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SOFTWARE CORPORATION

SPEEDTOOLS™ 3
UTILITIES

The ultimate utility suite for your Macintosh™

- *Safely Defragment Files*
- *Scan and Repair Bad Sectors*
- *Monitor S.M.A.R.T. Diagnostics*
- *Test Data Transfer Integrity*
- *Verify and Repair Volumes*
- *Backup/Restore Volumes*
- *Analyze Capacity Usage*
- *Hide Volumes*
- *Monitor Low Disk Space*
- *Preference File Inspector*
- *Find/Repair Broken Aliases*
- *Device/Volume Information*
- *Benchmark Disk Performance*
- *Complete Activity Log*
- *Schedule Important Tasks*
  and more...

Mac | Universal

User's Guide &
Reference Manual

Document Revision 3.6

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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.

Updating SpeedTools Utilities

From time to time, updates may be provided for this product. To check for software updates, go to the **Update** menu and choose **Check for Updates Now…** menu item. If an update is available you will see a window with update instructions; otherwise a message will simply state your version is current.

You can also select the option in the **Update** menu to **Automatically Check for Updates** which will check for an update each time you launch the SpeedTools Utilities application. Uncheck this option if you do not want the software to automatically check for updates at launch.
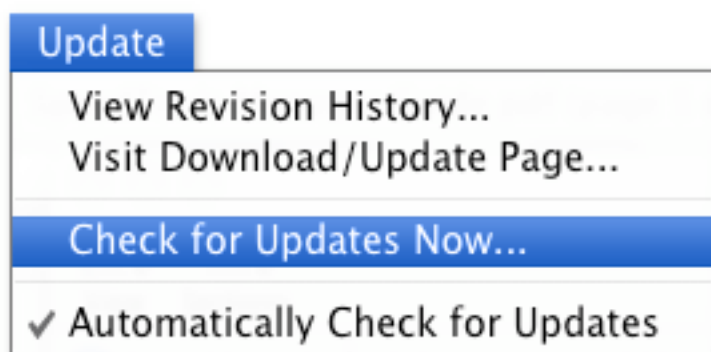
System Requirements

PowerPC G4 (400 MHz) processor or faster
Mac OS X 10.3.9 or later **(10.4 or later is highly recommended)**
CD-ROM drive   (if software was provided on compact disc)
256 MB RAM or higher
80 MB hard disk space

These requirements may change with future updates. You can find out the latest requirements by visiting the SpeedTools Utilities product page on the Intech website at:

http://www.SpeedTools.com

Introduction

Thank you for purchasing SpeedTools Utilities. The collection of hard disk utilities included in the software makes it easy to keep your computer running like new by using professional testing tools that have been adopted by industry giants to stay on top of any problems that may occur, and help protect your data in case of hard drive failure.

With SpeedTools Utilities you can:

- Scan and repair bad sectors
- Defragment files
- Verify and repair volumes
- Test data transfer integrity
- Find and repair broken alias and symbolic link files
- Analyze capacity usage
- Check and automatically monitor ATA/SATA S.M.A.R.T. status
- View detailed device and volume information
- Monitor low free space levels with alerts
- Hide Volumes from the Finder's view
- Backup and restore volumes
- Identify and Repair/Remove Damaged Preference Files
- Benchmark disk and volume performance
- View activity maintenance logs
- Schedule automated tasks

Some additional abilities in SpeedTools Utilities that many competitive products do not offer:

- There is no need to boot from a CD while defragmenting or repairing bad sectors on your startup volume.
- You can schedule volume and folder backups, file defragmentation and sector scanning/ repair tasks for your volumes in one easy-to-use interface. This includes setting automatic shutdown and sleep events when your task(s) are finished.
- You can test and repair more than one volume at a time.
- Receive S.M.A.R.T. alert notifications to find out if a device is about to fail.
- Monitor and alert you when free disk space become low -- with individual volume settings.

About Pro and OEM Versions

From time to time in this guide, you may see sections which begin with **PRO** . This means that the feature or instruction which follows are not available or provided in OEM versions of this software. If you have an OEM version (a version which was included with a hardware purchase, usually at little or no cost), you can upgrade to the Professional version of this software at anytime by selecting the **Upgrade to Pro Version...** menu item in the main **Update** menu. OEM versions are clearly marked in the main window's title bar with "OEM Edition".

Installing SpeedTools Utilities

To install:

- Insert the SpeedTools Utilities CD or double-click the downloaded disk image file to mount it.
- Double-click the CD (or disk image) icon on your desktop to view its contents.
- Drag the SpeedTools Utilities application icon to your Applications folder on your startup disk.
- Start SpeedTools Utilities (from your Applications folder) by double-clicking it's icon.
- Enter your administrator password when prompted.
- Accept the license agreement.
- **PRO** Enter your Name and the Serial Number provided with your purchase.

See: **First Time Users** later in this guide for more information.

Uninstalling SpeedTools Utilities

SpeedTools Utilities includes a built-in **Uninstall** option that completely removes all SpeedTools Utilities software components from the volume it was installed on. To uninstall the software, choose **Uninstall this Software** from the **Advanced** menu.

Technical Support

Should you need assistance with the installation and/or use of this software product, you may contact the support staff at Other World Computing. Intech Software has chosen OWC for this important support role because we want you to receive the best possible care and assistance. OWC is well known in the Macintosh community for its outstanding product support staff and we believe that your experience with them will be second to none.

Using your web browser, type in the following web url at the top of the browser window. When the page opens, you will be provided with assistance options for this product.
http://eshop.macsales.com/Service/

Or, while running the SpeedTools Utilities application, you may select **Online Support** from the **Help** Menu.

Overview of the SpeedTools Utilities Features

SpeedTools Utilities is a safe and reliable hard disk maintenance and repair utility suite designed to be easy enough to use by a novice or professional. Many of the utilities are straight-forward in determining if a fix is needed and, in most cases, offering a solution to the problem.

Chances are that you will not regularly use every feature in the SpeedTools Utilities software, but you will quickly become comfortable with some favorites that allow you to take control of the maintenance and repair of your computer. The following is a brief summary of what each feature allows you to do.

Scan and Repair Bad Sectors

Occasionally, sectors on a hard drive will go bad. This is completely normal. When this happens, the data on the bad sector will become damaged, but data on the rest of the drive will be unaffected and your disk can remain completely usable.

Use this utility to examine sectors for media defects and repair them based on several options. You can scan just the sectors/allocation blocks occupied by files on the selected volume, or scan all the sectors occupied by files and free space on the selected volume. If data is affected by a bad sector you probably won't be able to use the associated file anymore, but SpeedTools Utilities can show you which file was affected (in Scan Files mode) and allow you to make sure that the bad sector is never used again. Afterwards, you can replace the affected file from one of your previously saved backups or other saved location. This can save you a tremendous amount of time over restoring an entire hard disk because you didn't know which file had the bad sector.

Defragment Files

The regular use of files on your computer can cause them to become fragmented over time. Fragmented files can make your hard disk work slower and harder as it moves its heads across large sections of the media in order to read all of the parts of a fragmented file (which could be located all over the disk media).

You can use the Defragment Files option in the SpeedTools Utilities software to examine and repair file fragmentation on the selected volume. Once you defragment your files, you may notice an improvement in the overall speed of using your hard disk.

Test Data Transfer Integrity

This is basically a "stress test" for your hard disk. The Integrity test can detect data transfer problems with storage devices, and is compatible with nearly all mounted readable/writable volumes and Filesystems.

Use this feature to test the ability of your storage device to reliably and repeatedly read and write precise data patterns. Running the Integrity test will not disturb your existing data files.

Verify and Repair Volume

Over time you may notice problems such as applications quitting unexpectedly, files becoming corrupted or unreadable, an external device is no longer operating properly or your computer fails to start up. This can occur when your volume directory has become damaged due to power outages, system crashes and hard restarts to name a few.

SpeedTools Utilities allows you to verify, and if problems are found, repair issues with a disk or volume - often restoring full access to the files contained on it. To repair your boot (startup) volume, you will need to boot from another hard disk which has a Mac OS installation and run SpeedTools Utilities. Or, you can boot from your Mac OS X Install CD and run Apple's Disk Utility.

S.M.A.R.T. Diagnostics

At some point in time, all disk drives will fail. Once a drive crashes it can be difficult to retrieve the contained data, so it is critical to try and detect a failing drive and copy its data off it before it fails.

The S.M.A.R.T. diagnostics task in SpeedTools Utilities checks hard disk indicators for health and reliability based on your hard disk manufacturers specifications. You can run on-the-spot checks, or set the S.M.A.R.T. Alert to run at regular intervals. If a disk is predicted to fail, you can be alerted by an on-screen message or have a warning email sent to you. This may give you the time you need to make a backup of the affected disk drive before complete disk failure occurs.

Analyze Capacity Usage

Want to find out what files are taking up the most space on your hard disk? SpeedTools allows you to easily analyze your disk to see which files are consuming your system. You can view by file type or "Show Largest" in order to find the files with the largest size and then archive and/or remove them to free up space on your computer.

Volume Options and Settings

This section includes options to configure an alert when a volume's free space becomes low. Also included is a volume "Hide" feature which can help protect data from being easily seen by other people who might use your computer, such as children.

Device / Volume Information

Easily find detailed information about the a volume and its parent device. View information such as device serial numbers, firmware revisions, file and folder counts, use statistics and much more.

Find and Repair Broken Aliases

PRO Clean up unused or broken file links on your Mac. Quickly examine the alias and "soft" symbolic link files on a selected volume. If a target item cannot be found for an alias file, you can choose to link the alias to another item, delete it, or leave it untouched.

Backup / Restore Volume

Before you ever do any repair on your computer or hard disk devices, you should first consider doing a full backup/clone of your volume and store it in a safe location, such as on a storage device that is not connected to your computer. This way, if anything happens or fails on your primary disk drive you can have the peace of mind of recovering your important data files.

SpeedTools Utilities allows you to duplicate the selected source volume to another volume or disk image file. You can also backup specific items if you don't want to backup your entire volume (which can take up a large amount of space). To restore a volume to a previous state, simply choose the saved disk image you are interested in.

Repair and Maintenance Log

This feature allows you to quickly view activities and test results performed by SpeedTools Utilities. In addition, this log will provide you with the outcome of an automated scheduled task.

Benchmark Disk Performance

SpeedTools Utilities includes two different Benchmark utilities. One that measures various performance factors of a mounted volume (partition). And, another which measures the performance of your disk's entire media from end to end. See **Disk Benchmarking** for details.

Using the SpeedTools Utilities Software

It is highly recommended that you use SpeedTools Utilities regularly to keep your computer running like new and preventing problems before they arise (or, at least to limit their damage if irreversible damage occurs). To help you in this task, SpeedTools Utilities is the only utility that allows you to schedule when to defragment files, scan and repair bad sectors and backup your volumes and important folders in a single, easy-to-use interface.

For more information on the schedule options, please refer to the **Schedule an Automated Task** section of this manual.

Note: Before doing any repair you should always make sure to first run a volume backup. This way if any problems with your computer occur in the future you will be able to recover your system. Doing regular archival backups (several backups made at different times) can offer even better protection by allowing you to locate undamaged files that may be on an earlier backup but damaged or not present on a later one.

All of the utilities you need to keep you system running smooth are located in the main task menu when you first launch the SpeedTools Utilities software.

First Time Users

When you start the SpeedTools Utilities software for the first time, you will be presented with an Administrator password window. It is necessary that you enter this password so that the software can install and run important system components. Next, you will be presented with a License Agreement window. You will be given the opportunity to **Accept** or **Decline** this agreement. When you click the **Accept** button the following will happen:

PRO   An Activate Software window will be presented. Here, type in your name and the serial number which accompanied the software and click the **Activate** button to continue. The **Activate** button will become enabled if the serial number is correct.

Afterwards, you will be presented with a small window which will show the progress of various initial tasks. When these tasks are completed, the main window will be displayed.

Describing the Main Window

The SpeedTools Utilities main window has several areas of importance which we will call to your attention here and regularly reference throughout this guide.

1 This area is the SpeedTools Utilities Main Toolbar. It provides several general functions which will be discussed later in the section. See **The SpeedTools Utilities Toolbar** for more information.

2 This area is the **Volume List**. The Volume List (in light blue), will provide a listing of all volumes which the SpeedTools application predetermined it could work with in some fashion. From here, you can select a volume to perform a given task on. To do this, simply click on any of the listed volume(s). Afterwards, the list item will turn dark blue representing the new volume selection. See **Choosing a Volume For a Task** for more information. In addition, area #3 (the Selected Volume Heading) will display other useful information about the selected volume.

3 This area is the **Selected Volume Heading**, see #2 for more information.

4 This item is the **Main Task Menu**. You can use this menu to select a new task to perform on the selected volume. When the selected volume starts to perform a task, this menu will become grayed out and unavailable for a new selection until the task completes or until you select an different volume.

5 This area is the **Main Task Area**. When you first start the application, this area will feature the tasks that you can use on the selected volume (the same tasks which are contained in the Main Task Menu), only in large icon form. When you select a task by clicking the **Select Task** button, this area will convert into options and progress for the task that you selected.

6 This button is the **View Button**. The SpeedTools Utilities application provides two uniquely different views that you can choose from to make your task selections. To toggle between the two views, click the left or right side of the View Button. Alternatively, you may press the key combination: command key + "/" key.

7 This is the **Help area**. Depending on what you are doing within the application at various times, this area will display helpful information, tips or additional instructions.

8 This is the **CPU Meter**. The CPU Meter represents the total processing power of your machine and how much of the total is currently being used by all running processes. The meter takes into account multiple CPUs and/or cores (if you have them) and is automatically updated every few seconds. This feature may be turned on or off in "Preferences", if desired.

Get Quick Help with Help Tags

If you ever need some quick help to learn what a feature or option can do, try hovering your mouse pointer directly over the option itself. Many options (checkboxes, buttons, etc.) include help tags that appear if you hover your mouse pointer over them. This can save you time from having to look in this guide for quick bits of information.

The SpeedTools Utilities Main Toolbar

The SpeedTools Utilities Toolbar contains six buttons which are described below:

Unmount Button

To unmount a disk volume, first select it from the **Volume List** and then click the **Unmount** button. After you unmount a disk volume from your Desktop, the Unmount toolbar button will change to "Mount". Clicking the **Mount** option will re-mount the selected volume to your Desktop again.

Note: The Unmount option cannot be performed on your boot (startup) volume. If you click on your boot volume in the **Volume List**, the Unmount button will be disabled.

Benchmark Button

See **Disk Benchmarking** later in this guide for more informations about this feature.

Schedule Button

PRO   Use the Schedule option to schedule automatic runs of **Defragment Files**, **Scan and Repair Bad Sectors**, and **Volume/Folder Backups**. See **Scheduling an Automated Task** for more information.

SMART Alert Button

Use the SMART Alert option to set up automatic monitoring and notifications for S.M.A.R.T. failures and warnings. See **Automatic S.M.A.R.T. Monitoring with S.M.A.R.T. Alert** for more information.

Clear Tasks Button

Use the Clear Tasks option to clear all completed task results you have already run. For example, if you run a **Scan and Repair Bad Sectors** task, the results of the scan remain in the task window even if you move to another task or volume and then return. The Clear Tasks button will reset all tasks so the previous scan results will no longer be shown.

The Clear Tasks button does not remove any **Repair and Maintenance Log** entries for a selected volume, but does clear task results for every disk volume in the **Volumes List**, not just the one that is selected.

Users Guide Button

The Users Guide button opens a PDF version of this manual on your computer.

Choosing a Volume For a Task

The **Volume List** shows you what volumes are available to run chosen tasks on. You may only run a single task on the selected volume at a time, but you can test and repair more than one volume at a time. This means, for example, you can be running the **Scan and Repair Bad Sectors** task on one volume, while running **Defragment Files** on another volume simultaneously. To choose a new disk volume to run a task on, simply click on its icon in the **Volume List**. Once the task is started, you are free to click on another disk volume in the **Volumes List** if you wish to begin a new task on another volume.

Any volume running a task will show a status progress bar in the **Volume List** so that you know when a volume is busy performing a task and how far along the task is as shown below.
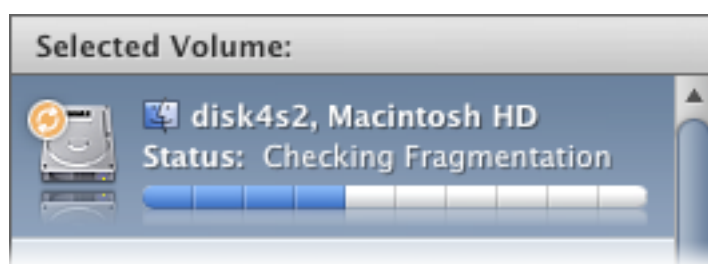
Tip: Your Startup volume (boot disk) will be automatically identified with the blue "Happy Mac" (Finder) icon as shown above.

Tip: Volumes which are mounted from Disk Image Files will be "badged" with a small Disk Image icon (over the volume icon) for easy identification.

Choosing a Task

When you are ready to choose a task to run on the selected volume you can simply click on any of the task icons located in the **Main Task Area**, then click the **Select Task** button or choose a task from the **Main Task Menu** popup (shown below).
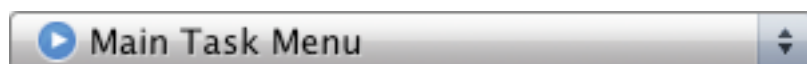
Another way to quickly choose a task for a specific volume, is to click your mouse's right button on a volume in the **Volume List** (when not already performing a task). This will reveal a menu which contains a task listing similar to the **Main Task Menu**. Additionally, this menu will contain options for mounting, unmounting and/or ejecting the clicked on volume when applicable.

Scan and Repair Bad Sectors

The Scan and Repair Bad Sectors feature is designed to test the reliability of, and potentially repair defective sectors on the volumes of your local storage devices.
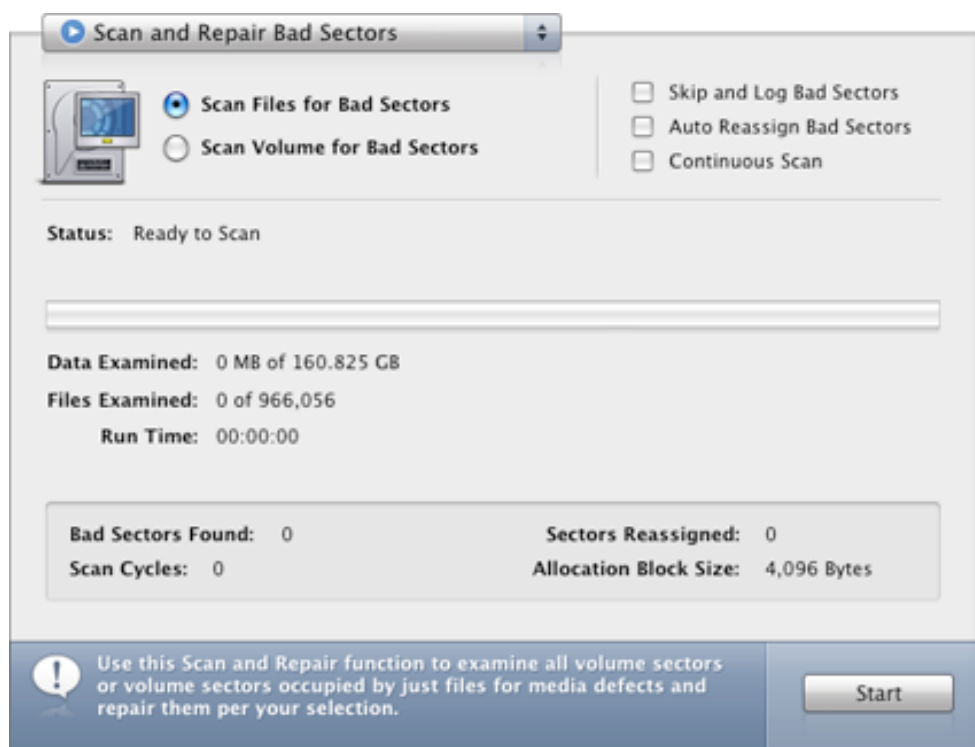
There are two alternative methods to detect defective sectors: scanning the files on a volume (**Scan Files for Bad Sectors**), or scanning the raw sectors on a volume (**Scan Volume for Bad Sectors**). Both methods have distinct advantages and some drawbacks which we will detail later in this section.

To begin, first select a volume from the **Volume List** on the left side of the main window. Then choose one of the two main options:

- **Scan Files for Bad Sectors** – Use this option to scan just the sectors/allocation blocks occupied by files on the selected volume.

- **Scan Volume for Bad Sectors** – Use this option to scan all the sectors occupied by files and free space on the selected volume.

Block/Sector vs. Allocation Block

Before proceeding any further, it is important to understand two terms which will be used extensively throughout this section and in the software: "Allocation Block" and "Sector." Strictly speaking, a "Block" and a "Sector" denote exactly the same thing: the smallest number of bytes that

can be transferred to or from a physical storage device such as a hard disk drive (aka "Block Device"). However, an "Allocation Block" is something significantly different and needs to be clearly understood to fully appreciate the ramifications of reassigning defective areas of storage media.

SpeedTools Utilities has introduced the ability to check individual files on all file systems supported by Mac OS X. Examples of supported file systems include HFS Extended, FAT32, UFS, UDF, CDDA, ISO 9660, etc. This file-based approach requires the introduction of the concept of an "Allocation Block." An allocation block is similar to a physical block/sector but differs in a very important way: it represents the smallest number of bytes that can be transferred to or from a file located on a given volume. An allocation block is a logical grouping of one or more physical blocks/sectors on the storage device. Additionally, the size of an allocation block can vary widely from volume to volume and from filesystem to filesystem.

Because a "Block" and an "Allocation Block" can so easily be confused, the term "Sector" will be used in this manual to denote the smallest number of bytes which a given block storage device can transfer. Likewise, the term "Allocation Block" will refer to the smallest number of bytes which a given volume's file system format can transfer.

Note: Most read-only (write protected) volumes are supported for bad sector detection only. Defective sectors cannot be repaired on read only media and you will only be provided with the option to skip over the defective sector. Additionally, in scan files mode, you will be able to view the affected file, cancel the scan, or skip over the sector or entire file.

Scan Files for Bad Sectors

**IMPORTANT**: Before beginning the **Scan Files for Bad Sectors** feature, it is vital that you test the volume for File System errors and/or inconsistencies. If the File System is damaged or not working properly, the **Scan Files for Bad Sectors** could erroneously report bad sectors found. If the volume's File System is MacOS Standard (HFS) or MacOS Extended (HFS+), you can use the SpeedTools **Verify and Repair Volume** feature to quickly verify that the File System is in perfect working order. If you are unable to verify the condition of your volume's File System, it is strongly recommended that you use the **Scan Volume for Bad Sectors** function instead, as a damaged File System will not influence its findings.

In the **Scan Files** mode, SpeedTools Utilities will attempt to access every file on the currently selected volume and verify each allocation block of the file. If an error is detected, the file which contains the defective sector will be identified and several options will be presented for the problem:

- **Option 1: "Show File in Finder."** Clicking this button will cause the Finder to open the window containing the file with the defective sector and highlight it for easy follow up examination, when desired. If clicking this button does not present the file in the Finder, it may be invisible or may be in a location that you do not have user access to. In these cases, hovering your mouse over the name of the file in the window will reveal the item's full path.

- **Option 2: "Cancel Scan."** Clicking this button will stop the current scan and reset the file scanning starting point back to the beginning of the volume.

- **Option 3: "Skip File."** Clicking this button will cause SpeedTools Utilities to stop the examination of the current file and continue with the file scan of the next file.

- **Option 4: "Skip Sector."** Clicking this button will cause SpeedTools Utilities to skip over the current allocation block which contains the defective sector within the current file and continue with the file scan.

- **Option 5: "Delete File."** Clicking this button will cause SpeedTools Utilities to permanently delete the file with the defective sector and continue with the file scan. This is usually the best choice since reassigning the sector will put a blank "hole" in the file equal to the volume's allocation block size. See "Reassign Sector" below for more information.

- **Option 6: "Reassign Sector."** Clicking this button will cause SpeedTools Utilities to attempt to reassign the defective sector. But be aware that in file scan mode, one full allocation block will have to be blanked out in order to repair a single physical sector. For example, if the volume is HFS+, it very likely has a 4096 byte allocation block size. In this case, reassigning a single defective 512 byte sector will put a 4096 byte blank spot in the file. Such a blank spot in the file may lead to unpredictable behavior when the program which created the file tries to open it and read in its data.

Of course, since the sector is bad to begin with, the program which created the file will not be able to access the allocation block which contains the defective sector, either, so your options are rather limited. See the "Advice" section below.

Advice on Detecting Bad Sectors in Scan Files Mode

If the **Scan Files** mode discovers a defective sector present in a file which you created, you have several options to try and minimize the loss of data:

1) Delete the file and replace it with your backup. This is dependent on having a backup saved for file recovery.

2) If you don't have a recent enough backup to make this a viable option, you could try to open the file with the program which created it. There is always a chance that the defective sector is located in an allocation block within the file which is not critical. You could then save a new copy of the file and delete the original.

3) Try the **Scan Volume** mode. **Scan Volume** mode will find the same defective sector, but will almost always have the advantage of being able to leave a smaller "hole" in the file. In scan volume mode, only one physical sector is mapped out (usually only 512 bytes) instead of one full allocation block (usually 4096 bytes). That's 87.5% less data typically wiped out!

Scan Volume for Bad Sectors

In the **Scan Volume** mode, SpeedTools Utilities will attempt to read every raw sector on the currently selected volume. If a defective sector is detected, SpeedTools Utilities will present two options: skip the sector or attempt to reassign it.

Be aware that if a sector has successfully been reassigned, a blank spot equal in size to the drive's physical sector size (usually 512 bytes) will exist where the defective sector used to be. In sector scan mode, SpeedTools Utilities does not know if the defective sector was being used in some application file or data file, but you certainly will not be any worse off than you were before you reassigned since the sector was bad, after all.

Advice on Detecting Bad Sectors in Scan Volume Mode

Sector scanning (**Scan Volume**) tends to be quicker than file scanning, especially if your volume is rather full and/or contains a large number of small files. If you are in a hurry and you want to check for bad blocks quickly, sector scanning is probably your best choice. If a bad sector is detected, you can always cancel the scan and switch to file scan mode. If file scan mode fails to detect a bad sector, then you can have a high degree of confidence that the defective sector can be safely reassigned without fear of any file being affected. On the other hand, if the defective sector resides within a file, at least you will know which file is affected and you can make a more informed choice about how to proceed.

Scan For Bad Sector Options

The following options are available in both **Scan Files for Bad Sectors** and **Scan Volume for Bad Sectors** modes:

☐ Skip and Log Bad Sectors
☐ Auto Reassign Bad Sectors
☐ Continuous Scan
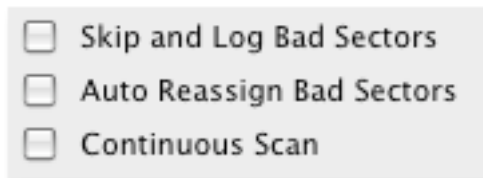
- **Skip and Log Bad Sectors** – Automatically skip found bad sectors and add them to the log for later viewing. This is a safe option if you would like to evaluate your volume and/or files without repairing them and without having to dismiss an alert window each time a bad sector is found.

- **PRO** **Auto Reassign Bad Sectors** - Be careful with this option! Checking this box will cause SpeedTools Utilities to attempt to reassign all defective sectors detected during the scan. This option can be dangerous if your drive is reporting media errors for some reason other than actual bad sectors, such as with excessive heat, excessive electrical noise, etc. We recommend using this feature only after running though a scan with the "Skip and Log Bad Sectors" option so that you know how many bad sector you have first. If it turns out that you have lots of bad sectors, it maybe that the drive is having other trouble, such as overheating for example. In this situation, the reported bad sectors may not actually be bad. If however, only a few bad sectors turn up with the skip and log option, the sectors are likely bad and it is safe to use the auto-reassign feature.

- **Continuous Scan** - Checking this box will cause SpeedTools Utilities to restart the scanning procedure each time one entire scan is completed, until the scan is cancelled manually. Repetitive scanning like this can turn up "weak" sectors (sectors that are accessible sometimes and other times not).

Viewing Results in the Repair and Maintenance Log

SpeedTools Utilities will keep track of all detected bad sectors, regardless of whether it is being used in file scan mode or volume scan mode. All the information that was provided at the time of the scan will be entered into the log. To view the SpeedTools Utilities log file, go to **Repair and Maintenance Log** in the main task menu. The log file will be titled with either **Scan Files for Bad Sectors** or **Scan Volume for Bad Sectors**, along with the date and time the task was run.

PRO   In addition, you can schedule **Scan and Repair Bad Sectors** to run at any time using the **Schedule** option in the main SpeedTools Utilities toolbar. For more information on this, see the **Schedule an Automated Task** section of this manual.

Defragment Files

The Defragment Files feature is designed to speed up your Macintosh's access to files stored on your hard disks. To do this, SpeedTools Utilities identifies files on HFS+ (also known as MacOS Extended) formatted drives which have pieces stored in more than one place on your drive and rewrites those files so that they form one continuous data location. This process can dramatically reduce the number of data reads and writes to access your files, thereby significantly speeding up file access related functions.
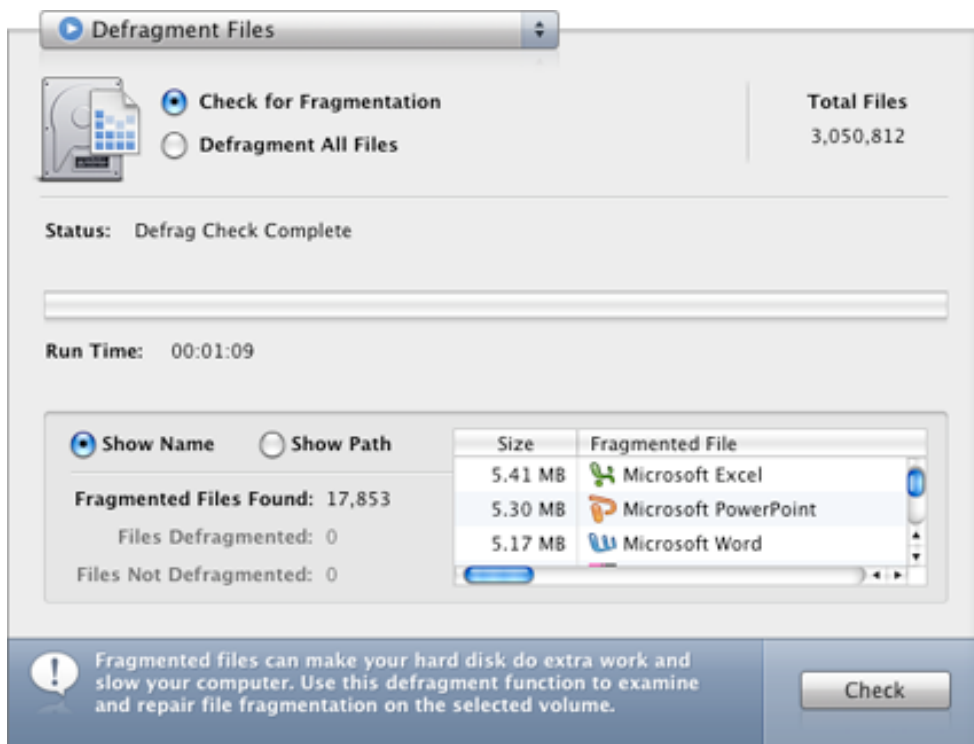
About Fragmented Files

Note: An additional and often overlooked side-benefit from defragmenting your files is better file recoverability. In the event that a disk volume becomes inaccessible due to corruption, a file recovery tool should have a higher probability of recovering the contents of a file if it is physically located in a single place on the disk instead of occupying multiple scattered locations. This is particularly true when using utilities which perform raw media scans and attempt to find data files without using the volume's catalog file.

What is File Fragmentation?

File fragmentation occurs, typically, as a result of the continuous process of creating, deleting and modifying files. When a file is deleted, for example, it leaves a "hole" (unused space) in the disk at the place it used to occupy. If a new file is created that is larger than the deleted file whose "hole" the new file is filling, the file may be split in to multiple pieces and placed within the available "holes". This file which now occupies more than one physical location on the disk is said to be "fragmented." Each part of the file located on separate areas of the disk is called a file fragment. The number of fragments that a file can be broken into is virtually unlimited. It is typical for large files on heavily fragmented drives to be made up of several hundred fragments!

Why do file systems allow files to become fragmented?

Since the first days of the Macintosh, hard disk space has been at a premium. As a result, most file systems allow files to be broken up and stored in chunks on your disk when they are created and later grown to hold more information. If this weren't the case, disks would fill up much more quickly because there would always have to be enough free space on the disk to store the entire file from beginning to end. For large files on relatively full disks, this would be especially impractical.

What are File Forks?

There is one more concept which should be explained in order to understand how **Defragment Files** works: file forks. Under the Macintosh HFS+ (MacOS Extended) file system, the information in files is organized into smaller structures called "forks." Every file must have at least one fork. In Mac OS versions prior to 9, there could only be two kinds of forks: Resource and Data. Resource forks are mapped and contain data typically defined by Apple, such as information about an application program's metadata, dialogs, controls, version information, etc. Data forks can contain any information, including executable code.

But from Mac OS 9.1 through all versions of Mac OS X, Apple has allowed for the addition of more than two forks. These forks are simply identified by name, not by type as in the case of data and resource forks.

How does the concept of forks affect the defragmentation of files?

SpeedTools Utilities works under the belief that it is much more important to keep each fork within a file contiguous (in one piece) than it is to keep an entire file with multiple forks contiguous. The reason for this is simple: the Mac can only access one fork at a time. For this reason it takes very little extra time to access different forks which are not sequential with respect to one another. This situation, where a file has contiguous forks (but the forks themselves are not contiguous with the respect to one another) is called a "file with non-sequential forks."

Therefore, while the **Defragment Files** feature will attempt to make the forks of a file sequential to each other, the main priority is to remove the fragments of each fork of a file. Defragmenting individual forks is where nearly all the speed improvement is gained.

Defragmenting vs. Optimizing Explained

An optimizing program makes the forks and files contiguous like the SpeedTools **Defragment Files** feature does, but optimizing programs additionally group all the files together, back to back, in some sort of pre-determined arrangement. For example, all files could be moved to the beginning or end of a disk, and potentially even grouped into categories, etc. While this type of functionality can serve a purpose, the **Defragment Files** feature does not perform this function.

Why doesn't the Defragment Files feature perform an optimizing function?

There are several reasons. First and foremost, it is not supported by Apple. The reason is simple: file optimizing requires direct manipulation of low-level file system data structures. Whenever Apple decides to change these structures (which they have on multiple occasions), a file optimizer could wreak havoc in these structures. Furthermore, if there are any errors in these structures, direct manipulation of them could make the situation far worse. Secondly, file optimization can actually encourage file fragmentation to return sooner and more severely than performing defragmentation exclusively since the files are placed end to end. As a result of the end to end file placement produced by optimizing, there is no room to grow any file without immediately creating a new file fragment elsewhere on the disk.

Using the Defragment Files Feature

To begin a **Defragment Files** task, first select a volume from the **Volume List** on the left side of the main window.

After the volume has been determined to allow writing and uses Apple's HFS+ (MacOS Extended) format, the information about the volume's size and files will be displayed in the **Main Task Area**. Now you're ready to begin a volume check or defragmentation run.

Note: It is vital that you first run a **Verify Volume** task (see **Verify and Repair Volume** in this guide) before working with tasks contained within this utility. This will ensure that your volume's file structure is in good working order and that the selected task will not encounter unexpected problems while performing other tasks.

Check for Fragmentation

Choose the **Check for Fragmentation** option to get information about the amount of fragmentation and which files are fragmented on the selected disk volume without repairing it. This option will **NOT** modify your volume in any way. While a check is in progress, you may click the **Cancel** button to stop the run at any time.

Defragment All Files

Choose the **Defragment All Files** option to start a defragmentation run. You can click the **Cancel** button at any time.

After the **Defragment All Files** has completed, all files that were unable to be defragmented will be displayed in the bottom-left listbox, along with the associated error code. You can lookup an error code description by selecting "**Common MacOS Error Codes Table**" in the main **Help** menu.

Note: Not all files can be defragmented. Some "Files Not Defragmented" can be correctable, such as when the fragmented file is currently in use by another program. To fix this problem, quit all applications which may have open files. Also, if you are defragmenting files on your boot (startup) volume, there may be a small number of files that cannot be defragmented because they are in use by your operating system. In this case, you can either ignore these few files, or run the SpeedTools Utilities on your boot volume from a separate hard disk. Alternatively, if you have a volume which contains a dozen or more files which were not defragmented, consider restarting your Macintosh and running SpeedTools Utilities immediately after the restart (and before running other applications) to minimize the amount of open files.

PRO In addition, you can schedule **Defragment Files** to run at any time using the **Schedule** option in the main SpeedTools Utilities toolbar. For more information on this, read the **Schedule an Automated Task** section of this manual.

Viewing Results in the Repair and Maintenance Log

Each time a volume is checked for fragmentation or defragmented, information about that operation is stored in a log file. To view the Defragment Files log file, go to **Repair and Maintenance Log** in the main task menu. The log file title will include either **Check File Fragmentation** or **Defragment All Files**, along with the date and time the task was run.

Common Questions about Defragmenting a Volume

**Q. Can I Defragment a Mac OS 9 volume in Mac OS X?**
A. Yes, provided the volume has been setup with a Mac OS Extended HFS (plus) format.

Q. Can I Defragment My Boot Volume?
A. Yes, but any fragmented files which are in use by the operating system or other applications will be skipped (this usually only amounts to a handful of files though).

Test Data Transfer Integrity

Test Data Transfer Integrity is designed to detect problems associated with disk firmware, data cable signal quality and the overall data transferring reliability of various storage devices and the busses to which they are connected.
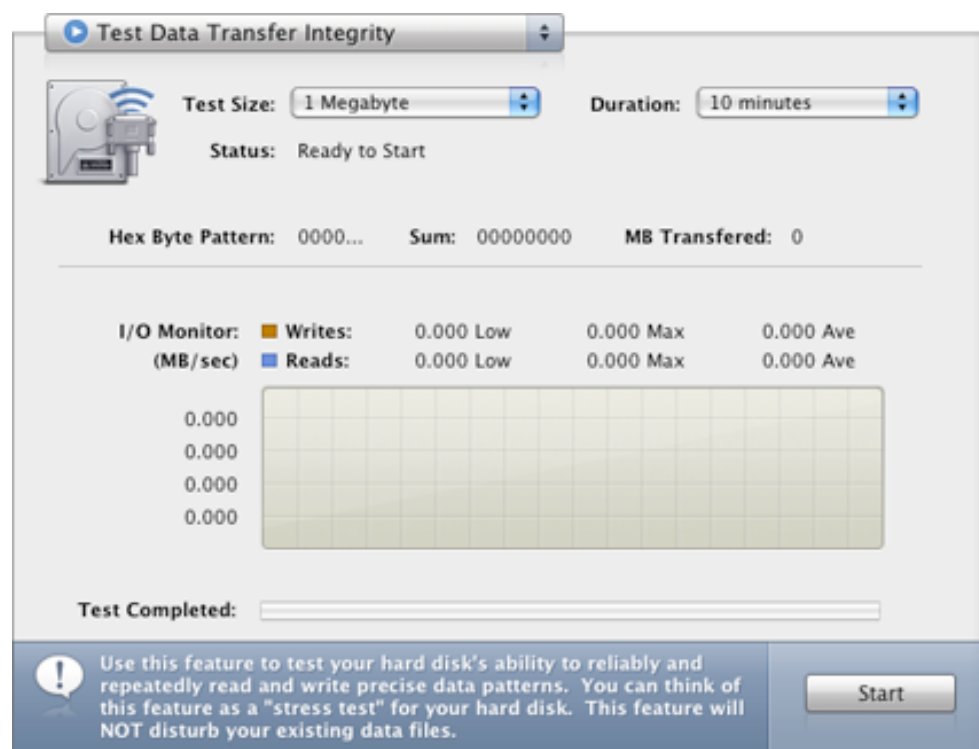
This test exclusively looks for data corruption while transferring data to and from your disk. To do to this, SpeedTools Utilities creates a test file. It then writes a revolving data pattern to your disk and reads it back in, each time comparing the data pattern to the original. And, it does it all as fast as your disk and its interface can handle. This test is basically a "stress test" for your hard disk drive and its interface. Additionally, the test is extremely safe since all of its tests are performed to a temporary test file, leaving your existing data completely untouched.

Why do I need to run Data Transfer Integrity tests?

A **Data Transfer Integrity Test** effectively reproduces the environment and steps that other applications use to save and retrieve data from your disk device(s). In other words, each test iteration verifies the reliability of everything involved with a data transfer process including various functions of the operating system itself, an application's ability to save and retrieve data through the operating system, the disk device driver, the bus that the disk device is connected to, the disk device data cable, the firmware of the disk device and the disk device cache.

Test Size

The selections in this menu represent the size of the file to be created and is used for the reading and writing tests. Test sizes from 1MB to 10MB are available to choose from. For most people, a 1MB size is usually sufficient to detect any problems. However, larger sizes are available for those who wish to test data transfers that better simulate data transfers used by some special-purpose applications.

Duration

The selections in this menu represent the amount of time the test will run for before stopping.

Status

The Status area shows detailed information regarding the current running test. The test **Status** information fields are described below:

- **Hex Byte Pattern** – A textual sample of the created data pattern which is currently being written and read during a test iteration.

- **MB Transferred** – The combined amount of data which is written to and read back in from the storage device. It is displayed in Megabytes (MB).

- **Sum** – The "check-sum" used to verify the integrity of the data.

- **Run Time** – The Run Time display will monitor the amount of testing time that has elapsed during a test session.

- **Errors Found** – This field represents each instance that the returning data did not match the test pattern data which was originally written.

I/O Monitor

This area of the Test Data Transfer Integrity window visually displays the overall performance of your hard disk while the integrity test is being performed.
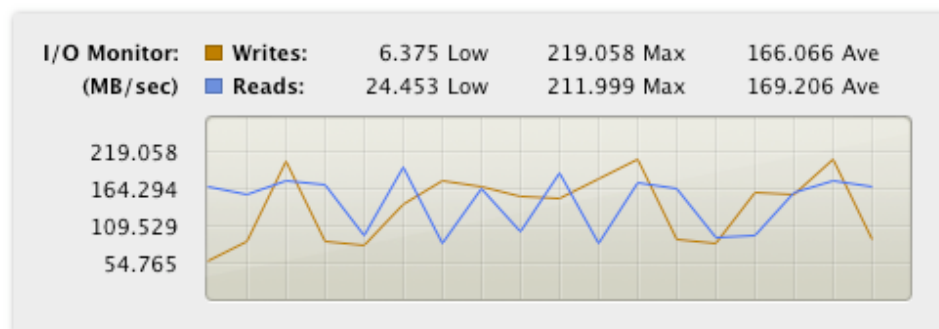
Starting a Data Transfer Integrity Test

Once you have selected your test size and duration, click the **Start** button to begin the test. You can stop the test at any time by clicking the **Cancel** button.

Viewing Results in the Repair and Maintenance Log

Each time you complete a test for data transfer integrity, information about that operation is retained in a log file. To view the log file, go to **Repair and Maintenance Log** in the main task menu. The log file title will include **Test Data Transfer Integrity**, along with the date and time the task was run.

Verify and Repair Volume

Verify and Repair Volume can help get your computer working smoothly again if you begin to experience problems running your system. These problems include: applications quitting unexpectedly, files not opening, external devices not working properly, or your computer failing to start up for the selected boot disk.
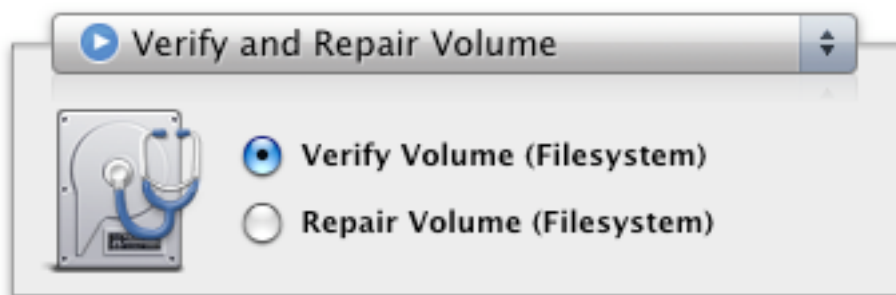
To begin, make sure other applications and files are closed and then select a volume from the **Selected Volume** pane on the left. Then click the **Verify** button.

Verify Volume

The **Verify Volume (Filesystem)** option will examine your selected volume's directory structure for errors. If you are scanning your boot (startup) volume, you may experience periods of total system unresponsiveness. This is normal. Just make sure that you are not running any other applications, or working with other files, while SpeedTools Utilities scans the volume.

While the scan runs, you will see each item that is checked in the results window. Once the scan completes, this window will display a message telling you if the selected volume appears to be OK or not, and that Verify is finished.

```
Verifying volume "Macintosh HD" on: Tuesday, August 11, 2009, 3:17:45 PM

Attempting to unmount the volume...
Volume was unmounted successfully.

Checking Journaled HFS Plus volume.
Checking Extents Overflow file.
Checking Catalog file.
Checking multi-linked files.
Checking Catalog hierarchy.
Checking Extended Attributes file.
Checking volume bitmap.
Checking volume information.

The volume Macintosh HD appears to be OK.

Verify finished.
```

If a problem is found, SpeedTools Utilities will recommend a repair be done. Make sure the volume remains selected in the Selected Volume pane and then click the **Repair** button.

Repair Volume

The **Repair Volume (Filesystems)** option will verify any errors once again and then attempt to repair them if found.

Once the repair process completes, the results list will tell you that the Repair is finished.

If you have been experiencing major problems with your computer, it is recommended you continue to run the **Verify and Repair Volume** options until no further errors are found.

Common Questions about Repairing a Volume

Q. Does Verify and Repair Volume also repair any physical media defects?

A. No. To scan for any media errors you will need to run **Scan and Repair Bad Sectors**.

Q. Why is the Repair Volume option disabled for my selected volume?

A. Repair requires the selected volume be writable and it must be MacOS Extended (HFS Plus) formatted. Additionally, the volume must be unmounted during the repair sequence, thus, you cannot repair a startup volume while you are booted from it. To repair your boot (startup) volume, you will need to boot from another hard disk which has a Mac OS installation and run SpeedTools Utilities. Or, you can boot from your Mac OS X Install CD and run Apple's Disk Utility program (First Aid option).

**Q. How do I use Apple's Disk Utility to repair my boot (startup) volume?**

A. To perform basic repair using Apple's Disk Utility, follow these steps:

1. Insert your Mac OS X Install disc into your computer
2. Start (or restart) your Mac while holding down the C key
3. Wait for the Installer to boot
4. Choose **Open Disk Utility** from the Installer application menu
5. Once **Disk Utility** opens, select a disk (default on most computers is "Macintosh HD") and then make sure the **First Aid** tab is selected.

You should then be able to Verify Disk and/or Repair the volume. For more information on these, as well as other Disk Utility features, please refer to the Help guide in the Disk Utility Help menu.

Analyze Capacity Usage

SpeedTools Utilities provides a handy tool to quickly see what kind of files are taking up the most space on your Mac. This allows you to easily locate any large files you don't use on a regular basis and archive or back them up to a CD/DVD or other storage device. Doing this will free up additional hard disk space for other files and applications you work with more often.
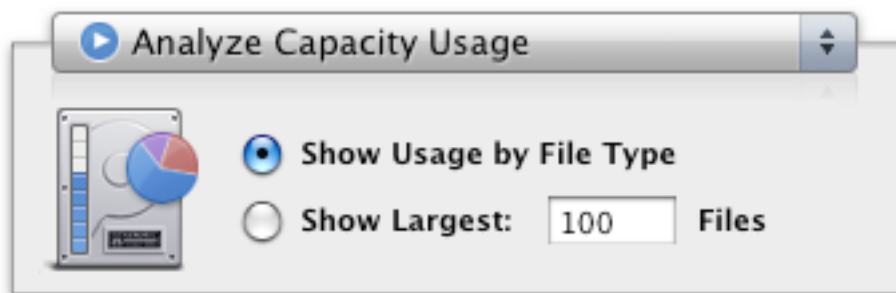
To begin, first select a volume from the **Volume List** on the left side of the main window. Next, click the **Update** button. The scan may take some time depending on the size of your system and how many files you have, so please be patient.

Once a scan completes, you have two viewing options available:

Show Usage by File Type – This will display what file types are taking up the most space on your selected volume (for example, what percentage of your disk drive is occupied by photo or movie files).

Show Largest Files – After scanning the selected volume, SpeedTools Utilities will display the largest sized individual files based on what you enter into the text box. By default, the largest 100 files will be shown, but you can change this from any number between 1 and 1000.

| Rank	File	Owner ▼	File Size	(% of Used)
1	PCMWave	root	669.23 MB	(02.369 %)
2	swapfile4	root	512.00 MB	(01.812 %)
4	swapfile3	root	256.00 MB	(00.906 %)
6	dyld_shared_cache_rosetta	root	156.97 MB	(00.556 %)
7	swapfile2	root	128.00 MB	(00.453 %)
8	dyld_shared_cache_i386	root	126.85 MB	(00.449 %)
9	0.indexPositions	root	106.60 MB	(00.377 %)
10	dyld_shared_cache_x86_64	root	85.42 MB	(00.302 %)
11	Body.data	root	80.27 MB	(00.284 %)
13	swapfile1	root	64.00 MB	(00.227 %)
14	swapfile0	root	64.00 MB	(00.227 %)

Files displayed in the results list while in **Show Largest** mode can be opened to their location with a simple double-click, and you can then remove or archive any non-essential files in order to recover space on your Mac.

You can sort the columns by clicking on the column headers Rank, File, Owner, File Size, or (% of Used).

Note: Do not remove any files you are not familiar with or you suspect is a critical file needed by your operating system or applications that you use. Only remove files you know will not harm your Mac. A good rule of thumb is to not remove any files that have the Owner "root".

Backup / Restore Volume

Backup / Restore Volume can be used to make a copy of a single volume or specific files and folders as needed. If you backup a volume as a Disk Image file, you can also restore a volume from the disk image using SpeedTools Utilities.
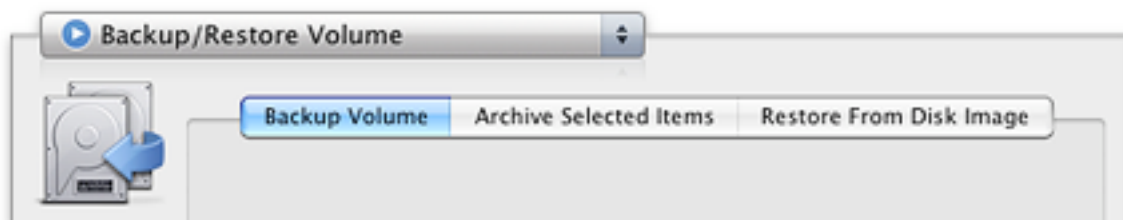
There are three main options presented as "tabs" when using Backup / Restore Volume:

Backup Volume

Use Backup Volume to copy the entire selected source volume's contents to either a **New Disk Image File**, or **Other Disk Volume**.

Backing up to **New Disk Image File** provides two advantages: First, you can backup multiple volumes to a single destination without fear of copying over files with the same name which may already be on the destination. This is because the entire backup will be contained in a single, restorable file. Second, the disk image file is compressed and therefore, will take up less space on the destination. However, you can't boot from a disk image file if your primary boot volume becomes damaged or incapable of booting. To turn a disk image file back into a hard disk that is bootable, you will need to restore it (See **Restore From Disk Image** later in this section). If you need to get specific files from a disk image, you can mount it by double-clicking the disk image file itself. Doing this will mount the disk image on your desktop just like a normal hard disk.

Backing up to **Other Disk Volume** provides the ability to boot your computer if your primary boot volume fails. When finished, the Other Disk Volume will have exactly the same file and folder contents of the selected "Source" volume. However, you should not backup multiple volumes of data to a single destination. Otherwise, you will run the risk of replacing similarly name files and folders. With this method, you can also choose to **Erase Destination** (clean off the volume you are backing up to prior to saving your new backup to ensure an exact copy). If you choose **NOT** to **Erase Destination**, items which have a unique name which are already on the destination volume will remain.

When ready, click the **Backup** button to begin.

Archive Selected Items

Use Archive Selected Items to backup important files and folders to a compressed ZIP archive file. Unlike creating Zip files using the Finder, you can easily add items from multiple folder locations and from anywhere on the selected volume. Additionally, you can select a specific destination for the archive file. If you make a mistake, click the **Remove** button to remove the selected item or click the **Clear** button to remove all items from the list. Then choose a **Destination** to save your backup to.

Note: Archive Selected Items does **NOT** remove the original items.

When ready, click the **Backup** button to begin.

Restore From Disk Image

Use this option to replace the contents of the Destination volume with the contents of a previously saved Disk Image file. To restore your boot (startup) volume from a Disk Image file you will either need to boot from another hard disk and run SpeedTools Utilities, or boot from your Mac OS Install disc and use Apple's Disk Utility to restore your hard disk.

After selecting a Disk Image file, click the **Restore** button to begin restoration of the volume.

In addition, you can schedule backups to run at any time using the **Schedule** option in the main SpeedTools Utilities toolbar. For more information on this, read the **Schedule an Automated Task** section of this manual.

Find and Repair Broken Aliases

PRO An alias is a small file that essentially "points" to another file, application, folder, removable medium, printer or other item on your Mac. Double-clicking on an alias acts in the same way as if you double clicked the original file: it opens it.

Mac OS X supports both alias files and Unix symbolic link files. A symbolic link is basically a simplistic form of an alias file. A symbolic link stores a path (or relative path) to the original file, while alias files store paths and additional information about the original file. Often, this additional information can help an alias find the original file - even if it has been moved to another location on your hard disk.

Sometimes, alias files and symbolic link files become broken and lose their ability to find the original file. SpeedTools Utilities can quickly scan for broken alias and symbolic link files, and help you repair them if needed.

To begin finding broken alias files, first select a volume from the **Volume List** on the left side of the main window.

You have two options for scanning, and can select both options if desired.
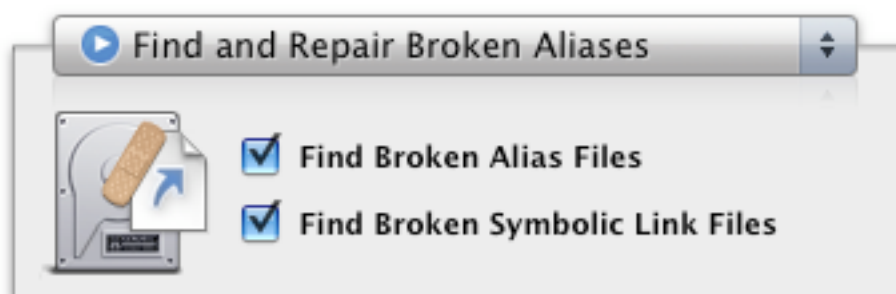
- **Find Broken Alias Files** – Select this option if you want to find broken "Apple-style" aliases on the selected volume.

- **Find Broken Symbolic Link Files** – Select this option if you want to find broken "Unix-style" aliases on the selected volume.

Click the **Find** button when you are ready to begin the scan.

A running progress is displayed as SpeedTools Utilities searches your selected disk volume for broken aliases and/or symbolic links (depending on what options you selected at the top).
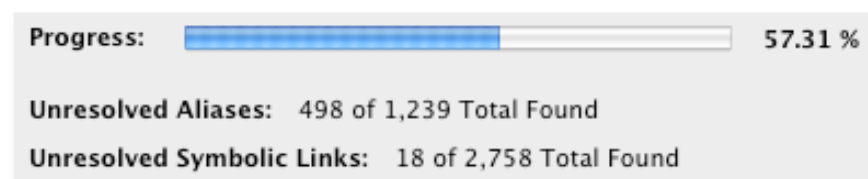
Once the scan completes, a list of unresolved alias files and/or Symbolic link files will be shown. With each item, an attempt will be made to get and display information about the original (target) item that the alias or symbolic link file once pointed to. In many cases, you can you use this information to help track down the original item if you wish to repair the broken alias file.

Once the list is displayed, the **Link Target** column will begin with either of the following two statements:

1) **Unfound target** – This indicates that the volume the alias once pointed to was found but the target file or folder was not. In other words, the link is broken.

2) **Unchecked location** – This indicates that the target file or folder resides on a volume that is not currently present on your system. Therefore, the target could not be checked for validity. This does not mean that the alias is broken, it just simply could not be checked.

In addition to repairing broken alias files, SpeedTools Utilities provides the ability to delete the files or leave them unchanged.


Repair Alias Options

- **Repair Alias** – Select a file from the results window and click the **Repair Alias** button. A browser window will open that allows you to select a new alias target. This means you just manually select which item on your system you want the broken alias to open.

- **Delete Selected** – Select a file from the results window and click the **Delete Selected** button. This will ask for a confirmation from you before you remove this alias from your system permanently. You should only delete alias files that you are familiar with; be very careful deleting system alias files. You can also save some time by selecting more than one file in the results window and delete all at once.

To see where a selected broken alias is located, click the **Show in Finder** button.

Note: Sometimes files cannot be automatically shown in the Finder, such as when a file is located in a folder that your user account does not have access to. If you click on the **Show in Finder** button and the file does not appear in the Finder, you can hover your mouse over the list item to show the item's full path as a Help Tag.

Volume Options and Settings

This section includes options to configure an alert when a volume's free space is becoming low and a "Hide Volume" setting which can help shield your private data from other people who may use your computer.
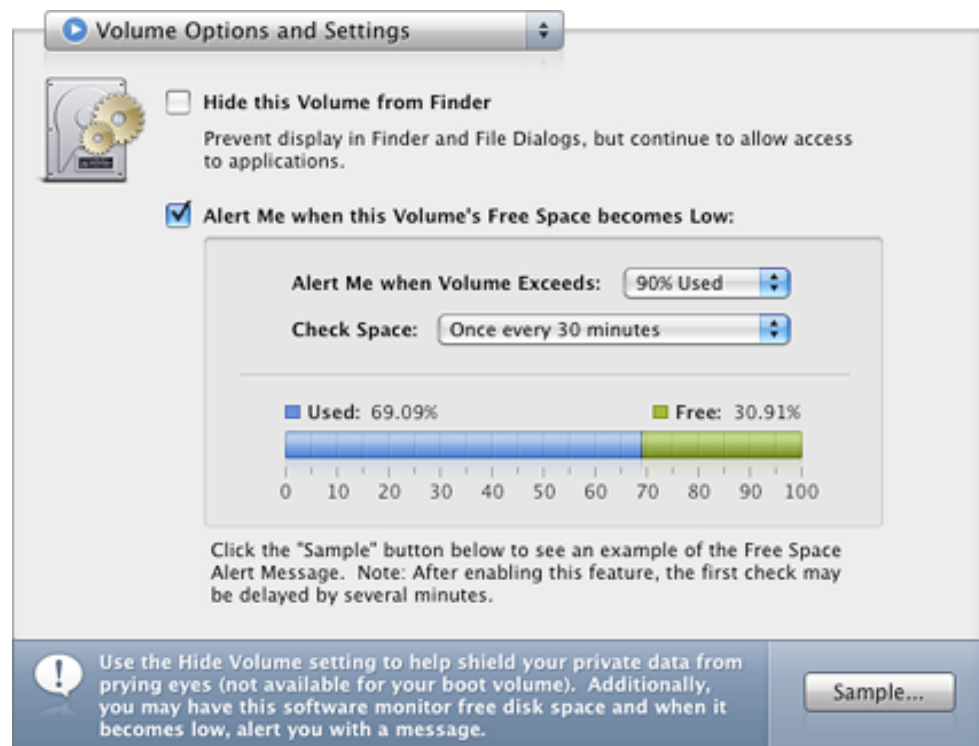
Hide this Volume from Finder

PRO This option allows you to prevent the volume from being displayed in Finder windows, on your Desktop and in File Dialogs, while continuing to allow access to applications.

In other words, the volume is still there and accessible, you just can't see it. You can use this feature to prevent the volume's data from being easily viewed by others, such as by children using your computer. Additionally, this feature is great for backup volumes that you don't want cluttering up your desktop and/or accidentally modifying while still providing access to backup applications like SpeedTools Utilities.

Note: Hiding a volume using this feature is not a secure way to restrict access to a volume from others. If a secure level of restricted access is desired, consider purchasing a commercial volume encryption utility or use Apple's FileVault.

Note: Hiding a volume "follows" the volume. That is, if you hide a USB or FireWire volume on your computer and then move the device to another computer, the volume will remain hidden on the new computer until it is either reformatted, erased or the Hide Volume feature is unselected using SpeedTools Utilities.

Note: This option is not available in MacOS X 10.3.x.

You cannot use this option on your boot (startup) volume, but you can use it on all other MacOS Extended (HFS plus) formatted volumes/devices connected to your computer. To unhide a volume, simply uncheck the checkbox while the hidden volume is selected in the **Volume List**.

Alert Me When a Volume's Free Space Becomes Low

This option allows you to be warned with an on-screen message window if a volume's free space falls below a level that is comfortable for you. Additionally, you can choose how often the selected volume's free space is checked. A graph of the volume's current used/free space is provided to help you make your choices. If you wish, each of your volumes may have an individual Free Space Alert setting and check time.

S.M.A.R.T. Diagnostics

Anything mechanical has reliability issues, including disk drives. The actual duty cycles they can withstand are unknown. All you can know for sure is that every disk drive will fail at some time. Some may fail before their estimated lifespan, while others may continue running years beyond what anyone would expect.

How a person uses their Mac can also make a difference. For example, a systems engineer doing intensive work on their computer every day may reduce the lifespan of their hard disk more quickly than a casual user who only logs on a couple hours a day to browse the Internet and respond to email.

So, what can you do about it?

Since a failed disk drive cannot often be repaired, it is important to save the data on a drive by predicting an impending failure before it happens. This can allow you more time to save or backup the data before the drive fully fails, which can be within minutes or up to several days or even weeks.

This is where **S.M.A.R.T. Diagnostics** comes in. S.M.A.R.T. stands for Self-Monitoring Analysis and Reporting Technology. This allows disk drives to monitor aspects of their own health and status and report them to you using software like SpeedTools Utilities.
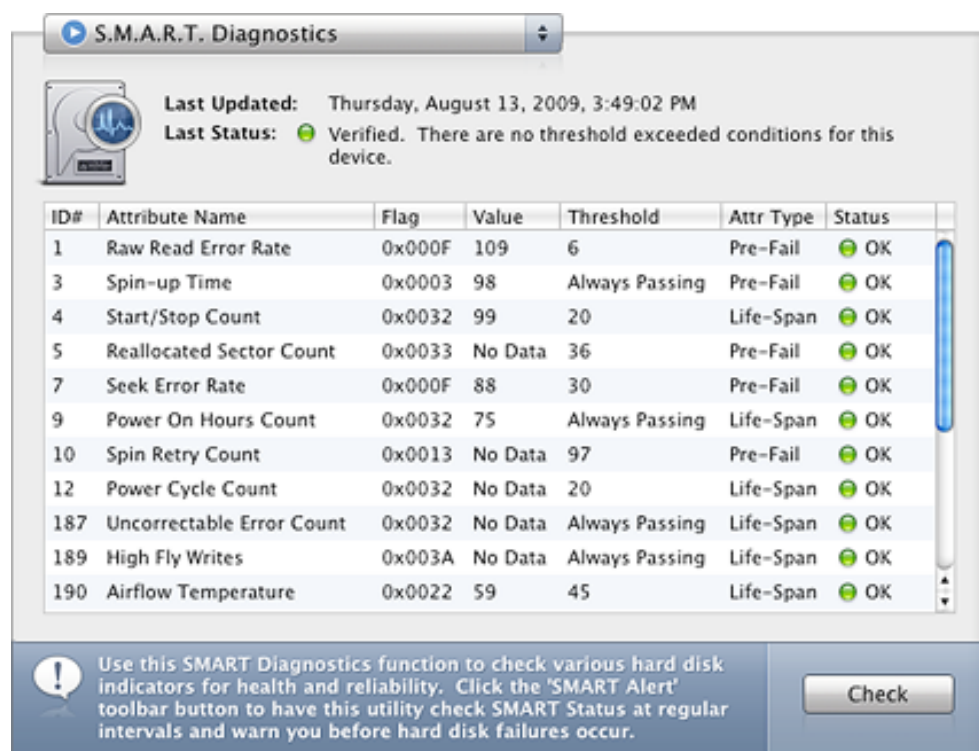
Today's S.M.A.R.T. represents the culmination of the effort of the major disk drive manufacturers to address one of the greatest drawbacks of modern hard disk drive storage technology: hardware failure resulting in partial or total data loss. Be aware that there are two kinds of hardware failure: predictable and non-predictable. Luckily, many failures are predictable because they are the result of a gradual decline in the reliability of a drive over time. This progressive degradation of reliability can usually be detected by the drive itself and impending failure can be predicted BEFORE catastrophic data loss occurs.

The SpeedTools **S.M.A.R.T. Diagnostics** task is a complete hard disk drive diagnostic utility with powerful and intelligent report-viewing and early warning capability.

SpeedTools Utilities also provides a pre-failure alarm which vigilantly keeps watch over your drives and alerts you at the first sign of trouble, both locally and/or remotely. Think of it as an early warning system for your disk drives which will, in many cases, provide valuable warning time to backup your critical data BEFORE catastrophic drive failure occurs! See **Configuring SMART Alert** for more information about automatic S.M.A.R.T. monitoring and notifications.

The S.M.A.R.T. Diagnostics Window

You can view current S.M.A.R.T. report information for the selected disk drive by selecting the **S.M.A.R.T. Diagnostics** item in the **Main Task Menu**.

NOTE: Not all disk devices and/or interfaces support S.M.A.R.T. diagnostics. Currently, the Macintosh and its drivers support S.M.A.R.T. on ATA and SATA devices exclusively. S.M.A.R.T. capability on FireWire and USB interfaces is **NOT** supported.

From here you can see the date and time S.M.A.R.T. Diagnostics was last run (**Last Updated**), and the status of that check (**Last Status**). If the **Last Status** displays a green circle next to "Verified" then there are currently no thresholds exceeded for the selected device. If a warning is displayed, find out what is failing from the results window by looking at the status for each item.

To check S.M.A.R.T. Diagnostics manually, click the **Check** button. The results should display nearly instantly.

Important Note about Attributes and their Thresholds

Drive manufactures use the term "threshold" to denote a reliability boundary for any given S.M.A.R.T. "attribute". S.M.A.R.T. attributes deemed worthy of monitoring is wholly up to the manufacturer of the drive. There are two types of attributes: "Pre-Failure" and "Life Span".

A Life Span attribute that has exceeded the manufacturer's threshold boundary is not considered to be an impending failure for a given device. However, this condition should not be taken lightly. This condition means that a given component of your hard disk is now running beyond the manufacturers expected life expectancy. Even though this condition does not directly constitute a failure, for safety we believe that you should replace the device.

A Pre-Failure attribute that has exceeded the manufacturer's threshold boundary is an immediate prediction of device failure. As such, you should backup the data contained on the device to another device and replace it immediately. To be clear, time is critical here, you may not have much time between failure prediction and actual failure!

Automatic S.M.A.R.T. Monitoring with S.M.A.R.T. Alert

SpeedTools makes it easy to not worry about constantly checking the S.M.A.R.T. status of your connected devices. Use the **SMART Alert** option in the **Main Toolbar** to automatically run regular S.M.A.R.T. status checks and notify you with an alert and/or email if a failure is about to occur.

The S.M.A.R.T. Alert feature is only available in Pro versions of this software.

Check S.M.A.R.T. Status

By default, the **Check S.M.A.R.T. Status** popup menu has "Do Not Automatically Check S.M.A.R.T. Status" selected. To change this, choose from any of the options shown in the popup menu. If your system is relatively new, you will probably be fine checking "Once at User Login and Every 12 Hours After", which will run a S.M.A.R.T. check twice a day. If you are using a computer that is several years old, it may be a good idea to select an option that checks S.M.A.R.T. status more frequently throughout the day (at least every hour).
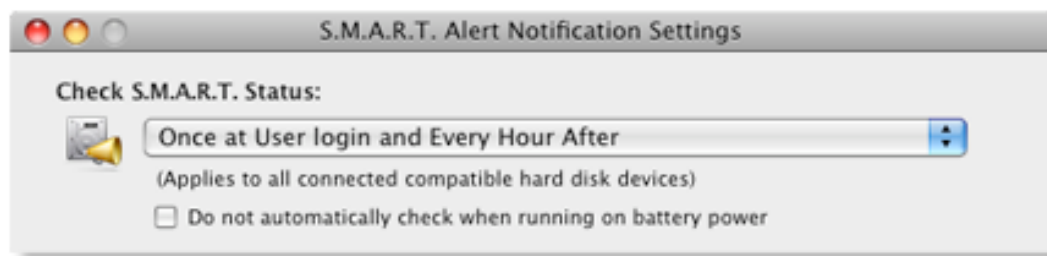

If you are running on a laptop, you can choose to disable the S.M.A.R.T. check in order to conserve battery strength. To do this, check the "Do not automatically check when running on battery power" option. Once your laptop is plugged back into AC power, the S.M.A.R.T. check will continue based on the **Check S.M.A.R.T. Status** popup menu selection.

Note: If your device is about to fail there is no way to determine when it will become unusable. This could be within minutes, or may last out for several more days or weeks. The alert and/or email notification may give you enough warning time to save critical files or backup your system before it fails.

S.M.A.R.T. Failure Notification Options

There are three ways of being notified of a S.M.A.R.T. failure: show current S.M.A.R.T. status in a status menu, open an alert message, and/or email an alert. You may choose just one option or any combination.
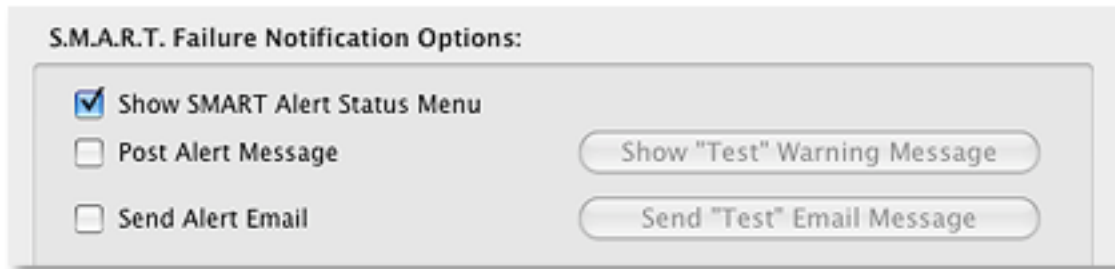
Show SMART Alert Status Menu – Displays S.M.A.R.T. Status in your main system menu bar (shown below). Also shown is an icon key of the various SMART status indicators. Check this box to activate this monitoring and notification method.
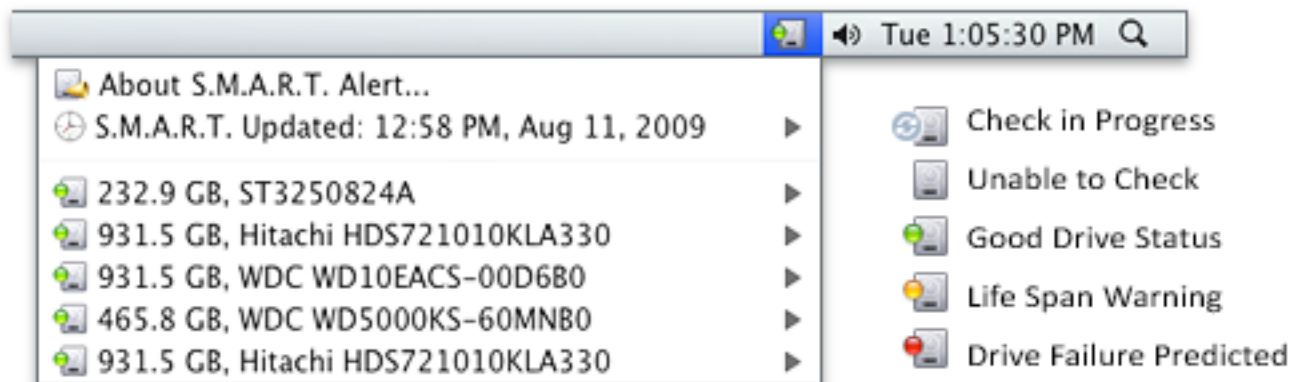
Send Alert Email – Sends an email notification to you when a drive is about to fail. Check this box to activate this notification method, but you will also need to enter information into the required fields that become active with this option. These include:

• **Outgoing Mail Server** (the outgoing SMTP mail server; if using Apple Mail you can find this in the Accounts section of Preferences)

• **Mail From Address** (this is the email address set up under the outgoing mail server you are using)

- **Mail To Address** (this should be the email address you check most often)

- **Mail Subject** (don't change, unless you think a different message would be more noticeable to you)

Enter an email address into the "**CC Mail To Address**" if you have a second email address that you want the notification to be sent to.

Advanced Options – These options should not be changed unless you know changes are required. This can include a different **Server Port** (25 is the default for most outgoing servers, but 587 also works well for .mac and MobileMe accounts), and whether or not your outgoing server requires authentication to send an email. If authentication is required, check the "Use Authentication" box and add your **User Name** and **Password**.

If you would like to be notified by email, it is strongly recommended that you send at least one test email to make sure that your settings are working. The email warning function depends on certain Internet configuration values to be set correctly. The only sure way to validate the email warning functionality is to actually send a test message.

Note: If you are unsure of these settings, you can contact your Internet Service Provider to find out what the outgoing mail server is named, if they suggest a different port, and what your User Name and Password are if authentication is required.

Once your S.M.A.R.T. Alert Notification Settings are complete, click the **OK** button to save your settings and close the window. Click the **Cancel** button to close the window without saving any changes.

Preference File Inspector

Preference files and other Property List formatted (.plist) files are used by your System and applications to store settings and other important information. Information in these text files are stored using the Extensible Markup Language (aka: "XML") format, which follows a structured "key-value" layout system. If the XML structure is broken, the file is damaged. This is true even if the file is readable by another application, such as a text editor. When the structure is broken, applications which rely on the structure for reading the data can crash or behave unpredictably.
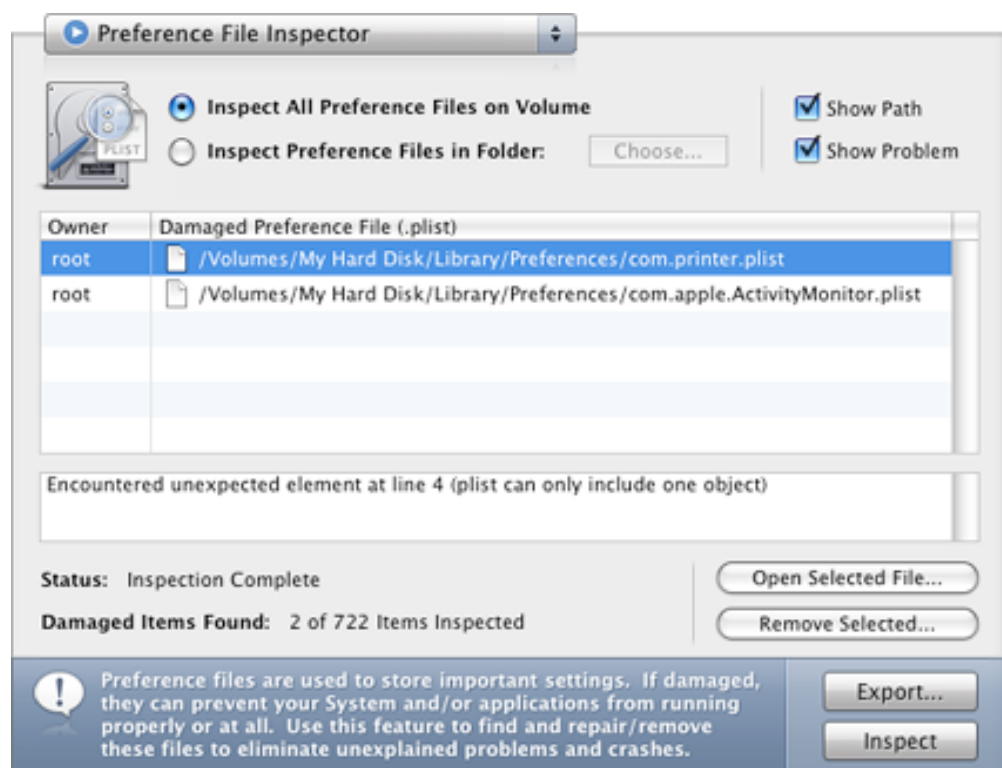
Starting an Inspection

The Preference File Inspector feature provides a quick way to find damaged preference files contained anywhere on the selected volume (including the System Folder) or in a specific folder, such as a User's Folder. To select a specific folder, click the **Inspect Preference Files in Folder** option. Next, click the "**Choose...**" button to select your folder of choice.

To begin an inspection, click the **Inspect** button at the bottom-right of the main window. After an inspection has started, the **Inspect** button will change to a **Cancel** button, allowing you to stop the inspection at anytime.

Note: Before removing or editing any file using this software, it is strongly recommend that you backup all of your important data first.

If one or more damaged files are found, you have a few options to resolve the problem:

1) You can replace the damaged file from a backup. To do this, double-click on the file in the Damaged Preference File list. This will reveal the damaged file in the Finder. Next, locate the backup version and drag it over the damaged file's icon in the Finder. This will usually prompt the Finder to ask you if it's alright to replace the file. **Note:** It may also be necessary to provide your administrator's password to replace the file.

2) You can delete the file by clicking the "**Remove Selected**..." button. This action will usually cause the application which created the file to create a new "default" file. **Note:** This option may cause the parent application to request new information from you such as a serial number the next time that you launch it. Additionally, the application may not remember certain custom preferences that you previously told it to retain.

3) You can open the file using Apple's TextEdit application by clicking the "**Open Selected File...**" button. This action will allow you to view and/or edit the file. If you are familiar with the XML format, you may be able to repair the missing or damaged structure without having to remove the file. To help you with this option, click the "**Show Problem**" checkbox. This will reveal an area, below the Damaged Preference file list, which can direct you to the offending structure.

4) You can use a combination of the previous options: You could, for example, open the file using the "**Open Selected File...**" button. After the file is opened in Apple's TextEdit, save a copy to your desktop. Then, delete the original file using the "**Remove Selected...**" button. Often, information stored in preference files will be readable to you. As a result, you may be able to use the opened copy to help restore some or all of the settings while you run the associated application.

About the XML/Property List (.plist) Format

Apple has provided several documents on the use of this format with Mac OS X on their website and with their operating system. From the plist man page:

"Property lists are constructed from the basic Core Foundation types CFString, CFNumber, CFBoolean, CFDate, and CFData. To build a complex data structure out of these basic types, you put them inside a CFDictionary or CFArray. To simplify programming with property lists, any of the property list types can also be referred to using a reference of type CFPropertyListRef.

In a CFDictionary, data is structured as key-value pairs, where each key is a string and the key's value can be a CFString, a CFNumber, a CFBoolean, a CFDate, a CFData, a CFArray, or another CFDictionary. When using CFDictionary as a property list, all keys must be strings.

In a CFArray, data is structured as an ordered collection of objects that can be accessed by index. In a property list, a CFArray can contain any of the basic property list types, as well as CFDictionary and other CFArray objects."

For more information on Property Lists, see Apple's online documentation at:
http://developer.apple.com/mac/library/documentation/CoreFoundation/Conceptual/CFPropertyLists/CFPropertyLists.html

Device / Volume Information

Use this feature to view detailed information about the selected volume and its parent device.

To begin, first select a volume from the **Volume List** on the left side of the main window. You will see two options available to you: **Volume Information** or **Device Information**.
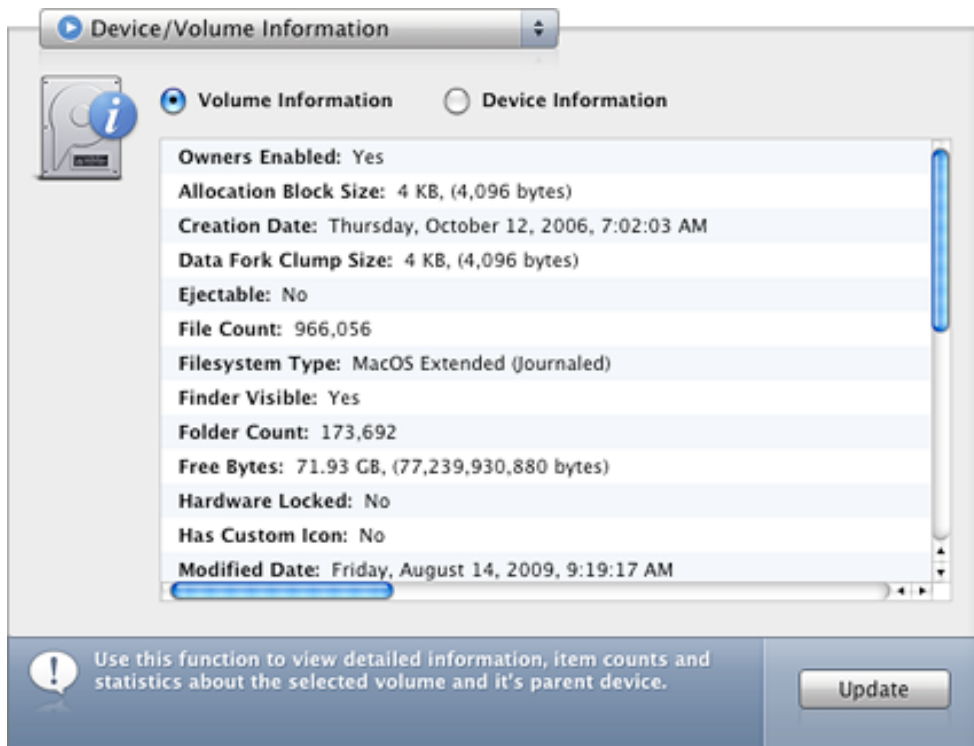
Volume Information

Viewing information about your volumes is a good way to further distinguish between two or more volumes which may look similar in the **Selected Volume** pane. Other information displayed here includes the number of files and folders contained on the selected volume, and the date the volume was last formatted/erased (see Creation Date), for example.

Device Information

The Device Information option provides interesting information about the capabilities of the selected volume's parent device. This includes information on the media capacity, whether it is S.M.A.R.T. compatible, the serial number, firmware revision, product name, and mountable volumes, among other things.

Repair and Maintenance Log

The Repair and Maintenance Log allows you to quickly view any repair, maintenance and task result performed by the SpeedTo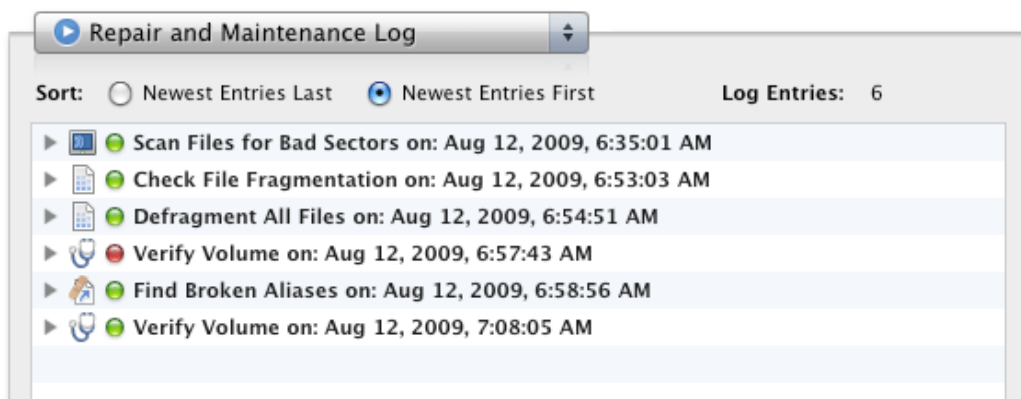ols Utilities software. Simply select a volume from the **Selected Volume** pane on the left to view any related log entries.

You can sort the log entries by "Newest Entry Last" (descending) or "Newest Entry First" (ascending). The total number of **Log Entries** is shown at the right of the Sort options.

Each log entry will include a "Success indicator" (Green LED for success or Red LED for failure), a task description, the date and time the task was run, and some additional summary details for the results of the task, which can be seen by clicking the disclosure triangle of the log entry you want to view.
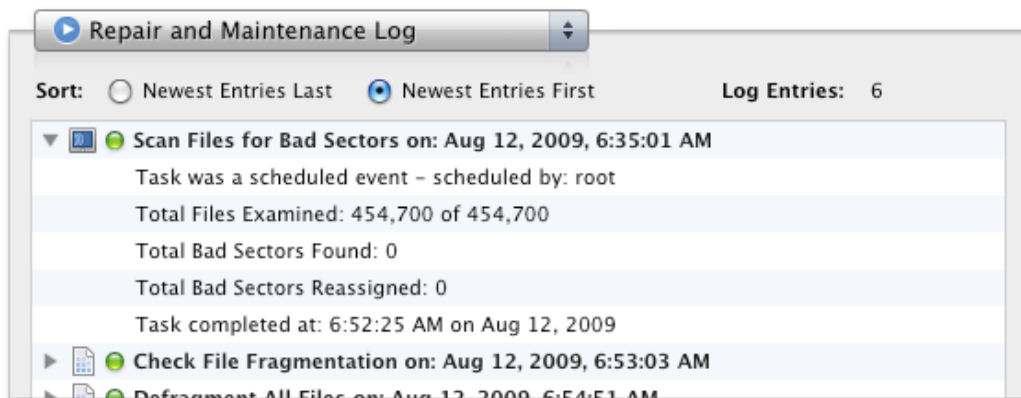
You may also expand or collapse all log entry items all at once. To do this, hold down the **Option** key on your keyboard while clicking any disclosure triangle next to a log entry.

Use the **Export...** button to save your log info to an RTF compatible text file. The file will be saved with the disclosure triangles opened or closed exactly as you have them on screen.

To remove all log entries for a selected volume, click the **Clear** button and confirm the removal of the log entries.

Scheduling an Automated Task

PRO   To start, click the **Schedule** button in the SpeedTools Utilities **Main Toolbar**. When the Schedule window opens you will see an empty **Scheduled Task** list. You will also see three options at the top of the window:

Add New – Adds a new Scheduled Task. Choose between Backup Volume, Backup Folder,Repair Bad Sectors and Defragment Files.

Edit Time – Allows you to edit the scheduled time for the an existing Scheduled Task. You can choose between having the task repeat, having the task occur only once, change the time/day/month, and whether or not to put your system to sleep or shut it down after the task completes. You can also open the Edit Time options by double clicking on a task in the Scheduled Task list.

Remove – Removes the selected task from the Scheduled Task list. This will automatically stop the task from running (although, if a scheduled task is already running, it will not stop the current process...only stop it from running again).

Adding a New Scheduled Task

After clicking the **Add New** button, you will be given four choices:
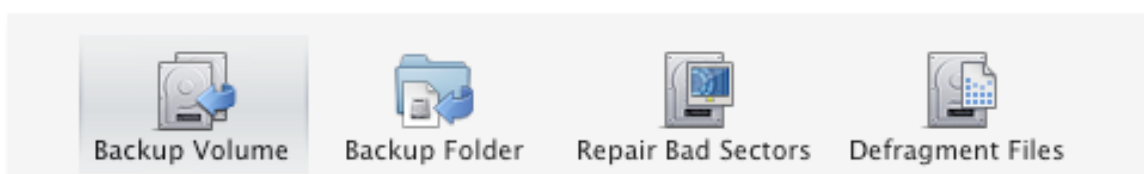
Click the task icon that you wish to schedule. Afterwards, options will be provided which are applicable to the selected task. These options are described below:

- **Backup Volume** – Make sure you first select a volume (your Backup Source) and then select a **Backup Destination** (either another volume or a Disk Image). If you are selecting a volume backup of your boot (startup) volume then you cannot select your boot volume as the Backup Destination. You can find more information on performing a volume backup in the **Backup / Restore Volume** section of this manual.

After setting the time/day/month, you can also set your computer to sleep or shut down after the scheduled task is complete. Shutting down your Mac may be preferable if you are running the scheduled task overnight and don't want your computer to remain on all night.

- **Backup Folder** – This option allows you to backup a specific folder that contains important data as a compressed disk image file. To start, click the **Choose...** button below **Folder to Backup**. This will display the standard MacOS folder selection window. Navigate to the folder that you want to backup and click the Select button. Next, click the **Choose...** button below **Backup**

Destination and navigate to where you want this disk image to be saved. If you are performing this task repetitively, each time the task runs, a new disk image will be created replacing the previous one.

After setting the time/day/month, you can also set your computer to sleep or shut down after the scheduled task is complete. Shutting down your Mac may be preferable if you are running a scheduled task overnight and don't want your computer to remain on all night.

- **Repair Bad Sectors** – Make sure you first select a volume to run this task on (Repair Bad Sectors), and then choose your **Scan Type** and **Scan Options**. You can find more information on the scan types in the **Scan and Repair Bad Sectors** section of this manual.

After setting the time/day/month, you can also set your computer to sleep or shut down after the scheduled task is complete. Shutting down your Mac may be preferable if you are running the scheduled task overnight and don't want your computer to remain on all night.

- **Defragment Files** – Make sure you first select a volume to run this task on (Defragment Files), and then choose whether to **Check for Fragmentation** or **Defragment All Files**. For a scheduled task, the option to Defragment All Files would be recommended in order to actually fix the fragmentation some of your files may be experiencing (rather than just checking to see if there is any file fragmentation). You can find more information on fragmentation in the **Defragment Files** section of this manual.

After setting the time/day/month, you can also set your computer to sleep or shut down after the scheduled task is complete. Shutting down your Mac may be preferable if you are running the scheduled task overnight and don't want your computer to remain on all night.

Note: You <u>can</u> schedule tasks to occur at the same time. If these tasks are to occur on different volumes, they will take place simultaneously. If these tasks are to occur on the same volume, they will take place sequentially (i.e. one after another) in the order of the scheduled task list.

Tip: After adding a task in the Scheduled Task list, you can simply uncheck its checkbox to stop the scheduled task from running again. You can then check the box once more to activate the scheduled task without having to add a new task or edit an existing one.

Tip: It is not necessary for you to leave your computer powered on for a scheduled task to occur. If you wish, you can set you computer to automatically turn on or wake up before a scheduled event using Apple's Energy Saver feature. This feature is located in System Preferences under the Apple Menu. To use this, click the **Energy Saver** icon in the **System Preferences** Pane. Next, click the **Schedule...** button at the bottom-right of the window. Make sure that you configure the Startup or Wake event to occur **5 minutes before** you want the SpeedTools scheduled event to occur. Also, make sure that your computer is set to sleep if it is inactive for **10 minutes or more**, so that it does not sleep before the SpeedTools Utilities scheduled event can occur.

Close the Schedule Tasks window when you are finished. Any activated scheduled tasks will continue running on your system at their given time(s), even if you close SpeedTools Utilities or switch between users.

Viewing a Scheduled Task in Progress

When a scheduled task begins, a small floating progress window will be displayed. The window will show the task name, the volume name that the task is working on and the progress of the task. If multiple tasks start during the same time, the progress window will grow to show those tasks too (shown below). If you run the SpeedTools Utilities application while a scheduled task is running, progress for the scheduled task will also be visible in the main window.
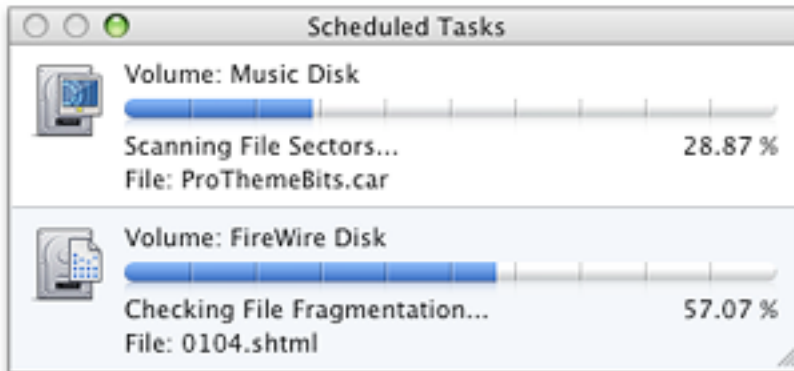
Preferences

Although most of what you need for each task in SpeedTools Utilities is found in the respective task area, there are additional options available to you. To open Preferences, select Preferences… from the SpeedTools Utilities application menu (near the Apple menu at the top of the screen).

When the Preference window is displayed, you will be given the following options:

- Play a sound when a task completes successfully
- Play a system beep to alert you when a task fails
- Show the disk number associated with each volume in the Selected Volume pane
- Remember Last Window Height
- Show/Hide CPU Meter (see **Describing the Main Window** #8 in this guide for more info)
- Require Admin password each time SpeedTools Utilities starts up   **(Strongly Recommended)**
- Automatically check for updates to SpeedTools Utilities
- Show Software Version in Window Title Bar
- Allow CPU Sleep During Tasks on AC Power
- Allow CPU Sleep During Tasks on Battery Power
- Prevent ALL Scheduled Tasks on Battery Power
- Remember Task...
- Auto Select Remembered Task

Many of these Preferences are strait-forward in terms of what they do. However, there are a few options which we feel could use some additional information:

Remember Last Window Height – This feature is especially useful for those who prefer the "Grid" icon task view. If you enlarge the window so that more task rows become exposed, this feature will remember the new window height and automatically expose the additional task icon rows the next time SpeedTools Utilities is run.

Allow CPU Sleep During Tasks on AC Power – By default, SpeedTools Utilities will prevent automatic CPU sleeping while tasks are being performed in both the main application and schedule application when your computer is plugged into an AC power source. This is done so that longer-running tasks can finish while you are away from the computer. Otherwise, the task may be paused while your system goes to sleep and then resumed when your system wakes up. It is important to note that while the CPU will be prevented from sleeping by default, your screen will continue to follow the normal sleep settings of the computer. Additionally, SpeedTools Utilities will NOT prevent manual Sleep selections from the Apple menu. If this setting is check-marked and the system asks the SpeedTools software if it is OK to sleep, it will be allowed.

Please note: Constant disk activity may prevent the CPU from sleeping as normal on some systems. As a result, the "Allow Sleep" settings of this software may not always work. This is because the system may not ask running software if its OK to sleep during heavy disk activity. Instead, the system may elect to keep the CPU awake until the disk activity has completed on its own.

Allow CPU Sleep During Tasks on Battery Power – By default, SpeedTools Utilities will **NOT** prevent automatic CPU sleeping while tasks are being performed in both the main application and schedule application when your computer is running on battery power. You may uncheck this box to override this behavior.

Show Zoom Effect with Task Icon Selections – Selecting this option will show a quick graphics effect that makes the selected icon appear to zoom out towards you during a task selection.

Prevent ALL Scheduled Tasks on Battery Power – By default, SpeedTools Utilities WILL prevent all scheduled tasks from occurring when running on battery power. This includes checking on and posting Low Free Space Alerts. You may uncheck this box to override this behavior.

Remember Task – Selecting this checkbox will automatically move the Main Task Selector to the task selected in the adjacent popup menu the next time that SpeedTools Utilities is launched.

Auto Select Remembered Task – Selecting this checkbox will automatically select the Remembered Task (see above) and make the task immediately usable. This item will be grayed out until the Remember Task checkbox has been checked.

To revert all Preference settings back to the recommended settings, click the **Default** button.

When you are done with your preference changes, click the **OK** button to save your new settings and close the window.

Disk Benchmarking

OEM Versions of this software include a volume benchmark utility which we call **QuickBench**. While the **PRO Version** includes QuickBench and another device-level benchmarking utility called ZoneBench. To get started, click the **Benchmark** button located in the **Main Toolbar**. In the **PRO Version**, a menu will be presented providing two options: **Benchmark Volume (QuickBench)** and **Benchmark Device (ZoneBench)**. OEM versions will simply start QuickBench automatically.

- **QuickBench** is an application designed to test the performance of a mounted volume in the same way that your system and other applications use the volume. In other words, it provides "real-world" performance measurements.

- **PRO** **ZoneBench** was developed to test the performance of your entire device from the beginning of the media to the end. This type of benchmarking can be especially useful for determining partition sizes since performance will reduce as data is accessed further and further toward the physical end of the disk. See **Using ZoneBench** for more information.

Using QuickBench™

The QuickBench application is a simple yet powerful disk drive performance evaluation tool (a.k.a. Benchmarker) which has four main components: a "Standard" test suite which measures relatively small random and sequential read and write speeds; a "Large" and "Extended" test suite which measure two larger test size sets, and, lastly, a "Custom" test. The **Custom Test** allows you to design your own test according to your personal requirements. QuickBench is extremely safe since all tests are performed by reading and writing to temporary test files exclusively.
To begin, first select a volume from the **Selected Volume** popup menu.

Note: 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. Although this is no longer the preferred nomenclature according to the U.S. National Institute of Standards and Technology, SpeedTools Utilities continues to use this labeling system because this is what Apple, Inc. supports. Keeping this uniform with what Apple uses should be the least confusing to SpeedTools Utilities customers.

QuickBench Requirements

The Standard test requires 153 MB of free space. The Large test requires 198 MB, and the Extended test requires 594 MB of free space.

Global Test Options

In the group box at the top of the main window, to the right of the **Selected Volume** popup menu, are two check boxes:
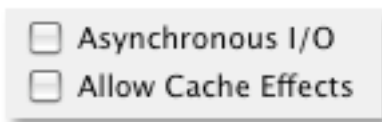

- **Asynchronous I/O** – QuickBench uses standard file system calls to perform read and write speed measurements. Broadly speaking, there are two different modes in which these routines can be executed: synchronously and asynchronously. It is beyond the scope of this guide to explain the details of these concepts, but it is worth noting that some improvement in write speeds can sometimes be achieved by transferring data asynchronously, especially on faster devices.

- **Allow Cache Effects** – Running a test with this box checked will result in a very short pause (delineated in milliseconds) between each transfer size being tested. A millisecond is a thousandth of a second.

Note that in the Standard Tests, these pauses will occur after every 1 MB of data transferred. Also, this setting is ignored during random testing.

Setting Read and Write Delay Values

When the "Allow Cache Effects" feature is enabled, these short pauses can have a dramatic, positive effect on measured drive speeds.

Furthermore, optimizing these pause values can significantly improve measured peak performance. It is recommended to begin changing these values using 5 millisecond increments.
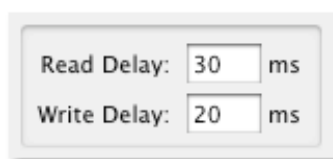

Note: Only values between 1 and 1000 milliseconds are allowed for the read and write delays.

- **Read Delay** – This setting controls how much time is provided to the drive between read requests, allowing the drive to anticipate the next read request and pre-fill its cache during the pause. If the drive actually performs read ahead caching, some or all of the data will be ready to transfer directly from the cache when the next read request actually occurs, significantly improving performance.

- **Write Delay** – This setting controls how much time is provided to the drive between write requests. This allows the drive to commit data it may have stored in its write cache to the physical storage medium. This, in turn, frees the drive's write cache to be fully available for the next actual write request.

Test Option: Cycles

A **Cycles** setting is available in every test mode. A new test cycle repeats the exact same test for as many cycles as are specified and then calculates the simple mean average for each result. After 5 cycles, the low score for each transfer size is discarded. This helps compensate for, but does not fully prevent, occasional random system activity from interfering with the testing. See **QuickBench Benchmarking Tips** at the end of this section for a discussion on this and other issues affecting benchmark testing.
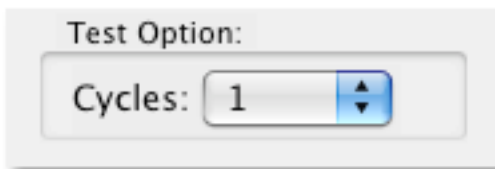
Since there is often a great degree of variance in speeds for any given single read or write, the addition of multiple test cycles can greatly assist in accurately and repeatability quantifying a drive's performance at a given task. This, shedding a much more consistent light on the performance comparison of the relative merits of one drive versus 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. Just keep in mind that the more cycles chosen, the longer the test will take to complete.

View Option: Line or Bar Graph

This option simply display the test results in either a line or bar graph.
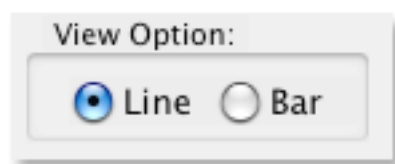
Test Status

Once you start QuickBench by clicking the **Run Test** button, this section will display the name of the test currently running.

Test Status:

Ready To Run Test

The Standard Test Suite

The Standard Test suite measures nine different data transfer sizes under four different scenarios for up to 100 cycles: Sequential Reads, Sequential Writes, Random Reads and Random Writes. The test results reflect the following influences: the drive's internal media transfer rate, seek time and cache efficiency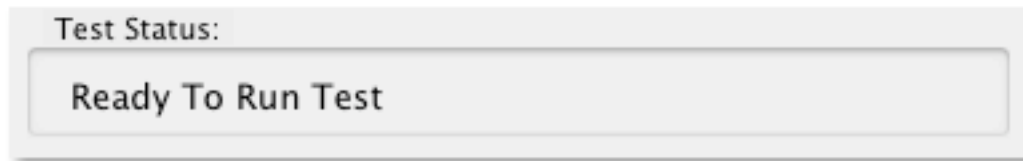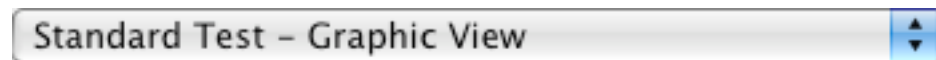, the efficiency of the various drivers controlling the drive and, lastly, the speed of the bus interface connecting your drive to your Macintosh.

Standard Test – Graphic View

QuickBench makes every attempt to limit the influence of the Mac OS file system cache because, in our view, the Mac OS cache makes it too difficult to determine the drive's true performance.

The Standard Test suite can be run while displaying the results in either a graphical representation or a sortable numeric representation (which shows measured speeds with much greater precision). Note that the graphical and numeric views perform exactly the same tests, but just display the results differently. In graphical mode, one test option, "Cycles," and one view option, "Line vs. Bar" chart, are available. In numeric mode, only the "Cycles" option applies. The "Cycles" option applies to both the graphical and numeric modes.

Large and Extended Tests

The Large and Extended Tests are provided to measure the drive's ability to sustain large amounts of data transferred to and from your Macintosh. The Large test measures transfer sizes from 2 through 10 MB in size. The Extended test measures 20 through 100 MB transfers. Note that, as opposed to the Standard Tests, both the Large and Extended tests are not a series of sequential reads and writes averaged together. Each transfer size test consists of only a single read or write of the test transfer size. However, each transfer size is tested sequentially relative to the previous transfer size so that the same area of the disk is not accessed more than once within a single read or write test set. This helps prevent drives with very large caches from receiving an unfair advantage.

Custom Test

The Custom Test section of QuickBench provides a nearly unlimited range of sequential read/write tests which can be performed. There are three test parameters which must be chosen and one test option available. The three test parameters are Transfer Size, Transfer Count, and Test Cycles:

- **Transfer Size** – The transfer size is the amount of data to be read from and written to the drive for each request. The popup menu allows the size you type in to be delimited as Kilobytes or Megabytes. Valid values range from one Kilobyte to 1024 Megabytes and is further limited by the amount of available physical RAM installed on your computer. For example, if you have 512 MB of RAM in your computer you will not be able to use a Transfer Size above 512 MB. In fact, the amount of actual memory available for data transfers will likely be far less than 512 MB.

- **Transfer Count** – 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 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. For example, a Transfer Size of 10 Megabytes and a Transfer Count of 100 will require 1000 Megabytes of free space on the test volume.

- **Test Cycles** – Test cycles are explained earlier in this manual, but notice in the Custom Test that test cycles, like the other two parameters, are to be typed in rather than selecting a pre-defined value from a menu. Valid values for the number of cycles to be performed are 1 to 1,000,000 (one million).

Test Option: Force Contiguous Test File Space

A file is considered contiguous when all of the blocks allocated for the file are arranged on the volume in a single location. A file is considered fragmented when it is arranged in two or more separate locations on the volume. Checking the **Force Contiguous Test File Space** box will force QuickBench to only allocate a contiguous test file. If there is not enough contiguous free space on the test volume, the test will NOT be performed. Note that if you do not check this box, QuickBench will still try to allocate a contiguous test file, but failing that allocation, QuickBench will attempt a new allocation allowing the test file to occupy multiple fragments.

When you are ready to begin benchmarking, click the Run Test button:

Saving Test Results

Test results can be saved into either a word processor friendly file or a spreadsheet friendly file. The spreadsheet friendly file is specifically designed to facilitate the creation of quick and easy graphical charts. To save any and all test results into a file, go to the **File** menu and select one of the two data format options (you also will be able to toggle file output formats from the Save File window).

The word processor friendly file is formatted with spaces and designed to be viewed by any word processing application. For best viewing, choose a monospaced font, such as Monaco. The spreadsheet friendly file is formatted with tabs between the data which should be assigned to columns and carriage returns for data to be displayed in rows.

QuickBench Benchmarking Tips

1) Quit all other non-essential programs. Due to the way Mac OS X splits processor time evenly among all running applications and other processes, 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 volume prior to being tested. Because QuickBench testing is file-based, other files on the test volume can affect the accuracy of QuickBench with respect to other otherwise identical test configurations. Formatting as HFS Extended without journaling is highly recommended since this is the native file system of Mac OS X, and journaling generates additional, unaccounted for disk access during testing.

3) Smoother is better. Test with at least 5 cycles, if possible, especially in the Standard Tests and the Large Tests. If your test results look similar to a saw blade (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 the benchmarking results.

6) Maximum accuracy. Mac OS X regularly reads and writes 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.

Using ZoneBench™

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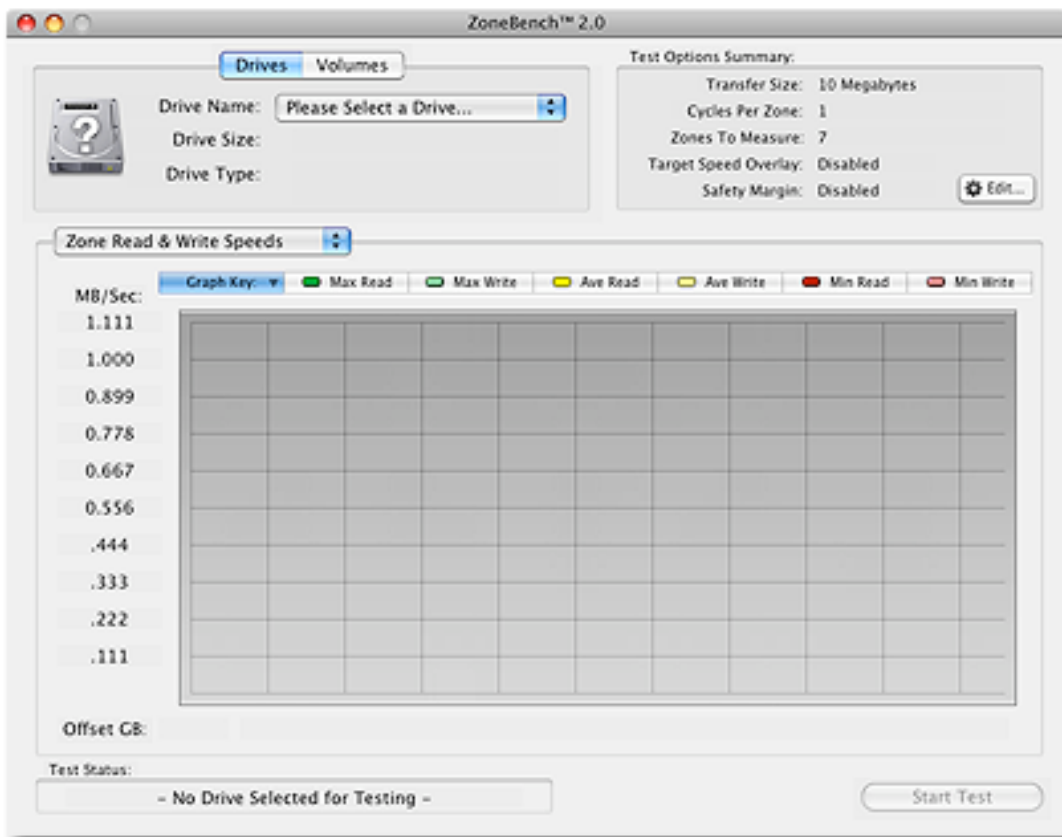
ZoneBench was created with maximum flexibility in mind. All zone test variables can be easily modified to suit almost any testing situation. Test results can be saved into tab-delimited text files suitable for importing into your favorite spreadsheet application or word processor.

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 ZoneBench is very different from 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.

When you start ZoneBench, its main window will be displayed (as show in the previous image). 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 which 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 want 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 window shown below:
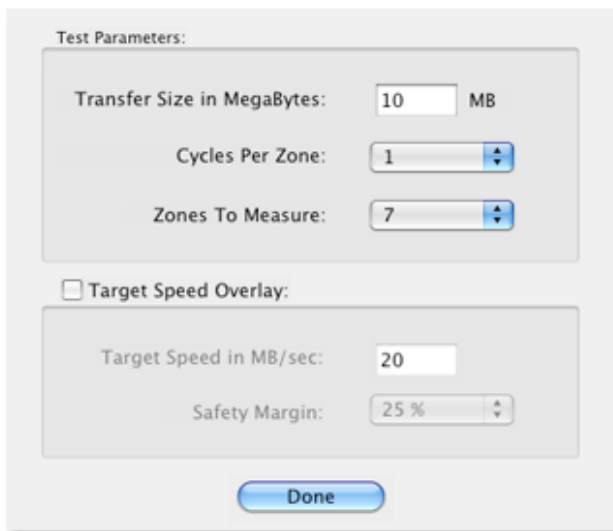
Transfer Size

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, we recommend 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 the image on the following page. The exact starting location will be presented in the saved results file. See "**Saving Test Results**" later in this section for more 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 the image below of a test performed on an internal 500 GB USB 2.0 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 (shown as a transparent white rectangle in the graph). 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.

Click the "Done" button when finished changing the test options. Your new settings will be remembered the next time you run ZoneBench.
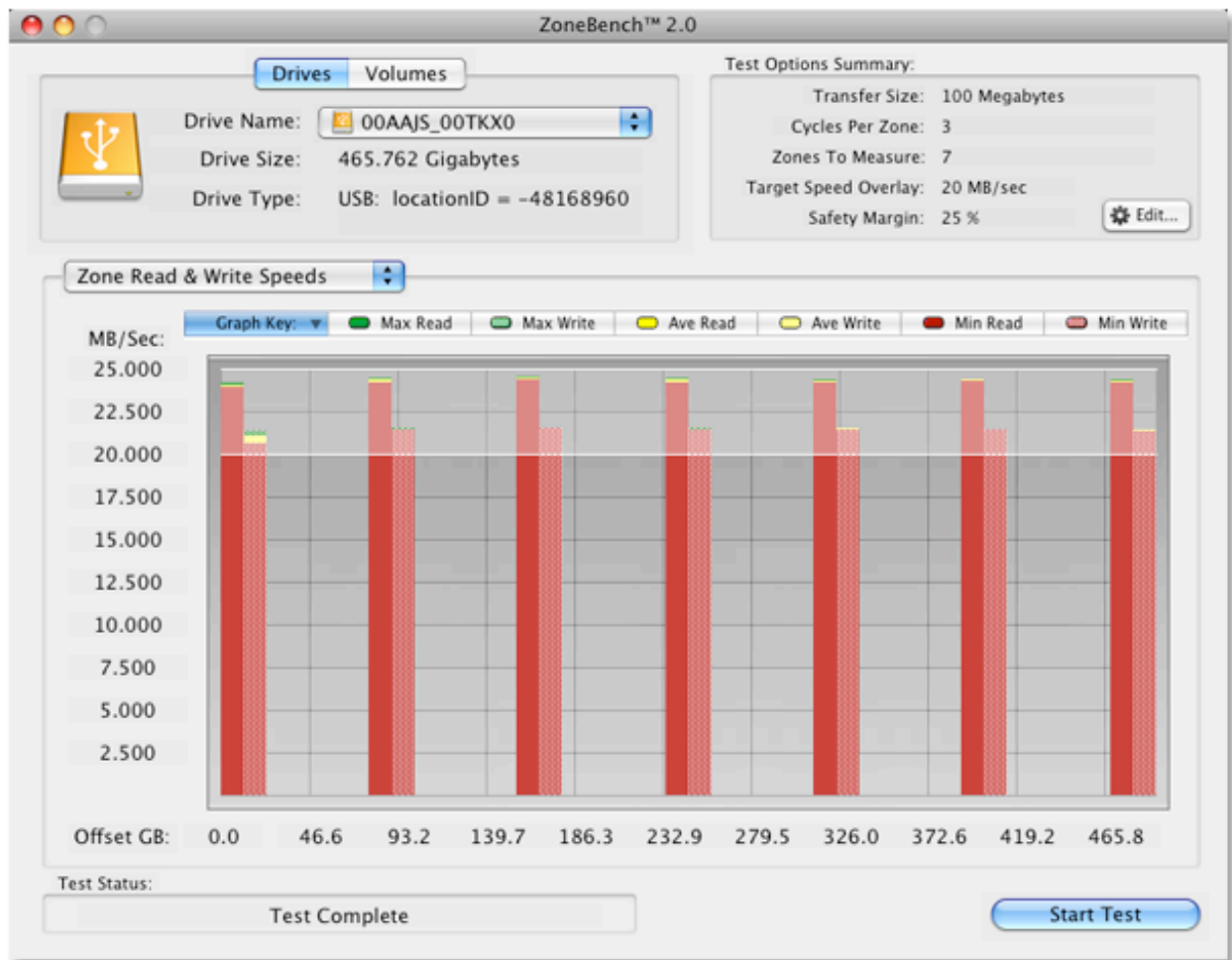
Note: There must be actual test results available in order for the overlay to be visible.

Random Read and Write Testing

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 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 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 a 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 ZoneBench 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.

SpeedTools Utilities Menu Options

The SpeedTools Utilities menu options include the following choices:

SpeedTools Utilities (main application menu)

- **About SpeedTools Utilities**– View information about the software, including version number and copyright information.
- **Preferences** – Change preference settings for SpeedTools Utilities. (see **Preferences** in this guide)
- **Hide SpeedTools Utilities**– Hides the application window.
- **Hide Others** – Hides other open applications and windows, leaving SpeedTools Utilities open.
- **Quit SpeedTools Utilities**– Closes the application. Any scheduled tasks will remain active based on scheduled settings.

File

- **Show Task** – Opens the selected task in the main application window.
- **Mount Selected Volume** – Mount the selected volume to the Desktop if the volume is currently unmounted.
- **Unmount Selected Volume** – Unmount the selected volume from the Desktop if the volume is currently mounted. You cannot unmount your boot (startup) volume.
- **Eject Selected Volume** – Ejects a selected volume from the Desktop if the volume is currently mounted. You cannot eject your boot (startup) volume. Use Eject for CD/DVDs and for other ejectable style media.
- **Open Disk Image** – Opens a browser to locate a disk image you would like to open and mount on your Desktop.
- **Open Recent Disk Image** – Shows a list of disk images you recently opened using SpeedTools Utilities so you can quickly open them again at a later time. This remains empty until you use the Open Disk Image menu option.

Advanced

- **PRO** **Run Selected Task On All Volumes** – Allows you to quickly choose a task to run on all volumes listed in the Selected Volume pane.
- **Stop All Cancelable Tasks Now** – Any tasks that are running on your volumes that can be canceled will be stopped. Tasks that cannot be canceled include Verify and Repair Volume, and some instances of Backup Volume (a block level copy). Some tasks may take a bit of time to cancel, so please be patient.
- **Show Log Info for Missing Volumes** – Display log entries (in a separate window) for volumes that are not currently mounted or connected to your computer.
- **Clear Log Info for All Volumes** – Will remove all log entries for all volumes, not just a selected volume.
- **Clear All Low Free Space Alert Settings** – Will remove all Free Space Alert settings for all volumes, not just a selected volume.

- **Force Unmount Selected Volume** – Can forcefully unmount a selected volume if the normal unmount option is not working. This cannot be used on your boot (startup) volume.
- **Uninstall this Software** – Completely removes SpeedTools Utilities from your computer.

Update

- **View Revision History** – Opens a window which displays information about features added and/or fixed in past revisions of this software - starting from version 3.0.
- **Check for Updates Now** – Tells you if your current version of SpeedTools Utilities is up-to-date, or opens an update window if a newer version is available.
- **Last Update Check** – A non-selectable menu item which displays the time and date that checking for a later version of this software was last preformed.
- **Automatically Check for Updates** – Check this if you want SpeedTools Utilities to check for a newer version whenever you open the application.

Help

- **Visit Intech's Website** – Opens your default web browser to the Intech SpeedTools website.
- **Online Support** – Opens your default web browser to the support section of the SpeedTools website.
- **View Users Guide** – Opens a PDF version of this manual on your computer.
- **Common Mac OS Error Code Table** – Show a small floating window with common Mac OS File System related error codes and a description for each.

Frequently Asked Questions

Q. Do I need to run SpeedTools Utilities from a boot CD in order to use the utilities on my boot (startup) volume?

A. Other utility suites require you to run their utilities from their boot DVD or CD, or a separate volume in order to work with the boot volume because they have to first unmount the volume. SpeedTools Utilities doesn't require this for any of its utilities, unless you are repairing your boot volume (the Verify and Repair Volume feature). SpeedTools can also defragment 99.99% of your boot volume on-the-fly.

Q. Can you use SpeedTools Utilities on a network volume?

A. No. SpeedTools Utilities requires disk drives to be physically attached to the computer you are using the software on.

Q. What types of volumes can SpeedTools Utilities work with?

A. Some tasks like Defragment Files, Backup and Verify/Repair work with HFS and HFS+ volumes exclusively. Other tasks, such as Scan for Bad Sectors, Test Data Transfer Integrity, Analyze Capacity Usage, Find and Repair Alias Files, SMART Diagnostics can work with virtually any filesystem type.

Q. Can I schedule any of the utilities to run when I am away from my computer?

A. SpeedTools Utilities allows you to schedule when to defragment files, repair bad sectors or backup a folder or volume… as often as you want. This means that you can run these utilities every night when you are not working on your Mac so that your system will be optimized and safe each morning when you return.

Q. Can I run SpeedTools Utilities on more than one volume at a time?

A. Absolutely. Run SpeedTools Utilities on as many volumes as you want simultaneously. This will save you time from having to run tests or repair multiple volumes one at a time.

Q. What will happen if the power goes out on my Mac while running an important process in SpeedTools Utilities?

A. One of the features that make SpeedTools Utilities stand out from the rest is how it handles an important process, like defragmenting your files for example. Fragmented files are copied to a temporary location to be put back together again; once this is done, the file is moved back whole once more. If a power outage occurs while this is happening, your original fragmented file will most likely remain safe since the defragment process had not yet completed. In addition, since the rest of the files on your system are not being worked on at the same time and since the low-level Catalog File is not being directly manipulated by SpeedTools while defragmenting files, you won't need to worry about your entire system getting wiped out should an interruption in power occur unlike with some other file defragment and optimizing utilities.

Q. Does SpeedTools Utilities support Mac OS X 10.3.9?

A. Yes. Currently, SpeedTools Utilities supports Mac OS X 10.3.9 and later.

Q. How can I uninstall SpeedTools Utilities?

A. SpeedTools Utilities provides an easy built-in uninstaller. To uninstall SpeedTools Utilities, choose the "Uninstall this Software…" option from the **Advanced** menu. Then just follow the instructions.

SpeedTools Utilities Keyboard Commands

Keyboard commands help you quickly access certain options or features in SpeedTools Utilities.

General Keyboard Menu Commands

Keystroke	Description
Command-,	Open Preferences
Command-H	Hide SpeedTools Utilities
Option-Command-H	Hide Others
Command-Q	Quit SpeedTools Utilities
Shift-Command-U	Unmount Selected Volume
Shift-Command-M	Mount Selected Volume
Command-E	Eject Selected Volume
Option-Command-O	Open Disk Image
Command-Z	Stop All Cancelable Tasks Now
Down Arrow	Select the Next Volume in the List
Up Arrow	Select the Previous Volume in the List
Left Arrow (while showing main task icons)	Move Task Scrollbar Position Left
Right Arrow (while showing main task icons)	Move Task Scrollbar Position Right
Command-/ (while showing main task icons)	Toggle Task Icon View
Shift-H	View Revision History
Shift-C	Check For Updates Now
Shift-W	Visit the Intech Website
Shift-A	Show Common MacOS Error Code Table
Shift-?	Open User's Guide

Show Task Keyboard Commands

Keystroke	Description
Command-M	Main Task Menu
Command-1	Scan and Repair Bad Sectors
Command-2	Defragment Files
Command-3	Test Data Transfer Integrity
Command-4	Verify and Repair Volume
Command-5	S.M.A.R.T. Diagnostics
Command-6	Analyze Capacity Usage
Command-7	Backup / Restore Volume
Command-8	Volume Options and Settings
Command-9	Preference File Inspector
Command-0	Find and Repair Broken Aliases
Command-I	Device/Volume Information
Command-L	Repair and Maintenance Log

Show Volume Heading Information Commands

Keystroke	Description
Shift-1	Show Volume Format
Shift-2	Show Device Serial/Revision (firmware)
Shift-3	Show Device Connection Type
Shift-4	Show Device Partition Scheme
Shift-5	Show Capacity Information
Shift-6	Show Capacity Information (as percent)
Shift-7	Show File/Folder Counts
Shift-8	Show Volume Creation Date
Shift-9	Show Last Volume Modified Date