WindSock V3.20 - Windows Performance Analyser

Freeware by Chris Hewitt, Copyright (c) 1992, 1993 Technical Pixies

WindSock allows you to analyse, record, and compare the performance of systems running Windows. WindSock assists in the selection and tuning of Windows platforms.

Become a registered user of WindSock or send in useful performance information and we will send you a disk containing all the performance data collected so far. See Registration for details.

Please report any bugs/suggestions to Chris Hewitt on CompuServe ID 100036,133 or by snail mail at 25 Coleman St, North Fitzroy, VIC 3068, AUSTRALIA.

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 WindSock Options

The WindSock Options Dialog controls various option settings for WindSock. These settings are saved in a file called WINDSOCK.INI 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).

Force Mono
When this control is checked, the display is altered slightly to be more readable in black and white. Use this switch to make the display easier to see on screens that use grey scales (portables) or before a screen capture that will be printed on a non-color printer.

Use Win Clock
If this control is checked WindSock will use the Windows 'GetTickCount' function rather than the PIT clock. If GetTickCount is in use, the tests will run for 2-3 times as long, and the CPU test will no longer be performed automatically (you will have to click on the CPU indicator each time) use this option only if using the PIT clock causes problems on your system.

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).

Other Options (in WINDSOCK.INI):

Dates DD/MM/YY
changing Date DD/MM/YY=0 to =1 will cause any dates in the program to be displayed in European format (this switch is especially for John Howells).

. Disk Reset
This switch defaults to 1 (on), and causes a Disk Reset to be performed after a disk test. This flushes the SmartDrive buffer, and allows another test to be performed without the old test data remaining in the buffer, which would give incorrect results. You can switch this off if Disk Reset causes problems on your system, but only the results of the first test you perform will be valid.

SmartDrive Commit
This switch defaults to 0 (off). If your disk test results vary greatly, or look too

high, you can try changing this to 1 (on). This will cause a SmartDrive Commit command to be issued before the disk test to flush the buffers. This option is only for systems with SmartDrive installed.

Start Iconic
If this switch is 1 (on) WindSock will launch as an icon rather than as a full window.

Wave Logo
If this switch is 1 (on), 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 (Wave Logo=0).

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.

 Registration

Registration? I thought this was Freeware!

I dislike crippled software as much as the next person (actually I hate it), so this Freeware version of WindSock has the same capabilities as the registered version. What you get when you register WindSock is **Information**.

There are three ways that you can get a registered copy of WindSock and a copy of the WindSock Performance Database:

1) Send me some useful and interesting data.

By this I mean send me a .WSK file which 'tells a story'. There are two example .WSK files in this package, COMPAQ.WSK which shows the capabilities of various Compaq 'M' series machines, and WIN3031.WSK which illustrates the performance differences between Windows 3.0 and 3.1 Standard and Enhanced modes.

Other examples that would be nice are comparisons of various video cards running on the same machine, comparisons between lots of systems of the same type (10 486/66s reviewed), or lots of different disk caching software on the same machine. Generally I would expect results from 10 or so different configurations to qualify for a free copy, but the keyword is **interesting**. if you have a set of results that other people will look at and go 'gee - I didn't realise that' that's good enough.

It might be a good idea to include some text pointing out what the results show - I'm a bit slow sometimes!

You can send your .WSK file by E-Mail or by snail mail to the address below.

2) Send me some money.

Send a cheque or money order for $US 10 to:

Chris Hewitt
Technical Pixies
25 Coleman St,
North Fitzroy, VIC 3068
AUSTRALIA

3) Register through CIS:SWREG

If you have a CompuServe ID you can register WindSock via the Shareware Registration Forum on CompuServe. Just 'GO SWREG' and follow the instructions to register shareware.

Once you have registered you will receive a disk containing a copy of all the .WSK files available so far and a copy of WindSock which can read them you should receive your copy within 3 weeks of our receiving your registration. Updates to the database will be posted on the WINADV forum regularly, and may also be copied to other BBS's, or you can send

another $10 for another disk with the latest copy of the database and WindSock.

All disks will be 3.5" 1.4MB unless you notify us that you require a different media.

Comparison of Results

The Results Comparison window allows you to compare WindSock benchmark results from various systems. These results are stored in .WSK files created by the WindSock Save Dialog.

In the top right hand corner of this window is a list box which enables you to select the .WSK file from which the benchmark data will be read. Only .WSK files stored in the directory from which WindSock was run can be accessed.

There are a number of controls along the bottom of the window. The first five control what aspect of performance is compared. These are CPU, Video, Disk, Memory, and Overall speed. When one of these buttons is pressed, the display changes to show the relevant performance statistics, and the icon and title at the top left hand corner change. When you first enter the Compare Window the Overall index is shown.

The next control consists of three check boxes. This is used to select the order in which the data is displayed. The choices are: by Name (ascending), by Performance Index (descending), or by Price (ascending).

The next checkbox allows you to choose which of the two CPU performance figures to use. The default (unchecked) uses the WindSock index which is 16 bit integer only. If this box is checked the iCOMP index is used. The iComp index includes floating point and 32 bit integer tests, and tests the speed of the math co-processor.

Most current Windows applications do not make use of the math co-processor, because they are designed to run on 386SX and DX machines which usually do not have one. In the future more applications will make use of the math co-processor as 486DX machines become more common. The WindSock index shows how well the machine will run current applications, the iCOMP index how it will run the more complex applications of the future (as well as compute-intensive spreadsheets etc.).

The two remaining controls are a Help button, which invokes Windows Help for this topic, and a quit button, which closes the Compare Window and returns you to the main WindSock Window.

The detail area in the middle of the window shows the information from the selected .WSK file. The information displayed is the System Name, a bar showing relative performance, and a price.

The relative performance bar is overlaid by a 'feel' scale value (Poor, OK, Good, Great, Superb) and the actual index recorded for this system. For the CPU figure the characters '(i)' are displayed as a reminder if you are using the iCOMP index.

The price is usually only of interest if you are evaluating systems and have 'street' prices for them. You can update prices in a .WSK file from the Review Window. In .WSK files I produce these will be approximations of the Australian or US street prices where available.

Results Review Window

The Results Review Window allows you to examine detailed information about the systems recorded in .WSK files. You may also delete unwanted observations from the files, and add or modify prices and comments.

This window opens below the main WindSock window. When the results window is active, normal testing activity stops. The information presented by the WindSock main window, by the various dialogs, and in the video details window relates to the currently selected saved benchmark, not the system which the program is running on.

There are several controls in this window. At the top is a list box which shows the name of the currently selected system, and allows you to select another from the active .WSK file. Alongside this are two buttons, which allow you to change the price and comments for this system.

Below this is another listbox which enables you to select the .WSK file to review. Next to this is a delete button, which deletes the current entry in the .WSK file. Finally the quit button closes the window and returns WindSock to normal operation.

When you are reviewing a .WSK file, the Save Dialog may be used to save the current entry to another .WSK file, or to list the contents as text in a .WST file.

Tuning your System

There are a number of publications, programs and help files which detail '100 ways to speed up Windows' etc. Many of these suggestions will actually improve some facets of Windows performance, but in most cases the improvement will not actually be noticeable.

If you are experiencing poor performance under Windows, and your system is reasonably set up (the Windows Install program usually does fairly well), you would probably be better to spend your money on more and faster hardware, which is about the only thing which will make a observable difference to the speed that Windows executes your applications.

However there are a few suggestions that can make a big difference. The following topics discuss issues relating to performance in specific areas:

CPU Performance   Video Performance

Disk Performance   Memory Performance

Save Test Data

This dialog enables you to save your test results in machine readable form in a .WSK file, or as text in a .WST file (or both). The results are saved in the directory that WindSock was run from.

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), if you are interested in the detailed GDI statistics, perform the GDI test. Wait for a few seconds to allow the CPU figure to stabilise, then push the save button.

The Save Dialog lets you choose to save to a .WSK file, a .WST (text) file, or both. There are two check boxes at the top of the window which let you choose which file to save the data to.

Alongside these check boxes are two list boxes which allow you to select the name of the file to save into. If you would like to create a new file, press the 'Plus' buttons beside the list boxes and enter the new file name.

Below the file selection controls is an edit field which allows you to enter a 'Name' for this observation. This is typically the name of the system tested.

Beside the System name field are two buttons, marked 'i' and '$'. The 'i' button allows you to add a comment to this observation, and the '$' button allows you to enter a price for this system.

Below these controls is a summary of the observation that is to be saved. Check that these numbers are reasonable before you save the data. If you want to save the data, push the 'OK' button, otherwise push the 'Quit' button to abandon the dialog without saving any information.

Detailed GDI (Video) Test

The detailed GDI (Video) test is more complete than the standard video test that you execute off the main screen. This test takes 2 minutes to finish - do not move the mouse or execute any other task while this test is in progress.

Test results are shown for each of the 18 most important GDI operations. The figures shown are the actual number of operations per second achieved, and an index value for each function. The GDI operations are actually displayed in order of importance to the overall index.

At the bottom of the screen is the overall index value for this test, and index values which indicate this video system's (CPU/Driver/Card) suitability for various types of application (Word Processing, Spreadsheets, CAD, and Paint/Draw). The weightings for the various indexes are based on averages of GDI calls executed by these kinds of application.

The results of the detailed test should be similar to the results of the 'standard' video test that is displayed in the main window, although because the operations tested by the standard WindSock test are mainly 'screen' functions (output pixels to the screen) and some of the functions tested in the detailed test (e.g. SelectObject) are GDI functions which may not be sent to the actual card, the figures will be quite different for some configurations (fast card - slow CPU, fast CPU - slow card).

There are 2 buttons at the bottom of the screen. The 'Help' button invokes Windows help with this topic. The 'OK' button closes the window and returns to the main window.

Once you have performed this test any subsequent saves of data will include the detailed video results.

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.

Opens the Review Window, which lets you review results stored in .WSK files.

Opens the Compare Window, which displays a comparison of results from a number of tests.

Executes the Detailed GDI (Video) Test - this will take 2 minutes.

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.

Note: In version 3.x, when using the 'Win Clock' option, the CPU test will not be performed automatically - you will have to click on the CPU indicator bar each time.

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

 <u>Windows performance</u>   <u>Windows Dialog</u>

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.

In version 3.x 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 '(iCOMP)' 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 FPUs 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	115	49	
486SX/16	120	63	
386DX/33	150	68	
486SX/20	150	78	
AMD386/40	185	85	*
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	

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486DX/50      380         249
486DX2/66     450         297
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Notes: These figures are for Windows **Standard** mode.
The iCOMP figures are the official Intel Index numbers.
* Non-Intel CPUs as reported by WindSock ('WiComp')

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 12 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 timing various GDI functions and then weighting them according to their usage in various common Windows applications. 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! The WindSock disk test issues a Disk Reset after it runs. This will cause a buffer flush for systems with SmartDrive, and possibly for other caching software/hardware.

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 overlayed 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 overlayed 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	4.7MB/Sec	
386DX/25	9.3MB/Sec	(if cached)
486SX/25	9.9MB/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.

Note: Many people have reported unexpectedly low memory transfer rates on their systems (with no known wait states). There appears to be a problem with some motherboards and **IDE controllers** - when certain motherboards have IDE controllers installed, their transfer rates drop alarmingly!

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

What other Software do you make, and where can it be found?

Actually, I write mainframe system software (including system monitoring software) for a living, and write Windows code as a hobby, but under the 'Pixie' label are currently:

WindSock
Performance Analyser, Current release 3.20, release 3.3 due 1 Aug 93.

WindSock SRM
Resource Monitor, Current release 3.10, release 3.20 due 1 Jun 93.

WindSock SIM
Currently alpha, and will be published as soon as I have enough time and data to complete it. In the meantime WindSock 3.20 includes quite a bit of code from the SIM alpha (.WSK files etc.).

These programs are Freeware. If you are on CompuServe they can usually be found on WINADV or ZENITH forums, keyword 'WindSock'.

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 test 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 is the best thing that I can do to make Windows run faster on my system?

There are three important facets to Windows performance: CPU, CPU, and CPU. Although it is generally accepted that an accelerated video card is a very good idea, from my observations the speed of the CPU has much more impact. You should buy the fastest CPU that you can afford, even if that means going for a cheaper video card. The video driver that you use may actually be more important than the hardware itself - always use the driver supplied with your card (not the Windows VGA.DRV), and try an accelerated driver before investing in new hardware (Panacea's WinSpeed for example!).

The same goes for disk caching hardware. Investing the same amount of money in a faster motherboard and more memory (which can be used by SmartDrive) will give you better disk performance. I know several people with cached disk controllers (including myself), and they all say that when SmartDrive is on (given that they have sufficient memory), it makes very little difference to the speed of the system.

External cache on the motherboard also helps, as does large amounts of memory, try to get at least 256KB cache on your motherboard, and 8MB of RAM to start with. Ensure that you can upgrade your memory to at least 32MB - you will need it one day.

A fast video card should be next on your list, you can get very fast cards with Windows accelerators for little more than the cost of a normal VGA card - most PC magazines rate video cards regularly. You should probably go for the 'fastest cheap' accelerator card - unless you have a specific requirement for the absolute best.

There is little that you can do to tune Windows from the software side. Ensure that you have the latest (normally fastest) Windows drivers for your video card - these are often available on BBSs or direct from the manufacturer. Don't make your SmartDrive too large - 2MB is usually enough.

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 'GetTickTime' 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 12 seconds, writing sets of bitmaps, ellipses, rectangles, polygons, text, and lines to the window. The index is weighted according to the number of these instructions used by the most common applications in the areas of Word Processing, Spreadsheets, CAD, and Paint/Draw. The overall index is also weighted by the usage of these applications.

If you are interested in the breakdown of the index into application types, save the test data, and look in the .WST report file (default WINDSOCK.WST) that save creates. If you have a couple of minutes, run the detailed GDI test to get a more accurate breakdown of the video sub-system's performance. The detailed test is similar to the standard video test, except that it runs for much longer, and tests 18 instead of 6 GDI operations (the 6 tested from the main screen are the most important).

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 if the machine or disable interrupts or anything like that. Because of this 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.

WindSock Performance Database

'WindSock Performance Database' is a rather grand name for a collection of .WSK files containing all the useful performance information that I have been able to collect so far.

Anyone who has a copy of WindSock can produce a .WSK file and place it in the Public Domain. I hope and expect that many people will, so you should be able to download .WSK files from BBS's and other electronic media. The difference between these and .WSK files from the performance database is that I have checked the information in the database for 'accuracy' and have selected and organised the raw data so that each .WSK file 'tells a story' about the systems it documents. Text files explaining the results are also included.

Another difference is that only registered copies of WindSock can read performance database files. See Registration for information on how to obtain a copy.

The more data I get the happier I become, so if you have an interesting .WSK file please send it to me at one of the following addresses:

CompuServe: [100036,133]

Snail Mail:

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

Not all of this information will be included in the database, I will be regularly uploading standard (readable by the Freeware version of WindSock) .WSK files from vendors etc. to CompuServe and other electronic media.

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	115	49	
486SX/16	120	63	
386DX/33	150	68	
486SX/20	150	78	
AMD386/40	185	85	*
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:

* Non-Intel CPU as reported by WindSock ('WiComp');

As WindSock 3.1 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 - Insufficient Memory

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 - Insufficient Memory

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 - Unable to find WINHELP.EXE

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

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

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 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 motherboard upgrade can be a cost-effective solution. Much of the cost of current systems is in the disk and video sub-systems, not the motherboard.

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.

The Speed of the CPU is the most important factor that impacts Windows performance - it is much more important than the speed of the video and disk subsystems. If you are looking for a hardware upgrade to improve your Windows performance, look at a faster motherboard (with lots of SRAM cache and RAM) first.

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 <u>cache</u> with <u>SmartDrive</u> 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 3.x assignments for various memory sizes would be:

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

i.e. for an 8MB system use: "DEVICE=SMARTDRV.SYS 2048 2048" in CONFIG.SYS for Windows 3.0, or "SMARTDRV.EXE" in your AUTOEXEC.BAT for Windows 3.1 (SmartDrive 4.0 will default to the appropriate size).

Note: I have noticed that on many systems people have installed Windows 3.1 and neglected to alter their AUTOEXEC.BAT and CONFIG.SYS file for SmartDrive 4.0. You should check that you have removed the 'DEVICE=SMARTDRV.SYS" line form your CONFIG.SYS and added a "SMARTDRV.EXE" line to your AUTOEXEC.BAT which specifies the SmartDrive that comes with 3.1 (in you Windows Directory).

Performance improvements from a larger SmartDrive cache size are minimal after 2MB, and the extra SmartDrive cache may even slow things down because of the length of time required for a buffer flush. 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.

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. Cheaper Clone systems often have very slow memory sub-systems because this facet of performance has not been tested and reviewed until lately.

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 <u>Expanded memory</u>, you can convert it to <u>Extended memory</u> (which windows uses) with the appropriate software.or hardware switches.

You should create a permanent <u>swapfile</u> 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 <u>caching</u> 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 <u>Heap</u> 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).

Make sure that you have the latest Windows drivers for your card and software. A good driver can make a lot of difference to your video speed. If you can't get fast video drivers for your card, you could try a 3rd party driver like WinSpeed from Panacea.

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 and associated files may be copied, used and posted on any BBS without charge or permission. WindSock may be included in a companion disk with any book or magazine, and included in any shareware library, as long as the program and associated documentation are not modified.

The program and associated documentation may not otherwise be modified, sold, or used as part of a commercial package without the express permission of the author.

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.

Finally thanks to Robert McCulloch of Intel UK for going out of his way to supply me with the details of the iCOMP index and it's compilation the same day that I requested it.

Chris Hewitt, 15 April 1993

DISCLAMER

Release Notes

Release 3.0 4 Nov 92

Release 3.0 was a major enhancement to release 2.0. The new features were:

- Introduced the iCOMP CPU index
- added Memory Speed and Overall Windows indexes
- added Memory Size index (in memory dialog)
- tests now performed by clicking on the results areas, not buttons
- 5 new dialogs, to display extra system and performance information
- facelift of all dialogs, buttons, and displays
- review of all tests for greater accuracy

Release 3.01   8 Nov 92

Release 3.01 fixed a bug in 3.0 which caused TMP files to be created (by GetTempFileName) and not deleted.

Release 3.02   15 Nov 92

Release 3.02 fixed a number of early bugs reported with 3.0, and adds a few requested features:

- Adds support for Mono screens (requested by Kenichi Nakano)
- Uses Disk Reset to ensure stable disk results with > 512KB SmartDrive
- Places the Video test window in the center of the screen
- moves the cursor out of the video window during tests
- changes the CPU test to improve results on 50 and 66MHz machines
- changed the Disk test to give slightly lower results

Release 3.03   07 Dec 92

Release 3.03 was a minor upgrade to 3.02 which:

- Added the 'Use Win Clock' option which uses 'GetTickCount' rather than the PIT clock
  (many Japanese PCs do not support the PIT clock).
- Fixed a problem with CD ROM drives.
- Changed the segment/page alignment of some tests causing some figures
  to vary slightly from 3.02 (because of the addition of code to support 'GetTickCount').

See Options for an explanation of the 'Use Win Clock' option.

Release 3.10   01 Feb 93

Release 3.10 was a major upgrade to 3.03 which:

Altered the main window to allow index values up to 700 to be shown on the bar, and values up to 9999 to be displayed.
Altered the video test to test different GDI functions, weighted by common usage.
Added a new detailed video test, launched off the main window.
Fixed a bug due to the use of RTC counter 2, which caused the figures to be much lower than they should have been on some systems.

See Detailed GDI (Video) Test for an explanation of the new video test.

Release 3.20   15 Apr 93

Release 3.20 is a major upgrade to V3.10 which adds the following functionality:

Both the iCOMP and WindSock CPU tests are now ALWAYS performed. The iCOMP option switch now only selects the value to display.
Save Data now saves machine-readable information to .WSK files and text information
to .WST files. WINDSTAT.TXT is no more.
The Review Results window has been added to enable .WSK files to be reviewed.
The Compare Results window is added to facilitate comparisons between systems.
All microhelp and messages are now stored in stringtables not as bitmaps in order to reduce the program size.
The program attempts solve some problems with the NEC 98 BIOS.

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/Divide by Zero in CPU test

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. If you experience this problem, use the 'Use Win Clock' option to revert to the Windows 'GetTickCount' function for timing.

Many Japanese PCs do not support the PIT clock. GetTickCount is less accurate, but the figures should still be OK for comparison. The CPU figure may vary a bit between tests when using GetTickCount, there is not much I can do about this as the Windows clock is not very accurate. If you experience very unlikely results with this option, please report it and I can try increasing the test intervals.

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), or just test with write cache turned off.

WindSock will perform a Disk Reset by default after the Disk test to prepare for another test. If you are still having problems, change the SmartDrive Commit option to 1 - this may help (this option for users of SmartDrive only).