

# On Running ScanDisk And Disk Defragmenter To Completion In Windows 9x/ME (Draft) (71.4KB)

For: [Windows 95](#) / [Windows 98](#) / [Windows ME](#)

Published: 14Jul00 | Last Updated: 14Jan04 | Status: Discontinued

## [I. On ScanDisk](#)

## [II. On Fragmentation/Defragmentation](#)

## [III. Important Notes On Running ScanDisk Before Disk Defragmenter](#)

## [IV. On Running ScanDisk & Disk Defragmenter To Completion](#)

## [V. Running ScanDisk To Completion](#)

## [VI. Running Disk Defragmenter To Completion](#)

## [VII. On How Often To Run ScanDisk & Disk Defragmenter](#)

## [VIII. Additional Reading](#)

---

### **I. On ScanDisk**

ScanDisk is a Windows utility which scans for, and provides a mechanism for correcting, Hard Disk errors. ScanDisk first appeared in MS-DOS 6.2 as a more capable Hard Disk error checking/correcting utility than the earlier MS-DOS utility, Check Disk.

ScanDisk checks the following when scanning a Hard Disk for errors.

- Media descriptor.
- File allocation tables.
- Directory structure.
- File system.
- Surface scan.

The checks are grouped into two types of tests.

- **Standard Test**
  - Media descriptor.
  - File allocation tables.
  - Directory structure.
  - File system.
- **Thorough Test**
  - Surface scan.

ScanDisk is included with Windows 9x/ME and may be run in DOS-Mode (a.k.a., MS-DOS Mode, Real-Mode, 16-bit-Mode) or in Windows-Mode (a.k.a., Protected-Mode, 32-bit-Mode). DOS-Mode does not require first booting the computer to Windows 9x/ME. Windows-Mode requires first booting the computer to Windows 9x/ME.

### **ScanDisk In DOS-Mode (SCANDISK.EXE)**

ScanDisk in DOS-Mode does not require first booting the computer to Windows 9x/ME. ScanDisk in DOS-Mode is recognized by the blue background/interface characteristic of later DOS applications. There are a number of instances where ScanDisk is run, or may be run, in DOS-Mode.

1. **Windows 9x/ME Startup Disk:** ScanDisk is included on a Windows 9x/ME Startup Disk

and may be run after booting the computer to a Windows 9x/ME Startup Disk.

**Note:** For more on a Windows 9x/ME Startup Disk see [On The Windows 9x/ME Startup Disk](#).

2. **Windows 9x/ME Installation:** During Windows 9x/ME Setup ScanDisk is automatically run to check the Hard Disk for errors.
3. **Improper Windows 9x Shutdown:** Upon reboot ScanDisk is automatically run to check the Hard Disk for errors.

**Note:** DOS-Mode support has been stripped from the Windows Me Operating System. As a result, when a Windows Me is improperly shut down and restarted, ScanDisk is run in Windows-Mode, as opposed to DOS-Mode for Windows 9x.

4. **Restart Computer In MS-DOS Mode:** After booting a Windows 9x computer to Windows 9x, one can instruct Windows 9x to restart the computer in DOS-Mode.

**Note:** DOS-Mode support has been stripped from the Windows Me Operating System. As a result, a Windows Me computer cannot be restarted in MS-DOS Mode.

### ScanDisk In Windows-Mode (SCANDSKW.EXE)

ScanDisk in Windows-Mode involves first booting the computer to Windows 9x/ME. Then the Windows 9x/ME GUI is used to initiate the running of ScanDisk. There are a number of different Windows 9x/ME GUI options for initiating the running of ScanDisk in Windows-Mode.

1. **System Tools.**
2. **My Computer.**
3. **Windows Explorer.**
4. **Boot Computer To Safe Mode.**

---

## II. On Fragmentation/Defragmentation

Disk Defragmenter is a Windows utility which reduces the fragmentation state of a disk's data. The process of running Disk Defragmenter is known as defragmenting, or defragging, the disk. As described below, Disk Defragmenter improves Hard Disk performance by decreasing the total distance that a Hard Disk's moving parts need to cover in order to read/write data. In doing so, Disk Defragmenter also reduces wear and tear on the Hard Disk, which improves Hard Disk lifespan. Lastly, with older hardware and CD burning software, running Disk Defragmenter prior to burning a CD may be requisite.

Hard Disk performance (i.e., the rate at which a data is read from, and written to, a Hard Disk) is a function of two things.

1. The speed of the Hard Disk's moving parts.
2. The fragmentation state of the data.

### On The Speed Of The Hard Disk's Moving Parts

A Hard Disk contains moving parts. These moving parts include the spindle, to one or more circular-shaped platters are physically attached and spin around in unison, and multiple arms which swing, also in unison, back and forth in an arc-like fashion over the surface of the spinning platters. At the end of each arm is a read/write head which reads data from, or writes data to, the surface of spinning platters.

In short, average seek time is a reflection of the time it takes for the Hard Disk's read/write heads to move from one location over the Hard Disk's surface to another. Average latency is a

reflection of the rotational spin speed of the Hard Disk's platters. The combination of average seek time and average latency comprise what is known as access time. The lower the value of access time the higher the performance of the Hard Disk.

The speed of a Hard Disk's moving parts is, however, an intrinsic, fixed, property of the Hard Disk. In other words, one cannot adjust the speed of the Hard Disk's moving parts. Therefore, if one wishes to improve Hard Disk performance, the only option is to improve the fragmentation state of the data.

**Note:** Although defragmenting a highly fragmented disk may result in a slightly noticeable improvement in overall System performance, those serious about improving System performance in terms of Hard Disk performance should obtain a newer Hard Disk with lower access time.

### On The Fragmentation State Of Data

Before installing an Operating System the Hard Disk must first be partitioned, which creates the Drive(s), and then the Drive(s) must be formatted, which imparts a File System to the Drive(s).

**Notes:** For more on partitioning see [On Partitioning \(Draft\)](#). For more on formatting see [On Formatting \(Draft\)](#).

When a Drive is formatted, one of the things that occurs is that individual data storage units are created. It is into and amongst these individual data storage units (a.k.a., clusters) that data is written to, stored on, and retrieved from. This data includes the files that comprise the Operating System itself, the files that comprise installed Applications, and any files "associated" with the Operating System, Applications, etc..

A Hard Disk may contain thousands, or even hundreds of thousands of files. The size of many of these files exceeds the size of a cluster. When the size of a file exceeds the size of a cluster, multiple clusters are required to store the file's data. If the multiple clusters involved in storing a file's data are located adjacent to one another, the disk is said to be **defragmented**. When a disk is defragmented, the total distance the Hard Disk's moving parts need to cover to read/write said data is kept at a minimum, and, as a result, the "apparent" performance of the Hard Disk is increased even though the speed of the Hard Disk's moving parts remains constant.

When one performs a clean install of an Operating System and Applications, the data is largely defragmented and the performance of one's Hard Disk is near maximal. However, the size of some Operating System files, the size of some Application files, and the size of many files associated with the Operating System and/or Applications are in flux. Moreover, files are being created and deleted as needed. As the result, clusters are being emptied and filled with file data which may not be related to the file data of adjacent clusters. If the multiple clusters involved in storing a file's data are not located adjacent to one another, the disk is said to be **fragmented**. When a disk is defragmented, the total distance the Hard Disk's moving parts need to cover to read/write said data is increased, and, as a result, the "apparent" performance of the Hard Disk is decreased even though the speed of the Hard Disk's moving parts remains constant.

### Disk Defragmenter In Windows-Mode (DEFRAG.EXE)

Disk Defragmenter is a **Windows-Mode only** utility; meaning, Windows 9x/ME does not include a DOS-Mode version of Disk Defragmenter, and that in order to run Disk Defragmenter one must first boot the computer to Windows 9x/ME. Then the Windows 9x/ME GUI is used to initiate the running of Disk Defragmenter. Like ScanDisk, there are a number of different Windows 9x/ME GUI options for initiating the running of Disk Defragmenter in Windows-Mode.

1. **System Tools.**
2. **My Computer.**

3. **Windows Explorer.**
  4. **Boot Computer To Safe Mode.**
- 

### **III. Important Notes On Running ScanDisk Before Disk Defragmenter**

It is widely suggested that one runs ScanDisk before running Disk Defragmenter. The reason for this is simple: Disk Defragmenter moves data, placing the data of large files into adjacent clusters, irregardless of the integrity of the data being moved.

As a result, if there should exist a Hard Disk error which compromises the integrity of data, and Disk Defragmenter moves the data from the problem area of the Hard Disk to an error-free area, Disk Defragmenter moves the data from its original location to a new location, the new location the data now located on a Hard Disk error-free, the data is displaced from the source of the data compromise, as it now exists in an error-free area, without any hint of the previous problem.

In other words, Disk Defragmenter moves data without the possibility of first fixing any potential data integrity problems so that the clusters involved placing the data of files in adjacent clusters. In other words, Disk Defragmenter does not check for errors. It moves the data, errors and all.

ScanDisk scans for Hard Disk errors, and, if a Hard Disk error is found, ScanDisk provides a mechanism for correcting the error *in situ*. Disk Defragmenter, on the other hand, simply moves data from one location on Hard Disk to another and does not check the integrity of data, and may move the data, with errors before possibly moving it to a new location on Hard Disk. It moves around.

If a Hard Disk error should compromise the integrity of a file's data, the error correcting mechanism of ScanDisk determines if the cluster containing the data is good or not, and, if not, ScanDisk attempts to correct it. It is best to allow ScanDisk the possibility of correcting the problem, at the location as it exists before Disk Defragmenter to may be able to correct the error. If, however, Disk Defragmenter encounters a compromised file data which it is going to move, the mechanism for correcting such errors will be affected. ScanDisk will not be able to correct the error. As some Hard Disk problems affect the ability of the error correcting mechanism, a Hard Disk error may include the data as comprises a file, it is best to correct the error as it rather than

move it. A Hard disk may include errors, and In other words, once a damaged file has been moved by Disk Defragmenter, the repair of a file becomes considerably more difficult and may require the replacement of the file or the reinstallation of an entire program.

Lastly, if one has a large Hard Disk please don't expect ScanDisk, and especially Disk Defragmenter, to run quickly. If the Disk/Drive being worked with is particularly large, say 20MB or more, one might be best running ScanDisk and Disk Defragmenter overnight.

---

### **IV. On Running ScanDisk & Disk Defragmenter To Completion**

ScanDisk and Disk Defragmenter are notorious for running for a period of time, restarting from the beginning, running for a period of time, restarting from the beginning, and recycling like this ad infinitum. As a result, it may be difficult, if not impossible, to run ScanDisk and/or Disk Defragmenter to completion.

ScanDisk and Disk Defragmenter require that the Hard Disk's data be static. Here, any Hard Disk read/write activity initiated by any program other than by ScanDisk or Disk Defragmenter, themselves, automatically prompts ScanDisk and Disk Defragmenter to restart from the beginning. As a result, when running ScanDisk and/or Disk Defragmenter the user is not to work

on the computer when running ScanDisk and Disk Defragmenter. Moreover, screen savers, antivirus programs, in short, any program which might initiate Hard Disk read/write activity should be closed before running ScanDisk and Disk Defragmenter. Some programs, however, are configured to automatically load on Startup. Programs configured to load on Startup are often referred to as running in the background. And unless one knows what one is doing, not only may it may be difficult to determine all the programs that are configured to load at Startup, but it may also be difficult to figure out how to close them momentarily.

There are two to start a computer so that as to eliminate the t ng sure ScanDisk and/or Disk Defragmentation runs to completion:

1. **Restart Computer In MS-DOS Mode:** When a computer is booted to MS-DOS Mode

**Notes:** Restarting computer to MS-DOS Mode is available for Windows 9x only, not Windows Me. ScanDisk may be run in MS-DOS Mode, not Disk Defragmenter.

2. **Boot Windows 9x/ME To Safe Mode:** To start computer in Safe-Mode press **F8** just before the Windows splash screen appears. Then select **Safe-Mode**.

Safe Mode is a special mode of Windows frequently used for troubleshooting. Of significance to this page, when a Windows 9x/ME computer is booted to Safe Mode, Applications that would otherwise load at startup are not loaded. For more on this see [On Running ScanDisk & Disk Defragmenter To Completion](#) below. Nonetheless, Safe Mode is Windows running in Windows-Mode, and after booting Windows 9x/ME to Safe Mode one may run ScanDisk Disk through System Tools, My Computer, or Windows Explorer, described above.

---

## V. Running ScanDisk To Completion

**Note:** The ScanDisk Surface Test in DOS is essentially the same as the ScanDisk Thorough test in Windows.

### Running ScanDisk To Completion In MS-DOS Mode (Windows 9x)

1. Boot computer to Windows 9x.
2. Reboot computer by clicking **Start | Shut Down | Restart in MS-DOS mode | OK**.
3. The **C:\Windows>** prompt appears.
4. Type **scandisk x:**, where x is the drive to be scanned for Hard Disk errors. Hit **[Enter]**.
5. ScanDisk performs the **Standard Test**.
6. If no Hard Disk errors are detected, ScanDisk prompts **Do you want to perform a surface scan now?**
7. Hit **[Tab]** or use keyboard **arrow keys** to select **Yes**. Hit **[Enter]**.
8. ScanDisk displays the surface map and performs the **Surface Scan**.
9. If no Hard Disk errors are detected, ScanDisk prompts **ScanDisk did not find any problems on drive x**, where x is the drive scanned for Hard Disk errors.
10. Hit **[Tab]** or use keyboard **arrow keys** to select **Exit**. Hit **[Enter]**.
11. The **C:\Windows>** prompt appears. Restart computer to Windows 9x by typing **exit** and hitting **[Enter]**, or reboot computer by hitting **[Ctrl-Alt-Del]**.

### Running ScanDisk To Completion In Windows Safe Mode (Windows 9x/ME)

1. Boot/reboot computer.
2. Repeatedly press **[F8]** until the **Microsoft Windows 9x/ME Startup Menu** appears.

**Note:** The point is to hit [F8] just before the "Windows Splash Screen" appears. If necessary, repeat and hit [F8] a bit more frequently.

3. Select **Safe Mode** and hit **[Enter]**.
4. **Windows 9x:** The Windows 9x Safe Mode Desktop appears.  
**Windows Me:** The Microsoft Help & Support Safe Mode Trouble Shooter window appears. Close the Microsoft Help & Support Safe Mode Trouble Shooter window.
5. Click **Start | Programs | Accessories | System Tools | ScanDisk**.
6. The **Scan Disk dialog** appears. Indeed, **Select the drive you want to check for errors**.
7. Here, my selections read as follows:
  - The **Type of test fieldset** one has two options: Standard or Thorough test. As we are running ScanDisk to detect/correct Hard Disk errors prior to Defragmenting, select **Thorough**.
  - **Auto fix errors:** I do.
  - Click the **Options button**. In the **Area of disk to scan fieldset** select **System and data areas**. Do not select the two square boxes below. Click **OK**.
  - Click the **Advanced button**. My selections read as follows:

**Note:** For information about each option, click the "?" at the top right of the window and then click directly on an option.

- **Display summary:** Only if errors found (if no errors found, why bother with a summary).
- **Log file:** Replace log (no point in having a huge log file if you do scandisk regularly).
- **Cross-linked files:** Make copies.
- **Lost file fragments:** Convert to files (gives you the chance to check the file yourself).
- **Check files for:** Invalid file names (checks to make sure that the file can be opened).
- Uncheck the remaining two boxes and click **OK**.

8. Click **Start**.
9. Once the scan has completed you are ready to Defragment your Hard Drive.

## VI. Running Disk Defragmenter To Completion

### Disk Defragmenter In Windows Safe Mode (Windows 9x/ME)

1. Click **Start | Programs | Accessories | System Tools | Disk Defragmenter**.
2. The **Select Drive dialogue** appears. Indeed select **Which drive do you want to defragment**.
3. Click the **Settings button**.
4. In the **When defragmenting my hard drive fieldset** make sure both the **Rearrange program files so my programs start faster box**, and the **Check the drive for errors box**, are checked.

**Note:** The **Check drive for errors** method alluded to here does not perform the **DOS Surface test/Windows Thorough test** described above: only a simple scan is performed. Because of this, there is relatively little time waited in leaving the **Check the drive for errors box** checked.

5. In the **I want to use these options fieldset** go ahead and make sure the **Every time I**

**defragment my hard drive radio button** is selected.

6. Click **OK** | **OK**.

---

## VII. On How Often To Run ScanDisk & Disk Defragmenter

"How often should I run ScanDisk and Disk Defragmenter?"

As the integrity of data is EVERYTHING, it is far more more important to run ScanDisk than it is to run Disk Defragmenter. And the older one's Hard Disk is, and the more frequently one uses computer, and if one uses the computer to the more what one uses the computer for, enter into the equation. to the and even more so if one's Hard Disk is frequently say And the older o, and the more one's Hard Disk the more if one's Hard Disk is ScanDisk . This is a loaded question normal user (A casual user The normal, casual user How often one should As to the question, "How often should I run ScanDisk and Disk Defragmenter?" the answer depends on how much you do with your system. Someone who uses their computer only for the occasional school paper doesn't need to perform nearly as much maintenance as someone who uses their computer everyday on the Web, frequently runs huge graphics applications, plays hi-end, graphics-rich games, and uses their computer for a job.

But more important than how often one should runs ScanDisk is one's data backup strategy. Simply put, Hard Disks almost always fail unexpectly. And although the frequent running of ScanDisk may give one a heads up, there is no substitute for rigid schedule of data backup. In fact, stagmatter

As a "power user," I like to run ScanDisk every three days and run Disk Defragmenter once a week, Defragmenting to have programs start faster every two weeks.

To remind once again...make sure nothing is running in the background, including antivirus programs, or running ScanDisk and Disk Defragmenting in full blown Windows may very well continually restart.

---

## VIII. Additional Reading

- [ScanDisk Runs After Improper Shutdown or Hard Disk Error \(152404\)](#) (Microsoft).
- [Description of ScanDisk for Windows \(Scandiskw.exe\) in Windows 98/ME \(186365\)](#) (Microsoft).
- [List of Articles About the ScanDisk Tool \(287914\)](#) (Microsoft).
- [Description of the Disk Defragmenter Tool in Windows 98/ME \(186171\)](#) (Microsoft).
- [List of Articles About the Disk Defragmentor Tool \(286263\)](#) (Microsoft).
- [How Windows 95 Performs a Safe-Mode Start \(122051\)](#) (Microsoft).
- [How to Start a Windows 98-Based Computer in Safe Mode \(180902\)](#) (Microsoft).
- [Desktop Icons May Be Rearranged After You Boot into Safe Mode \(256196\)](#) (Microsoft).

**A special thanks to Cold Canuck for the initial version of this page.**

## **Steve's Tech Resource**

The Web Development, Internet, Software, Hardware, and Multimedia Resource



Copyright © 2000-2010 Steve's Tech Resource