QuickBench™

**Disk benchmark utility which provides more than
70 different built-in disk performance measurements and
a powerful, highly customizable self-directed test.**

For use with Windows™ 2000 and later

User's Guide

intech

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Table of Contents

9   Chapter 3. Using the QuickBench Utility

1   Guide Introduction

About This Guide

The instructions and explanations in this guide assume that you understand how to operate your computer system. You should, for example, know how to choose, select, drag and launch/start an application by using your mouse. In addition, you should also understand how the desktop, windows, dialog boxes, buttons and file/folders work within the system environment. For more information about these items, please refer to your operating system's user guide and/or your computer's user guide.

Conventions Used In This Guide

Note: This symbol calls your attention to important information about the adjacent text. A note will always appear in standard print.

Warning: This symbol calls your attention to procedures in the adjacent text which could cause harm to you, your data or computer system. A warning will always appear in bold print.

User Registration

Please take a moment to register your copy of this software on-line via the Intech Software World Wide Web site at http://www.SpeedTools.com.

Technical Information

If you received this software with the purchase of a drive subsystem and you require technical support, Intech as made special arrangements with your drive manufacturer to support this software directly via their technical support department. For customers who have purchased this software product as stand-alone, Intech provides technical information and other late-breaking information via its web site at http://www.SpeedTools.com.

2 Describing the QuickBench™ Utility

About QuickBench

QuickBench is a simple yet powerful disk drive performance evaluation tool. It provides three pre–defined test sets as well as a custom test for measuring speeds using virtually any transfer size. QuickBench for Macintosh® is also available – providing the unique ability to compare the speeds of various devices on the two most popular operating systems in the world.
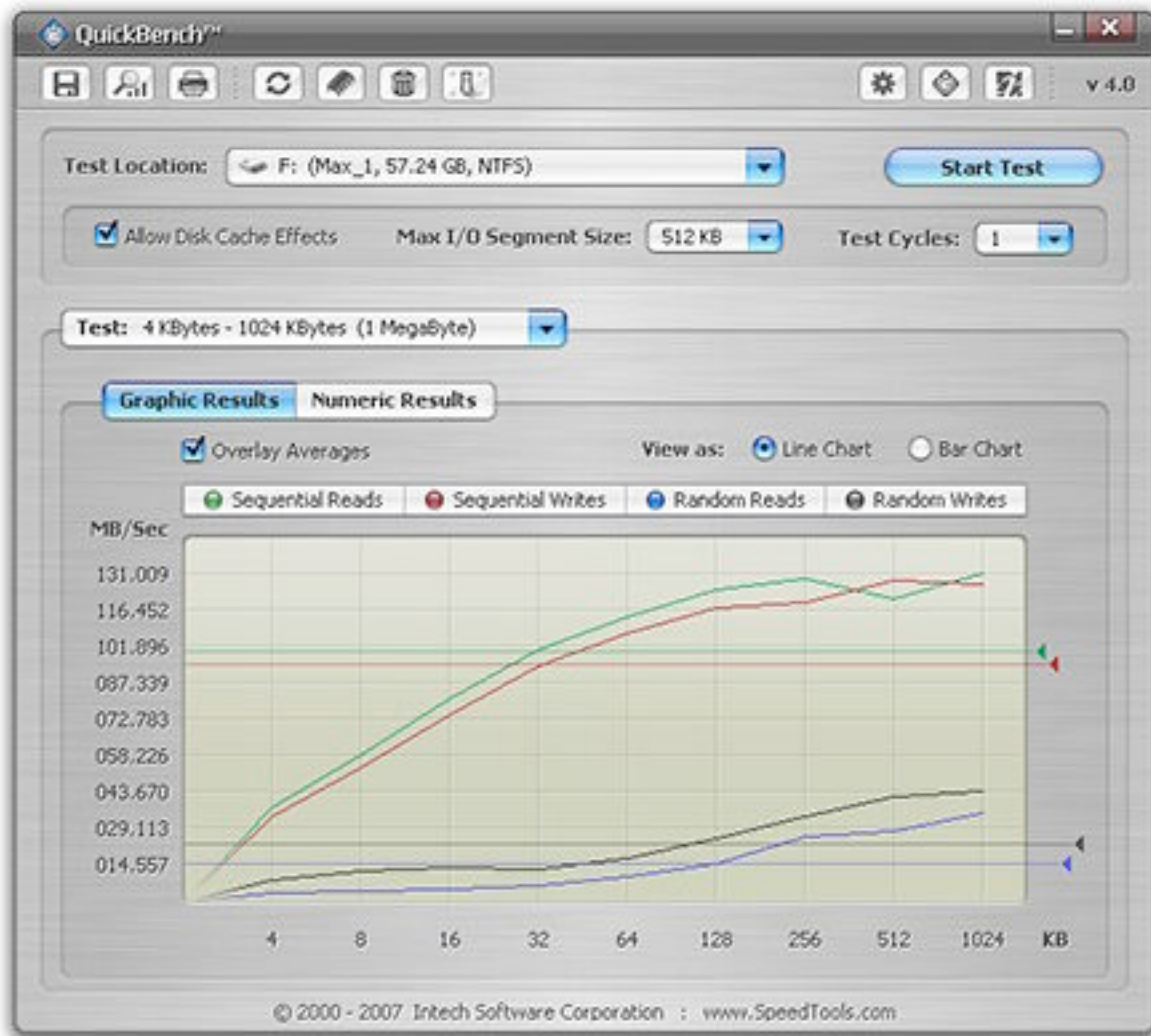

Figure 1. **The QuickBench Main Window (Shown in Graphic View)**

QuickBench is Non-Destructive

All QuickBench tests are performed by reading and writing to temporary test files exclusively. This means QuickBench is extremely safe and can be used on existing disk devices which may already contain data.

However, for maximum test repeatability, it is recommended that tests are conducted on disk devices which contain little or no data. See "QuickBench Benchmarking Tips" later in this guide for more information.

Measurement and Size Nomenclatures

QuickBench always presents byte sizes in powers of two. For example, a Kilobyte is considered to be 1024 (2^{10}) Bytes, NOT 1000 (10^3) Bytes. A Megabyte is considered to be 1024 Kilobytes, NOT 1000 Kilobytes, etc. Intech realizes that this is no longer the preferred nomenclature according to the U.S. National Institute of Standards and Technology. However, Microsoft Corporation continues to use this nomenclature throughout its applications and utilities, and so to reduce confusion, Intech has follows this same practice.

Describing the QuickBench Window Controls

Test Location Menu

This menu, located near the top of the window, allows you choose a disk volume for testing. Disk volumes will not be listed in this popup menu if they are write protected or are too small to be tested such as floppy disk devices, for example.
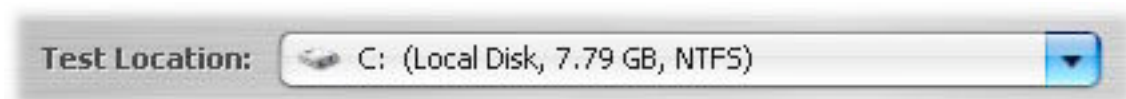

Figure 2. The QuickBench Test Location Menu

Allow Cache Effects Checkbox

Running a test with the Allow Cache Effects box checked, located just beneath the Test Location menu, will result in a very short pause (delineated in milliseconds) between each transfer size being tested.

The purpose of the feature is to provide a small amount of time to allow your drive to anticipate the next request and to pre-fill its read-ahead cache during read tests. For write tests, this pause can provide time for the drive to commit the data that it may have stored in its write cache to the physical media. These pauses are meant to reflect what might happen when data is copied to and from two physical drives, for example. When the "read drive" is in operation, the "write drive" may see a small pause and vise-versa.

These pauses can have a dramatic effect on overall drive performance. Further, by testing your drive with and without this feature enabled, you should be able to see first-hand the powerful roll that disk caching plays in today's drive technologies.

The amount of default "pause" time is 30 ms (milliseconds) for reads and 20 ms for writes. However, these values are not necessarily the most efficient for every disk device available. As such, QuickBench provides you with the ability to change these values, so that you may apply the right amount of delay that you find works best for your hardware configuration. See "Change Cache Effect Delay" later in the guide for more details.

> **Note:** The "Allow Cache Effects" setting is ignored during random testing.

Max I/O Segment Size Menu

Very often, large transfer requests are automatically divided within the Windows operating system into several smaller size data segments (sometimes called "chunks"). These segments are transferred individually until the entire transfer has been completed. This segmenting process is entirely beyond the control of QuickBench.

The optimum segment size is impossible to determine in advance because all test configurations are unique. As a result, QuickBench provides the "Max I/O Segment Size" menu. This feature allows you to select a segment size which best suits your specific hardware configuration.

It is important to note that larger segment sizes do not necessarily translate to improved performance. In fact, many times a larger segment size can equate to poorer performance. Conversely, a segment size which is too small can reduce overall performance because the disk drive access time becomes a greater overall factor in the transfer.

Test Cycle Menu

A test cycle repeats the exact same test for as many cycles as are specified and calculates the simple mean average for each result. Since there is often a great degree of variance in speeds for any given single read or write, the addition of multiple test cycles can greatly assist in accurately and repeatability quantifying a drive's performance at a given task. This, in turn, can shed a much more consistent light on the comparison of the relative merits of one drive vs. another.

Test cycles are averaged by QuickBench on-the-fly, so each successive test cycle provides an increasingly accurate and repeatable picture of a drive's capabilities. In general, to increase the accuracy and repeatability of the test results choose a larger number of test cycles. But, of course, the more cycles chosen, the longer the test will take to complete.

Test Size Menu

This menu allows you to choose from one of three pre-defined test sets and a custom test.
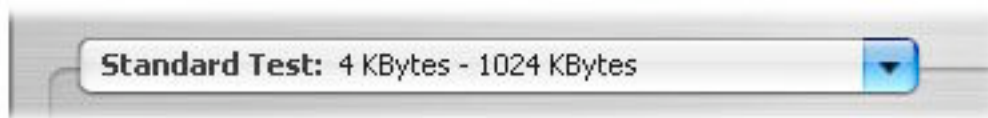
Figure 3. The QuickBench Test Size Menu

Additionally, it provides you with the option to run all three pre-defined test sets at once as well as view the details of your disk device and system environment. See "Using QuickBench" later in this guide for more about the different tests offered in this menu.

Graphic and Numeric Results Tab Button

This button allows you to choose a presentation for your benchmark results. Each result view has its presentation strength. The Graphic view allows you to quickly perceive device performance patterns. The Numeric view provides precise performance details.

Figure 4. The Graphics and Numeric Results Tab Button

Each view has associated presentation options which may further improve its usefulness. These options are discussed below:

Graphic Results – Overlay Averages Checkbox

This option displays a translucent colored line over the graph to indicate an average for a given test. After a test has concluded and if this featured is enabled, hovering your mouse over the colored arrow (at the end of each average line) will reveal the average performance in numeric form.

Graphic Results – View As Line or Bar Chart Buttons

This option provides yet another way to graphically view your results data. The bar chart option is particularly useful if you have read/write results with similar performance marks since each bar graphic cannot overlap another.

Numeric Results – Emphasize Low and High Marks Checkboxes

Use these options to highlight the lowest and/or highest results for a given test. When the "Low Marks" checkbox is enabled, the lowest marks will appear in blue. When the "High Marks" checkbox is enabled, the highest marks will appear in red.

The QuickBench Toolbar Buttons

The toolbar buttons, located at the top of the QuickBench window (just below the title bar), provide the means to save, recall and print test results, among other functions. You may notice at different times while using QuickBench that some of these buttons may become enabled and available or disabled and unavailable. QuickBench knows when a button's function is useful and when its not and the toolbar buttons will reflect this. The "Save" toolbar button is not useful if there are no results to save, for example.

Each button is shown and discussed below, starting from left to right as they appear in the QuickBench window:

 Save Results: This button allows to save your test results to a file. The file is created as a ".txt" text file which can be read by any word processing and text editing applications. Additionally, these files can be re-read by QuickBench to review past results. Alternatively, you can press "Ctrl-S" when this button is enabled to save your results.

Open/View Results File: This button will allow you to select and open a previous QuickBench results file. Once the file is open, the results will show in both graphic and numeric forms as if you had just run a test. The test options that where used when the test was originally conducted will be reselected in all controls, but will be grayed-out and not available for change. Additionally, the disk device details and system environment will also be preserved and is available using the "View Test Environment" selection in the Test Menu. Alternatively, you may press "Ctrl-O" when this button is enabled to select and open a saved results file.

Print Results: This button allows to print the currently displayed results. When this button is clicked it will present you with options that will allow you to choose a specific test report to print. You may, for instance, choose to print only the 4 KB – 1024 KB test results and no other. Alternatively, you can press "Ctrl-P" when this button is enabled to print your current results.

Rescan for New Volumes: This button allows you to rescan for new disks and/or volumes that you may have added after starting QuickBench initially without the need to restart QuickBench again.

Change Cache Effects Delay: This button displays a window that allows you to individually set, in milliseconds, the specific amount of delay time for reads and writes as shown below:
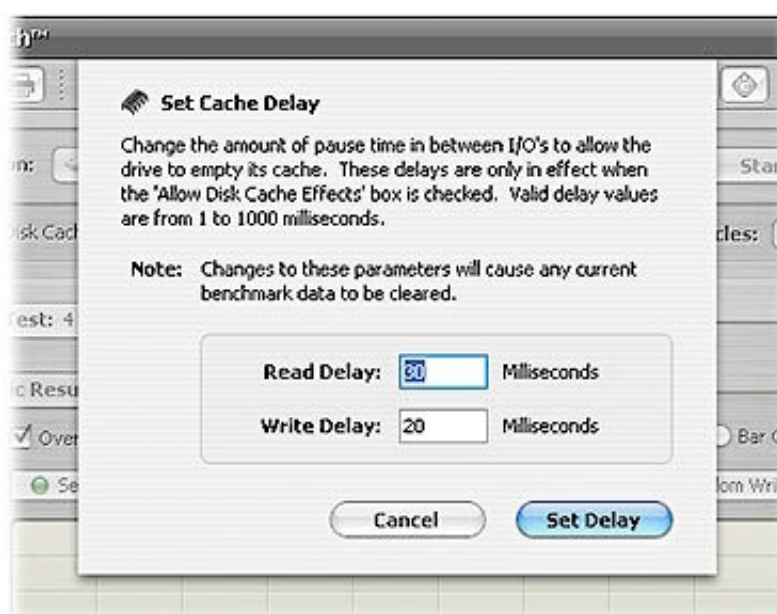

Figure 5. **Set Cache Delay Window**

You may choose a value between 1 and 1000 milliseconds for the cache effect read and write delays. See "Allow Cache Effects Checkbox" earlier in this guide for more details about this feature. Alternatively, you may press "Ctrl–D" when this button is enabled to view and/or change these values.

Clear Results: This button allows you to clear all current results. Alternatively, you can press "Ctrl–X" when this button is enabled to clear your results.

Revert to Default Settings: This button allows you to easily reload the "Intech factory" settings for all QuickBench options. Alternatively, you can press "Ctrl–R" when this button is enabled to revert to the default settings.

QuickBench Preferences: Clicking this button will provide a window of general application options and behavior choices.

About QuickBench: Clicking this button will open a window which provides version and copyright information about QuickBench. Alternatively, you can press "Ctrl–I" to view this information.

Go to Intech's Website: Clicking this button will automatically start your default internet browser and display Intech's home page.

The Start Test Button

After selecting a valid test location, the "Start Test" button will become enabled and turn from gray to blue, allowing you to begin a test. When this button is enabled, you may also press the "Enter" key to start a test.

Exiting/Quitting the QuickBench Utility

Quitting the QuickBench utility is as easy as closing the main window. Simply click the red "X" button located at the top–right corner of the window as shown below. You may quit QuickBench at anytime – even while a test is taking place.

Figure 6.   The Close Window Button (Used to Quit)

3 Using QuickBench™

The QuickBench Tests

QuickBench test results reflect the following influences: the drive's internal media transfer rate, drive access time and cache efficiency, the efficiency of the various drivers controlling the drive and, lastly, the speed of the bus interface connecting your drive to your computer. QuickBench makes every attempt to limit the influence of the Windows file system cache because, in our view, the file system cache can make it very difficult to determine the drive's true performance – which is the ultimate goal of QuickBench!

Standard Test: 4 KBytes – 1024 KBytes

The first QuickBench test set found in the Test Size menu is the 4 KBytes – 1024 KBytes test. This set is called the Standard Test because it tests a range of transfer sizes that are used most frequently in common application and file system use.

The Standard Test set measures nine different data transfer sizes under four different scenarios: Sequential Reads, Sequential Writes, Random Reads and Random Writes. This test requires 307 Megabytes of available disk space.

Large Test: 2 MegaBytes – 10 MegaBytes

The Large 2 MB – 10 MB Test set is designed to measure the drive's ability to sustain large amounts of data transferred to and from your PC.

The Large Test set measures nine different data transfer sizes under two different scenarios: read performance and writes performance. This test requires 672 Megabytes of available disk space.

Extended Test: 20 MegaBytes – 100 MegaBytes

The Extended 20 MB – 100 MB test set is the last pre-defined test set offered in the Test Size menu. Like the Large 2 MB – 10 MB test set, it is designed to measure the drive's ability to sustain very large amounts of data transferred to and from your PC. This test is large enough, in most cases, to overwhelm today's disk caches and should be used to help

determine a given disk device's true unassisted media rate. However, if testing a multi-disk array where the sum amount of on-board disk cache is very large, you may need to use the Custom Streaming test with a larger transfer size setting to measure the actual sustainable media transfer rate.

The Extended Test set measures nine different data transfer sizes under two different scenarios: read performance and writes performance. This test requires 840 Megabytes of available disk space.

Custom Size Streaming Test:

The Custom Test section of QuickBench provides a nearly unlimited range of sequential read/write tests which can be performed. There are two test parameters which must be chosen before you begin a test. The two test parameters are Transfer Size and Transfer Count and will automatically be displayed when the Custom Size test has been selected. These test parameters are shown and discussed below:

Figure 7. The Custom Size Test Parameters

Custom Size Streaming Test – Transfer Size Parameter:

The transfer size is the amount of total data to be read from and written to the drive with each request. The menu to the right of this value toggles the delineation of this value between Kilobytes and Megabytes. Valid values range from one Kilobyte to 1024 Megabytes.

Custom Size Streaming Test – Transfer Count Parameter:

The transfer count is the number of sequential reads or writes which will be performed with the chosen transfer size for each test cycle.

Note: When using the Custom Size Test, you will need to be mindful of the amount of free space available on the test volume. The size of the test file which needs to be created is equal to the Transfer Size multiplied by the Transfer Count plus 50 Megabytes of additional space for a warmup.

Starting a QuickBench Test

To begin a test, first select a test location (a disk or volume). Next, select the test that you wish to conduct in the Test Size menu. Choose any test options that you would like to apply and click the "Start Test" button. Alternatively, you may push the "Enter" key at this point to start a test.

While a test is running, a small window will appear providing you with progress information about the running test. In all tests, except custom, results will display dynamically as they become available.

Note: Once a test begins, you may choose to terminate the test at anytime by pressing "Ctrl–T". However, doing so will clear any data that was collected during the course of the selected test.

Changing Test Options

Changing any test option which could influence or change a testing result will automatically clear any current benchmark data. This is because your current results are no longer valid with the new test option and, therefore, must be discarded.

QuickBench Benchmarking Tips

1) Quit all other non-essential programs. It is strongly recommended that you close all unnecessary applications when using QuickBench. Competition for processor time can significantly affect test results, especially during heavy CPU usage. Additionally, many applications and other processes generate disk access which also can adversely affect reliability of the QuickBench tests.

2) Fresh Format – If possible, you should re-format a disk/volume prior to being tested. Because QuickBench testing is file-based, other files on the test volume can effect the accuracy of QuickBench with respect to an otherwise identical test configuration.

3) Smoother is better – Test with at least 5 cycles, if possible, especially with smaller size tests. If your test results look similar to a saw blade (i.e. up, then down, then up again etc.), try increasing the cycle count until the pattern flattens out. If you are testing with cache effects enabled, you may need to adjust the delay time up or down to smooth out the results.

4) Re-test if necessary – Sometimes an unrelated process will generate disk access on the disk you are testing right in the middle of a QuickBench test set. This will produce a clear anomalous result which shows up as an unexplained drop in performance at some arbitrary point in the test. If this happens, please ignore it and retest. If it happens repeatedly, you may need to track down which process is generating the I/O and terminate it before testing.

5) Do not put QuickBench into the background during testing – Strictly speaking, this should have no effect on test results. But we assume that if you put QuickBench into the background, you did so in order to do something else. It is this "something else" action which may adversely affect QuickBench's results.

6) Maximum accuracy – Your file system may need to regularly read and write data to the boot volume at fairly random intervals. When accesses occur during a QuickBench test set, it may adversely affect the test results. This is true even if you are testing a different volume which belongs to the same drive as the boot volume. For optimum results, do not test a drive which shares a data bus (channel) with the boot drive (such as a master/slave ATA pair) since only one drive will be able to send/receive data over the bus at one time which could then induce a bottleneck.

7) Not for use on "Virtual Machines" – Using QuickBench in virtual environments (applications which allow a Windows™ operating system to run on alternative platforms or hosts) may produce unpredictable and/or unrealistic disk device benchmark results.