



# Optimum Indeo™ Video Playback

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**Tuning** Indeo™ Video Technical Marketing  
Intel Corporation

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Your  
PC  
for**

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# Tuning Your PC for Optimum Indeo™ Video Playback

## Introduction

Intel's Indeo™ Video is a technology that provides a platform for capture, compression, and decompression/playback of digital video on the PC. It is licensable free of charge and is currently implemented as part of various video software packages such as Apple Computer's QuickTime\*, Microsoft's Video For Windows\*, IBM's Video IN\* and OS/2\*, Rational System's DOS4/G\*, and Novell's Netware\*.

The computational requirements of compression and decompression challenge the performance limits of your PC. This document describes ways to improve video **playback** on your PC by providing guidelines for optimizing your hardware and software configurations.

For best video results, your PC should have:

1. Local-bus architecture;
2. A powerful processor: Intel486™ DX processor or higher. Faster processors, such as the Pentium™ processor, support larger playback windows and higher frame rates;
3. A fast hard disk and double-speed CD-ROM;
4. At least 8 Mbytes of RAM;
5. A Windows graphics accelerator board;
6. 256-color VGA, SVGA, or other 256-color Windows driver;
7. A sound card.

The quality of video playback by any system is partly determined at the time of video capture and edit. At capture time, the video data rate, window size, frame rate, and quality settings are chosen. Because of this, video clips can vary significantly in their perceived continuity and color mapping, even when played back on a high-performance system without dropping any frames.

## The VidTest\* Diagnostic Utility: An Overview

To evaluate video playback performance, use the VidTest\* utility provided in the CD-ROM version of Microsoft Video for Windows\* 1.1 You can run vidtest.exe from the CD, or copy it to hard disk and run it from there. This application plays videos from any specified drive and reports various performance measurements, including:

8. Number of frames dropped;
9. CPU utilization for decompression and display, audio, and disk access;
10. Disk throughput.

If video clips do not play "briskly," you may want to consider using VidTest for some performance measurements. Refer to VidTest's readme and on-line help for instructions. Although VidTest results should be considered as approximations, they may help identify specific Indeo video playback bottlenecks in your PC. The basic steps for improving performance are:

11. Run the VidTest video playback test on the Indeo video test clip (defindeo.avi).
12. If frames are dropped, modify your system setup using the methods described later in this document.

Re-run the VidTest video playback test. If no frames are dropped, run VidTest again using other video clips to verify your system modifications.

## VidTest Tips

Be sure you are testing Indeo video playback (click on the appropriate menu box). VidTest defaults to using MS-Video1\* clips for testing.

Results typically vary each time you play back the same clip. Rerun the test several times for verification.

The "display performance test" CPU utilization result includes the video decode as well as the image drawing. It informs you of the Windows graphics

display driver usage (in spite of what the help-files claim!). From the Advanced menu, you can test display driver performance separately.

## Optimization Tips

### Tuning the Graphics Subsystem

(Note: Open circle bullets (○) indicate the most common causes of poor-quality video playback.)

13. Make sure you have 256-color VGA, SVGA, or other 256-color Windows drivers installed. If a 16-color VGA driver is used, colors will appear distorted. Playback performance can also be improved by switching from 24-bit or 16-bit graphics mode to 8-bit (256) color graphics mode, depending on how the .avi file was captured. Surprisingly, 16-bit performance may be worse than 24-bit; so if you prefer “true color,” compare your system’s performance in both modes.
14. Update your graphics drivers to the latest version. Playback frame rate is often improved with new driver releases, which are usually available at no charge from the vendor’s BBS or CompuServe\* forums.
15. Get a DCI-enabled display driver for your graphics subsystem card; contact your board vendor for current availability. (DCI stands for Display Control Interface. It is a driver-level software interface developed by Microsoft and Intel that provides enhanced video playback on the PC.)

### Tuning the Disk Subsystem

To quickly determine if disk I/O is a bottleneck in your PC:

1. Create a small (2 Mbyte) RAMDRIVE via your CONFIG.SYS file:

```
DEVICE=C:\DOS\RAMDRIVE.SYS
2048 /E
```
2. Reboot your PC.
3. Copy a small clip into this RAMDRIVE area.

VidTest ignores some factors (such as caching, main memory size, and CPU type) although these “hidden” items are factored into its disk, display, and audio tests.

If lip sync or frame rate of video playback improves, then the input/output data subsystem of your disk is a limiting factor.

16. Make sure your hard disk is defragmented. Run a disk defragmentation utility like MS-DOS Rel 6.x “DEFRAG\*”, or Norton Utilities Speed Disk\*. While defragmenting the disk, it is important to align the directories as well as the files. Disk defragmentation should be performed after every significant file addition or deletion activity.
17. Avoid using disk-compression software (e.g., MS-DOS DoubleSpace\*, DriveSpace\* or Stacker\*) on video files, since file size reduction is minimal and it adds to CPU overhead.
18. Use MS-DOS Smartdrv\* disk-caching program **efficiently**. Video files are large and usually contiguous if the disk is defragmented. Smartdrv’s useful “b” option determines how far to read-ahead.

To determine optimum cache configuration, test it by changing the command string and then rebooting. Your AUTOEXEC.BAT file should include the following:

```
C:\DOS\SMARTDRV.EXE 4096 4096
/b:81920
```

4096 tells the program to use 4 Mbytes of RAM for its cache. (Use 2048 or 3072 for the second number, if you have 8 Mbytes of system RAM.) See Microsoft Windows\* or MS-DOS\* documentation for details on Smartdrv parameters.

19. If your CONFIG.SYS file has a SMARTDRV line that contains the /DOUBLE\_BUFFER switch:
  1. Comment this line out (precede the line with the letters REM followed by a space).
  2. Put the earlier smartdrv invocation into your AUTOEXEC.BAT file.

The /DOUBLE\_BUFFER switch tends to make drives much slower, and may be excessive.

20. Microsoft's Windows for Workgroups\* 3.11 provides significantly faster disk file access than standard Windows 3.1 or Windows 3.11. Upgrade to Windows for Workgroups if you are playing clips from hard drives at high data rates.
21. Third-party disk caching software — such as Norton Utilities Ncache2\* or PC-KWIK\* — may improve frame rates for slower hard disks.
22. Video performance from CD-ROM can be improved with CD-ROM caching software such as in MS-DOS 6.2 Smartdrv. This software especially benefits older single-spin (150-Kbyte/sec) CD-ROMs by compensating for mechanically slow hardware. Use the most current drivers for Microsoft Windows and MS-DOS. For example, use MS-DOS Rel. 6.x Smartdrv instead of Microsoft Windows Rel. 3.1. When in doubt, check the smartdrv.exe file date with File Manager.
23. If the hard disk is IDE, enable the 32-bit access mode, if your drive supports this feature. This function is checked via the Windows Control Panel, 386 Enhanced section. This option improves video file access and throughput. However, for most SCSI hard disks, 32-bit disk access is not an option. To find out if your drive supports this feature, click the boxes marked 32 bit access and restart Windows. If Windows doesn't give you an error message, your drive supports 32-bit file access. If an error message appears, your drive does not support this feature and you should go back in to the Control Panel and uncheck this box.
24. CD-ROM files are padded to ensure equal frame sizes and constant data rate so that playback is smooth. If CD-ROM playback is slow, use the VidEdit program to verify that the video files on the CD-ROM are padded with "audio interleaved 1:1." If the video file is not interleaved, copy it to hard disk and play it from there.
- performance significantly, depending on your video card, capture rate of the .avi file, and your processor.
27. Have at least 8 Mbytes of RAM in the system. Of course, 12 or 16 Mbytes is much better.
28. Have the latest version of Microsoft's Video for Windows runtime installed. Version 1.1a (available since March '94) runs better than 1.0 or 1.1, and supports many new features. Download it from Microsoft's BBS or CompuServe. Recent versions of software applications which contain video should already include this latest Video for Windows package.
29. For best appearance, set the overall Windows screen size to 640x480 or 800x600, and use a 17" monitor or larger. Note that 1024x768 and

### **Adjusting the System Configuration**

25. Make sure you have the latest Indeo video drivers installed, and that your video clip is a recent one using the latest version of the encoder (latest version is 3.2, as of August 1994). You can download these drivers from Intel's BBS, at (916) 356-3600.
26. Run only one video application at any time. Opening multiple video files can slow

30. 1280x1024 screen size makes video windows look very small.
31. To use “full screen mode,” change the setting in the Media Player’s Device Configuration screen. In this mode, Microsoft Windows writes directly to the hardware instead of through the GDI. This results in a performance boost on some systems.
32. With Windows for Workgroups 3.11, enable 32-bit FILE access via the Control Panel Enhanced section. The default setting is 16-bit, which usually proves to be slower.
33. Create a permanent swap file for Windows (again via the Control Panel, 386 enhanced, Virtual Memory selection) rather than using a temporary swap file.
34. Make sure the ROM and Video BIOS are being shadowed to RAM. This is usually handled in the system configuration utility (outside of Windows, outside of DOS, accessed usually at power-on) or the system BIOS setup utility. If the system does not support this, obtain a utility such as QEMM Rel 7 that does.
35. The system must be running in turbo mode, NOT deturbo mode. Also ensure that the external cache and internal caches of the CPU are enabled, via the system BIOS setup utility.
36. Make sure that the system is running in Enhanced Mode (check via the “Help” “About” menus in Windows Program Manager or File Manager).
39. Some notebook computers cannot play full-screen video. If this is the case, play the video in a window. This problem would manifest itself as strange screen behavior in full screen mode of Media Player.

### **Tuning Notebooks and Energy-Efficient Desktops**

37. On notebook computers using a parallel port sound device, video performance may suffer due to I/O interrupts and system resource requests from the parallel port. To test, unplug the audio device, reboot, and retest video playback. Frame rate should improve. You may need to switch to some other type of audio device or a different notebook with built-in audio.
38. If the system is a notebook or energy-efficient PC, make sure the power conservation measures are “NOT” operational. Optimizations for power conservation can make peripherals or CPUs run at reduced rates, which results in a reduction in video performance. To test if power managed options are enabled, plug your

## **More Information**

If you have additional questions, please call the  
Indeo Technology Support hotline at 800-628-8686.  
(Outside the U.S., call +916-356-3551.)