



WindSock V3.0 - Windows Performance Analyser



FreeWare by Chris Hewitt, CompuServe 100036,133 Copyright (c) 1992 Technical Pixies

WindSock measures your system's performance from the point of view of Windows. It uses Windows API calls where appropriate, measures the speed of the CPU, video, disk, and memory, and displays an overall Windows performance index for your machine.

WindSock 3.0 also allows you to determine the iCOMP (tm) index of your machine, and can use the iCOMP index as an alternative to the WindSock CPU index.

Please report any bugs/suggestions to Chris Hewitt on CompuServe ID 100036,133.

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WindSock Options

The WindSock Options Dialog controls various option settings for WindSock. These settings are saved in a WINDSOCK.INI file in your windows directory.

Check Boxes:

iCOMP Index

When this control is checked, the CPU index shown is an approximation of Intel's iCOMP (tm) CPU speed index.

Test at Launch

When this control is checked, all the tests will be run as soon as WindSock starts. Caution: The 'startup figures may be slower than usual due to the interaction of the tests with the program startup.

Float on Top

When this control is checked, WindSock will 'float' above any other window on the screen (both as an Icon and a Window).

Wave Logo

When this control is checked, the 'Sock' logo is animated when WindSock is running as an Icon. The TPIX logo in the About dialog is also animated. Turn this off if you find it distracting.

Start Iconic

If this control is checked WindSock will launch as an icon rather than as a full window.

Total BIOS Scan

On some systems the BIOS scan which identifies system and Video BIOS information may not pick up your system's ID. If this happens, switch this option on, and a full scan of BIOS memory will be used (this is slower).

Test CPU Every n Seconds:

This control allows you to set the interval at which WindSock measures the CPU Index of your system. This figure can be set between 1 and 60 seconds. This is a 'Spin' control: click on the up arrow to increase, and the down arrow to decrease the value.

Test CPU for n Milliseconds:

This figure controls the length of the CPU Index test loop. Shorter tests use less resources, but may give unstable (changing) results. The test may be varied between 100 and 900 Milliseconds. This is a 'Spin' control: click on the up arrow to increase, and the down arrow to decrease the value.



Save Test Data

This Dialog enables you to comment and save test information. The results of your latest test are saved in a file called WINDSTAT.TXT in the directory that WindSock was run from. This is especially useful if you are carrying the utility around on a floppy to evaluate systems.

Before you save the test data, perform the Video, Disk, and Memory tests several times until you are happy with them (they may vary in certain circumstances), then allow the CPU figure to stabilise. Set the CPU test interval to 4 or 5 seconds, wait for a test to complete, then push the save button. The test results are displayed, along with a comments field which allows you to annotate the test results. Push the OK button to append the new test data to the file.

If you are using the iCOMP (tm) CPU index, this will be noted in the Save Dialog, and the composite parts of the iCOMP index (16 bit integer, 32 bit integer, and floating point) will also be written to WINDSTAT.TXT.

You may edit the WINDSTAT.TXT file yourself at any time.



Displays, Controls, and Options

The window which is displayed when you invoke WindSock shows five speed indicators, each consisting of a bar and a numeric LED, which show the relative speed of your CPU, Video, Disk, Memory, and Overall Windows performance. When the program is running minimised (as an icon) the CPU speed figure is displayed on the icon.

Context help is provided in a field at the bottom of the window. When you move your mouse over any control or data object a brief description of the object will be displayed

The buttons along the top of the window control various program functions, these are:



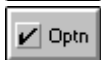
Displays information about Windsock.



Invokes Windows Help for WindSock.



Starts the save dialog, which allows you to save test information to disk.



Starts the options dialog, which allows you to change various program options.



Halts execution and exits from the program.

All main window commands are available when the program is minimised in the window's system menu. In order to use this menu, click once on the icon

The data area of the window is divided into five areas, each indicated by a button/icon. Each button, when clicked, invokes a dialog which will show you information about that aspect of your system. In order to perform a particular performance test immediately (or all tests in the case of the Overall Windows area), click on the indicator bar (sunken area) next to the appropriate button.

Click on the names below for details on the performance indicators, and the information presented in the related dialogs.



CPU performance CPU Dialog



Video performance Video Dialog



Disk performance Disk Dialog



Memory performance Memory Dialog



Windows performance Windows Dialog



CPU Performance

The area to the right of the CPU button contains an indicator bar which shows the relative performance of your CPU, and an LED display which quantifies the speed as an index number. The CPU index tells you how many times WindSock managed to perform the CPU test in 100ms. The WindSock CPU test loop contains a balanced mixture of non floating point instructions, typical of those found in an 'average' program. If you move your mouse or run another program while the test is being performed, it may slow down significantly.

A scale under the performance indicator bar shows a '^' at the points on the indicator that I expect various Intel-based CPUs to register. If you point at these indicators, the machine types related to these indexes will be displayed in the MicroHelp field at the bottom of the main window.

In version 3.0 you may specify (in the [Options dialog](#)) that the [iCOMP](#) (tm) CPU index be used instead of the WindSock Index. If you are using the iCOMP test the characters '(i)' will appear on the right side of the CPU indicator bar. This index is scaled to be approximately the same as the WindSock index (on the display), although iCOMP includes floating point instructions, so there will be a difference between systems with x87 FPU's and those without.

The CPU index is tied fairly closely to the speed of the hardware (CPU/Cache), but it may be slightly higher when you are running Windows in Standard mode rather than in Enhanced mode (in a virtual 8086). If the figure varies, or seems too low, try changing the 'test for n Milliseconds' figure in the [Options dialog](#).

Overlaying the CPU indicator bar are two extra pieces of information: the CPU type (as determined by Windows), and the maximum speed of the system clock in Mhz. This figure is the internal speed of the CPU, not the speed of the motherboard (which will be different in the case of DX2 and Overdrive CPUs).

As to what constitutes a 'good' CPU performance figure, well that depends on what you want to do with your system. A 386SX/20 has an index of 80, and is quite fast enough for most common Windows applications (word processing/spreadsheets etc.). More specialised applications may require a faster system, I use a 486DX/33 (index 250) for Windows development, and a 486DX2/66 (index 450) for NT development. A 386DX/33 (index 150) is now the standard 'entry-level' machine. The following are the results that you can expect from various Intel CPUs (If you have a non-Intel CPU, please send me your test results - I am very interested!).

CPU	WindSock	iCOMP
386SX/16	65	22
386SX/20	80	32
386SX/25	100	39
386SL/25	110	41
386DX/25	120	49
486SX/16	120	63
386DX/33	150	68
486SX/20	150	78
486SX/25	185	100
486DX/25	190	122
OverDrive/16	200	132
486SX/33	245	136
486DX/33	250	166

OverDrive/20	250	166
OverDrive/25	315	231
486DX2/50	350	231
486DX/50	380	249
486DX2/66	450	297

Notes: These figures are for Windows **Standard** mode.
The iCOMP figures are the official Intel Index numbers.



CPU Dialog

The CPU Dialog presents the following information about your System:

Name

The name of the Manufacturer of this motherboard, or if that cannot be determined, the name of the BIOS manufacturer, or blank if unknown. If the system name is unknown, try turning on the 'Total BIOS Scan' option.

BIOS

The name of the manufacturer of the system BIOS, or blank if unknown. Use 'Total BIOS Scan' if the BIOS name is unknown. If you still do not get a result, and have access to CompuServe, I would appreciate it if you would send me a message and tell me what BIOS your system has.

Date

The date that the system BIOS was manufactured, or blank, or (possibly) garbage if the BIOS date is not at the usual location.

Math CPU

The generic name of the math CPU (80x87), or 'Not Installed' if no Math CPU is present.



Video Performance

This area consists of an indicator bar and an LED which represent your system's video (screen) performance. Initially the video index is zero. To run this test, click on the video indicator bar. The test will last 3 seconds. A comment will overlay the indicator bar on the completion of a test, giving you some feel for how this systems stacks up. The index values for each level are:

Poor	0-29
OK	30-89
Good	90-209
Great	210-449
Superb	450 and up!

The test is conducted by painting a weighted set of lines, bitmaps, and text using the Windows API. The index is the number of test loops that were completed in 3 seconds. Your machine's video speed is determined by several factors: how fast your video card runs, your CPU speed, the driver that you are using, the version of Windows, and memory caching.

The video index figure may vary between tests due to other system activity that occurs while the test is running. Perform this test several times in order to get a feel for the comparative speed of the system.



Video Dialog

The Video Dialog presents the following information about your video subsystem:

BIOS

The name of the Video BIOS, or blank if unknown. If the BIOS name is unknown, try using the 'Total BIOS Scan' option to look for the Video BIOS name in less obvious locations.

Model

The model number of your video card, or blank if it cannot be determined.

Version

The version number of your video BIOS, or blank if this cannot be determined, or garbage for some cards (one algorithm doesn't fit all - sorry).

Driver

The name of the Windows video driver being used. This is the name of the .DRV file in your Windows/System directory that is being used.

Driver Version

The Windows version number of your video driver.

Driver Name

The full name of your video driver (on a line by itself).

Pixels

The number of pixels (X*Y) that the driver supports.

Colors

The number of simultaneous colors that the driver supports.



Disk Performance

This area consists of an indicator bar and an LED which represent your system's disk performance. Initially the disk index is zero. To run this test, click on the disk indicator bar. The test will last 3 seconds. A comment will overlay the indicator bar on the completion of a test, giving you some feel for how this systems stacks up. The index values for each level are:

Poor	0-29
OK	30-89
Good	90-209
Great	210-449
Superb	450 and up!

Disk performance is calculated from the weighted result of three tests: physical (reading an uncached file then writing another on the default hard disk), cached (reading the file we just wrote), and tempfile (writing to then reading from your Windows [tempfile directory](#)). Disk performance is dependant on disk speed, hardware caching, and software caching.

The disk index figure may vary between tests due to other system activity that occurs while the test is running. Perform this test several times in order to get a feel for the comparative speed of the disk subsystem.

If you are using SmartDrive with write caching turned on, the whole problem of what is and what isn't in the cache gets much more complicated, and the Disk index figure varies much more. It is interesting to watch the internal workings of the cache. The write buffers tend to get in the way of the read buffers to some extent and the cached read component of the test actually gets quite a bit slower (the write of course speeds up dramatically). Buffer flushes sometimes happen when you are re-running the test (or even the other tests), causing these figures to vary.

In a way write caching is just putting off till tomorrow (well for 5 seconds anyhow) what we used to do today. I would suggest that you test with read caching only, but it's up to you!



Disk Dialog

The Disk Dialog shows the name of the drive that is being used for your TempFile directory. The remaining part of the window shows size and usage of up to 6 disks (all that there was room for).



Windows Performance

This area consists of an indicator bar and an LED which represent your system's overall windows performance. This is a composite index made up from the results of all the other tests. This figure will be zero until all other tests have been conducted. If you click on the indicator bar, all the tests will be performed. The value is overlaid by a comment which aims to give you some feeling for how your system stacks up as a Windows platform. The comments and scores to which they relate are as follows:

Poor	0-29
OK	30-89
Good	90-209
Great	210-449
Superb	450 and up!

The composition of the index is:

CPU Speed	40%
Video Speed	20%
Disk Speed	20%
Memory Speed	10%
Memory Size	10%

The memory size figure is determined when WindSock starts, and displayed in the Memory Dialog.



Windows Dialog

The Windows dialog shows you the following information about the Windows environment that you are running:

The **versions of Windows and DOS** that you are running. Different versions will give different results for the video and disk tests.

The **Windows Mode** that you are using. This will either be Standard or Enhanced (BC++ programs do not run in Real mode). Again, the mode that you are using will have an impact on the results of the tests. Standard mode is faster.

The **status of the swapfile**. In Standard mode the swapfile is inactive (not used).

Windows Directory

The name of the directory from which Windows is running.

Kernel

The name of the Windows kernel that is being used currently.

Shell

The name of the shell that is executed by Windows at startup.



Memory Performance

This area consists of an indicator bar and an LED which represent your system's Memory transfer performance. Click on the indicator bar to perform this test. The indicator bar will be overlaid by a comment which aims to give you some feeling for how good your system's memory transfer rate is. The comments and scores to which they relate are as follows:

Poor	0-29
OK	30-89
Good	90-209
Great	210-449
Superb	450 and up!

The actual rate achieved (in MB/Sec) is displayed in the Memory Dialog.

If you do not have enough real memory available to 'swamp' the system's SRAM cache, a warning will be displayed. In this case, the memory figure will be suspect, close some applications and try again.



Memory Dialog

The information displayed is:

Base Memory

The amount of memory below 640KB reported by the BIOS POST routine (usually 640KB).

Extended

The amount of extended memory available, as reported by POST.

Size Index

An index related to the size of your physical memory. This number contributes 10% towards the overall Windows performance index. The 'value' of your memory is scaled so that the first few megabytes are more important than the later ones: 16MB is **not** twice as good as 8MB. There is no 'feel' scale for this index, but 1MB works out as 'Poor' and 4MB is the start of 'Good'. You need something over 64MB to qualify your memory size as 'Superb'.

Transfer Speed

The number of Megabytes per second achieved by the memory transfer rate test. 'Not Tested' if this test has not been conducted.

Memory transfer rates expected for various CPU types (with no wait states) are:

386SX/20	4.65MB/Sec	
386DX/25	8.7MB/Sec	(if cached)
486SX/25	9.75MB/Sec	
386DX/33	11.5MB/Sec	
486DX/33	11.5MB/Sec	
486DX2/66	11.5MB/Sec	(33Mhz Motherboard)

The memory transfer speed is related closely to the MHz rating of the motherboard. If your system performs significantly worse than this, check that your motherboard is running at full speed, and that your memory is fast enough to function with 0 wait states (is the speed recommended for your motherboard). When running at 1 wait state, the memory speed will be halved.

Swapfile Size

The size of the swapfile (permanent or temporary) if running in Windows Enhanced mode, or the size of the permanent swapfile if running in standard mode (when the swapfile will not be active).



Common Questions and Answers

If WindSock is so good, why is it free?

WindSock is free in order to achieve the widest distribution possible. WindSock is the basis for a shareware product called WindSock Sim (Windows Performance Simulator). Sim uses the data gathered by WindSock to allow it to predict the Windows performance of various hardware and software combinations. We will continue to upgrade WindSock in response to feedback from users. Upgrades will be available every 3 months, usually showing up on the CompuServe WINADV forum first (3.1 is due 1 Feb 93).

I have an amazingly fast/expensive disk drive/controller/video card, but my 386/20 still gets 'Poor' performance on the Disk, Memory, and Video tests - why?

Because the CPU is too slow for a better result. The video test uses the Windows API to write to the screen. The API calls use up CPU time, hence the faster the CPU, the better the video performance (although on the same machine, a good card will still give you better performance). Fast cache memory on the motherboard will also boost video performance, and faster machines generally also have SRAM cache.

The disk subsystem is less sensitive to CPU speed, but it is weighted towards systems with lots of fast cache memory (which is a very good thing for a Windows application). A faster CPU usually has more and faster memory.

The Memory speed depends on the speed of your motherboard and on the number of memory wait states (i.e. the speed of your memory chips). A wait state can ruin your day, so make sure that you install memory that is recommended for your motherboard by the manufacturer. Care should also be taken to buy new memory from a reputable dealer, because there have been cases of memory being labelled misleadingly.

What does each test consist of?

The CPU test is a loop with a 'typical' mixture of instructions. The test uses the real time clock for greater sensitivity. It waits for the clock to hit zero, performs the test loop, then finds out how many ticks have passed since the test began. It runs this test as many times as it can in the test interval, then uses the average number of ticks to work out how many tests could have been carried out in 100ms. This figure is the CPU index (all the tests use our own RTC 'GetTickCount' function rather than GetTickCount). The CPU test loop does not contain any floating point instructions, so it does not test the math co-processor at all.

When you use the iCOMP option, a set of three tests is carried out: Integer, Long, and Floating point, and the CPU performance index is calculated using a modified form of the iCOMP algorithm. This will test your math co-processor if you have one.

The video test creates a new window, then loops for 3 seconds, writing a weighted set of lines, small bitmaps, and text to the window. The index is the number of sets that were written in that time. These are the most common video API instructions in Windows applications.

The disk performance index is calculated from the weighted result of three tests: physical (reading an uncached file then writing another on the default hard disk), cached (reading the file we just wrote), and tempfile (writing to then reading from your Windows tempfile directory). Each test is run for 1 second, then the number of 1k blocks read/written by each section is then 'kludged' by a weighting algorithm to give the result.

The memory test allocates up to 1MB in 64KB chunks, then cycles for 2 seconds copying memory around. This should 'swamp' up to 512KB of SRAM cache, and give you a fairly accurate picture of the transfer speed of your system. A system with 1.2MB or more of SRAM cache deserves the extra points it will score (probably 999!).

In general the philosophy of this product is to be 'environmentally friendly'. None of the tests alter the normal running of the machine or disable interrupts or anything like that. Because of these tasks which happen in the background (TSRs, SmartDrive, drivers etc.) can have an impact on the test results, so don't use the mouse or do anything else while the tests are running.

Why do the test figures change from release to release?

I have attempted to change the tests as little as possible from release to release, but I am also trying to improve the quality of the testing. There have been problems with several tests at various times, as far as I know this 3.0 release solves all of them.

The policy is that any change in the test results will be indicated by a change in the major version number. You will be able to compare 3.0 to 3.1 results, but not to 2.x results. The main reason for the jump from version 2.0 to 3.0 was the introduction of the iCOMP test, which caused changes in the way that the CPU figures are calculated.

Where is WindSock SRM 3.0, and NutShell?

I am working on WindSock SRM 3.0 at the moment. The performance analyser was more important because more people requested changes and upgrades, and because Sim is dependant on the amount and quality of feedback generated by WindSock. NutShell has been dumped because the last thing the world needs is another Windows Shell program (there are some very good ones out there).

Why are most of the strings in this program actually bitmaps?

This is to enable the strings to be translated into Kanji/Kana. The bitmap/strings are 16 pixels high, which is just big enough for the smallest Kanji font. Translation of the strings into other languages can be performed using a resource editor. This scheme also allows fairly simple translation of the constant strings into Arabic, Hieroglyphs, Cuneiform, or even Linear B!

In recognition of the fact that most of the world does not speak English, the main window display (icons, indicators, LEDs etc.) is designed to be mostly 'language free'. The program is also (almost) keyboard free, partly for the same reason, but mostly because you have to be crazy or desperate to try running Windows without a mouse.

Note: **Hieroglyphs** ('priestly writing')- Early form of WingDings, the only language ever to consist entirely of puns.
Cuneiform - First language that 'Even a manager could write'.
Linear B - Job creation scheme for Philologists, something like well-aged S/360 Assembly Code.



WindSock Sim (Windows Performance Simulator)

WindSock Sim is a shareware product that uses data gathered by WindSock to predict the performance characteristics of various machine configurations **before** you buy or upgrade.

Sim allows you to visually create a system configuration, including motherboard, memory, video card and monitor, disk controller, drives etc. and estimates the Windows performance of this system in terms of WindSock test results. You can even add prices to the database to allow you to determine the most effective system for your money.

The WindSock Sim program and demo database are free. The full database will be available for a moderate fee, and will be updated quarterly to allow for new hardware and software releases.

The initial shareware release of the program, WindSock Sim 3.0 (the release numbers will track the WindSock releases used to gather the data, appearing approximately 3 months later) will be available in early February 93. Ordering information for the database will be included with the program documentation. Companies that are interested in distributing the database can contact us on CompuServe or at the address below.

In order for this product to be useful, statistically meaningful amounts of data are required for thousands of different machine configurations. Anyone who provides complete and accurate (i.e. useful) data on 5 or more different system configurations will receive a **free copy** of the database. By different configurations I mean various combinations of motherboard, video card, disk drives etc. (the software part is easy to factor). Results which fall outside standard deviations will be rejected, so throw in a few extra sets for luck.

Data on Proprietary Japanese systems (NEC, Fujitsu etc.) would be very useful.

The data required is the WINDSTAT.TXT (iCOMP CPU please) results of your tests, annotated to include:

- The system manufacturer.
- The name, type and BIOS of the motherboard.
- The amount of SRAM (external) cache.
- The amount and speed (in nanoseconds) of the memory.
- The manufacturer, model, and BIOS date of the Video card.
- The manufacturer and model of the screen
- The manufacturer and model of the disk drive tested, and the controller

The following is an example of the sort of data needed. If you don't have all this information, just try your best.

Comments: HandMade by Pixies, for Pixies

Manufacturer: Technical Pixies
MotherBoard: NS-486/3, ABC Computer, AMI BIOS
SRAM cache: 256KB (30ns)
Memory: 8*1MB SIMMs, 70/80 ns mixed (with a wait state!)
Video: Video7 1024i 512KB, Headland BIOS
Screen: Compaq VGA
Disk: Maxtor 120IDE, 12ms, Miniscribe AT Controller

Test Conducted at 02:10:44 on 10/31/92
Processor: 486DX/33+FPU (CPU index is iCOMP)
iCOMP: Int 16 (67%) 139 31, Float (8%) 498 26,
Int 32 (25%) 139 31

Memory: Base 640KB, Extended 7168KB,
Size Index 172

Environment: Windows 3.10 Standard Mode	CPU	Video	Disk	Memory	Overall	
DOS 5.0	Swapfile Inactive	167	138	203	121	196

You can send your data to the following addresses:

CompuServe: [100036,133]

Snail Mail:

Technical Pixies
25 Coleman St,
North Fitzroy,
Victoria 3068,
AUSTRALIA



The iCOMP (tm) index

(iCOMP is a trademark of the Intel Corporation)

iCOMP stands for Intel COmparative Microprocessor Performance. The iCOMP index has been developed by Intel as a standard way of measuring the relative speed of various processors.

The iCOMP index is based on an analysis of the execution profiles of the most popular current and future applications. Intel then ran suites of test programs which approximate these workloads, and summed up the results as an index number, based on the performance of a 486SX/25 being 100.

The 'iCOMP' index implemented by WindSock is not the same as the official iCOMP index, because it does not use exactly the same tests. The WindSock iCOMP index (WiCOMP) is an approximation of the official iCOMP test.

The official iCOMP index numbers (and their WindSock equivalents) are:

CPU	WindSock	iCOMP
386SX/16	65	22
386SX/20	80	32
386SX/25	100	39
386SL/25	110	41
386DX/25	120	49
486SX/16	120	63
386DX/33	150	68
486SX/20	150	78
486SX/25	185	100
486DX/25	190	122
OverDrive/16	200	132
486SX/33	245	136
486DX/33	250	166
OverDrive/20	250	166
OverDrive/25	350	231
486DX2/50	350	231
486DX/50	380	249
486DX2/66	450	297

Notes:

As WindSock 3.0 has not been tested against all possible combinations of CPU/FPU, the results you get may vary from those expected. If your results vary significantly from the standard results presented here, and you have access to CompuServe, please mail me your test results from 'WINDSTAT.TXT'.

The WiCOMP test was tuned to the iCOMP index using a range of Compaq machines (M series) as the test beds (i.e. for this index a Compaq 486s/25M = 100). The older 'E' series machines returned generally worse results.

The 'WindSock' figures in the previous table refer to the standard WindSock CPU test (iCOMP option off), which is integer only. These should be broadly comparable with WindSock 2.0

CPU results.



Error and Warning Messages

Error and Warning messages are displayed in red in the MicroHelp field at the bottom of the Main Window. These messages disappear after a few seconds. The following is a description of the possible error and warning messages and their meanings:

E001 - Unable to Allocate Buffer for Mem Test

WindSock was unable to allocate sufficient free memory on your system to run any sort of meaningful memory speed test. Close down some applications and try again.

E002 - Very Low Memory, Mem Test Aborted

WindSock was unable to find sufficient free memory on your system to run any sort of meaningful memory speed test. Close down some applications and try again.

E003 - WINHELP.EXE not found

WINHELP.EXE (Windows Help) was not in your system path. Check that this EXE file is available (it is usually in the Windows root directory).

W001 - Low Disk Space, Disk Test Unreliable

Less than 1.5MB of disk space is available on your Tempfile Disk (see Disk Dialog to find out which one that is). The test is still run, but the results may be higher than expected, because WindSock was unable to 'swamp' your disk cache. Delete or move some files from this disk and try again.

W002 - Low Memory, Memory Test Unreliable

Less than 1MB of free system memory was available to run the memory speed test. The test is still run, but the results may be high because WindSock was unable to 'swamp' the SRAM cache on your motherboard.



CPU Performance Considerations

Windows 3.0 is a lot slower than DOS for most applications. There is nothing much that you can do about this other than buying a faster machine. A 386SX/20 should be OK for a normal Windows user (Word processors and spreadsheets), if you have a 286, you should be seriously thinking of upgrading.

Another option is to upgrade to Windows 3.1 (if you are a Windows 3.0 user). Windows 3.1 includes a lot of tuning in the API, and you should see improvement in video speed and general application performance. This performance improvement is not reflected in the CPU index figure, because this measures the raw machine CPU performance. Since most Windows CPU usage is by video API functions (it is a GUI after all), the change in the video performance figure between 3.0 and 3.1 will be your most accurate gauge of CPU improvement. This will probably be a 10-15% improvement, although applications that were slow because they spent a lot of time doing video API stuff may seem to go **much** faster. The 3.1 device drivers are generally faster too.

CPU speed also has a significant impact on your disk and video performance. This is especially true of machines which have SRAM cache which will deliver much better video and disk performance than an uncached machines with the same speed CPU.

Windows is also slightly faster in Standard mode than in Enhanced. Run in Standard mode unless you have a reason (DOS programs, lack of memory) not to.



Memory Size, Speed, and Allocation

You should have at least 2MB of memory to run Windows. Adding more memory (at least 2MB) is a good idea, because you can use it as a disk cache with SmartDrive or some other disk caching software.

Memory usage is the most critical factor in windows performance which you can control (memory speed is probably more important, but you can't fix that short of getting a faster machine). Your major control is over the Size of the SmartDrive.

Typical SmartDrive assignments for various memory sizes (Windows 3.0 only) would be:

Memory	SmartDrive Size	Minimum
	Normal	
1MB	384KB	256KB
2MB	1MB	512KB
4MB	2MB	1MB
8MB	2MB	1MB

i.e. for an 8MB system use: "DEVICE=SMARTDRV.SYS 2048 1024" in CONFIG.SYS

Performance improvements from a larger SmartDrive cache size are usually minimal after 2MB. The actual optimum cache size for your machine is dependant on your application load. Experiment with various sizes to determine the best size for your machine.

Windows 3.1 users should probably accept the default SmartDrive configuration. At this release (4.0) SmartDrive has a tendency to lock your system if you let it have too much memory. The default configurations (for 4.0) are about half of the sizes I have suggested for Win 3.0. Experiment by all means, but not with important files open!

If your memory speed seems low compared to other similar systems, check the speed of your memory. Ensure that you have the recommended memory chips for your motherboard.

Many Windows applications use temporary files. These are usually placed in the directory identified by the TEMP environment variable. This directory should be on your fastest hard disk, or if you have enough memory (4MB or more), in a RAM disk. 256KB is usually enough for a RAM disk, assigning more may result in unnecessary swapping when your applications run out of real memory. Microsoft suggests not using a RAM disk at all unless you can think of a good reason why you should, because SmartDrive (especially SmartDrive 4.0) may actually be faster than RAMDrive especially when using 'look-ahead' buffering techniques (the default).

To set TEMP directory:

In AUTOEXEC.BAT use: "SET TEMP = C:\TMPFILES"

To setup a 256KB RAM disk:

In CONFIG.SYS use: "device = c:\windows\ramdrive.sys 256"

If you have Expanded memory, you can convert it to Extended memory (which windows uses) with the appropriate software.or hardware switches.

You should create a permanent swapfile if you require extra virtual memory to run applications in Enhanced 386 mode. If you are using a swapfile you should still use a

reasonable amount of memory for the disk cache. If you do have enough real memory for your applications to run, you should use Standard Mode which is faster than Enhanced 386 mode.



Disk Considerations

Windows uses your hard disk intensively. Windows programs tend to be large, and application programs often use tempfiles. In 386 Enhanced mode the disk may be heavily used for application swapping. Use Standard mode if you have enough real memory. You should use disk caching software to minimise actual disk accesses. See under Memory Tuning in this help file for recommended SmartDrive sizes.

A caching disk controller card will improve your system's performance, but it is usually better to spend your money on extra extended memory which can be configured as either Heap or disk cache.

If you are experiencing very poor application performance due to disk I/O, you should consider using caching software or hardware which allows disk **writes** to be cached (most only cache reads). SmartDrive 4.0 (which comes with Windows 3.1) has this capability (in fact it is the default). This option is reasonably safe, but if your system is halted before the write buffer is flushed to disk, you can lose data. The buffer is flushed at least every 5 seconds, so if you wait that long before turning your machine off, you should be OK. The following DOS command forces SmartDrive to flush it's buffers:

```
SMARTDRV /C
```

Actually the performance boost from write caching is not as high as you might at first expect, because the writes are using the same cache as the reads, and may cause pages to be flushed that would normally be in memory for a future read (the reads and writes get in each other's way).

If you have any difficulties with SmartDrive 4.0 write caching use:

```
SMARTDRV.EXE C D
```

in your AUTOEXEC.BAT file to turn off write caching while maintaining read caching (in this example for the C and D drives).



Video Tuning

Video speed is dependant on the speed of your CPU, video card and video device driver. Some systems allow video BIOS to be placed in high conventional memory (640KB-1MB), or to be cached with fast RAM. Use these options if you can.

Some video cards implement common Windows video functions (BitBlt, TextOut etc.) in hardware/firmware. These cards improve video speed dramatically.

If you are using higher display resolutions (800x600 etc) or more than 16 colours, you may notice that your video slows down quite a bit (depending on the card and video driver).

Windows 3.1 is 10-15% faster than Windows 3.0 on video I/O (depending on the driver). The standard drivers for Windows 3.1 are also improved. The standard super VGA (800x600x16) driver seems to be just as fast as the old VGA driver.

Base Physical Memory('Real' memory):

Usable memory below 1MB as determined by the BIOS POST routine.
Usually limited to 640KB.

Extended Memory:

Extra (above 1MB) conventional memory installed on your system, usually on the motherboard.

Windows comes with HIMEM.SYS which manages extended memory. Some machines can utilise memory between 640KB and 1MB as extended memory..

Expanded Memory:

Extra memory available via an expanded memory manager. Often installed on a special card.

Windows comes with a driver, EMM386.SYS, which manages expanded memory. Expanded memory can be converted to extended memory for windows use. Check the manual for your expanded memory board or software.

Test Interval:

The interval between CPU index tests. This can be varied between 1 and 60 seconds in the options dialog.

Windows Mode:

Windows 3.0 can run in 3 modes: Real, Standard, and Enhanced (3.1 does not support Real). Real mode uses the base physical memory ('real' memory) of the machine, it can also utilise Expanded memory.

Standard mode uses base and extended memory. Windows runs faster in Standard mode than in Enhanced mode.

Enhanced mode requires a 386 or 386SX machine with 2MB of memory. Enhanced mode allows you to use a swapfile (virtual memory).

System Heap:

The memory available to Windows to run applications, includes base, extended and virtual memory.

Swapfile:

A disk file used as virtual memory in Enhanced 386 mode

tempfile directory:

The directory identified in your environment as TEMP. Usually defined in AUTOEXEC.BAT as TEMP=C:\WINDOWS\TEMP or some other directory

cache:

Memory used as a temporary store for information from slower memory or disk.

Motherboards may have fast cache memory to improve access time to main memory.

Software like SmartDrive allows memory to be used to improve disk performance. Some disk drives have integral cache to improve their performance, and disk controller cards are available which include CPUs and memory to boost the speed of attached disk drives.

Caching is a generally good idea,

see under Disk tuning in this help file

SMARTDRV.SYS:

SmartDrive is a disk caching program supplied with Windows. It is added to your CONFIG.SYS file (or AUTOEXEC.BAT for Win 3.1) automatically by the Windows install program.



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This Program was developed using Borland C++ 3.1 and the Borland ObjectWindows Library.

I would like to thank all the people who reported bugs with the previous versions of this product, or made suggestions for improvements and new features - especially Jonathan Gift, Akira Ohkado, Paul Kingsley and John Howells.

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Chris Hewitt, 4 November 1992



Known Bugs and Incompatibilities

Norton Desktop for Windows 1.0

There is a problem with message handling between BC++ programs and NDW 1.0. This is not a problem with NDW 2.0. The symptom is a UAE when using the Hist button.

Very low/changing CPU performance figure

The CPU performance test uses the PIT clock to give a more accurate measure of CPU time. It appears that some systems have a problem with this. Perhaps some other software is using/modifying the programmable timer, or the timer hardware is different. If you experience this problem and are on Compuserve, please send me some mail and describe the problem, including the type of machine and BIOS, and what TSRs are running.

Disk performance figure varies by +-10%

When SmartDrive 4.0 (or other) write cache is enabled, the figure for disk performance will vary depending on when the disk buffer was last flushed. Perform several tests and use the average figure (shown on the right of the display).