

Hard Disk Sentry

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Hard Disk Sentry

Hard drive maintenance is very important to any hard drive user. You see the file on your drive but cannot open it. Your hard disk shows plenty of memory and you still get out of memory messages. Files are just plain unreadable. Giving your hard disk drive a "physical" can avoid these problems. Hard Disk Sentry is the cure.

Hard Disk Sentry is very simple to use. The program will walk you through step by step displaying your options. In the beginning of this manual, we will explain these steps. In the back of this manual there is more technical information.

Note: Hard Disk Sentry can only fix errors in the file system structure. It cannot repair a physically damaged hard drive, controller, or other faulty hardware.

The Advantages of Hard Disk Fix and Optimizer

The only way to restore FAT (File Allocation Table) damage is to either zero out and reload from backups, or go in manually with a sector editor and fix the damage manually - if you can find it. This is a very tedious job and data is lost at the slightest mistake. Most restore programs, even the "fast" ones require much user intervention (swapping floppies) and would take much precious time to complete. Hard Disk Sentry typically takes less than a minute for all partitions. Your files are current, not stale from old backups, nor is there the risk and complexity of sector-editing.

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Running Hard Disk Sentry

IMPORTANT:

First create a special boot disk with only the HD driver in the AUTO folder.

Always reset the machine before running the SENTRY.PRG because TOS could be in an "erroneous state".

First start by verifying the drive. This will show where the problems are.

Run the program by double clicking on it's icon "Sentry.Prg".

You will see a dialog box that asks you to select the disks that you want to verify. You may select more than one drive. You may also verify floppy disks as well as hard disks. Selecting the print option will send all results to the printer as well as the screen. When you have selected the drives, click on "OK" (Don't be concerned with the other options now).

The tests will begin. The program will check each device automatically. At this point the drive is only being checked for errors. There are no repairs being performed.

The results of the test will be displayed on the screen. If the total errors are zero (0), when you continue, the program will ask if you would like to optimize (unfragment) the volume. Click on "Yes" or "No".

If errors are found during the verify, the

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program will ask if you want to list the threatened files. Click on "Yes" or "No".

Then, the program will ask if you want it to repair the damage. Click on "Yes" or "No". If you want it to actually repair the volume, you must specify "Yes".

After the disk is repaired, a summary of repairs is printed. And the "Verify Complete" box is shown. Click on "Done". The disk is now structurally in good shape.

After the errors have been repaired, the program will ask if you would like to optimize the volume. Click on "Yes" or "No".

FIX_??????? Files

For files that are found but have no name, files will be created in the form of FIX_??????? - the last "???" will be an educated guess as to the file type (you may have to dump or show the program to be sure.)

DIR will be a directory

TXT is a text file

PRG is a program

UNK unknown (other)

Look for a directory of this form in the root (it will be listed and you should have a copy, if you specified printing) The recreated files will be inside. Normally you can just delete the entire thing, but it is usually better to look first.

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Warning: Please read the following cautions

DO NOT use Hard Disk Sentry without creating the special boot disk with only the HD driver in the AUTO folder. Do not auto boot from your hard drive. It is very important for your hard drive to be in a stable state when using this program. No other program should be calling your drive. Hard Disk Sentry is analyzing and repairing your entire drive, therefore you should only boot with the Hard Disk Sentry program and the low level disk drivers. This is not a bug in the program but a safeguard for your protection. Beckemeyer Development can not predict how the program may react if you do not follow this instruction.

Don't wait to repair disks; repair as soon as Hard Disk Sentry detects something or you suspect something happened (such as a power failure or crash). This will prevent a bad end from changing into a collision. Errors can only grow.

This routine can only repair errors in directories, if an error has persisted for a while, it may affect a file. Moreover certain crashes may write garbage to a file as easily as a directory. Any files listed should be thoroughly checked to see if they are still valid.

If there are very many errors, or a glitch zapped many places, it is suggested that you backup any files modified since the last backup, delete every file, and reload, since

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every file may have been affected.

The (X) Option

The (X) Option is used only when the program recommends it. Hard Disk Sentry has allocated enough RAM to handle the repair processing. In the event your hard drive has numerous errors the program will suggest increasing memory space by selecting the (X) Option. The program should run on a 520 ST (512K) if there aren't too many accessories or TSR programs.

Bypass

If after selecting option (X) you still get a "Select option (X)" message, then select the Bypass option. This option will ignore any file that has a bad file name. If you still get "Select (X) option" then try the (X) option and Bypass together. This method may lose more files but will work on the worse drives. Files will most likely still be recovered as FIX_??????? files

The Damage Report

A summary list of disks which have (or had) errors will be printed. If repair is specified, a log of the repair will be printed. Other information will be printed as described below - it may give interesting statistics, or you may ignore it.

FAT Statistics:

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Total FAT clusters (1k)

This is the actual space on the disk useable for files. Each cluster is 1K (2 sectors) which is the minimum you can allocate at one time.

FAT File Starts

Number of clusters that begin chains. Since the FAT is a list of pointers, these are clusters which are not free and are not pointed to by any other cluster.

FAT File Ends

Number of EOF (End of File) markers. This is the number of FAT entries marked at EOF properly. It is possible to have a file cut off early if the system crashes. "Starts" should equal "Ends". A small file (less than 100 K) will have the start and end be the same cluster.

Bad File Endings

Number of chains ending at an invalid cluster. If a cluster chain does not end at an EOF marker, it will be counted here. Files may end at either EOF, or a deleted cluster, or invalid cluster (past the physical end of the disk) or even a loop like 4->5->6->4.

Invalid FAT clusters

Number of invalid clusters (not free, next, or EOF). If a cluster isn't pointed to (part of a file chain) and has a value that makes no sense (past physical end of the disk) it is counted here.

Chain Collisions

Number of collisions (chains merge). When

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two file chains point to the same cluster it is a serious error. This could also be from a loop. Most other errors would be corrected by deleting the bad file, but this could make that action worse.

Contiguous Clusters

Number of contiguous clusters. For speed, files should be in the same area of the disk. This gives the number of clusters that are immediately after their predecessor.

Non-Contiguous Clusters

Number of noncontiguous clusters. This gives the total number of gaps in file chains. This is not an error, but will make accesses slower since the disk will have to search more to get files. It is provided as a measure of when it might be useful to optimize.

Total Files

Total number of files in directory and FAT. This is the maximum possible recoverable files on the disk. It includes every directory entry that points to something usable, and every file chain in the FAT that has no corresponding directory entry.

Total File Clusters

Clusters allocated to known files. This is the total space used by the files in the directory. It is an accurate measure in clusters (K) as opposed to adding the size fields which can be wrong.

Free Clusters

Available clusters. This is the number of clusters marked free in the FAT.

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Orphan Files

"Orphan" clusters-allocated, but no file uses them. This is the file chain in the FAT which has no directory pointing to the starting cluster. It will be recovered when a filename is added to the directory. This is the amount of space used by such files.

Recoverable Clusters

Neither file nor orphan, recoverable clusters, including small loops with no directories pointing into the chain. These will be marked "Free".

Unuseable Clusters

Reserved clusters (normally bad blocks). TOS allows certain values for physically bad sectors (sectors which have a defect and cannot store data) which take space away, but don't qualify as anything else. They may also be used for special files like a disk log or for copy protection key areas.

Unknown Clusters

Unknown (deeper cross referencing necessary, done in repair). These are the clusters after collisions. They may be an orphan chain, or belong to one of the colliding files. These are also the body of loops. Since Hard Disk Sentry can't figure out exactly here, it just notes it as an error condition.

Orphan Files

Number of "orphan" files. This is a count of file starts that have no corresponding directory entry.

Orphan Decedents

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Decedents of an orphan directory. If the orphan file qualifies as a directory, it will be searched like any other subdirectory, but the files will be counted here (not in "Files") since in order to access them, the orphan file must be restored. Also, these files would be orphan files if the subdirectory wasn't recovered.

Total Errors

Number of threatened or bad files. Total number of files (other than orphans) that need some form of repair.

Total Good Files

Number of perfect files. Total number of files which need no repair.

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Appendix A:

A Technical Explanation of the Hard Disk Sentry Repair Processes

Some errors will not show up in the counts. These are those that are not produced by any linkage problem such as inconsistent size or strange characters in a filename.

Each beginning and ending in the FAT is matched with the directory, and any differences are noted. If a chain is allocated, but no directory entry matches, it is flagged as an "orphan". This can occur when deletes are interrupted. If a free block ends a file chain, it's status is unknown, but can be resolved further. Since it is neither Free or allocated, it is counted "unknown". Further repair will either change it to EOF or FREE. This applies to some other situations. Recoverable is not marked free, but cannot (or should not) be recovered into a file, but will be marked free when repaired.

This information may not be of interest except to users who know about GEMDOS and may want to do some editing with other tools to manually restore some files. Otherwise it may be useful only to point out which files may be invalid or altered, and those which are created by the utility. It will also indicate the general health of the disk if repair is not specified.

The FAT is stored as a linked list. Each chain should have one beginning and end as an EOF marker. All other clusters are marked reserved/bad or free and should not be a part of any chain. If a cluster points to the one

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following it, it is considered contiguous, otherwise, if it is not an EOF it is non-contiguous. Contiguous chains are faster to access.

FAT chains that do not have any corresponding directory, are called "orphan" files - having no parent directory. Orphan files may be deleted if necessary. Since it is not possible to know if the file was really deleted or the directory entry was trashed, the files are just recovered (with a guess as to the type). If nothing was missing, these are probably files which the delete merely failed to complete, so the space should be recovered by deleting the files. Otherwise (e.g. if a source file was missing or deleted and `FIX_xxx.TXT` appears) look at or run (carefully, since programs may delete some files) the file to see what happens. Orphan descendants occur when the entry for a directory is missing or erased. The file is recovered as a directory, and the directory is read and any files within it are recovered.

Collisions occur when two files link through the same cluster. The part of the file left usually belongs only to one of these files, But deleting the other file will remove this area as well. The FAT chain is cleaved based on the most likely owner. A related problem is a bad end, the last cluster in the file is not the EOF mark, but a free cluster (which can be allocated by another file causing a collision), or points outside of the storage area of the disk (e.g. track 120 on an 80 track disk). These are changed to EOF's or the cluster pointing to this end is changed to EOF.

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Appendix B Notes on the Hard Disk Sentry

Empty Files

Any file that was newly created but never written to (except volume labels) will not give an error during verification, but will be deleted during repair.

Created Files

Created files have name FIX_xxx.yyy, where xxx is a serial number (actually the starting cluster in hex) and yyy is one of the following: PRG TXT UNK. DIR are for directories. TXT are text files. PRG are programs (or Alcyon object files). UNK are others. They are all placed in a newly created directory.

FAT Analysis

Although two copies of the FAT are stored, only one fat is used for analysis. If different, the best one is selected and used. The modifications are made and it is written back to both copies

Orphans

The size of orphans will be an exact multiple of the cluster size (1024 bytes), but the very last cluster may contain garbage after the file actually ended.

Renaming and Moving Files

You may have to rename files to make them work (e.g. a resource file may have to be changed to program.RSC from

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FIX_xxxx.UNK).Of course, you can use the desktop to create, delete, and move files and folders or any other utility you want. In any case the disk will be left in a completely valid state.

Any files listed should be thoroughly checked to see if they are still valid.

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Appendix C The PC Ditto™ Bootable Partition

Hard Disk Sentry will make a hard disk partition bootable without reformatting by simply rearranging the files in the proper order so that it can be recognized by PC Ditto's boot routines. This involves simply copying IBMIO.COM and IBMDOS.COM to the root directory of drive C:.

Theoretically, it would make any partition bootable, but the current revision of PC Ditto only supports booting MSDOS from partition C:. Other files such as COMMAND.COM, any .SYS files, and AUTOEXEC.BAT should also be copied to the root directory of C:, but those do not need special treatment as for a placement on disk. The simplest way to do this is to format a standard floppy as a system disk (which will put IBMIO.COM, IBMDOS.COM, and COMMAND.COM on the disk with proper attributes), then (using the GEM desktop) drag the floppy icon onto a newly opened disk C: window, (i.e. the root folder). all the files will be copied, and these system files will have their hidden and read-only attributes copied, so will not appear on the desktop, however there have been no problems if they are unhidden/unlocked.

Ver. 1.3

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Disk Repair and Optimize Utility

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