

DMDE

DM Disk Editor and Data Recovery Software



User Manual

Version 2.4

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(c) 2005-2012 Dmitry Sidorov

Contents

About DMDE Help	3
Context Sensitive Help	3
About DMDE	4
About DMDE	5
Acknowledgement	6
File Descriptions	7
DMDE Editions	8
Contacts, WWW	9
Installation and Run	10
Operating Systems	10
System Requirements	11
Activation	12
Languages/Localizations	13
Settings	14
Problems and Limitations	15
Updates	16
Work with program	17
Find and Open Volume	18
Data Recovery	19
Partition Management	21
NTFS/FAT Search	23
Device Selection	24
Device I/O Parameters	25
Disk Images and Clones	29
RAID Arrays	30
File Panel	31
Disk Editor	32
Cluster Map (File Allocation)	33
Menu	34
Menu "Drive"	35
Menu "Tools"	38
Menu "Windows"	47
Menu "Editor"	48
Menu "Mode"	49
Menu "Edit"	50

About DMDE Help

DMDE help files can be used standalone or as a context sensitive help.

The most recent and actual help and translations are available on the [software sites](#).

Due to the lack of screenshots it is recommended to run the software while reading the manual.

There are some additional software parameters for "advanced" users. It is recommended to keep default values detected automatically for such unclear parameters. Understanding these parameters requires a deeper knowledge of file systems and disks, which explanation is beyond the scope of this guide. At the same time "advanced" users can guess parameter meanings from their names. Therefore there is no description for such parameters in this manual.

Bold font or **green font** is usually used for the software interface terms or for the commands.

In order to open CHM file in Windows you should copy it to a local disk and unblock the file (right click for **Properties** and press **Unblock**).

Context Sensitive Help

Context sensitive help can be called from the most dialog boxes by pressing **F1**/**Shift+F1**/**Shift+F11** keys or button **Help**. Supported in Linux and Windows only.

Help is available in the form of a set of HTML files under both Linux and Windows. CHM files are supported under Windows.

By default CHM files are used under Windows. To use HTML files remove CHM files and copy directory **man_en** to the software directory or other **man** directories to the directory **locals**. HTML files are opened using default system browser.

In Linux command **xdg-open** is used to call the default application for HTML files. You may use another command using parameter **shellopen=**.

About DMDE

- [About DMDE](#)
- [Acknowledgement](#)
- [File descriptions](#)
- [DMDE Editions](#)
- [Contacts, WWW](#)

About DMDE

DMDE 2.4 (DM Disk Editor and Data Recovery Software)

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The software is to search, edit, and recover information on disks.

- **Free Edition** (all disk editor and file recovery features except for file group and directory recovery);
- **paid editions** recover file groups and directories;
- **Prof. Edition** has additional features for data recovery for clients;
- GUI, Console versions for Windows 98/ME/2K/XP/Vista/7, console versions for DOS, Linux (terminal);
- file systems supported: FAT12/16, FAT32, NTFS/NTFS5 (browse, view files and system structures, data recovery);
- quick search and repair lost partitions using boot sectors and superblocks (FAT, NTFS, exFAT, extFS);
- thorough search for NTFS, FAT volumes for the most complex cases;
- disk images (create, write image, clone disk);
- work with FAT, NTFS volumes with damaged file system;
- large file size, large disk size, large sector size support;
- NTFS tools to work bypassing NTFS driver (copy, delete file, create, repair directory);
- NTFS compression support;
- multilingual interface

View/Edit Modes:

- hexadecimal,
- partition tables,
- FAT/FAT32/NTFS boot sector,
- FAT/FAT32 directory,
- FAT/FAT32 cluster table,
- NTFS directory (view only),
- \$MFT record (view only): attributes list, standard information, file name, clusters chain, extended attributes.

Acknowledgement

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File Descriptions

Executable

dmde.exe or **dmde** - the program

Localization

* **.tbl** - code page tables

* **.lng** - language files

Documentation

eula*.txt - license agreement (EULA) files

versions.txt - information about some version changes

readme*.txt - readme files

dmde*.chm - help files in Windows CHM format

man*/* - help files in HTML format

Other files

dev9x.dll, **dev32.dll** - drivers to run under Windows 9x/ME

dmde*.ini - program settings files

cwsdpmi.exe - DOS Extender to run 32-bit DOS apps (Copyright (C) 2000 CW Sandmann, not a component of DMDE product)

DMDE Editions

With **Free Edition** you can recover files one by one.

Home Edition and **Prof. Edition** feature file group and directory recovery preserving directory structure.

Prof. Edition has additional features for data recovery:

- [Data recovery report](#) (include logs and file checksums)
- [I/O handler script](#) (include I/O error logs)
- NTFS alternate stream [recovery](#)
- DMA access under DOS
- Flash disk assigned [activation keys](#) to run on different computers
- Additional licenses to run remotely on client computers (no additional features)
- Native 64-bit versions for Windows-x64

Compare editions, **buy** online:

<http://softdm.com/>

Contacts, WWW

Internet:

<http://softdm.com/>

<http://dmde.ru/>

E-mail:

dmdeinfo@softdm.com

dmdeinfo@gmail.com

Installation and Run

[System Requirements](#) [Activation](#) [Languages](#) [Settings](#) [Limitations](#) [Updates](#)

Attention! Do not load operating system, install or run the program on a partition where lost or damaged data is located (data to recovery), otherwise it may be erased irrevocably.

To prevent writing to the problem disk load system from the removable media (LiveCD, bootable flash drive) and run the program from the removable media too (diskette, flash drive).

To install and run the program just extract entire software package into a single directory (preserving directory structure, removable media are allowed) and run `dmde.exe` or `dmde` depending on the OS and version. You need Administrator/Superuser privileges to work with devices in Windows NT+, Linux. To start the software without Administrator rights (to work with images only) add the parameter `notadmin=1` to the file `dmde.ini`.

Operating Systems

Windows 98/ME

Attention! Without special patches Windows 9x/ME handles 128 Gb and larger drives incorrectly.

To avoid the problem reload computer in MS-DOS mode and use DMDE for DOS to access such drives via BIOS or ATA-interface or load another OS.

Windows 2K/XP

To use the program you should login as Administrator.

Attention! To work with 128 Gb and larger drives you need Windows 2K SP4 with LBA48 support manually switched on in the registers or Windows XP SP2 (LBA48 is switched on by default).

Windows Vista/7

To run the program as Administrator right-click the program icon and use the corresponding command in the context menu or confirm UAC elevation request.

Linux

At first go to the Root Terminal or run Terminal emulator (Konsole, Gnome-terminal, etc.). Go to the software directory and type `./dmde`. You should run the software as a superuser to access devices. Please, refer to your operating system documentation for this information (e.g., run `sudo ./dmde` in Ubuntu, go to root with `su` command in Debian at first, etc.). You may also need to set execution permission for the file `dmde`.

DOS Bootable Disk

Prepare any bootable DOS disk (flash disk) or a diskette. You may format such diskette under Windows using option "Format bootable MS-DOS disk". If there is not enough space to extract the software package then copy it (packed) to the root of the disk with files from the **DOS boot package** (from the software site), and run `dmde.bat` after load. If you wish the software to start automatically just rename `dmde.bat` into `autoexec.bat`.

System Requirements

Windows 2K/XP/Vista/7

Drives: supported by OS.

Administrator privileges.

Attention! To work with 128 Gb and larger drives under Windows 2K/XP certain ServicePacks must be installed and LBA48 support must be switched on in the registers.

Windows 98/ME

Drives: supported by OS.

Attention! Windows 9x/ME handles 128 Gb and larger drives incorrectly unless special patches are installed. In this case reload computer in MS-DOS mode and use DOS version of the software to access drives via BIOS or ATA-interface.

DOS

OS: MS-DOS 5.0+ compatible.

Drives: supported by BIOS or supporting ATA-interface (IDE or SATA). SATA disks can be switched to IDE-compatible mode in the BIOS.

DOS Extender (e.g., file CWSDPML.EXE ((c) 2000 CW Sandmann) placed in the software directory).

At least 200 kB of low memory free.

At least 40 MB of extended memory.

DOS long name driver may be required for better name handling without substitution during recovery (e.g., DOSLFN.COM (c) Haftman software).

Mouse with driver loaded may be used.

Linux

Drives: supported by OS.

Superuser rights.

Root terminal or terminal emulator (xterm, Konsole, Gnome-Terminal, etc.).

Activation

In order to enable all features you should activate your **licensed copy** of the software. When you first run the software on a new/modified hardware there is an activation dialog box. You can activate your copy via direct Internet connection or enter activation key obtained on the activation site.

You can try activation in **Free Edition** (without actual feature activating) by adding parameter **demoactivation=1** to **dmde.ini** file and using menu command **Help-Activation**.

Operating system reinstalling, external device connection is not considered as a hardware modification. Motherboard change, CPU change, BIOS update may imply hardware modification.

Activation via the Internet

Press the button **Activate via Internet**. If direct Internet connection is available the software will be activated automatically. Activation key will be saved to the software directory. DOS version does not support automatic activation via direct Internet connection.

Activation Using the Activation Key

If Internet activation is not possible you may obtain and enter the activation key instead.

1. Run the software on a computer where you want to activate it. Press the button **Activate using Activation Key/File**. Write out your **Prod.ID** and **Inst.ID** (or save them to the file **dmdeinst.dat**).
2. Visit one of the activation sites <http://activate1.softdm.com/> or <http://activate2.softdm.com/> from any place. Enter your **Prod.ID**, **Inst.ID** and registration e-mail into the corresponding fields on the site (or upload the file **dmdeinst.dat**). An activation key will be generated for you. Write out it (or save to **dmdekey.txt**).
3. Run again the software on a computer where you want to activate it and enter your activation key (or open **dmdekey.txt**).

Assigning the Activation Key to a Removable Device

Prof. Edition (Windows and Linux version) allow assigning activation key to a flash disk for future use on a new hardware without Internet connection and without visiting activation sites.

Obtaining the assigned key.

1. Press the button **Assign key to device** in the activation dialog box and select appropriate removable device (use menu command **Help-Activation** to open activation dialog box).
2. Obtain the activation key using any of the above two instructions and save the key for future use.

Using the assigned key.

1. When start the software (on any hardware) press the button **Assign Key to device** and select the same removable device.
2. Press the button **Activate using Activation Key/File** and open saved activation key if it is not in the software directory.

You can check whether the software was activated by viewing the status of the menu command **Help-Activation**.

Languages/Localizations

Dialog Box "Select Language"

Apply Codepages. If the option is checked then ANSI and OEM code pages from the selected localization file are used.

Translit. Transliterate interface if there are problems displaying national symbols.

Code Pages - Interface and Data Recovery

ANSI code page is used in DMDE interface under Windows and Linux. **OEM code page** is used in DMDE interface under DOS. Symbols outside the selected interface codepage are transliterated or substituted.

OEM code page is used also when read short names (8.3 format) from FAT volumes in all DMDE versions. DMDE for DOS uses **OEM code page** for file name recovery also. DMDE for Windows and for Linux uses Unicode (if it is supported by OS) during recovery regardless of the selected code page.

By default OS code pages are used (if applicable). Code pages from [Ini-file](#) (if defined) override them. Code pages from the selected lng-file (***.lng**) override everything if **Apply Codepages** option is checked in the dialog box **"Select Language"**. Lng-file string **107** is for ANSI, lng-file string **108** is for OEM codepage.

INI-file settings

loadlngfiles=

loadcptables=

usecodepage= ANSI code page

oemcodepage= OEM code page

translitenable=

viewtranslit=

Settings

Settings are stored in the file `dmde.ini` in the software directory. See the file for the parameter descriptions.

[Device I/O Parameters](#) can be changed at runtime.

Problems and Limitations

Data Recovery

- DOS, Win9x/ME: unicode symbols in file names outside the selected code page are replaced with "_" or transliterated according to the loaded translit tables
- DOS, Win9x/ME or FAT: unable to recover file greater than 4 Gb as a single file due to a FAT limitation
- NTFS alternate streams can be recovered to NTFS volumes only
- One file hard link per NTFS directory is recoverable
- One alt. stream hard link per NTFS file is recoverable
- NTFS symbolic links are not supported
- NTFS encrypted files are not supported
- Win9x/ME: drives greater than 128 Gb are not handled correctly without special patches applied to Windows drivers
- Maximum path length supported: 259 characters for DOS, 1024 for Windows, Linux
- Maximum path length supported by DOS: 79 or 127 characters (for DOS-names) depending on DOS version.
- Subdirectory depth is up to 1024 (can be increased using `maxrecoverdepth= parameter`)
- If name substitution is used under DOS then name handling (such as auto renaming) is not supported

NTFS write support

- Journal is not supported
- SECURITY INFORMATION is not supported on creation (to access files and directories it is necessary to set permissions using OS features)
- OBJECTID is not supported
- DOS short names (8.3) are not supported
- Compressed files are not supported
- Alternate data streams are not supported
- Removing file/directory problem: directory entries may be incorrectly updated after removing. Directory entries may be repaired with the help of system `chkdsk` or using NTFS Tool [Repair Directory INDX-Records](#).

Other

- Up to 100 disks in [RAIDS](#)
- Up to 400 volumes in the [Partitions](#)
- Up to 1024 logical drives in the list of found FAT disks (can be changed using `fatmaxvolumes= parameter`)
- Up to 1024 logical drives in the list of found NTFS disks (can be changed using `ntfsmaxvolumes= parameter`)
- Up to 131072 (Windows, Linux) / 65536 (DOS) MFT fragments for [NTFS Search](#) (can be changed using `ntfsmaxmftruns= parameter`)
- Maximum search depth for [File Panel Search](#) is up to 1024 directories
- Unicode is supported in names to recover only (otherwise unicode support is very limited)
- Keyboard and mouse input is limited in Linux (keyboard shortcuts and national input may not be supported)

Updates

Updates are performed in the same way as a first [installation](#).

License owners of [Paid Editions](#) may download licensed software copies from the personal site section of the software. Obtaining personal entrance link:

<http://softdm.com/fdownload.html>

[Activation](#) of the updated software on the same hardware is not considered as a new activation and does not change the total number of activations.

Work with program

- [Find and Open Volume](#)
- [Data Recovery](#)
- [Partition Management](#)
- [NTFS/FAT Search](#)
- [Device Selection](#)
- [Device I/O Parameters](#)
- [Disk Images and Clones](#)
- [RAID Arrays](#)
- [File Panel](#)
- [Disk Editor](#)
- [Cluster Map \(File Allocation\)](#)
- [Menu Commands](#)

Find and Open Volume

To browse, view, edit, and [recover files and directories](#) you should find and open a volume containing data. Use the following methods depending on the damage level.

1. If the volume is not damaged and accessible by a letter (C:, D:, ...), you may open it via the dialog box [Select Drive](#) by selecting the option **Logical Disks/Volumes** (or **DOS Services** in the DOS version). This method is suitable to recover deleted files from a healthy volume. If it is not possible to open the volume or properly recover the files try the next method.
2. Select a physical device containing the volume ([Select drive](#) – **Physical Devices**, or under DOS – **ATA Interface** or **BIOS Services**). Then select and open the volume in the dialog box [Partitions](#). If it is not possible to open the volume in such a way or data is still not properly recoverable try using the next method for the most complicated cases.
3. Run [NTFS or FAT Search](#) depending on the volume file system and open one of the found volumes. Read [NTFS/FAT Search](#) section for more efficient recovery in this case.

Automatically detected volume parameters are displayed just before opening the volume. Some parameters can be changed manually for a better result, however the default parameters usually provide the best recovery.

Instead of opening real physical device a [drive image](#) may be used.

If the initial storage is a RAID you probably need to [Construct RAID](#) instead of opening single physical device.

Also, the volume may be opened from the [Editor Window](#) when view the volume boot sector or boot sector copy in [NTFS/FAT/FAT32 Boot sector](#) mode.

Data Recovery

Before recovering data you should properly [find and open volume](#). The result of recovery depends on results of the previous volume search and what volume is opened.

Attention! Do not recover to the same partition which contains source data to recover. It is highly recommended to recover files and data to another physical device. You may recover to another partition of the same device only if you are sure that source and destination partitions don't overlap and device has no physical damages. Do not load system or run program from the partition where data to recover is located.

To recover found lost and removed files do [Volume Scan](#) by opening virtual directory [**All Found**] in the [File Panel](#).

[Free Edition](#) does not support file group and directory recovery. Free Edition may allow recovering files in the current panel (include search panel) if there are no more than 4000 files after size is calculated.

Dialog Box "Recover"

Button "Size"

Calculate size of the data to recover. Global indicator of recovery process is working if the size is calculated. You should not calculate the size to avoid unnecessary device load on devices with bad sectors.

Button "List"

Save list of files selected for recovery to a file.

"Deleted" files

Recover files marked as "deleted" (see [File Panel](#)). If the option is not selected "deleted" files won't be recovered regardless the selection state.

Checkbox "Include Found"

Recover files marked as "found" (see [File Panel](#)). If the option is not checked "found" files won't be recovered regardless the selection state.

Unicode names

The option is selected if the OS supports recovering paths containing special or national symbols which does not included in limited [ANSI set](#).

Create report ([Prof. Edition only](#))

Save recovery report to a file. List files and directories, log file I/O errors, calculate checksums CRC32, MD5, SHA1.

Checkbox "Include altstreams" ([Prof. Edition only](#))

Recover NTFS alternate data streams (Alt. stream name and file name are separated by a colon, i.e. **FileName:StreamName**).

Additional Issues

Recover to a FAT formatted volume

FAT volumes does not support files greater then 4 Gb (or sometimes 2 Gb). So it is not possible to recover larger

files to a FAT volumes. Large files will be splitted during recovery (upon request). You can manually merge file parts using system utility `copy /b part1 + part2 + part3 result`, for example. Pure DOS supports only FAT volumes.

Long and national file names in DOS, checkbox "Substitute names"

Without special drivers long files names are not supported under DOS. Option **Substitute names** allows name substitution during recovery. File **LRENAME.BAT** is being created in the destination folder for backward renaming. To restore original file names load OS Windows, go to the destination folder and execute file **LRENAME.BAT**. An appropriate **OEM code page** must be selected when working in DOS in order to restore national symbols correctly. Unicode symbols outside the selected code page will be transliterated or substituted.

Paths longer than 259 symbols under Windows NT+

In order to recover paths which are longer than 259 symbols you should manually prepend the destination directory name with a prefix `\\?\`, e.g.: `\\?\C:\`. Such long paths may be inaccessible for standard programs such as **Explorer (My Computer)**.

Handling of Name Duplicates

During recovery there may be name duplicates due to finding different versions of the same file, different links to the same file, or due to erroneous merging of directories.

If a file or directory with the same name is being recovered there is a query where you can choose how to handle the duplicates. It is possible to rename the object manually by entering name or to choose auto renaming or skipping all subsequent objects. It is also possible to merge directories with same names.

There is a threshold number of renaming for a single object after which there will be a second query for a desired action for the case of threshold achieving. Parameters **maxfilerenames** and **maxdirrenames** of **ini-file** are used as threshold numbers by default.

Determining name duplicates is working on the base of destination file system. Name handling is not working if **name substitution** is used under DOS.

Partition Management

A tool to view, search, and [open volumes](#), as well as for simple [partition management](#) on MBR-style disks. Be sure to read the [warning](#) before operating.

Partition management includes [undeleting removed and lost partitions](#), [restoring boot sector from copy](#) and other tools. You may operate FAT (FAT12/16/32), NTFS, ExFAT, and ExtFS (Ext2/3/4) volumes. However, only FAT and NTFS volumes can be [opened](#) and checked for consistency. GPT-style disks are supported in read only mode. Other styles (such as Dynamic Disks) are unsupported and partitions on such disks may be shown as found.

On selecting checkbox [found](#) a quick search for lost and removed partitions is performed. Quick search for FAT/NTFS/ExFAT/ExtFS volumes is supported. For more complex and deeper search use [NTFS or FAT search](#). Volumes opened after NTFS or FAT search are added to the list of found partitions and become available for partition management (e.g. undeleting is possible if a valid boot sectors is found).

To prevent "Partitions" dialog box appearing and auto searching partition uncheck the box [Show partitions](#) when [open a device](#) or [construct a RAID](#).

Info mode checkboxes:

- [found](#): display found partitions
- [tables](#): display AMBR partition tables
- [detailed](#): display partition information from tables and boot sectors respectively in several lines per partition

[\(A\)](#) - bootable (active) partition status ([Partition](#) column).

[Indicators](#) - volume diagnostic indicators (indicate correspondent structure presence):

- [T](#) – partition table;
- [E](#) – table entry;
- [B](#) – volume boot sector;
- [C](#) – boot sector copy;
- [F](#) – MFT(0) for NTFS or Root for FAT (is being tested on [FAT volume opening](#));
- [f](#) – MFTMirr(0) for NTFS;
- [x](#) – structure is absent or damaged;
- – structure is not tested.

Red color indicates errors in the partitioning.

Dialog Box "Partitions" · Commands

Attention! Partitioning modification may cause impossibility to boot from the disk or inaccessibility of some partitions after applying. Never modify partitioning of your boot or system disk. Use alternative boot disk or connect your disk as a secondary one to another computer. Run the software from the device which won't be modified and [save current partitioning](#) to a file on a device which won't be modified. After applying restart the computer or reconnect pluggable device for changes to take effect. Cancel the [chkdsk](#) utility (by pressing any key) if it runs automatically at startup as it may cause non-recoverable damage of the data.

Use the [Menu](#) button to call the menu of operations available for the selected partition.

Partitioning changes are pending until you press button [Apply](#) or use menu command [Apply Partitioning](#).

Open volume

[Open volume](#) to view and [recover files](#).

Show volume letters

Display volume letters assigned by OS.

FAT, NTFS Search within the Partition

[FAT, NTFS Search](#)

Create Image/Clone

Call the dialog box [Copy Sectors](#) to create partition image or clone the partition.

Insert Partition (Undelete)

Insert lost or removed volume as a primary or logical partition into the current disk partitioning. Invalid partitions may prevent insertion so they must be removed before insertion. Completely damaged partitioning may be resetted using the command [Toggle MBR Signature On/Off](#) applied to the topmost item. You should add partitions from the beginning to the end of the disk. You may insert up to 4 partitions (as primary) if there is no distance between them.

Remove the Partition

Remove existing partition or partition table. Some partitioning errors may be fixed by removing and inserting the partition.

Create RAW Partition

Create unformatted (RAW) partition within the unallocated space. If there are no partitioning errors it is highly recommended to use only standard system tools for creating and removing partitions.

Restore Boot Sector From the Copy (Replace)

Replace damaged boot sector with a backup copy.

Toggle Bootable (Active) Partition Status

Set or reset active (**A**) status of a bootable partition.

Toggle MBR/Boot Signature On/Off (MBR On/Off)

Set or reset boot sector signature (**0xAA55**).

Discard Partitioning Changes

Cancel partitioning changes and display current partitioning.

Load Partitioning from File

Load disk partitioning from a file. To apply loaded disk partitioning use the command **Apply**.

Save Current Partitioning to File

Save current partitioning to a file for a backup purposes. Do not try saving if there is no partitioning on the disk (if there is no indicator **T** on the first line).

Apply Partitioning

Write partitioning changes to the disk. You will be prompted to backup current partitioning to a file before applying.

NTFS/FAT Search

Comprehensive search method allows finding and rebuilding in memory directory structure of a damaged file system.

It is recommended to perform FAT/NTFS search over a selected area of a physical device rather than over a logical disk. The software may read beyond the selected area if it is necessary.

If a file system is not seriously damaged then the volume found can be opened before search completes. If the opened volume does not contain necessary files or they are being recovered incorrectly you may continue the search or try opening another volume.

Open volume Open volume selected in the list.

Save... Save search log to a file.

Load... Load search log from a file (to continue previous search or to use previous search results).

Start/Stop Start/stop scan. If the scan area is not changed the scan will continue from the last point.

Scan range Select the area to scan. Is is possible to select one of the partitions or any drive extent.

The special search method allows detecting volumes without prior complete scan of the selected area. The volumes with the most number of files are being found first. Some fake volumes may be found by mistake (e.g., if partitions were moved or resized) so it is recommended to define the most exact area to scan. If data was moved over disk some files of one volume may be found on different volumes. Moreover, the one file may be found on different volumes. However, generally the file is recoverable correctly from one volume only.

NTFS Search

Upper list displays found volumes. Column **Check** generally corresponds to recovery quality of a found volume. Volume sorting order can be changed by clicking a column header (or by selecting the header and pressing **Enter** key in the console version). Sorting by **Volume Number**, **Volume Start**, and by **Check** is supported.

LBA Size of the volume is *estimated* on the base of the best MFT fragments and it is not exact.

When NTFS Search is stopped you may connect/disconnect MFT fragments to the selected volume before opening.

For the selected volume the number of the found files and total possible number of the volume files is shown (in parentheses there is a number of found files include duplicates).

MFT Volume Start #1 and **Volume Start #2** are possible volume starts for a given MFT fragment (in parentheses there is check).

Volume **Mod** = Volume **Start** mod **Cluster** size

MFT **Mod** = MFT Cluster Start mod **Cluster** size

FAT Search

Signs "-" in the columns **Boot** **FAT1** **FAT2** **Root** indicate the absence (damage) of the corresponding file system structures (boot sector, main FAT table, FAT table copy, root directory).

The column **Found** shows the number of directories found and generally indicates the recovery quality of the volume.

Values of the columns **Boot** **FAT1** **FAT2** **Root** are the corresponding offsets (in sectors) from the **Data start** (back).

Device Selection

Before [searching and opening a volume](#) or [disk editing](#) you should either open a device via dialog box "Select device/disk" or [construct RAID](#).

Logical disks/volumes / DOS Services should be selected only if the volume is not damaged (e.g. to recover deleted files from healthy volume).

Uncheck **Show partitions** checkbox to disable auto open and search [partitions](#).

Use **Parameters** button to set [device I/O error handling](#).

Windows OS

- **IO R/W File** Use ReadFile/WriteFile functions to access device
 - **IOCTL SCSI** Use SCSI driver request ([SCSI timeout](#) can also be set)
- Overlapped** Allow [I/O Dialog box](#) popping up before I/O completes. It seems to be useless and is not recommended to use.

DOS

- ATA Interface** Use direct device access via ports (for [IDE or SATA](#) disks in IDE mode [timeout](#) can be set)
- BIOS Services** Use BIOS functions to access device
- DOS Services** Use DOS functions to access logical disk
- use DMA** Supported in [Prof. Edition](#) only

Linux

If some specific devices are not listed in the dialog box you may open them using the option **Open image** and manually entering device path, e.g. `/dev/mmcblk0`.

Device I/O Parameters

Skip I/O Errors. If an error occurs and the option is checked then I/O operation continues after a certain number of **auto retries**. Otherwise operation stops after a number of **auto retries** until user make a choice in [device I/O dialog box](#).

Do not wait if device is not ready. If the option is checked then I/O operation continues even if the device is not ready. Otherwise the user reaction is required ([device I/O dialog box](#)).

always: apply to future operations.

now: apply to current operation.

Auto retries number on CRC Error. A number of additional I/O retries number before entering standby mode for user reaction or continuing the operation.

Zero value (0) stands for no additional retries, herewith the rest sectors of the block after the error will not be read to the **I/O buffer**.

If the value is non-zero then sectors are being reread one by one until error sector encounters. The error sector is being read until the number of auto retries is reached or the sector is read successfully.

Increasing of retries number increases the percent of data successfully read but decreases the device lifetime due to heavy load.

Auto retries number on Seek Error. The same for errors of the type "sector is not found".

Input error is assumed to be a seek error if I/O buffer contents is not changed after I/O (or it is filled with zeroes). Usually seek errors significantly slow down I/O and they are not recoverable after a number of retries.

Number of sectors to jump over on error. A number of sectors to skip after a nonrecoverable error encounters.

Skipped sectors will be filled with a **Filler** value. If there are areas of sequential bad sectors then skipping significantly reduces loading the device. Herewith the percent of the data successfully read will decrease if there are individual bad sectors.

Read back after jump. Reading skipped sectors backward until bad sector encounters.

The option is unavailable if the number of sectors to skip is too big. The feature improves data recovery quality when skipping sectors is used. This option should be turned off when copying sectors **backward** using [Copy Sectors](#) function.

Filler. 4-byte hexadecimal value to fill sectors skipped when jump over.

I/O buffer size in sectors. The maximum number of sectors transferred as a single block during I/O.

Timeout, msec. Time (in milliseconds) to wait for a device response.

Under DOS the option is available [the device is opened](#) via **ATA interface**.

Under Windows NT+ the option is available if [the device is opened](#) with **Overlapped** parameter checked and **IO R/W File** option selected. However, the timeout does not actually controls I/O timing.

SCSI Timeout, s. Timeout for SCSI driver I/O.

The option is available under Windows NT+ if [the device is opened](#) with **IOCTL SCSI** option selected.

Script... [Device I/O Handler Script](#)

Device I/O Dialog Box

If an error occurs during device I/O then the dialog box appears where you can choose how to handle the error.

The following information is displayed: disk number in the RAID (or #0 for a single disk), sectors where error has occurred, attempt number, error number, and error description. After a number of retries (defined by [parameters](#)) program waits for a user reaction (unless skipping errors mode in [parameters](#) is selected) and the button **Retry** becomes active.

Abort: Abort current operation.

Button is inactive if the operation is not abortable.

Retry: Retry I/O.

In some cases it is possible to successfully read a sector and continue without data distortion after a number of retries. Button is inactive while I/O is in the progress.

Ignore: Continue operation ignoring the error.

The current operation will be continued but most probably with data distortion. When reading file system structures this may cause missing of some files and directory structure damage.

Ignore all: Continue operation ignoring all analogous errors.

After a number of retries (defined by [parameters](#)) program does not wait for user choice but ignore the error and continue the current operation.

Reset: Reopen device after detaching/attaching (Windows NT+ only).

Parameters: [Device I/O settings](#)

Confirm, Cancel: Used for `%CONFIRM%` variable in the [Device I/O Handler Script](#)

Device I/O Handler Script

The script can be used for I/O error logging and for extended processing of errors (include external program calls). The feature is available in the [Prof. Edition](#) only.

Script can be loaded or modified via [Device I/O Parameters](#) (button **Script**).

The file **deviolog.txt** is a simple script for I/O error logging.

The file **ondevhsc.txt** contains a brief description of available commands and some script examples.

Possible script lines are of the form:

IF CONDITION COMMAND

or

COMMAND

or

:LABEL

where CONDITION is an inequality or equality (**!=, >, <, >=, <=, =**) of two quantities, and quantity is either an integer constant (**0, 1, ...**) or a variable (the list is below) or a simple mathematical expression (operators **+, -, *, %, /**, without parentheses, ignoring the mathematical order of operators), e.g. **%ERROR%=0**

Comments are preceded by two minuses (**--**)

-- Variables (all are zero based):

-- %CONFIRM% - =1 if **Confirm** pressed, =0 if **Cancel** pressed (dialog box appears and waits for user choice)

-- %DISKNUM% - disk number in RAID array

-- %TRYNUM% - i/o retry number

-- %LBA% - first i/o sector number

-- %SECNUM% - number of i/o sectors

-- %ERROR% - i/o error

-- %LINE% - current line number in script

-- %SERVICE% - i/o service type:

-- 0-ATA 1-ATAPI 3-BIOSINT13OLD 4-BIOSINT13

-- 5-DOSINT25 6-DOSINT73 8-DOSMSCDEX 9-DOSFILE

-- 11-WINFILE 12-WINSCSI 14-WIN9XINT13 20-LINUXFILE

-- %LASTRES% - result of the previous command

-- %LASTERR% - error of the previous command

--

-- Commands:

-- SHOWDLG - force device i/o dialog box popping up

-- WAIT - wait for user choice

-- DELAY N - delay for N msec

-- EXEC CMD COMMANDLINE - execute external command **CMDLINE** using Command interpreter

(equals "cmd **CMDLINE**" in Windows)

```

-- EXEC CMDQ CMDLINE - execute without creating new console window (quiet)
-- EXEC "FILENAME" CMDLINE - call external program FILENAME with parameter
CMDLINE
-- EXECQ "FILENAME" CMDLINE - call without creating new console window (quiet)
-- MSDOS - call Command processor (not supported in Linux)
-- GOTO LABELNAME - jump to label LABELNAME in script (to the string
:LABELNAME)
-- RETURN - break script execution, handle error according to device I/O
params
-- RETRETRY - break script as Retry button pressed
-- RETIGNORE - break script as Ignore button pressed
-- RETABORT - break script as Abort button pressed
-- ADDLOG "FILENAME" LOGLINE - write LOGLINE to file FILENAME
(string LOGLINE may contain variables)
-- CANCELIO - Call CancelIO (WinNT+ only)
(available if a device is opened with overlapped option)
-- OVLRESLT N - Check Overlapped result (N=1: wait; N=0: not wait) (WinNT+
only)
(must be used if a device is opened with overlapped option)
-- RESETHANDLE - Reopen disk handle (WinNT+ only)
--
-- Format specifiers:
-- To format output integer a variable name may be followed
-- by a format specifier after a colon, e.g.
-- %LBA:8x% - width: 8, hexadecimal

-- Script example:
IF %ERROR%=0 RETURN -- return if no error on last i/o
IF %ERROR%=128 GOTO LABEL1
IF %ERROR%=5 GOTO LABEL1
RETURN

:LABEL1
IF %CONFIRM%=0 RETRETRY -- retry if Cancel button is pressed
-- continue script execution if Confirm is pressed
EXECCMD /K ECHO error %ERROR% at LBA: %LBA% (%SECNUM%) try: %TRYNUM%. Type
EXIT to return.
IF %TRYNUM%<2 RETRETRY
DELAY 500
ADDLOG "C:\ERRORS.LOG" error %ERROR:x% at LBA: %LBA:10% (%SECNUM%) try:
%TRYNUM%
RETIGNORE

```

Disk Images and Clones

- [Copy sectors](#) (menu "Tools"): creating and writing images, disk cloning
- [Open image](#) (Menu "Drive"): opening and using image as device

RAID Arrays

Dialog box "Construct RAID"

A tool for manual constructing RAID using individual disks (or partitions and images) when it is not possible to use standard tools of the controller (hardware RAID) or the operating system (software RAID).

If it is necessary disks must be detached from the RAID controller and attached to a computer as single disks to construct a RAID.

RAID types

RAID-0: Usually contains two disks on which information is written alternately by blocks (stripes). If one disk is absent only small files which fit into single block may be recovered. RAID-0 is supported in read/write mode.

RAID-1: Usually contains two disks, data is duplicated. Stripe size is not used. Supported in read-only mode. One healthy disk may be [opened](#) as a single device without loss of data.

RAID-4: Usually contains three disks. One disk is for parity. Data is alternated between the rest disks. It is possible to recover all data without any one of the disks. Use **NULL device** instead of the absent device. Supported in read-only mode.

RAID-5: Usually contains three disks (or more). Data is alternated between all disks herewith one block of parity per the rest blocks of data. There are four types of data rotation on a RAID-5. Some RAID5s (usually hardware) may have delayed parity. It is possible to recover all data without any one of the disks (which should be replaced with **NULL device**). Supported in read-only mode.

JBOD/Spanned: Just a bound of disks which are used as one continuous disk. There is no data alternation, stripe size is not used. Data located on any disk will be lost if the disk is absent. JBOD is supported in read/write mode.

RAID parameters

Stripe Size: data rotation block size. Not used in RAID-1, JBOD.

Delay: used in RAID-5 with delayed parity only.

Offset: data start offset on disk (usually used on software RAID5s).

Offset and Size: partition offset and size for JBOD/Spanned disks.

Null disk: is used instead of absent or damaged disk.

File Panel

File panel displays virtual directory structure and allows browsing through directories and selecting items to [recover](#) or to open them in the [Disk Editor](#). You should [open a volume](#) to access the file panel.

Open virtual directory [**All Found**] to [scan volume](#) and display all found and removed files and directories and rebuild virtual directory structure. The results of [NTFS/FAT Search](#) are used for rebuilding.

To recover files marked as "found" or "deleted" (see icon description below) the corresponding options must be selected in the [data recovery](#) dialog box.

Directory structure is virtual and may differ from the one that can be found directly on the disk or in the standard browser. Virtual names are enclosed in square brackets or begin with the sign \$ and are usually placed in the topmost level of the directory structure. Virtual directory \$Root generally corresponds to a root directory of a volume in the standard browser.























Press **Enter** key or double click to open the directory, or open the file in the [Disk Editor](#).

Press **Ctrl+Enter** to open the item in the [Disk Editor](#).

Press **Insert** key or **Space Bar** or click the checkbox to toggle marking the item for recovery.

Press **Shift+F9/Shift+F10** or right click the item for a context menu.

GUI Console Icon Description

	[.]	general directory containing files
	[]	directory not containing files
	[x]	directory containing deleted files
	[f]	directory containing "found" files
	[x]	directory containing deleted and "found" files
	(x)	deleted directory
	(.)	deleted directory containing not deleted files (some kind of file system error)
	(f)	deleted directory containing "found" files
	(x)	"found" deleted directory
	(.)	"found" deleted directory containing general files
	{f}	"found" directory (name is followed by MFT fragment number in square brackets)
	{.}	"found" directory containing general files
	{.)	"found" directory containing general and deleted files
	.	general file
	f	"found" file (name is followed by MFT fragment number in square brackets)
	x	deleted file
	xf	"found" deleted file
	[.]	[MetaData] - virtual directory containing special file system files
	[.]	[NonameData] - virtual directory containing MFT files without names
	[>]	directory is not completely investigated
	.	virtual directory containing fragments of a file occupying several MFT files
	.	FileName:StreamName - NTFS alternate data stream StreamName of a file FileName

Disk Editor

Disk editor allows you to view and edit disk objects, such as sectors, files or file streams, directories, and other file system and disk structures. Different modes of data representation is supported.

Select an object for editing

- use the menu [Editor](#) to select disk or file system object
- use [File panel](#) to select a file or directory (right click for a context menu or press **Ctrl+Enter**)

Use the menu [Mode](#) to change view mode.

Use the menu [Edit](#) for toggling edit mode, for editing, and writing changes to disk.

Use the menu [Tools](#) for additional functions:

- [Copy sectors...](#) to write the selection or the entire object to a file.
- [Fill sectors...](#) to fill sectors with a pattern.
- [Search string](#) to search string in the selected object.
- [Search spec. sector](#) to find some data structure on a disk.

Yellow text color in the Disk Editor indicates modified but not written data.

Grayed text color indicates unused data (unused part of the cluster, unused entry, etc.).

Green text color indicates I/O errors while reading corresponding sector.

Red text color indicates logical errors in the data.

Cluster Map (File Allocation)

Volume cluster map allow finding the file located at a given cluster/sector.

To use cluster map first [open volume](#) and update cluster map (menu **Tools**).

To go to a specific location use menu commands

- **Editor - Volume Cluster** [**Alt+C**] to go to a specific volume cluster
- **Editor - Volume Sector** [**Alt+S**] to go to a specific volume sector
- **Editor - Physical Sector** [**Alt+P**] to go to a specific device sector

To identify the file located there use menu commands

- **Editor - Cluster Map** [**Ctrl+M**] to open cluster map at a selected location.
- **Editor - File Data** [**Ctrl+F**] to open file at a selected location.

Status string of the cluster map has the following format:

```
[current volume cluster/total clusters number] "file (stream) name" vcn:  
cluster number per file
```

Menu

- Drive
 - Select Drive...
 - Open Image...
 - Construct RAID...
 - Partitions...
 - Lock Volumes for Write...
 - Device I/O Parameters...
- Tools
 - Recover...
 - Search in found (by name)...
 - NTFS Search...
 - FAT Search...
 - Scan Volume...
 - Cluster Map
 - Update Cluster Map
 - Clear Directory Tree
 - NTFS Tools
 - Copy Sectors...
 - Fill Sectors...
 - Search for Special Sector
 - Search String in Object...
 - Search Again
- Windows
- Editor
- Mode
- Edit

Menu "Drive"

- [Select Drive...](#)
- [Open Image...](#)
- [Construct RAID...](#)
- [Partitions...](#)
- [Lock Volumes...](#)
- [Device I/O Parameters...](#)

Open Image

Open image of a disk or a partition instead of accessing real device.

Volume Locking

Volume locking is used under Windows NT+ for RAW write access to prevent simultaneous OS access to a volume at the same time.

DMDE tries locking volumes automatically when it is required. However, locking may fail if the volume is being used by system or other applications. In this case, DMDE requests to retry or dismount not locked volumes. Close all applications which may use the volume and retry.

- Retry** Retry volume locking
- Force** Dismount the volume. **Warning!** All used volume handles will be lost, e.g. unsaved data in opened files will be lost
- Ignore** Try RAW writing without locking the volume. **Warning!** File system may be damaged or RAW write access may be denied by operating system
- Cancel** Cancel the operation

Warning! You should not lock or dismount the volume from where DMDE software runs. You may not lock or dismount system volume.

DMDE unlocks volumes when closing the device currently used.

Additionally you may manually manage volume locking using menu "Drive" · "Lock Volumes for Write".

Menu "Tools"

- Recover...
- Search in found (by name)...
- NTFS Search...
- FAT Search...
- Scan Volume...
- Cluster Map
- Update Cluster Map
- Clear Directory Tree
- NTFS Tools
- Copy Sectors...
- Fill Sectors...
- Search for Special Sector
- Search String in Object...
- Search again

Volume commands

Search in found (by name)

List files on a search panel in accordance with a specified pattern. Search is performed over already found volume files.

Update Cluster Map

Update [file allocation](#) information.

Clear Directory Tree

Reset reconstructed virtual directory tree. View directory structure without including the results of [NTFS/FAT Search](#) and [volume \(partition\) scan](#).

Scan Volume

Rebuild virtual directory structure and prepare found and removed files and directories for recovery. To scan current volume open virtual directory [**All Found**] in the [File Panel](#).

NTFS volumes

Search for lost and removed files through all found MFT fragments assigned to the volume. The results of [NTFS Search](#) are used.

FAT volumes

Search for lost and removed FAT directories through all volume clusters.

Assemble FAT Search directories only

Use the previous [FAT Search](#) results only without scanning the entire volume again.

Rescan the entire volume for directories

Additionally rescan the volume if it is not scanned completely during [FAT Search](#). Unlike [FAT Search](#) you cannot save the results of Volume Scan for a future use.

NTFS tools

Warning! The use of NTFS Tools on incompatible NTFS volume may damage the file system. Do not use the tools if the program does not recognize file system properly or you are not sure if it is.

Never execute the commands on the system volume (where operating system files are located) otherwise it will be damaged.

[Volume locking](#) is performed when writing to volumes. After executing the commands you should check the volume with the system utility [chkdsk](#).

It is not recommended to create file names with special symbols.

[Open NTFS volume](#) and enter the necessary directory in the [file panel](#) before using tools.

Copy File

Copy, overwrite, or append file to the [opened NTFS volume](#) bypassing NTFS system driver.

Read the warning before using.

- Open destination directory in the [file panel](#) to copy file to.
- Call the command from menu.
- Select the source file.
- Enter destination file name.
- Choose either to overwrite or append file if the destination file exists.

A continuous free space on the volume is required for writing the file.

Create Directory

Create a directory on the [opened NTFS volume](#) bypassing NTFS system driver.

Read the warning before use.

Directory is being created in the current folder of the [file panel](#).

Remove File/Empty Directory

Remove selected file or empty directory from [opened NTFS volume](#) bypassing NTFS system driver.

Read the warning and NTFS write issue before use.

Repair Directory INDX-records

Repair NTFS directory currently opened in the [file panel](#).

Read the warning before use.

Copy Sectors

A tool for creating disk images, clones, writing images back to disk, and copying different disk objects. For changes to take effect in OS you may probably have to reload computer. See [Volume locking](#) also.

Button	Purpose
Device	Select Device, Logical disk (volume), Image as source/destination sectors
Partition	Select Partition as source/destination sectors (use Device button to select the disk before), To select the entire current device/disk/RAID double click the topmost item in the partition list
File	Use file as source bytes / a destination (alternatively Device · Open Image to use file as sectors)
Editor	Use the object opened in the Disk Editor window as source bytes
Selected	Use selected block of the Disk Editor object as source bytes

Source fields **Start Sector**, **End Sector**, **Number of Sectors**, **Start Byte**, **End Byte**, **Size in Bytes** are filled in automatically on source selection by buttons. Fields may be altered manually in order to specify an offset and size of a portion to copy.

Destination field **Start Sector** is also filled in automatically on destination selection by buttons **Device**, **Partition**. **Start Sector** is specified relative to the beginning of the selected destination object.

Continue from: specify position to continue writing to a file. Do not change the source fields when continue creation of the same image. **Reverse copy** starts next to the specified position and goes backward (setting **1** just copies sector **0**).

Reverse copy: copying from the end to the beginning. This may be useful for making image of a disk with bad sectors.

Set [Device I/O Parameters](#) to handle I/O errors during copy (number of retries, blocks to skip, etc.).

[Constructed RAID](#) may be used as a source/destination.

When **Editor** or **Selected** is used as a source then some errors (such as invalid cluster or sector numbers) are silently ignored.

Fill sectors

Write a hex pattern or a file pattern to a sector range of the [device](#).

The maximum size of the hex pattern is 8 bytes. Use files for larger patterns.

Sector alignment. If the option is checked and the next pattern copy does not fit into the sector entirely then pattern writing starts from the beginning of the next sector. Otherwise patterns are being written consistently regardless of sector boundaries.

Search special sector

Search for special disk or file system structure. Search is performed over disk sectors starting next to the current sector.

Boot Signature: search for a sector having boot signature **0xAA55**.

Boot Sector: search for a FAT/NTFS boot sector.

Partition Table Sector: search for a partition table.

MFT Record: search for MFT file.

NTFS Dir Record: search for NTFS directory INDX-record.

FAT Table Sector FAT16,

FAT Table Sector FAT32: search for FAT cluster table (file allocation table).

FAT Directory: search for FAT directory.

Search String in Object...

Search for a string in the [Editor](#) object.

Search again

Continue [searching the string](#) over the current object or [specific sector](#) over the disk starting from the current position in the [Disk Editor](#).

Menu "Windows"

- [Directory Tree](#)
- [File Panel](#)
- [Editor](#)
- [Search Panel](#) (Search in Found)

Menu "Editor"

Select object to open in [Disk Editor](#).

Partition Table	Open all disk sectors. Go to the MBR sector (the first disk sector).
Boot Sector	Open all volume sectors. Go to the volume boot sector (the first sector of the volume opened).
Boot Sector Copy	Open all volume sectors. Go to the volume boot sector copy.
Root Directory	Open volume root directory.
FAT/MFT	Open FAT1 (main cluster table) for FAT volume, MFT for NTFS.
FAT Copy/MFT Mirror	Open FAT2 (cluster table copy) for FAT, MFTMirr for NTFS.
MFT Record...	Open MFT. Go to the specified MFT file.
Volume Cluster...	Open all volume sectors. Go to the specified volume cluster.
Volume Sector...	Open all volume sectors. Go to the specified volume sector.
Physical Sectors...	Open specified drive sectors. Go to the specified drive sector.
File data	Open file located at the current cluster.
Directory entry	Open directory containing current file. Go to the file entry.
FAT cluster/MFT record	For FAT: open FAT1; go to the FAT1 cluster corresponding the current volume cluster. For NTFS: open MFT; go to the MFT record corresponding the current file or volume cluster.
Cluster Map	Open Cluster Map . Go to the map cluster corresponding the current volume cluster.
Goto Object Offset...	Go to the specified position of the opened object.

Except for commands **Partition Table** and **Physical Sectors** you should [open a volume](#) at first.

Menu "Mode"

Toggle [Disk Editor](#) view mode.

Hexadecimal, Text	Use menu item Encoding to change view code table.
FAT Directory	Press Enter key to open file data or directory in the Editor window (if FAT volume is opened).
FAT12/FAT16/FAT32	FAT cluster table. Press Enter key to jump to the corresponding volume cluster.
Partition Table	Press Enter key to jump to the boot sector or to the chained table.
FAT/FAT32/NTFS Boot Record	Volume boot sector. Use the command again or press F7 to select the next file system. Press Enter to open volume .
NTFS Directory	NTFS directory INDX-record. Press Enter to open file or directory in the Editor window (if NTFS volume is opened).
MFT Record	Press Enter key to open selected attribute or directory in the Editor window. Press Space bar to view attribute details.
NTFS File RAW Sectors	Switch between decoded file data and RAW sector data (as on drive).
Encoding...	Select code table to translate text in Hexadecimal/Text mode.

Menu "Edit"

To switch to edit mode use command "Edit Mode" (**Ctrl+E**).

To write changes to disk use command "Write Changes" (**Ctrl+W**).

To discard changes use command "Discard/Read Again" (**Ctrl+R**).

For changes to take effect in OS you may probably have to restart computer. See [Volume locking](#) also.

More than one sector can be modified before writing to disk only when editing object "Sectors" (not a file).

Editing is supported in the following view modes:

[Hex](#), [Text](#), [FAT Directory](#), [FAT16/FAT32](#), [Partition Table](#), [FAT/FAT32/NTFS Boot Sector](#).

NTFS file editing is supported in [RAW mode](#) only.

Fill Zero Block	Fill the selected block with zeroes
Copy	Copy the selected block to the internal buffer
Paste	Paste internal buffer data at the current cursor position
Paste File...	Paste file at the current cursor position
Select Block	Toggle selection mode. Or hold down Shift and use arrow keys or hold down left mouse button
Select All	Select the entire object
Write Changes...	Write changes to the disk (* Volume locking)
Discard/Read Again	Discard changes and read data from the disk again
Edit Mode	Toggle edit/read only mode

Additionally use the menu [Tools](#):

- [Copy sectors...](#) to save the selected block to a file
- [Fill sectors...](#) to fill many sectors with a pattern