYS	:DRDOSEND

**Problem**

Sidekick, when loaded as a TSR, could not be unloaded from memory from the Service menu or from the command line.

**Regression**

XXCAL removed everything from the config.sys and autoexec.bat and was not able to complete the test until removing EMM386.SYS, which forces DR DOS 6.0 to load in conventional memory.

**MICROSOFT CONFIRMATION**

We confirmed the problem using XXCAL's stripped configuration.

We also confirmed that the same test ran successfully using MS-DOS 5 and EMM386.EXE.

**MS 0079354  
CONFIDENTIAL**

## APPENDIX B: MEMORY TEST CONFIGURATIONS

The following are the config.sys files we used (booting off a floppy). We did not use an autoexec.bat in any configuration. The 80386 machine (IBM PS/2 model 70) was a VGA with no cards plugged in.

	DR DOS 6.0	MS-DOS 5	MS-DOS 5 + Bluemax 6.0*
80386	FILES=30 HIBUFFERS=30 LASTDRIVE=G DEVICE=A:\EMM386.SYS /F=NONE /B=FFFF  HIDOS=ON	FILES=30 BUFFERS=30 LASTDRIVE=G DEVICE=A:\HIMEM.SYS  DEVICE=A:\EMM386.EXE NOEMS DOS=HIGH,UMB	FILES=30 BUFFERS=30 LASTDRIVE=G DEVICE=A:\BLUEMAX.SYS EMS=0 PRO=A:\BLUEMAX.PRO DOS=HIGH
80286	FILES=30 HIBUFFERS=30 LASTDRIVE=G DEVICE=A:\HIDOS.SYS HIDOS=ON	FILES=30 BUFFERS=30 LASTDRIVE=G DEVICE=A:\HIMEM.SYS DOS=HIGH	N/A
8088	FILES=30 BUFFERS=30 LASTDRIVE=G	FILES=30 BUFFERS=30 LASTDRIVE=G	N/A

### \* BLUEMAX.PRO:

```
AUTOBCF          ; INSTALL ==> Compress the BIOS using @65c9.BCF
USE=B000-B800    ; INSTALL ==> Recover RAM in MDA region
                  ; This profile created automatically by INSTALL
```

MS 0079355  
CONFIDENTIAL