



ZoneBenchTM

Test read and write speeds over entire media surface on all rewritable storage devices and interfaces

Part of the Intech's SpeedToolsTM Utilities and SpeedToolsTM Test Suite for MacOSTM X

User's Guide



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For One Computer

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Guide Introduction

About This Guide

The instructions and explanations in this guide assume that you understand how to operate your Macintosh computer. You should, for example, know how to choose, select, launch, and drag by using your mouse. In addition, you should also understand how the desktop, windows, dialog boxes, buttons and file/folders work within the Macintosh environment. For more information about these items, please refer to your Macintosh User's 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 can 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 the SpeedTools™ software on-line via the Intech Software World Wide Web page 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 has 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>.



ZoneBench

About ZoneBench

SpeedTools ZoneBench is a benchmarking application designed to measure the read and write speeds over an entire local storage device. That device can be either logical (such as a disk volume which is actually a RAID array made up of two or more disk drives) or physical (such as your internal ATA disk drive). ZoneBench also has the capability to measure the speed of read-only volumes such as a mounted CD or DVD data disc. ZoneBench does not measure the speed of burning recordable CD/DVD discs, however.

Measuring speeds across an entire device is important because most storage devices do not maintain consistent speeds across their entire storage area. For example, all modern hard disk drives get slower as data is accessed further and further toward the physical end of the drive. Conversely, CD and DVD ROM discs get faster as you access toward the physical end of disc. (This is because CD's and DVD's are read starting at the center of the disc moving progressively outwards.



Warning: ZoneBench is designed to be non-destructive. However, because ZoneBench reads and writes directly to your storage device, there is always a possibility of data corruption. Please make sure you have current backup of any writable device you wish to test.

ZoneBench was created with maximum flexibility in mind. All zone test variables can be easily modified to suit almost any testing situation. Test results can be saved into tab-delimited text files suitable for importing into your favorite spreadsheet application or word processor.

Lastly, as of version 2 and higher, ZoneBench includes a Random Read and Write test which measures 10,000 small (4 KB) transfers over all parts of the selected drive or volume and reports the average speed. This test demonstrates how quickly a drive responds to multiple data requests which are out of sequence and which span the entire test area.

Please note that SpeedTools ZoneBench is very different from SpeedTools QuickBench. QuickBench creates test files to read and write from and tests the speed to access these files using standard file system access routines. ZoneBench uses direct read and write calls to the device itself (logical or physical), bypassing the high-level file system altogether. This means that QuickBench can require several hundred MB of free space on a test volume. ZoneBench does not require any free space at all.

Using ZoneBench

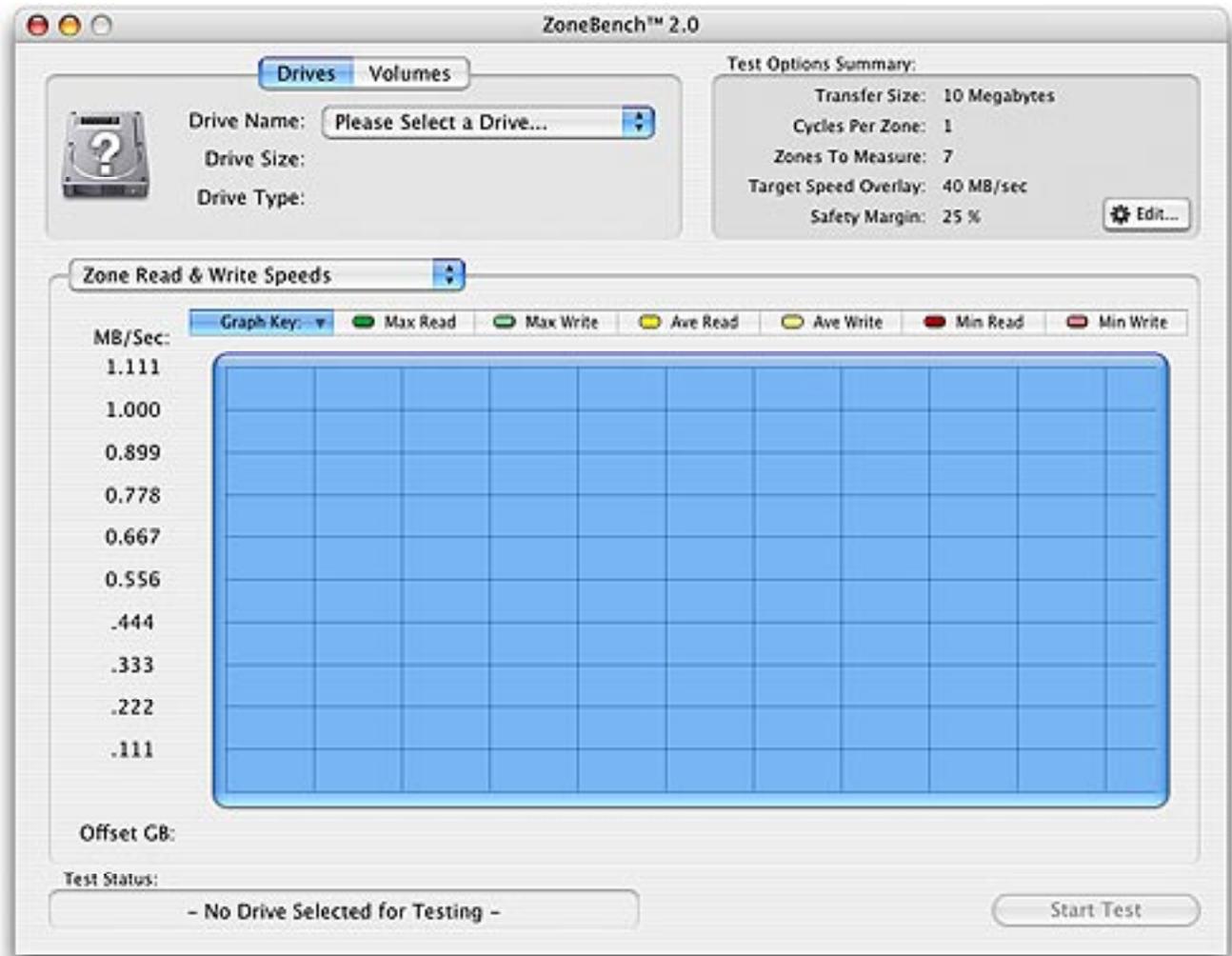


Figure 1. The ZoneBench Main Window

When you run ZoneBench for the first time, the main window will look very similar to Figure 1 above. The test options will be defaulted to a 10 Megabyte transfer size, 3 iterations covering 7 equally-spaced locations or "zones" on the test device. Feel free to change the parameters at any time. See a complete discussion of the test options in the following section.

To begin a benchmarking run, you will need to select a physical or logical device to be tested. Physical devices usually correspond to a single disk drive, but not always. If you have setup a RAID group using Disk Utility, for example, you can test the entire RAID group by locating it in the popup menu located "Drives" tab pane. If you simply wish to test a single mounted volume, click on the "Volumes" tab, and locate the volume you wish to test using the presented popup menu. Or alternatively, drag and drop a volume's desktop icon on to the volumes tab pane area. A volume can correspond to a single partition of a single disk, or can be a partition of multiple

disks which are part of a RAID array. The only requirement is that all devices be "local" to the computer (*i.e.* they can not be networked storage devices).

Once you have selected a device to be tested, you can either begin the test, or modify the test parameters.

Changing the Zone Test Options

If you wish to change the way the testing will be performed or setup a semi-opaque speed target overlay, click the "Change Test Options..." button. This will bring up the following sheet window (Figure 2).

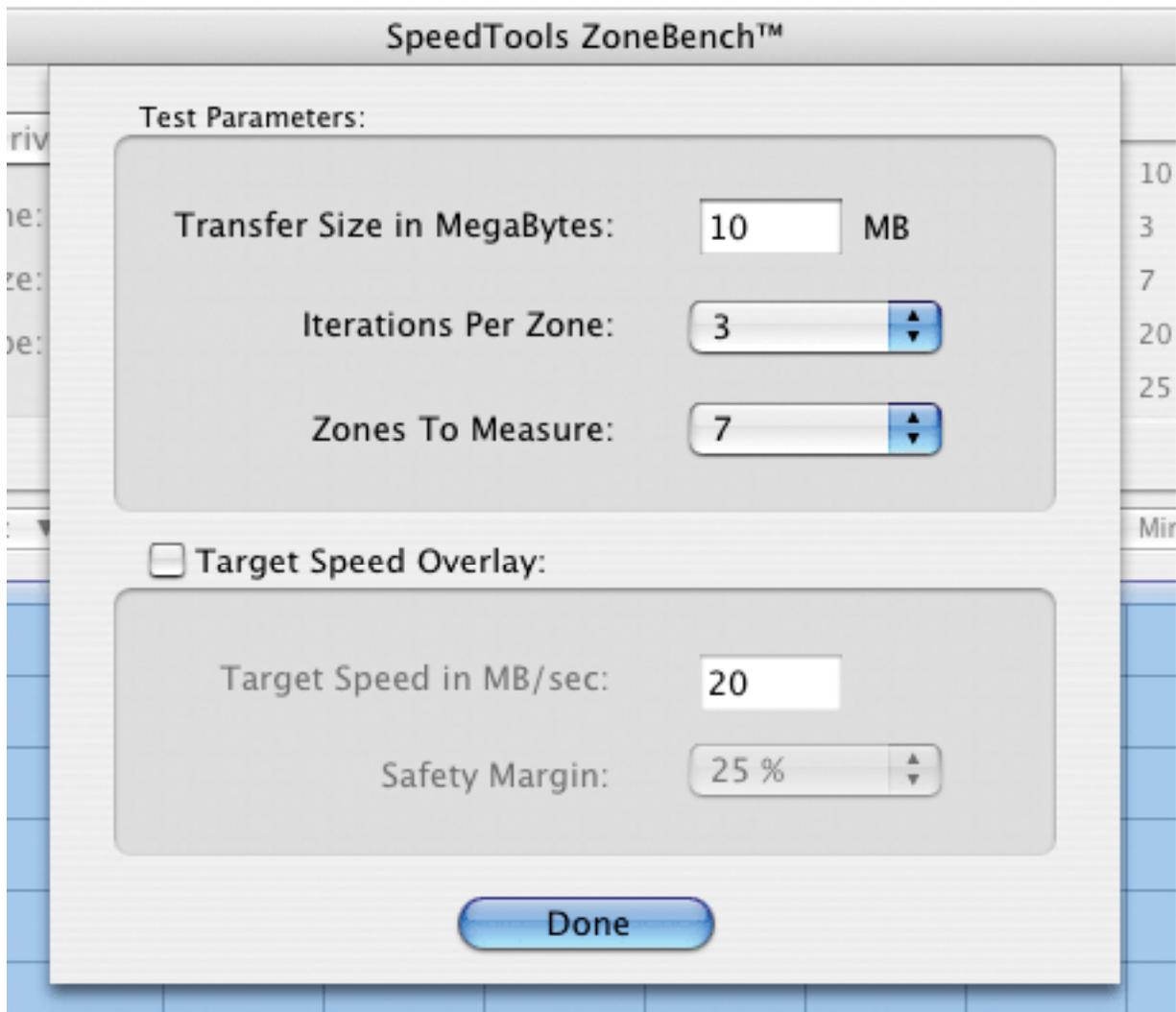


Figure 2. Changing The Zone Test Options

Transfer Size

The first changeable item is "Transfer Size." Transfer size is the number of Megabytes which will be transferred for each read and write request. The main goal when selecting an "ideal" transfer size is to use the smallest possible size which still allows the device being benchmarked to deliver its best performance. This ideal size will vary from device to device, but it is possible to offer some rough suggestions for starting values.

For slower devices such as CD/DVD ROM discs, a transfer size between 5 and 10 Megabytes should be sufficient to yield the maximum speed from the drive without consuming an enormous amount of time to perform the test. FireWire 400 and USB 2.0 devices usually hit maximum speed between 50 and 100 Megabyte transfer sizes. Firewire 800 and fast ATA drives reach maximum speed between 100 and 200 Megabytes. Lastly, fast RAID systems should use the maximum possible transfer size: 511 Megabytes. Currently, 511 Megabytes is the maximum transfer size allowed by MacOS X.



Note: Whatever transfer size you request will require an equivalent amount of available RAM. If you attempt to test with a transfer size which exceeds the amount of available RAM, you will get an error, but no harm will occur to your test disk. Simply reduce the transfer size until the test runs successfully.

Iterations Per Zone

This setting controls how many times the speed will be measured at each zone. In order to get a balanced result, Intech recommends at least three iterations. However, iteration count becomes less important as the transfer sizes get very large which tends to normalize the results automatically.

Zones To Measure

ZoneBench can measure up to 50 evenly spaced, discrete locations (*i.e.* "zones") across any local storage device.



Note: Please be aware that the concept of a "zone" in ZoneBench is NOT the same as and does not correspond to an actual physical zone on a hard disk drive or optical disc.

The approximate starting location of each zone can be seen right below the main window graph. For a visual example, see Figure 3 on the next page. The exact starting location will be presented in the saved results file. See "Saving Test Results" on page 7 for details.

Target Speed Overlay

A target speed overlay is a white line or semi-opaque rectangle (if you are using a safety margin) which is drawn superimposed over the results graph on the main window. The line corresponds to the target speed measured in Megabytes per second. To enable the target speed overlay feature, check the "Target Speed Overlay" box and type in your desired target speed. If a visible safety margin is desired, select a value from 5 to 100 percent from the popup menu.

For a visual example, see Figure 3 below of a test performed on an internal 80 GB ATA hard disk drive. Notice in this example a 20 MB per second target rate is satisfied all the way across the drive until the very end. Specifically, somewhere past about 64 Gigabytes into the drive. For finer granularity, you could increase the number of zones and re-run the test to get a much more accurate location of where the transfer rate falls below the desired safety margin.



Figure 3. Test Results

Click the "Done" button when finished changing the test options. Your new settings will be remembered the next time you run ZoneBench.



Note: There must be actual test results available in order for the overlay to be visible.

Random Read and Write Testing

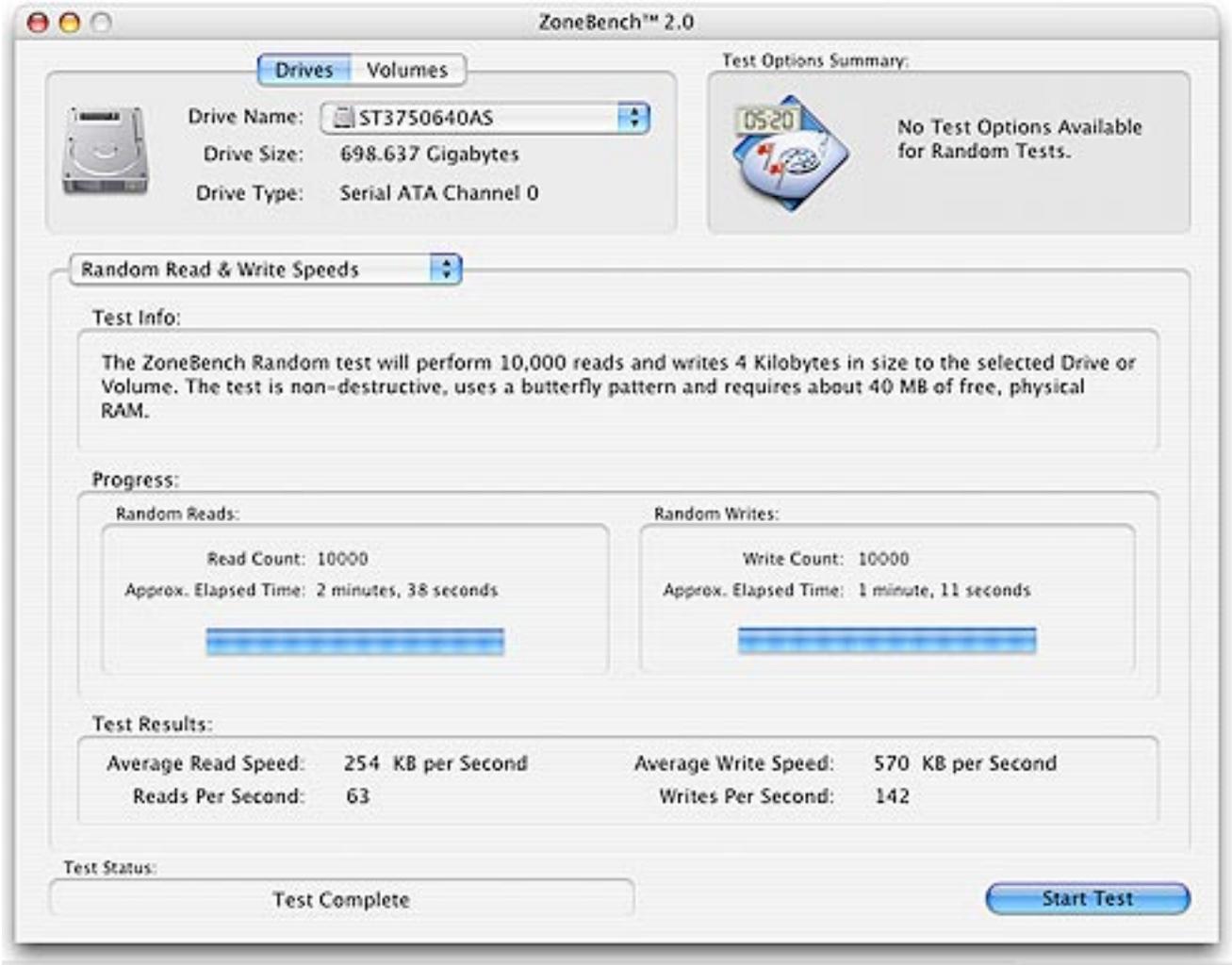


Figure 4. Random Test Results

The Random Read and Write test will perform 10,000 reads and then 10,000 writes 4 KB in size to the test drive/volume (i.e. target). This test employs a "butterfly" pattern. This butterfly pattern means that Zonebench first divides the test target into 10,000 equally spaced locations (based upon the size of the test target) and proceeds to test back and forth between the beginning and end of the disk, progressively working toward and finishing at the target's middle.

For example, if the test target is 100 GB in size, each test location would be about 10 MB apart from the next location. The test would begin by reading from the very last test location on the target. The next read would occur at the very beginning of the target. The following read would occur about 10 MB from the last location. The next read would occur at the beginning of the target plus about 10 MB, and so on until the test finishes in the middle of the storage area of the target.

A target test size of 4 KB was chosen because it represents the most commonly used, smallest block size employed by MacOS X. So drives that perform well on this test relative to other drives should do well with large numbers of small reads and writes to non-sequential areas of the disk. A database program would be an excellent example of this kind of data access.

Note that there will be multiple factors affecting drive performance. For reads, the dominant factor will likely be rotational speed. The faster a drive rotates its media, the faster it should perform. For writes, the size and efficiency of the disk cache will play a dominant role in the test. Rotating magnetic recording storage devices such as hard disk drives generally perform much faster at random writing than reading. Conversely, solid state drives such as memory card devices for cameras generally perform faster reading than writing. Read only devices such as DVD's can only perform random read testing, naturally.

Saving Test Results

After any benchmarking run, the "File->Save Results As..." menu item will become active. All available test results data will be recorded in the test results file. Two file format output options are available: spreadsheet friendly and word processor friendly. The spreadsheet friendly file is specifically designed to facilitate the creation of quick and easy graphical charts.

ZoneBench System Requirements

- MacOS X 10.2 or later
- A disk drive which is local to your computer (not networked)
- Minimum 10 Megabytes of free RAM.