

# Drive Backup User Manual



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# 1 Introduction

This program is a fast, convenient and reliable solution of disk copying, upgrading and configuring needs. It provides a wide-range functionality in the field of managing disk layout structures.

Presently hard disks are the primary part of modern informational systems based on IBM PC family computers. Hard disks hold not only user's data but also applications and system files required for running an operating system. Parameters and configuration of disk-based storage systems noticeably affect the overall system performance and reliability.

## 1.1 How to Use this Manual

This manual provides the necessary information to get the program installed, configured and work correctly.

## 1.2 Key Features

### Friendly user interface for Windows, DOS and Linux platforms

The program works in DOS, Windows and Linux environments. All versions have almost identical functionality and interface layout.

### Virtual pre-execution of operations: what you see is what you *WILL* get

The program allows previewing the resulting layout of hard disks before actually executing operations (so-called *virtual operations*). The special predicting module forecasts the post-operation state of the hard disks. You are able to execute multiple virtual operations and then evaluate the future state of hard disks. If needed, you can undo one or more virtual operations.

### Easy to use Masters for technically advanced operations

Execution of such functions as Partitions Restoring ([Undelete](#)), [Incremental Backup](#), [Copy Hard Disk](#) is realized through the system of Wizards. Wizards regulate the sequence of the user's actions in intricate situations, provide suitable and intelligible tools for operations settings and significantly simplify the disk structure analysis. For example, Partition Restoring is a rather complicated task involving many technical nuances. The Undelete Wizard allows the user to easily orient in the operation logic, find a deleted partition and then restore it correctly.

### Schedule program operations

The program allows creating schedule for the automatic execution of a single operation or a group of operations. It is handy when operations are performed regularly, for example in case of everyday backup or in case of retesting of a disk surface at night. See the chapter [Scheduling tasks](#) to know how it works.

### Fast processing algorithms for popular file systems

The program employs fast algorithms for copying and moving partitions for FAT16, FAT32, NTFS, Ext2, Ext3, ReiserFS and HPFS file systems (named *known file systems*). It uses the knowledge of the internal structure of these file systems and manages only used sectors of the partitions.

### Basic functions for initializing, partitioning and formatting hard disks

Traditionally, the program provides basic disk partitioning functions such as creating, deleting and formatting partitions. Instead of the standard Windows and Linux disk tools, the program supports all file systems and allows automating the process.

### Making backup images of integral file system state

The program is able to make the "momentary photography" of partitions. The backup image includes not only contents of all user-made files but also the exact structure of directories, information about location of files on the disk; all file attributes and related information (e.g. security information).

### Making backup images of system Windows partitions faster and easier

The program is able to make backup images of system Windows NT, 2000 & XP partitions without rebooting your computer. This feature gives the possibility to save much time therefore fully justifying its name – [Hot Backup](#).

### Incremental Backup

The users can add modified data of partitions to [backup archives created before](#). This function helps you to keep one archive if you need to backup the same partitions frequently. It will save disk space and your time.

### Selectable restoration of partitions from backup archives

Another new feature included in the Program is the ability to [restore only selected partitions](#) from multi-partition archives (such as images of entire hard disks or images of the Extended Partition).

### Built-in tool for exploring contents of backup archives

The program includes the [Image Explorer](#) tool that allows exploring contents of backup images and extracting selected files or directories without performing the restoration of the entire partition.

### Built-in CD/DVD burning tool

The Windows and Linux based versions of the Program provide the ability to [burn backup images on recordable CD and DVD media](#) directly from the program's interface, without using additional CD/DVD burning software.

### Built-in tool for checking file system integrity

This feature enables you to [check the file system integrity](#) on FAT16, FAT32 and NTFS partitions from the program interface to validate if the partition is capable of modifications: almost all advanced operations such as resizing, conversion or changing cluster size can be executed only on valid partitions.

## 1.3 Drive Backup Editions

The program is being released in three editions, "**Personal**", "**Professional**" and "**Server**", which vary in price and provided functionality:

1. The "*Personal*" and "*Professional*" editions do not support Windows Server:

- It cannot be installed on a Windows NT4/2000/2003 Server
- It cannot run in a Windows NT4/2000/2003 Server environment
- It cannot work in Terminal Sessions
- However, it can modify partitions of server operating systems.

The "*Server*" edition supports Windows NT4/2000/2003 Server.

2. The "*Personal*" edition does not support Dynamic Disks:

- It cannot perform any operations on Dynamic Disks; the only exception is an entire deletion
- However, it can recognize the layout of Dynamic Disks.

The "*Professional*" and "*Server*" editions recognize the layout of Dynamic Disks and allow converting Dynamic Disks back to Basic Disks in order to perform advanced disk management operations.

3. The "*Personal*" edition does not support scripting, i.e. it cannot perform batch tasks in unattended mode.

Instead, the "*Professional*" and "*Server*" editions support scripting. The special component named "Paragon Script Interpreter" executes batch tasks in the unattended mode. It can be used for:

- Creating scheduled disk management tasks
  - Building custom recovery systems (e.g. cloning of a system disk for backup purposes)
  - Creating automatic disk initialization/formatting tools, which can be suitable for PC manufacturers and office engineers
  - Many other tasks
4. In addition to the already mentioned, the [Recovery CD](#) included into the "*Professional*" and "*Server*" editions provides further useful features:
- Built-in NTFS drivers work in read-write mode
  - The Linux-based session of Recovery CD includes network support

Both features may be effectively used for system recovery purposes. Network support provides a special set of convenient wizards that help to easily change network settings. Partly this is achieved by using a large database of drivers for various network adapters included into the Recovery CD package.

## 2 Installation

The setup package is contained in the CD installation package and in the downloadable version. The installation CD contains setup files and the Paragon Recovery CD. Paragon Recovery CD is the Linux-based bootable CD with Linux version of the program. It can be used:

- As a fully functional disk management tool based on the bootable CD
- As an autonomous recovery tool in case of severe malfunction of on-disk software

A brief guide devoted to different aspects of using the Recovery CD is to be found in a dedicated chapter [Recovery CD](#) of this manual.

### 2.1 Minimum System Requirements

To install and use the Program on your computer, make sure your system meets the following minimum system requirements:

- IBM AT compatible computer with i486 or higher CPU.
- A 32-bit version of Microsoft Windows: Windows 95, 98, ME, NT, 2000 or XP. Windows is required to install the program and Recovery Media Builder.
- 64 MB of RAM
- 60 MB of free disk space
- VGA-compatible monitor
- Mouse (recommended)
- Network card – 100Mbit/s (to use network possibility of the program)
- CD-ROM drive.  
CD-ROM drive is required to install the program from CD.

Additional requirements to the system for using the Paragon Recovery bootable CD:

- ATAPI compatible CD-ROM drive.
- On-board BIOS should support the ability Boot from CD.

### 2.2 Package Contents

The installation package contains the following items:

- Drive Backup for Windows 95, 98 and ME
- Drive Backup for Windows NT, 2000 and XP
- Drive Backup for DOS platform
- Drive Backup for Linux platform
- Recovery Media Builder
- Partition Explorer
- Image Explorer
- Easy CD-DVD Recorder
- Image Mounter
- Net Burner

### 2.3 Installing the Program

#### 2.3.1 Downloadable Installation Package

The downloadable installation package contains a single executable file, which is the self-extracting Windows-based application. You can get this file in the following cases:

- You have purchased the program on the Internet and have downloaded the setup file



- You have downloaded an update/upgrade package of the program from the E-Service System.

The following steps lead you through the installation process:

### Step 1. Unzip setup files

Run the downloaded executable file and unzip the contents of the self-extracting archive to a folder of your choice. By default the utility places setup files on the current logical drive.

### Step 2. Run Setup application

Go to the folder where the setup files have been placed and run the **SETUP.EXE** file. This application will lead you through the complete program installation procedure. The setup utility has been made with the InstallShield SDK, hence contains the standard user interface and the standard set of installation screens.

### Step 3. Starting Setup

The **Welcome Screen** informs you about application being installed. Simply press the **Next** button to move on.

### Step 4. Confirm License Agreement

The **License Agreement Screen** displays the License Agreement. Read the Agreement and then press the **Yes** button to accept the Agreement and continue the installation process.

### Step 5. Choose an Installation Folder

The **Destination Location Screen** allows you to choose the folder in which the program will be installed. Press the **Browse** button to customize the name of the installation folder. Press the **Next** button to apply the selected name. The default path and name for the installation folder is:

**C:\Program Files\...** [the program's name]

### Step 6. Choose a Program Group

The **Program Folder Screen** allows you to select the application's program group in the **Start** Menu. By default, it will be the program group:

**Start >Programs > ...**[the program's name]

### Step 7. Verify Setup Settings

The **Start Copying Screen** allows you to verify settings you have made before and probably make some corrections. Press the **Back** button to go back and modify the installation settings. Press the **Next** button to complete the installation process.

### Step 8. Copying Files

The **Setup Status Screen** shows the overall progress of the installation. You are allowed to abort the process by pressing the **Cancel** button.

### Step 9. Finishing the Installation

The **Final Screen** reports the end of the setup process. From here on, the program is ready to be used.

## 2.3.2 Comments

### 2.3.2.1 Acceptable Installation locations

A couple of issues concerning the *installation folder* must be pointed out:

- Do not install the program on network drives
- Do not use Terminal Server sessions to install and use the program

In both cases, the program functionality will be limited. In addition, in some cases it may lead to instability of the application.

### 2.3.2.2 Installing the program on the NTFS partition

Attention to owners of Windows NT/2000 Server and Advanced Server versions: if you are installing the program on a NTFS formatted partition, make sure that the generating of *short filenames* is enabled. Otherwise the program may fail to run the *BlueScreen Component* that is responsible for processing *system* and *locked partitions* in Windows NT, 2000 and XP.

In such a situation it is recommended to reinstall the program in the directory which has the name that meets the "8.3" *filename format*.

By default, *short filenames* generation is enabled, yet sometimes administrators disable this option to improve NTFS performance.

Generation of short filenames for newly created files is controlled by the *Windows Registry key*:

**NTFSDisable8dot3NameCreation**

This key is duplicated within multiple registry keys, which describe the hardware and software system configuration:

HKEY\_LOCAL\_MACHINE\SYSTEM\ControlSet001\Control\File system

To enable *short filenames* generation:

1. Run REGEDIT or REGEDT32 utility
2. Find the NTFSDisable8dot3NameCreation key
3. Set it to zero (0)
4. Reboot Windows.

### 2.3.2.3 User privileges

There are some points concerning *user account* and *privileges* to be considered:

- The user should have the privileges to modify the Windows system partition and to modify the Windows Registry, i.e. registry branches:

**HKEY\_LOCAL\_MACHINE\SYSTEM  
HKEY\_LOCAL\_MACHINE\SOFTWARE**

- Roaming user accounts are not permitted. The user must use a local account

## 2.4 Registering and Updating

The Developer Company provides a wide array of online services provided by the Electronic Service System.

### 2.4.1 E-Service System

The Electronic Service System (ESS) provides the following services:

- Registering new users
- Registering purchased products for registered users
- Providing registered users with the around-the-clock available downloading center. Registered users are able to download free updates and upgrades of purchased products, any language versions available, and the documentation of the products.
- Providing all users with free demo versions and open documentation.
- Providing the online Knowledge Base of the Technical Support Team.

To enter the ESS, visit our web site.

It is recommended to use Internet Explorer 5+ or any compatible browser.

Generally, the following scheme is considered:

1. The user should register in the ESS. At this stage, the user need not be an owner of any product.
2. After purchasing a product (e.g. The program), the user should login the ESS and register the product. From now on, he is able to download commercial updates and upgrades of the product.

### 2.4.2 Registering in the E-Service System

1. Run the Internet browser and visit the E-Service System page.
- Click on the "Registration" menu item. Then follow the on-screen instructions:
- ⇒ On the 1<sup>st</sup> screen, choose the country.
  - ⇒ On the 2<sup>nd</sup> screen, fill in the form.

The most important field is the *registered e-mail address*. First, ESS will send you the password to the registered e-mail address. Second, the registered e-mail address is used as the login to the ESS.

### 2.4.3 Registering New Products in the E-Service System

1. Run the Internet browser and visit the E-Service System page
2. Click on the "Login" menu item.
3. On the Login screen, enter the registered e-mail in the **User Name** field and the received password in the **Password** field.

After submitting the form, you have access to the E-Service System.

4. Click on the **Product Reg.** menu item. The list of the registered products should appear followed by the new product registration form.
5. Select the general name of the product on the List **Base Product**.  
For example, to register the program, select the appropriate item.
6. The form will update itself automatically.
7. Then, select the particular version of the product on the List **Product**.
8. Enter the serial number of your product in the **Serial Number** field.
9. Press the button **Submit**.
10. ESS will verify your registration. On success, it will save your information in the database and thus enables you to use the download center.

### 2.4.4 Downloading Updates

1. Enter E-Service System page.
2. Click on the item **Download Update** to get access to commercial downloads of your products.
3. Select the desired update and click the button **Download**

On the **Download page**, you can see the list of registered products on the top of the page. Below the list of products, you can see the list of available commercial updates (only for products you have registered). These updates are free of charge for the registered users. Each item is provided with brief information about new features, the size of the downloadable file and the date.

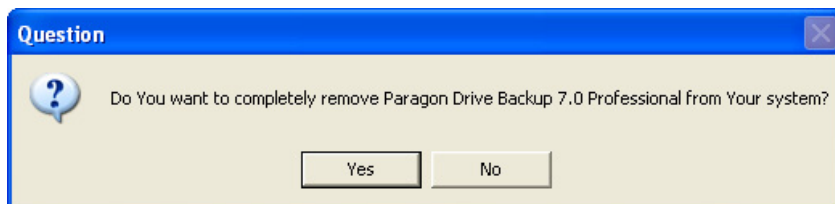
### 2.4.5 Updating and Upgrading Registered Products

Usually, *updates* and *upgrades* are fully functional installation packages of proper products. To apply an update, you should uninstall the previously installed version of the program and then install the update/upgrade.

## 2.5 Uninstalling the Program

To uninstall the program, select the shortcut in the Start menu:

**Start > Programs > [the product's name] > Uninstall**



Confirm the deletion of the program and all of its components. Reboot is not required to complete the uninstallation process.

## 3 Basic Working Concepts

This chapter introduces some concepts, which will serve as a good base for working with the program. It includes the program functionality and interface overview, description of key features and terms.

### 3.1 Functionality Overview

This chapter introduces the overview of the program's functionality.

#### 3.1.1 Known File systems

The program uses the knowledge of the internal structure of FAT-12/16/32, NTFS, Ext2, Ext3, ReiserFS, HPFS, L-Swap 1&2 file systems.

The program provides the advanced functionality exclusively for partitions that are formatted to the *known file systems*. The basic functionality (copy, backup and restore) is *available for partitions of all types*, even "unknown" ones.

Operation	FAT, NTFS	Ext2, Ext3	ReiserFS	HPFS	L-Swap 1&2	Other file systems
Copy	YES	YES	YES	YES	*re-create	** in 1:1 mode
Format	YES	YES	YES	YES	YES	NO
Backup & Restore	YES	YES	YES	YES	*re-create	** in 1:1 mode

\* The program does not save data located on the Linux Swap partitions. The program deletes existing L-Swap partitions and creates new ones.

\*\* The partitions of unknown types are always processed by using the sector-to-sector algorithm (1:1 mode)

#### 3.1.2 Copying Algorithms

The basic functions of the program are:

- [Backup partition](#) & [Backup hard disk](#)
- [Restore partition](#) & [Restore hard disk](#)
- [Copy partition](#) & [Copy hard disk](#)

These functions can be executed in two different modes:

1. The *fast copying mode*
2. The *sector-to-sector mode* (also named *1:1 mode*)

##### 3.1.2.1 Fast copying mode

In the *fast copying mode*, the program uses the knowledge of the file system structure to detect sectors of the partition, which are not used by files or metadata. Then, the program optimizes read-write operations to skip unused sectors. This technique significantly improves the performance of basic operations.

However, the fast copying mode has some restrictions:

1. It is applicable only for [Known file systems](#).
2. It is inapplicable for corrupted file systems.

Every operation begins with a file system integrity check. In case of file system corruption, the program will show the error message "**Incorrect file system**" and cancel the operation. In this case, you should fix the file system integrity by using the provided system tools (e.g. run **SCANDISK** in Windows 98, **CHKDSK /F** in Windows 2000 or **e2fsck** in Linux).

##### 3.1.2.2 Sector-to-sector copying mode

In the *sector-to-sector mode*, the program simply operates all sectors of a partition. The program does not use the map of used sectors thus it accepts partitions of any type.

Fast copying Mode	Sector-to-sector Mode
Advantages	
<ul style="list-style-type: none"> <li>The program copies only used sectors</li> <li>Requires less time to complete the operation (Copy, Move)</li> </ul>	<ul style="list-style-type: none"> <li>Applicable for all file systems, even unknown ones</li> <li>Applicable for all partitions including corrupted ones. The only method to copy a corrupted partition is to switch the program to the sector-to-sector mode</li> </ul>
Disadvantages	
<ul style="list-style-type: none"> <li>Inapplicable for corrupted file systems. In particular, you're unable to copy or move corrupted partitions</li> <li>Inapplicable for unknown file systems</li> </ul>	<ul style="list-style-type: none"> <li>The program copies all sectors, even unused</li> <li>Requires more time to complete the operation</li> </ul>

By default, the program works in the "smart mode": it automatically switches to the fast copying mode to operate partitions of *known types*. When processing unknown file systems, the program automatically switches to the sector-to-sector mode.

The program can be forced to work in the sector-to-sector mode for all partitions (see the section Copy all sectors 1:1):

**(menu) General > Settings... > (tab) General > Copy all sectors 1:1**

### 3.1.3 Virtual Operations

The program supports two different operational modes: the *Immediate Execution mode* and the *Virtual Execution mode*.

#### 3.1.3.1 Immediate Execution mode

In the *Immediate Execution mode*, the program performs each operation immediately after the user enters operation parameters.

#### 3.1.3.2 Virtual Execution mode

In the *Virtual Execution mode*, the program emulates the post-operation configuration of hard disks; the program allows previewing the expected layout (i.e. the *virtual state*) of hard disks before execution.

The program does not execute operations immediately, but places them on the *List of Pending Operations*. The special predicting module forecasts the post-operation state of hard disks. The user can execute multiple virtual operations and then evaluate the future layout of hard disks. The user can *undo* one or more virtual operations if necessary. To execute pending operations, the user is able to *apply pending operations* by pressing the **Apply** button.

The advantage of the *Virtual Execution mode* is that it allows the user to quickly execute a set of virtual operations, which then will be performed in the unattended mode.

#### 3.1.3.3 Smart mode for virtual operations

In addition, the program supports the mixed execution mode named "smart mode". In this mode, the program virtually executes all lengthy operations. Quick operations are executed in the following manner:

- If virtual operations have accumulated, a quick operation will be virtually executed as well: it will be placed on the *List of Pending Operations* for future execution.
- If no virtual operations are scheduled, a quick operation is executed immediately.

Quick operations are:

- ⇒ [Hide/Unhide partition](#)
- ⇒ [Set partition active/inactive](#)
- ⇒ [Mount partition](#)

⇒ [Set partition Label](#)

### 3.1.4 Incremental Backup

Common backup tools allow only backup all contents of partitions. In case of making multiple backup archives, unchanged data is duplicated and as result archives take redundant space on backup media.

Incremental Backup provides the ability of archiving only those changes in partition's contents, which were made since its last backup. Such archives usually take much less disk space.

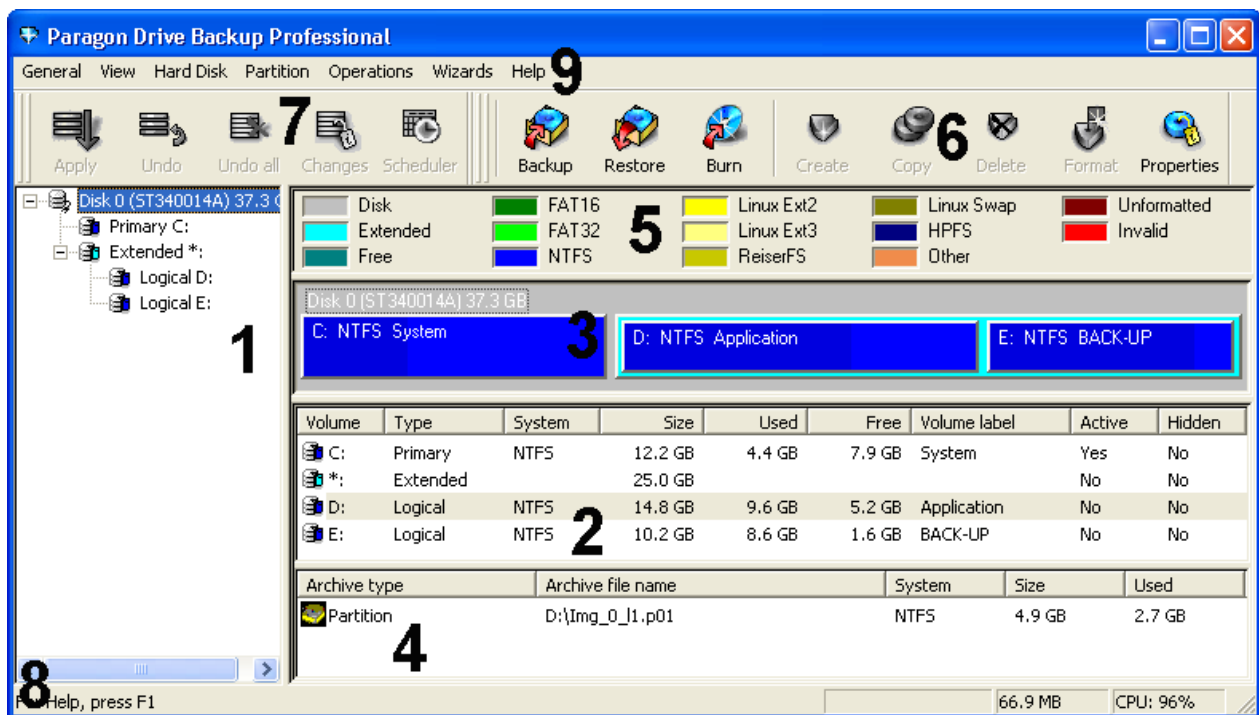
To perform the Incremental Backup of a partition, the program requires previously made archive of this partition. The previous backup image is named the *Basic Archive* or the *Basic Backup Image*. The program produces the exact comparison of the previous partition's data (that are saved in the basic image) with the current one (that is actually the partition itself). The difference in contents is saved in the newly created incremental backup archive. An incremental backup archive cannot be used detached from its basic image.

## 3.2 Interface Overview

This chapter introduces the overview of the program interface.

### 3.2.1 Interface Layout

The main window of the program is conditionally subdivided into several sections that differ in their purpose and functionality:



1. [Tree Layout Panel](#)
2. [List of Partitions](#)
3. [Partitions Visualization Panel](#)
4. [Archives List Panel](#)
5. [Legend Panel](#)
6. [Main Toolbar](#)
7. [Virtual Operations Toolbar](#)
8. [Status Bar](#)
9. [Main Menu](#)

Some of the panels have similar functionality with a synchronized layout. The program allows the user to hide some of the panels to simplify the interface management.

All the panels are separated by vertical and horizontal expandable sliders, so that the user can customize the screen layout.

### 3.2.1.1 Tree Layout Panel

The panel represents the tree-like hierarchic list of hard disks and partitions.

Hard disks are represented with top-level expandable nodes that contain the *disk number*, the *OEM model name* and the overall disk capacity. Disks are sorted in the system by their logical numbers.

*Extended Partitions* are also represented with expandable nodes. The sub-tree of each Extended Partition contains the list of logical partitions.

Nodes that represent *primary partitions* and *logical partitions* contain information about partitions: the *type* of a partition (Primary, Extended or Logical), the *drive letter* assigned (if exists) and the colored representation of the *file system type*.

In addition, *blocks of free space* are represented with simple nodes, which include information about the type and size of a free block.

You can call the context-sensitive popup menu for every type of nodes:

- The popup menu for *Disk* nodes is equal to the **Hard Disk** menu.
- The popup menu for *Partition* nodes is equal to the **Partition** menu.
- The popup menu for *Free* blocks is equal to the **Partition** menu.

The *Tree Layout panel* is synchronized with the List of Partitions and the *Partitions Visualization Panel*.

### 3.2.1.2 List of Partitions

The *List of Partitions* represents only partitions within the selected hard disk. The panel displays additional information about the partition: *drive letter* (if exists), *partition type* (Primary/Extended /Logical), *file system* type, *size*, amount of *used* and *unused (free)* space, *volume label* and flags "Active" and "Hidden".

The list of partitions is sorted by the starting position of partitions in ascending order.

You can call the context-sensitive popup menu for every item on the List.

The *List of Partitions* is synchronized with the Tree Layout panel and the *Partitions Visualization Panel*.

### 3.2.1.3 Archives List Panel

The *Archives List panel* is designed for the purpose of simplification the navigation between backup images. It holds brief information about recently used and created images: type of saved objects (disk/partition/MBR/1<sup>st</sup> track), location, file system type, partition size and amount of used space.

The context-sensitive popup menu provides the possibility of browsing and validating image contents, modifying the list of images and restoration of image contents.

The database of recently used images is kept in the file ARCHIVES.INI, which is located in the same directory with the program's executable file; by default, it is located in the folder:

C:\Program Files\...\ Drive Backup \winDB

### 3.2.1.4 Partitions Visualization Panel

The main window of the program includes the *Partitions Visualization Panel* that graphically represents the layout of all available hard disks and also enables "visual" partitioning (i.e. manipulating partitions in the virtual mode).

Each disk of the system is represented by a wide gray bar with a title and a disk map as a colored bar. The disk title includes the hard disk number, which is assigned by the operating system, disk model (manufacturer ID), and capacity in MB.

Below the title, a disk map with partitions is to be found. The blocks of free, unpartitioned space on this disk map are proportionally sized and color-coded. Each partition is designated by a drive letter and colored according to the type of file system, with unused (free) space on the partition being colored lighter than the displayed color of the used space. Free disk space or unpartitioned space is colored aqua-green.

To get detailed information about particular partition, select a partition and right-click it or click the *Properties* icon on the *Operations* toolbar. The Properties Panel will appear:

- Partition type (primary or logical)
- File system (if one of FAT12/16/32, NTFS, Ext2, Ext3, ReiserFS, HPFS, L-Swap 1&2 file systems)
- Partition number
- Partition size
- The size of used space on partition
- The size of free space on partition
- The number of sectors for one cluster
- The first sector of partition
- The last sector of partition

Partitions on the disk map are sensitive to the user's actions and can be effectively used for a quick modification of the disk's layout – for visual partitioning, including such operations as copy, move and resize. All changes made on the Partitions Visualization Panel are virtual operations, listed on the *List of Pending Operations*. It is possible to undo several of them beginning with the last, or undo all at any time prior to being executed.

Visual partitioning is also used in the program's other interfaces: resize and move, and create operation dialogs.

### 3.2.1.5 Legend Panel

The *Legend panel* describes the color indication of the file system types being used in the program's interface.

The program distinguishes following types of partitions:

- Known file systems (FAT12/FAT16, FAT32, NTFS, Ext2, Ext3, ReiserFS, HPFS, Linux Swap-1&2).
- Extended Partition (the space that is reserved in the Extended Partition for allocating logical partitions).
- Free space (the *unpartitioned* disk space that does not belong to any partitions). Within the Extended Partition, the free space does not belong to any logical partition.
- *Invalid* partitions. This category includes only partitions with invalid parameters and ones having *corrupted file systems of known file system types*.
- *Other* partitions (i.e. partitions that have *unknown* file system types). In addition, the program marks partitions which are incompletely modified by the program (e.g. some operation was abnormally interrupted) as *other*.
- *Unformatted* partitions. The category includes recently created partitions. The program can confuse *wiped* and severely damaged partitions with *unformatted* ones.

### 3.2.1.6 Main Toolbar

The *Main Toolbar* provides fast access to the most frequently used partitioning operations: backup/burn image/restore for partitions & disks and create/delete/format/copy for partitions.

### 3.2.1.7 Virtual Operations Toolbar

The *Virtual Operations Toolbar* provides fast access to the functions for manipulating with the *List of Pending Operations* (see [Virtual operations](#)).

Available operations:

<b>Apply</b>	Execute all accumulated pending operations (the List of Pending Operations will be emptied)
<b>Undo</b>	Undo the last pending operation on the List
<b>Undo All</b>	Cancel the entire list of pending operations
<b>Changes</b>	Display the advanced dialog of managing virtual operations

### 3.2.1.8 Status Bar

The *Status Bar* displays additional information:

- In the left corner, the menu hints (brief descriptions) are displayed
- In the right corner, the current *CPU usage* and the *memory used* values are displayed.

### 3.2.1.9 Main Menu

The *Main Menu* provides access to the entire functionality of the program. Available functions are as listed below:



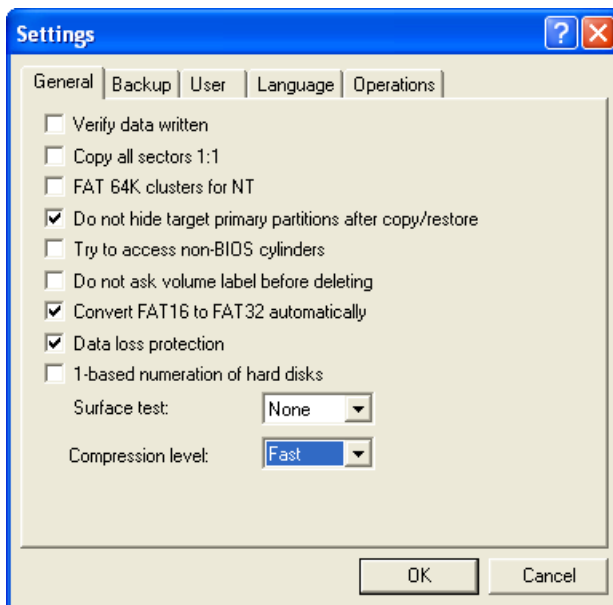
Menu Item	Functionality
<b>General</b>	<b>(settings and getting information)</b>
<a href="#">Show archive info</a>	Explore the structure of partition(s) stored in the backup image with the ability of browsing their contents
<a href="#">CD/DVD Burners</a>	Display the list of CD/DVD burning drives
<a href="#">Generate script</a>	Generate script on the base of the current pending operations set
<a href="#">Save to scheduler</a>	Save virtual operations as a scheduled task
<a href="#">Scheduled tasks</a>	Edit scheduled tasks
<a href="#">Settings</a>	Change program settings
Exit	Exit the program
<b>View</b>	<b>(controlling interface layout)</b>
<b>Toolbar</b>	<b>(controlling the view of toolbars)</b>
Main toolbar	Show/hide Main toolbar
Virtual operations toolbar	Show/hide Virtual operations toolbar
Large buttons	Switch between large and small buttons in all toolbars
Text labels	Show/hide text labels under buttons in all toolbars
Status Bar	Show/hide Status Bar
<b>Disk Map</b>	<b>(Partitions Visualization Panel settings)</b>
Size	Select the width of the Partitions Visualization Panel (three alternatives)
Proportional view	Follow proportions of hard disks capacities on the Partitions Visualization Panel. By default, the program ignores the difference in size of hard disks.
Legend	Show/hide the Legend panel that displays the color indication of file system types
Configuration tree	Show/hide the Tree Layout panel
Recent archives list	Show/hide the Archives List panel
<b>Hard Disk</b>	<b>(hard disk based operations)</b>
<a href="#">Copy hard disk</a>	Copy all contents of entire disk (Track#0+all partitions) with the ability of proportional resizing of all partitions
<a href="#">Create an image of hard disk</a>	Make an image of all contents of entire disk
<a href="#">Burn an image of hard disk to CD</a>	Place the disk image to recordable CD/DVD discs
<a href="#">Restore hard disk from image</a>	Restore disk from image with keeping the disk layout and the ability of proportional resizing of all partitions at once
<a href="#">Selective partition restore on hdd</a>	Restore chosen partitions from the hard disk image with the ability of independent resizing
<a href="#">Update MBR</a>	Overwriting the current bootable code in the MBR by the standard bootstrap code
<a href="#">Change primary slot</a>	Re-order MBR records that refer to primary partitions (controlling of DOS and Windows boot-up behavior)
<a href="#">View sectors</a>	Explore & edit sectors of the disk
<a href="#">Browse disk</a>	Browse disk contents by using the built-in file system drivers
<a href="#">Properties</a>	Show properties of hard disk
<b>Partition</b>	<b>(partitions based operations)</b>
<a href="#">Copy partition</a>	Copy a single partition with the ability of resizing
<a href="#">Create an image of partition</a>	Backup a single partition
<a href="#">Burn an image of partition to CD</a>	Place the partition image to recordable CD/DVD discs
<a href="#">Restore partition from image</a>	Restore the partition from the image with the ability of partition resizing
<a href="#">Selective partition restore</a>	Restore separate partition(s) from a multi-partition image with the ability of independent resizing
<a href="#">Create</a>	Create a new partition (primary, Extended, logical)
<a href="#">Format</a>	Format an existing partition to FAT/FAT32, NTFS, Ext2, Ext3, ReiserFS or Linux Swap with using built-in tools
<a href="#">Delete</a>	Delete an existing partition
<a href="#">Mount</a>	Assign/remove the drive letter assigned to the partition (available only in Windows NT, 2000, XP)
<a href="#">Hide/Unhide</a>	Hide/unhide the partition. The property will affect the system working in next reboot
<a href="#">Set active/Set inactive</a>	Set/reset primary partition active (=bootable). The property will affect the system working in next reboot
<b>Modify</b>	<b>(changing parameters of file system)</b>
<a href="#">Set Label</a>	Change the volume label placed in the boot sector
<a href="#">Change partition ID</a>	Change the code of the file system type in the MBR/EPT
<a href="#">View sectors</a>	Explore & edit sectors of the partition
<a href="#">Retest surface</a>	Perform the surface test on the existing partition or the block of free space.

<a href="#">Check file system integrity</a>	Check file system integrity by built-in tools (available for FAT16, FAT32 and NTFS file systems)
<a href="#">Undelete</a>	Finds and recovers an occasionally deleted partition
<a href="#">Browse partition</a>	Browse partition contents by using the built-in file system drivers (available even for unmounted partitions)
<a href="#">Properties</a>	Display the detailed properties of the partition
<b>Operations</b>	<b>(managing virtual operations)</b>
View pending changes	Display the advanced manager of pending operations
Apply changes	Immediately execute all accumulated pending operations
Undo last operation	Undo the last operation on the List of Pending Operations
Undo all operations	Cancel all the List of Pending Operations
Reload	Re-read the current state of hard disks (available only in case the List of Pending Operations is empty)
<b>Wizards</b>	<b>(changing parameters by using wizards)</b>
<a href="#">Copy hard disk</a>	Copy all contents of entire disk (Track#0+all partitions) with the ability of proportionally resizing all partitions.
<a href="#">Incremental Backup</a>	Update a previous made archive
<a href="#">Undelete partitions</a>	Restore previously deleted partitions
<b>Help</b>	<b>(help and troubleshooting)</b>
Contents and Index	Run program's Help
<b>Troubleshooting</b>	<b>(automated troubleshooting assistance)</b>
<a href="#">Send log files</a>	Compress and send the log to the Support Team
About ...	Display the <i>About</i> window

## 3.3 Settings Overview

This chapter gives an overview of the program's settings.

### 3.3.1 General Settings



#### 3.3.1.1 Verify data written

The option forces the program to verify data being written: every *write-to-disk* action is followed by the *read-and-compare* action. The feature is used for unstable hard disks and may significantly reduce the overall performance.

#### 3.3.1.2 Copy all sectors 1:1

This option forces the program to work in the *sector-to-sector mode* (see [Fast copying algorithm](#)). The option affects the following functions:

- [Backup partition](#) & [Backup Hard Disk](#)
- [Copy partition](#) & [Copy hard disk](#)

### 3.3.1.3 FAT 64K clusters for NT

The option allows creating FAT16 partitions with a 64K cluster size. Hence, the program is able to make FAT16 partitions up to 4GB in size.

### 3.3.1.4 Do not hide target primary partitions after copy/restore

The option controls whether the program automatically sets the *Hidden* attribute for the last copied partitions. There is no obviously preferred value for this option. See the explanation below to choose the most appropriate value.

The fundamental feature of the *Copy partition* functions enables *changing the amount and probably the relative order of partitions*. The primary after-effect is that the drive letters assigned to partitions have probably been changed. From this point, the difference in the Windows versions plays a significant role:

- In Windows NT, 2000 and XP, one can fully control the drive letters assigned to any partition. These operating systems do not automatically change drive letters for already mounted partitions in case adding new ones – the user should make changes manually.
- In Windows 95, 98 and ME, the operating system automatically assigns drive letters to detected partitions, according to some predefined rules. An unreasoned adding a new partition may lead to the mixing of drive letters after the next system startup, so that this may also lead to the non-operability of some software or even the operating system.

To avoid mixing of drive letters automatically *hide* new partitions.

Another problem is that Windows (except for Windows 2000 and XP) are unable to work with hidden partitions, so that one must manually unhide partitions to work with them.

In case of copying the system partition, the user must un-hiding the last copied system partition, otherwise Windows will be unable to initialize from the hidden system partition.

### 3.3.1.5 Try to access non-BIOS cylinders

The option forces the program to inquire the hard disk capacity value that is returned by BIOS and detect the disk capacity by non-standard procedure.

In fact, the option is required only for the compatibility with different old hardware. This feature is effective only in DOS and Windows 95, 98, ME. In Windows NT, 2000 and XP and in Linux the option takes no effect.

### 3.3.1.6 Do not ask volume label before deleting

Activate the option to suppress the acquiring of the partition's volume label being deleted (see chapter [Delete Partition](#)).

By default, the program requests the volume label before deleting the partition (to eliminate the chance of accidental deletion).

### 3.3.1.7 Convert FAT16 to FAT32 automatically

Activate the option to suppress the warning concerning the conversion of FAT16 file system to FAT32 during the resizing partition. The option affects the following operations:

- [Copy Partition](#) (with Autoresize)
- [Copy Disk](#) (with Autoresize)
- [Restore Partition](#) (with Autoexpand)
- [Restore Disk](#) (with Autoexpand)

Note: that the maximum capacity of FAT16 is limited to approximately 2GB (in case of 64K cluster the limit is 4GB, see the option [FAT 64K clusters for NT](#)). For this reason, partitions that are greater than 2GB cannot be correctly formatted to the FAT16 file system.

The program suggests converting the FAT16 file system to FAT32 in case the resulting size of a partition exceeds the maximum size for the FAT16 file system. By default, the program warns the user about the file system conversion since old operating systems do not support FAT32:

- Windows NT 4.0 and lower versions
- Windows 95 OSR1
- All DOS versions that precede the MS-DOS 7.1 (from Windows 95 OSR2).
- MS Windows 3.11 and lower versions.

### 3.3.1.8 Data loss protection

Activate the option to force the program to work in the *fail-safe mode*. In this mode, the program keeps a specific journal of the operation's progress.

In case of hardware malfunction, power break or operating system failure, the modified partition may become corrupted and non-operable. However, the program is able to complete the interrupted operation and thus "revive" the partition.

The journaling of the operation progress significantly reduces performance.

To use this feature, build the bootable diskette or CD/DVD with the DOS-based version of the program prior to running operations in the fail-safe mode. The alternative is to use the program's Bootable CD.

In the fail-safe mode, if the system crashes during the operation, insert the bootable diskette (or the Bootable CD) and initialize the computer from it. The program will automatically detect the journal of the interrupted operation and accomplish the job.

### 3.3.1.9 1-based enumeration of hard disks

Activate the option in order to use the 1-based enumeration of hard disks. By default, the program uses the zero-based enumeration of hard disks and partitions.

### 3.3.1.10 Surface test

The option defines the default value for the *media surface test* sub-operation. The available values are:

<b>None</b>	No surface test
<b>Normal</b>	Single-pass read test
<b>Extreme</b>	Three-pass read-&-write test

The option affects following operations:

- [Format partition](#)
- [Copy partition](#)
- [Retest surface](#) (this operation ignores the setting *Surface Test = NONE*)

When performing the surface test, the program is able to detect bad sectors and mark them unused.

### 3.3.1.11 Compression level

The option defines the default compression level. The option affects the following operations:

- [Backup partition](#) & [Backup hard disk](#)
- [Burn an image of a partition](#) & [Burn an image of a hard disk](#)

Using the image compression significantly slows the overall operation performance.

#### Approximate values for the compression ratio and speed deceleration

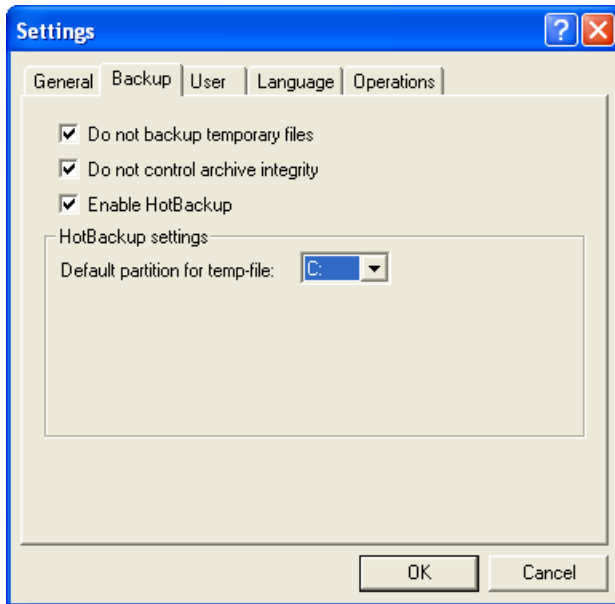
Level	Algorithm	Compression	Performance
<b>None</b>	(none)	no compression	no deceleration
<b>Fast</b>	RLE	95-80 % (1.05 – 1.25 times squeezing)	~90 % (~1.1 times slower)
<b>Normal</b>	LZW	65-70 % (1.4 – 1.5 times squeezing)	60-70% (1.4 – 1.7 times slower)
<b>Best</b>		40-50 % (2.0 – 2.5 times squeezing)	10-12% (8 – 10 times slower)

In fact, the real value of compression ratio fundamentally depends on the statistical properties of data being compressed. The performance depends on the CPU and hard disk performance.

The *RLE algorithm* (Run Length Encoding) is based on compressing of multiple repetitions of a single character. Concerning the program functionality, RLE provides good results in case of backup partitions that have multiple small files, or partitions containing sparse data (like .TXT/.DOC/.XLS/.BMP-files).

The *LZW algorithm* (Lempel-Ziv-Welch) is a very popular and effective compression algorithm that is based on building the dictionary of repetitive patterns. Modern archivers (ZIP, RAR etc) use modifications of the LZW algorithm. It provides good compression ratio on almost all kinds of data.

### 3.3.2 Backup Settings



#### 3.3.2.1 Do not back up temporary files

This option allows the program to ignore unimportant files while creating backup archives. This saves time and reduces the size of the backup archive. If the option is activated, the current version of the program ignores the contents of the PAGEFILE.SYS and HIBERFIL.SYS system files on NTFS partitions, but saves the information on their sizes and locations. When restoring an NTFS partition, the program will generate the contents of these two files.

If this option is disabled, the program backs up these files along with others on a partition.

#### 3.3.2.2 Do not control archive integrity

The option controls the generation of the integrity validation code while creating backup archives. With this option deactivated, the program has a 2-7% performance gain, but the probability of occurring faults increases.

#### 3.3.2.3 Enable HotBackup

This option allows using the HotBackup mechanism in case of system or locked partition backup.

The program must have the exclusive access to processed data during the backup operation but these data can be in use of other software or the operating system. There are two ways to get exclusive access:

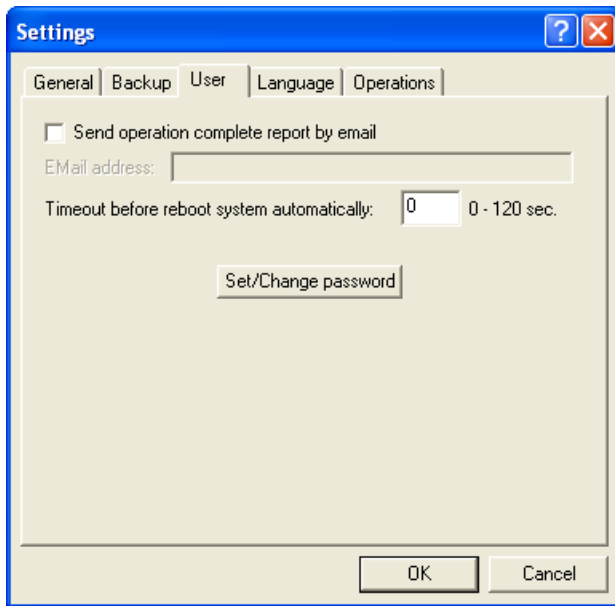
1. To reboot the system to some single-tasking mode where the working program could complete the operation (please see the chapter "Working with locked and system partitions" for more information).
2. To use the HotBackup mechanism that allows the user to make backup of the system partition without rebooting.

Obviously the second way is much better but there are some cases when it cannot be used. The most serious of such restrictions is that the HotBackup mechanism works only under Windows NT, Windows 2000 and Windows XP operating systems.

#### 3.3.2.4 Default partition for temp-file

The option defines the partition (by default – C:) for HotBackup Temporary File. Temporary file will be deleted when hot backup will be performed however it may require large amount of disk space. If there is no enough free space on drive C: another drive should be selected.

### 3.3.3 User Settings



These settings are available exclusively for the Windows-based version of the program.

#### 3.3.3.1 Send operation complete report by email

Mark the option to enable the program send a notification of the completion of scheduled virtual operations via email.

Some operations may take considerable time, e.g. completing of a large list of pending operations takes considerable time. The program supports the feature of remote notification on finishing the execution of pending operations.

#### 3.3.3.2 Email address

Enter the email address to be used for the email notification for completing operations.

#### 3.3.3.3 Timeout before reboot system automatically

Set the **positive non-zero value** to the textual field in order to define the timeout for auto-reboot. Clear the field or enter the **zero value** to disable the automatic rebooting feature.

Some operations require the system to be rebooted. This setting controls the behavior of the program in such situations. By default, the program stops the execution and waits until the user confirms the reboot. Set the timeout to eliminate an interruption, so that the program is able to complete operations without the user's intervention.

#### 3.3.3.4 Set/Change password

It is possible to protect the program from incompetent or unauthorized modifying of disk contents by setting the password on the physical execution of the operations.

To set the password, press the **Set/Change password** button.

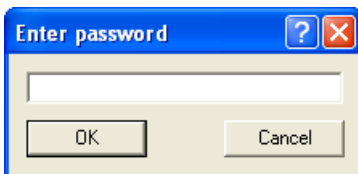


To set a new password, enter the old one in the **Old password** field. Then set some new value in the **New Password** field and re-enter it in the **Confirm new password** field. The **Do not use password** checkmark disables password protection.

**Note:** the old password is required to change or disable the password.

In case the password is defined, the program will behave in the following manner:

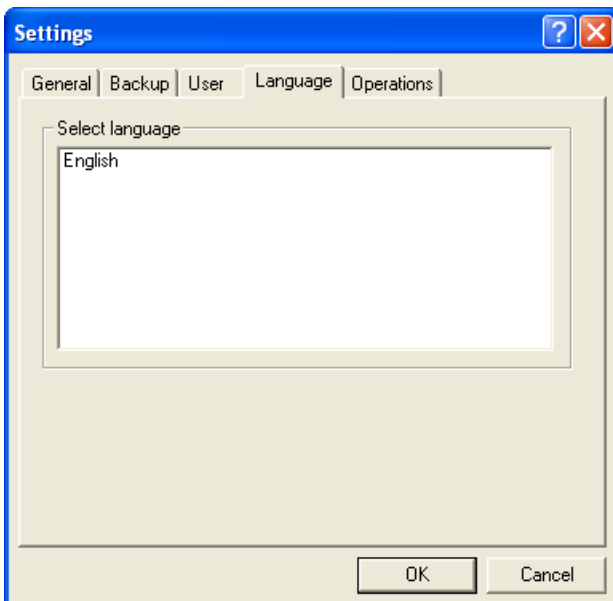
- Anyone can call any operation dialogs;
- Anyone can virtually execute operations (if the program works in the *Virtual Execution mode*);
- Anyone can press **Undo** and **Undo all** buttons that only lead to the modification of the List of Pending Operations.
- Anyone can activate operations that do not modify disk contents, such as:
  - ⇒ [View Partition/Hard Disk Properties](#)
- All operations that produce real modification of disk contents require the password to be entered for the physical execution:



In case of working in the *Immediate Execution mode*, the program requests the password immediately after submitting parameters of the operation.

In case of working in the *Virtual Execution mode*, the program requests the password when the applying of pending operations is commenced.

### 3.3.4 Language Settings



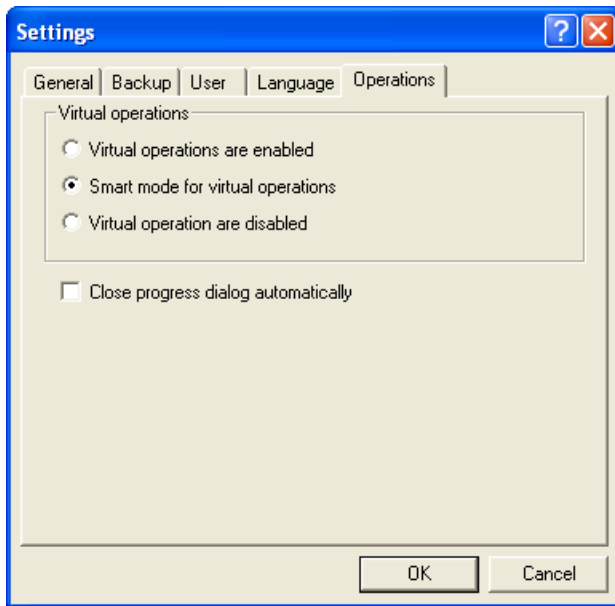
The Windows-based version of the program supports the on-the-fly changing of the interface language.

#### 3.3.4.1 Select language

This box contains the list of language resources available. Simply select the desired interface language and press the **OK** button.

Language resources are stored in the subfolder **...\WinDBTL\Resources** of the program's installation folder, in dynamic libraries of a special format.

### 3.3.5 Operations Settings



#### 3.3.5.1 Virtual operations are enabled

Mark the option to switch the program into the *Virtual Execution mode*.

In this mode, all operations, which support virtual execution, will be scheduled on the *List of Pending Operations* for future completion (see the [Virtual Execution mode](#) chapter for more details).

The program displays the *virtual state* of hard disks layout – this state will be reached after completing all the pending operations. To execute pending operations, one should press the **Apply** button.

#### 3.3.5.2 Smart mode for virtual operations

Mark the option to switch the program into the "smart execution" mode (see the [Smart mode for virtual operations](#) chapter for more details).

In the smart execution mode, the program executes all lengthy operations in the virtual mode (i.e. these operations are scheduled on the *List of Pending Operations* for deferred execution).

Instead, the program immediately executes quick operations, in case there are no pending operations on the List.

#### Quick operations:

- ⇒ [Hide/Unhide partition](#)
- ⇒ [Set partition active/inactive](#)
- ⇒ [Mount partition](#)
- ⇒ [Set partition Label](#)

#### 3.3.5.3 Virtual operations are disabled

Mark the option to switch the program into the *Immediate Execution mode*. All operations will be executed immediately after submitting operation's parameters (see chapter [Immediate Execution mode](#)).

#### 3.3.5.4 Close progress dialog automatically

When executing operations, the program displays the *Progress Information* window that contains the performance statistics and brief execution log (see the section [Progress Information](#)). By default, the program holds the *Progress Information* window until the user presses the **Close** button, so that the user is able to look at the brief execution log and statistics.

Mark the option to force the program close the *Progress Information* window automatically after completing execution of accumulated pending operations.



## 3.4 Executing Operations

### 3.4.1 Wizards vs. Manual Management of Operations

You can use either *Operation Wizards* or *Operation Dialogs* to execute operation from the program's interface. Hereafter you will find the detailed description of all Operation Dialogs, including information on how each setting affects the operation performance.

#### Wizards

Wizards guide you through the set of Wizard's screens. Each screen contains one simple question and prompts the limited list of possible answers. Passing through all these screens the Wizard collects enough information to initiate the required operation. Finally, the program will execute the operation.

Wizards are easy-to-use, but disable configuration of some advanced features. To be able to fully control the behavior and performance of the program, it is recommended to use the *Operation Dialogs*.

#### Manual management with Operation Dialogs

In the manual management mode, the program allows the user to customize all controllable parameters of operations in appropriate dialogs. By using this feature, one can effectively control performance and use full functionality of the program.

Usually, all parameters required for an operation are collected in one dialog. The program suggests some consistent initial values for all operation's parameters, and in most cases the default settings are sufficient.

### 3.4.2 Initiating Operations

First, one should initiate an operation. A common procedure is the following:

1. The user should select an object to operate (a *partition*, a *free block* or a *disk*).
2. The user should choose an operation to be performed.
3. The program displays the appropriate dialog with the parameters required for the operation execution.
4. The user should assign the parameters and then click the **OK** button.

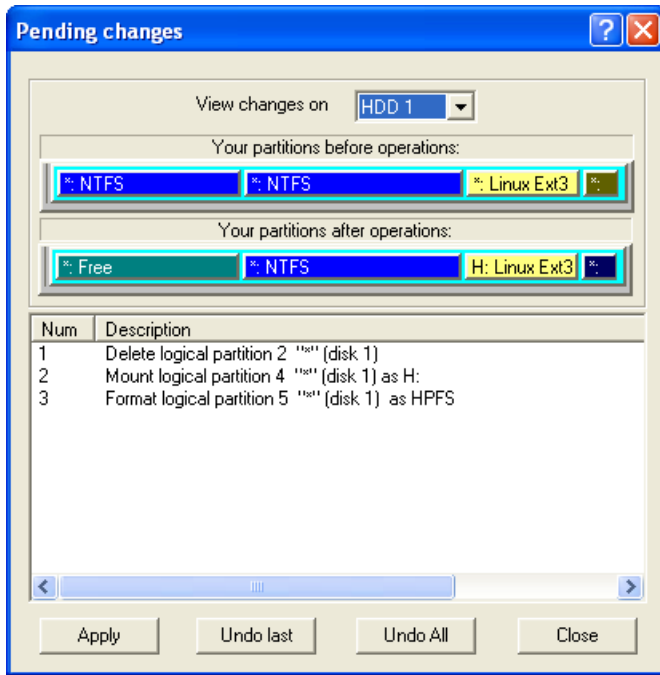
Next actions depend on the selected operation and program's settings. In case virtual operations are disabled, the program immediately executes the operation. Otherwise, the program will add the operation to the *List of Pending Operations*.

### 3.4.3 Inspecting Pending Operations

In case virtual operations are enabled, the program adds operations to the *List of Pending Operations*. One can examine the list before the program completes operations. To inspect the List of Pending Operations, choose one of the following actions:

- Select in the main menu:  
**(menu) Operations > View pending changes...**
- Press the **Changes** button in the Virtual Operations Toolbar

After this, the *Pending changes* dialog will appear if there are any virtual operations on the List:



This dialog has the following functionality:

#### View changes on [HDD##]

This pull-down list allows selecting a hard disk for previewing changes in its layout.

Two panels, which are placed below and labeled "**Your partitions before operations:**" and "**Your partitions after operations:**", display expected layout changes for the selected hard disk.

The textual box in the middle of the window contains the *List of Pending Operations*.

Buttons at the bottom of the window provide the following functionality:

<b>Apply</b>	Immediately execute all accumulated pending operations. The <i>List of Pending Operations</i> will be cleared
<b>Undo last</b>	Undo the last pending operation on the List
<b>Undo All</b>	Cancel the entire list of pending operations
<b>Close</b>	Closes the dialog No changes on the <i>List of Pending Operations</i> will be performed

The user may inspect pending operations only if the virtual operations are enabled (see the section [Virtual operations](#)).

### 3.4.4 Applying Operations

For immediate execution of accumulated operations, the user should take one of following actions:

- Press the **Apply** button in the *Virtual Operations Toolbar*
- Select in the main menu:

#### Operations > Apply changes

In case there are operations listed on the *List of Pending Operations*, the program displays the following warning message.

This dialog has the following functionality:

#### Apply all operations in BlueScreen mode

This option is available only in the Windows-based version of the program.

If this option is activated, the program will reboot Windows and execute operations by using the so-called *BlueScreen Component* (see the section [Working with locked and system partitions and hard disks](#)).

Buttons at the bottom of the window provide the following functions:

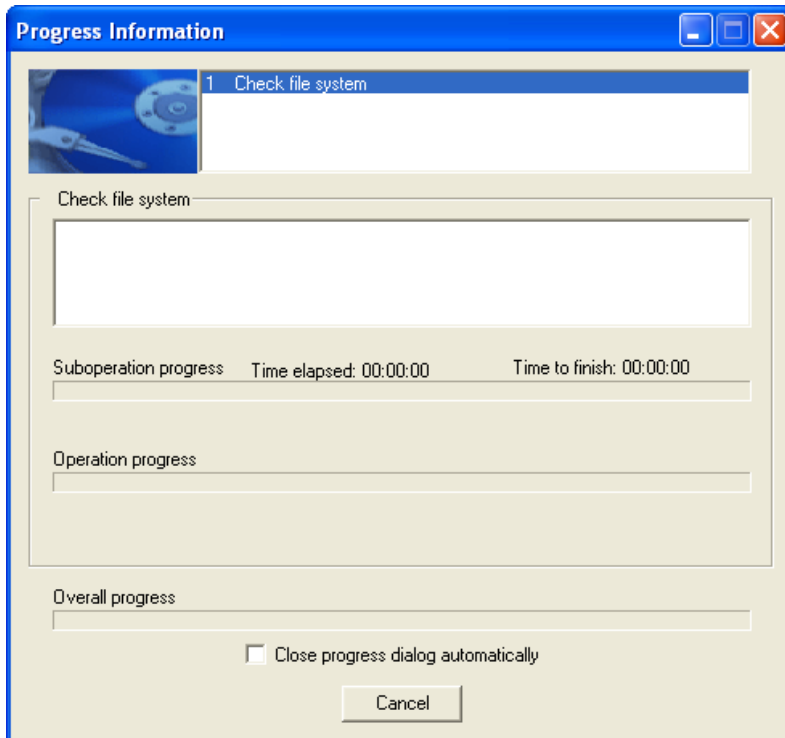
<b>Yes</b>	Immediately execute pending operations
<b>No</b>	Cancel all pending operations
<b>Details</b>	Inspect the List of Pending Operations

In the DOS and Linux environments, the program executes the entire list of operations within a single session.

In Windows, the execution may vary: the program requires the system reboot to process locked and system partitions or hard disks.

### 3.4.5 Progress Information

The real execution of operations displays the *Progress Information* dialog:



The dialog displays:

- The complete *list of operations* to be executed (at the top of the window); the currently executed operation is highlighted
- *Brief information* on actions being performed (a textual box in the middle of the window)
- Three progress bars:
  - ⇒ *Overall progress* (bottom) displays the overall progress for the entire list of operations
  - ⇒ *Operation progress* (middle) displays the progress of the currently performed operation
  - ⇒ *Suboperation progress* (top) displays the progress of the currently performed suboperation, for compound operations only

The program displays **Time elapsed** and **Time to finish** for each progress bar. The Operation progress includes additional information for some operations: amount of processed and remaining data, average transfer rate.

In addition, the *Progress Information* dialog contains the following control elements:

#### Cancel (Close)

This button provides the ability to abort operations. The program will interrupt the currently performed and all the following operations on the List of Pending Operations.

After all operations on the List are completed or aborted, the **Cancel** button changes its caption to "**Close**".

### Close progress dialog automatically

This checkbox duplicates the functionality of the appropriate program's option (see the section [Settings overview > Close progress dialog automatically](#)). If the option is marked, without the user's approval the program automatically hides the **Progress Information** dialog after completing all operations.

## 3.4.6 Working with Locked and System Partitions

If a pending operation is aimed at a locked/system partition, the program will save the rest of the List of Pending Operations and reboot the computer. All operations from the list will be executed in single-tasking mode until completion.

### In Windows NT, 2000 and XP

The program processes locked partitions in the so-called "Startup Bluescreen" by using the special utility named *Bluescreen Component*. After completing the operation, the program will reboot the system to the Windows session. The program will not reboot in case the Hot Backup option was enabled [in the program backup settings](#).

### In Windows 95 and 98

The program reboots to the "true" DOS session and starts the DOS-based version of the program in the unattended mode. After completing the operation, the program will reboot the system to the Windows session.

### In Windows ME

The program requires using a preliminary made bootable diskette with the DOS-based version of the program. The next chapter contains the detailed explanation of this functionality.

Unfortunately, Windows ME has no practical single-tasking environment. For this reason, the program requires to use either a DOS bootable diskette with the diskette-based version of the program or the Paragon Recovery CD with the Linux-based version of the program, in order to process locked partitions and hard disks in Windows ME.

The special utility named [Recovery Media Builder](#) has been developed to simplify the process of making bootable diskettes with the diskette-based version of the program:

1. Before working with the program, run the Recovery Media Builder utility and make the DOS bootable diskette with the diskette-based version of the program
2. Run the Windows-based version of the program
3. Initiate a required operation and define all parameters
4. Before starting an operation, the program checks whether partition is locked or not
5. If a partition/disk is locked, the program requests the system reboot  
Press the **OK** button to reboot the system and complete an operation, or press the **Cancel** button to abort it.
6. The program asks the user to insert a diskette with the program in the floppy drive [A:]
7. Insert the required diskette; the program will pass the task to the diskette-based program
8. Reboot the computer and keep the diskette in the floppy drive. Ensure that the computer is configured to boot from floppy first
9. The diskette-based program will automatically start the operation in the unattended mode
10. When the diskette-based program completes the operation, remove the diskette from the drive and reboot the computer.

## 3.4.7 Executing Operations in the Fail-safe Mode

The program provides the ability to perform several operations in the *fail-safe mode*. In this mode, the program can resume operations, which have been interrupted due to hardware/software malfunctions or power breaks.

When running in the fail-safe mode, the program permanently keeps a log of the operation progress. If the operation has been interrupted, the program will detect the log information of an incomplete operation and will suggest the user to either resume or finally cancel it.

The log support noticeably slows down the performance. For this reason, the program supports the fail-safe mode only for operations that modify a "source" partition. Other operations, such as [Copy Partition](#), keep the source object intact, so that these operations can be simply restarted in case an interruption.

### Working in the fail-safe mode

A common procedure is as follows:

1. The user should make the DOS-based bootable diskette Linux-based Bootable CD by using the [Recovery Media Builder](#) utility
2. The user should run the program and activate the *fail-safe mode* in the program Settings (see the section [Settings Overview > General Page > Data loss protection](#))
3. The user should initiate and execute the desired operation. The program will seem to start the operation in the usual manner, however, in this case it will keep a log of the operation progress
4. In case of unexpected interruption (failure), the program replaces the MBR bootstrap code with the special bootable code that asks the user to continue the interrupted operation from the bootable diskette or the bootable CD
5. The user should boot the computer from the program's bootable CD or from the program's bootable diskette
6. The program will detect the interrupted log and will ask the user either to continue the operation or cancel it
  - ⇒ In case of continuing the operation, the program resumes the operation and completes the modification of a partition
  - ⇒ Otherwise, the program only restores the old bootstrap, but leaves a processed partition in an unused state.

### Manual interruption of an operation

In case an operation was interrupted by the user, the program will not provide the ability to resume the operation, even while working in the fail-safe mode.



Remember, an interruption of some operations leads to the irrevocable corruption of a processed partition

## 3.5 Scheduling Tasks

The automation of the program operations is especially effective when the user has to do them on a regular base. For example a network administrator has to create backup copies of server's disks everyday and it would be convenient to do it at the same time. Indeed similar operation simply asks to be automated because we can clearly formulate the task for multiple executions.

Another aspect of any automation is the independence of the process from the user presence. The program will execute operations without the user's interference. For example it allows optimizing the working load of an office local network. A number of operations, which can decrease the network performance, could be done at night or at the time when the office computers are the least work loaded.

The program has an integrated scheduler, a special tool that allows the user to automate operations, to create their schedule, where one can set when and which operation should be performed. This chapter explains many details of the scheduler's use.

### 3.5.1 A Task Statement

As it was mentioned earlier (see the [Virtual Operations](#) chapter) the program has two basic ways of operations execution, two different modes: the *Immediate Execution mode* and the *Virtual Execution mode*. In the *Immediate Execution mode* the program performs operations immediately after the user enters operation parameters. This case does not allow scheduling operations. In the second case, in the *Virtual Execution mode* the program does not execute operations immediately, but places them on the *List of Pending Operations*. The user can execute multiple virtual operations saving them on the List of Pending Operations, forming in that way their group.

The user can apply Pending Operations by clicking the corresponding **Apply** button in the Virtual Operations Toolbar. However there is also a possibility to postpone the operations execution to a special time or set a special condition for their starting. In terms of the program these actions are named *scheduling a task*. Here a *task* is understood as a virtual operation or a group of virtual operations, which has to be done at a certain time or in a certain condition (for example by the system start-up).

The program keeps tasks in the form of scripts. Every necessary operation of a script is written with commands of the macro-language (Paragon Scripting Language). Since the script is a usual textual file it can be edited by the user. The scheduler provides the possibility of the similar editing.

### 3.5.2 A New Task Schedule

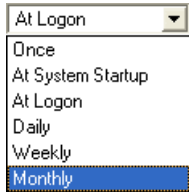
If the *List of Pending Operations* contains a virtual operation or a group of operations (speaking in terms of the program if *there is an assigned task*) then you can define the special time condition for their execution with an embedded scheduler. To start the scheduler dialog choose the following item in the Main menu:

**General > Save to scheduler...**

or click the “**Scheduler**” button  in the Virtual Operations Toolbar.

The scheduler dialog has two important control elements: the *List of Schedule Types* (a pull-down menu at the top part of the dialog) and the Task Scheduling Options section (under the menu).

The *List of Schedule Types* gives a possibility to define the time condition for the task performance.

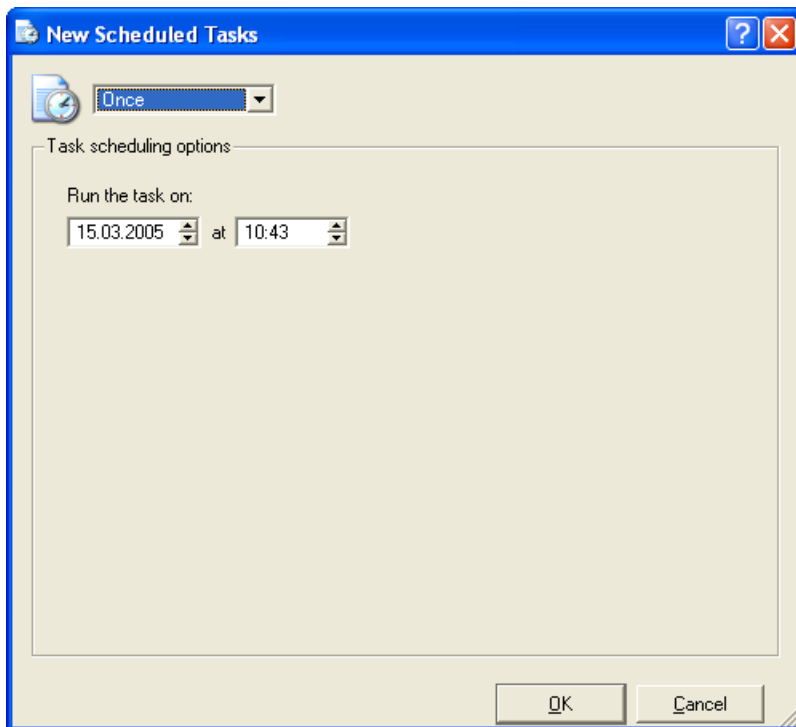


All the possible variants (menu items) can be divided into two categories:

- starting the task depending on an event:
  - one time only (the “Once” item);
  - when system starts (the “At System Startup” item);
  - when user logs on (the “At Logon” item).
- starting the task periodically (daily, weekly, monthly);

The user should choose one of the variants. Depending on the choice the low section of the window, the “*Task scheduling options*” section will contain a form for definition of the task schedule parameters.

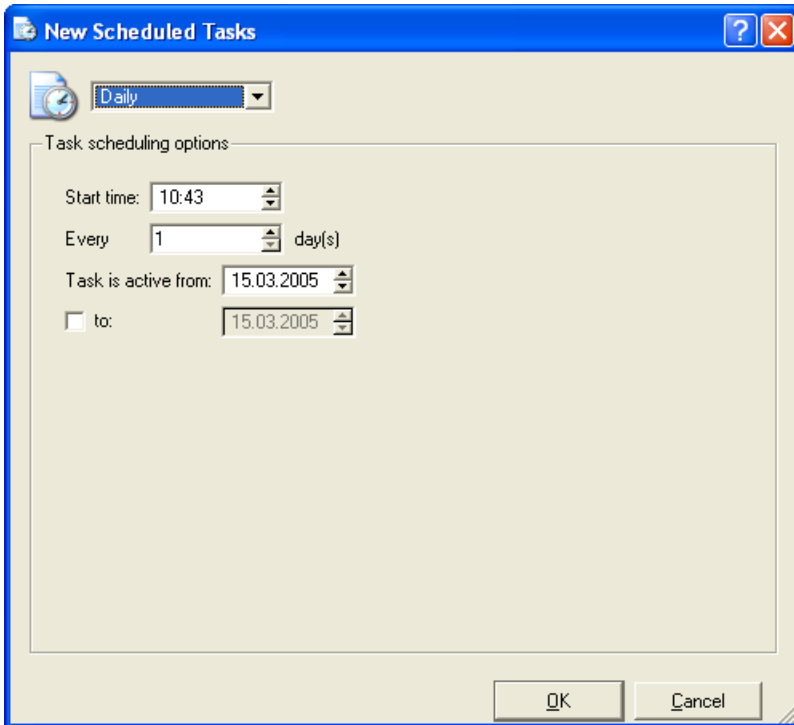
If the **Once** item was chosen then the low section will contain fields that helps you define the date and time when the task starts.



If the **At Logon** or the **At System Startup** items were chosen, the low section will contain the checkbox “*Delete the task after run*”. Working actively the program will collect old unused tasks littering the scheduler’s task list. Tick the checkbox to avoid it.

If the **Daily** variant was chosen the low section will contain the following form fields:

- the time when the task starts (the “*Start time*” field, where control buttons on the right side of the field for editing the value);
- a period during which the task will perform (the “*Every*” field; the control buttons are available for editing too);
- the date when the task starts (the “*Task is active from*” item);
- the date when the task finishes its work (the ticked “*to*” checkbox activates the corresponding field for this date).

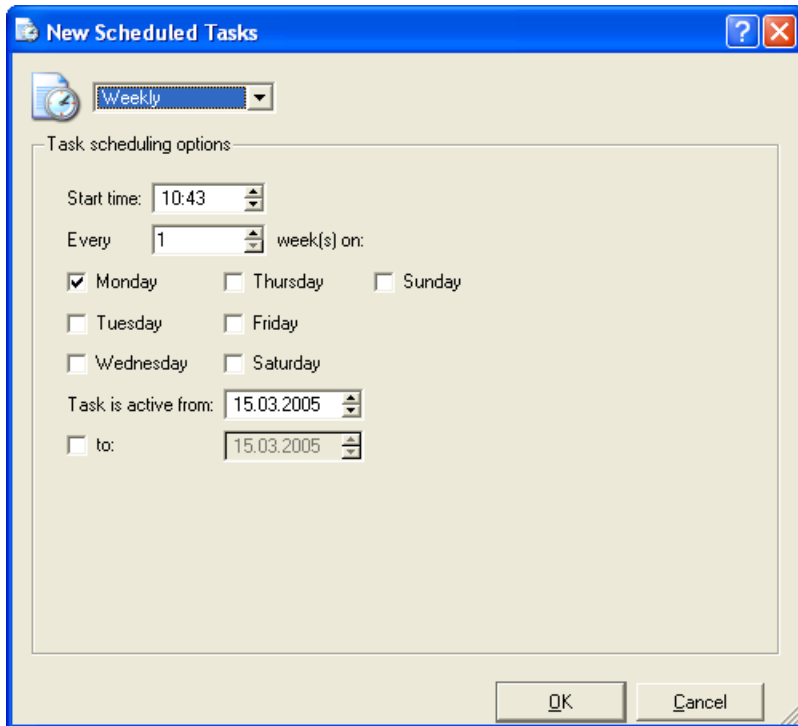


The screenshot shows a Windows-style dialog box titled "New Scheduled Tasks". At the top left is a folder icon and a dropdown menu set to "Daily". Below this is a section titled "Task scheduling options" which contains several fields: "Start time:" with the value "10:43", "Every" with the value "1" followed by "day(s)", "Task is active from:" with the date "15.03.2005", and a checkbox labeled "to:" which is checked, followed by the date "15.03.2005". At the bottom right are "OK" and "Cancel" buttons.

If the **Weekly** variant was chosen then the low section will contain the following form fields:

- the time when the task starts (the “*Start time*” field, where control buttons on the right side of the field for editing the value);
- a period during which the task will perform (the “*Every*” field; the control buttons are available for editing too);
- the date when the task starts (the “*Task is active from*” item);
- the date when the task finishes its work (the ticked “*to*” checkbox activates the corresponding field for this date).

The special set of checkboxes with subscribed days of week gives you a possibility to set concrete days when the task starts. You can select some days of the week, not only one.



The screenshot shows the 'New Scheduled Tasks' dialog box. At the top, there's a blue title bar with a question mark icon and a close button. Below the title bar, there's a tab labeled 'Weekly'. The main area is titled 'Task scheduling options'. It contains the following fields and controls:

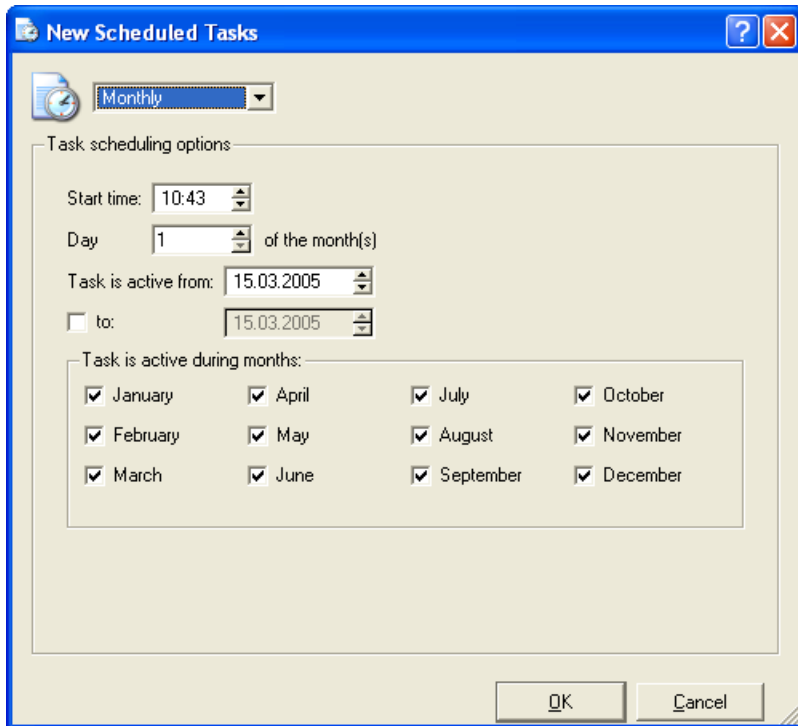
- 'Start time': A text box with '10:43' and up/down arrows.
- 'Every': A text box with '1' and up/down arrows, followed by 'week(s) on:'.
- Days of the week: Checkboxes for Monday (checked), Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday.
- 'Task is active from': A date picker showing '15.03.2005'.
- 'to:': A checkbox followed by a date picker showing '15.03.2005'.
- At the bottom: 'OK' and 'Cancel' buttons.

If the **Monthly** variant was chosen then the low section will contain the following form fields:

- the time when the task starts (the “*Start time*” field, where control buttons on the right side of the field for editing the value);
- a period during which the task will perform (the “*Every*” field; the control buttons are available for editing too);
- the date when the task starts (the “*Task is active from*” item);
- the date when the task finishes its work (the ticked “*to*” checkbox activates the corresponding field for this date).

The special set of checkboxes with subscribed names of months gives a possibility to set concrete months when the task starts so the date of starting will be defined by the field “Day” and the pointed months. For example, if you set “2” in the field “Day” and then point January, February and March then the program will start the task on the 2<sup>nd</sup> January, the 2<sup>nd</sup> February and on the 2<sup>nd</sup> March.





### 3.5.3 Scheduled Tasks





In order to edit a task schedule that has been already created the user should choose the following item in the main menu:

**General > Scheduled tasks...**

By this action the task scheduler starts. Here one can edit schedules of the program tasks. Tasks are listed at the left section of the dialog window. Each list item contains a name of a script where all scheduled actions were recorded with use of the [Paragon Scripting Language](#).

#### Operations for scheduled tasks

The scheduler has its tool menu with the most frequently used tools such as:

	start a task
	stop a task
	edit a task
	delete a task

These tools will be applied to a task that the user selects on the task list.

The “Start a task” tool forces the program to start the task execution immediately. But the user can stop the execution by the “Stop a task” button.



Remember, an interruption of some operations leads to the irrevocable corruption of a processed partition

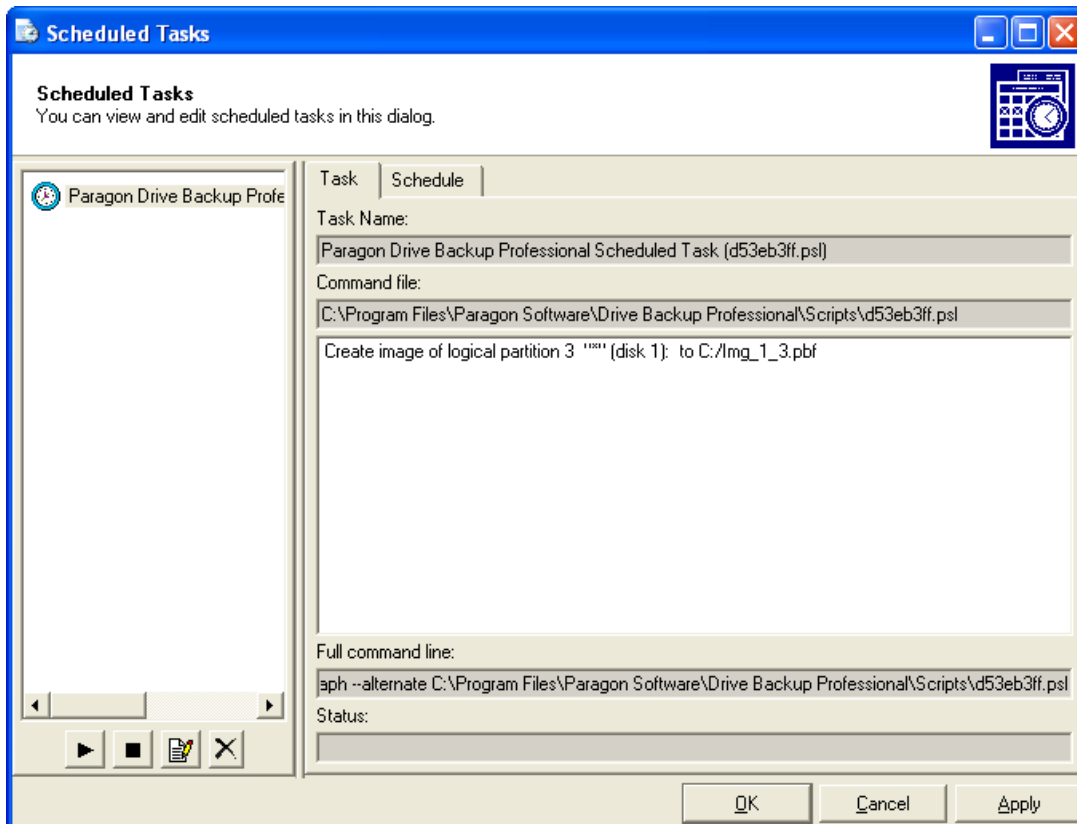
The “Edit a task” tool is worthy of special notice. In this case the standard tool for editing of textual files starts (for example “Notepad” in the Windows). You can edit any command of scheduled operations in your script as a usual text. Scripts use the Paragon Scripting Language for the commands description.

The “Delete a task” tool gives the possibility to delete old or incorrect formulated tasks from the tasks list.

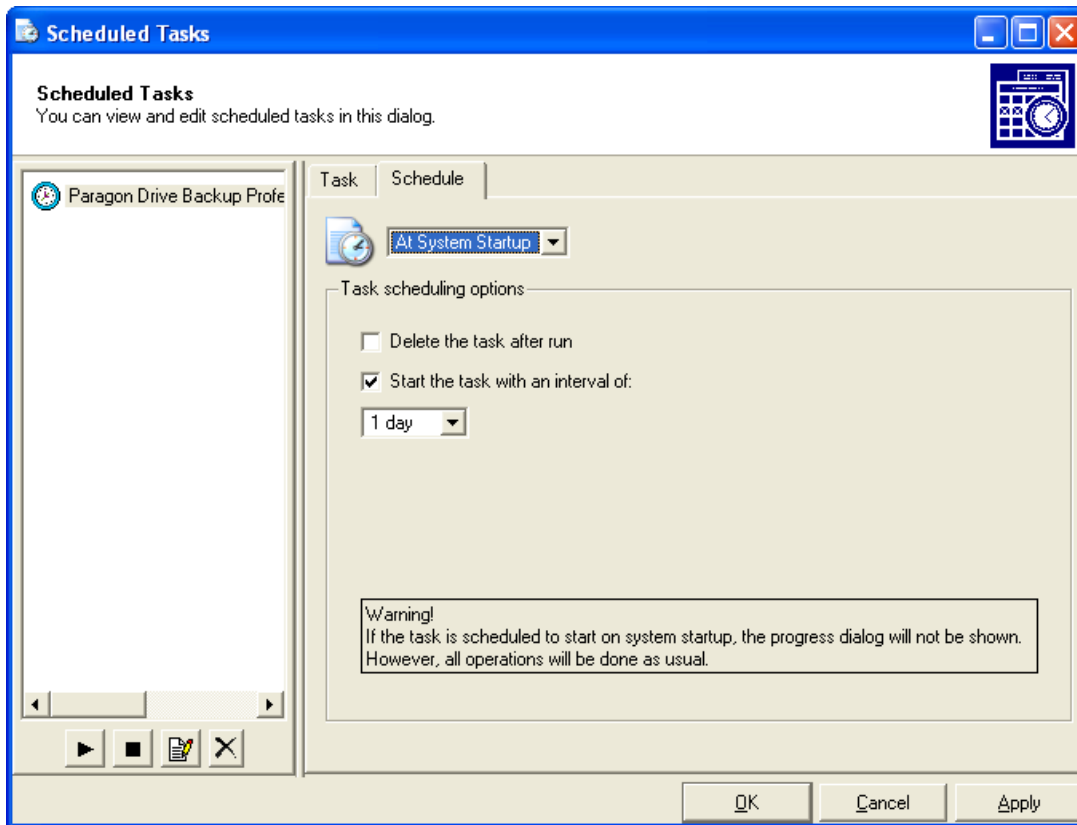
## How to change a task schedule

There are two tabs on the right side of the “Scheduled tasks” window:

- Task
- Schedule



The “**Task**” tab displays command line of the task selected on the List and its short description. It helps you easily orient in the task list and identify what kind of actions will be performed during an operation.



The “**Schedule**” tab displays the periodicity of the task starting:

- a type of schedule (daily, weekly, monthly or by a special event for example such as the system starts),
- start time,
- start date,
- end date (if it is necessary)
- and the period of the task execution (by the day).

All these parameters are defined by creating a new task schedule and were described in the [A new task schedule](#) chapter.

The scheduling of the program work time gives you a chance to use the program as a sort of robot, which perform your tasks automatically. You should just formulate, describe your task and then control the program job from time to time.

## 4 Hard Disk Management

This chapter describes how to proceed with the most frequent partitioning operations by using the program. But first it is recommended to familiarize oneself with the [Settings overview](#).

### 4.1 Backup Partitions

This chapter explains how to make backup images of separate partitions on local and network drives, unmounted partitions and removable media under various conditions.

#### 4.1.1 Overview

*Backup* is the primary function of the program. One can backup partitions having important data and system partitions to protect oneself from downtime in case of system malfunction. The partition can be completely restored within few minutes from the backup image.

The backup image includes not only contents of all files but also *file system metadata*. In that way the program keeps all information associated with files: the exact structure of directories, location of files on the disk, security information, access quotas and so on. After the restoration, the partition becomes in the pre-backup state.

Take into account that new data added to the partition after making the backup image, will be lost after the partition restoration.

The program allows backing up partitions of any type. The program backs up partitions of [known file system types](#) by using the [fast copying algorithm](#). All the other partitions are processed in the *sector-to-sector* copying mode. See the section [Processing partitions of unknown types](#) for more details.

The implementation of the backup function varies in some cases:

1. In Windows, the operation differs for *unlocked* and *locked* (system) partitions. To process locked partitions, the program needs to reboot the computer
2. In addition, the processing of *locked partitions* differs for Windows 95/98, Windows NT/2000/XP and Windows ME

##### 4.1.1.1 Where you can save backup images

The program allows saving backup images on the following storage media:

- *Mounted* local drives (i.e. partitions having the drive letter assigned)
- Mapped network drives (i.e. network resources with the drive letter assigned)
- Mounted removable media (ZIP, LS-120, MODD, ZIV etc)
- Mounted USB drives and Compact Flash cards (in Windows only)
- Any other media somehow mapped in the system and providing the read-write access
- Unmounted partitions formatted to NTFS, Ext2 and Ext3  
The program uses the built-in *Universal File system Driver* (UFSD) to access unmounted partitions on local hard disks
- CD-R(W) and DVD-R(W) drives (in Windows only). The equipment should be detectable and available in Windows  
This feature is explained in the chapter [Burn partition images on CD/DVD](#).

##### 4.1.1.2 Restrictions

The program is unable to place the backup image (or some of its volumes) on the partition that is being imaged. One should place the image on another partition, another hard disk, removable media or a mapped network drive.

### 4.1.2 Initiating the Operation

#### Step 1. Select the partition you want to backup

Select some existing partition you want to backup, in the Tree Layout panel, or on the Partitions Visualization Panel, or on the List of Partitions. Anyway, the partition will be highlighted in all three panels.

The function is not available for blocks of free space.

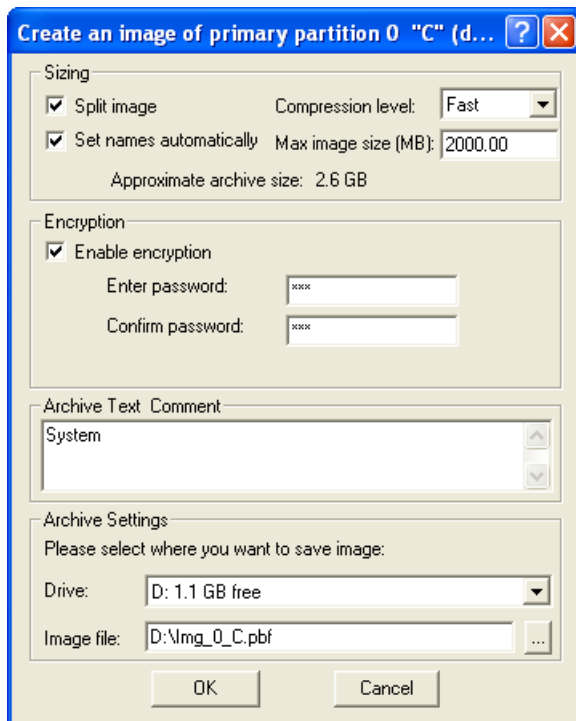
After selecting a partition, most buttons on the Main Toolbar will become enabled.

## Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Create an image of partition...**
- Call the *popup menu* for the selected partition in any of the layout panels (right click of the mouse button) then select the menu item:  
**Create an image of partition...**
- Press **Alt+B** keyboard combination
- Press **Backup** button on the Main Toolbar.

## Step 3. Assign properties of the backup image



Assign properties of the backup image (see the [Description of the Backup parameters](#) chapter).

Initially the program suggests some consistent values for all parameters. In most cases, you can just press **OK** button to confirm the operation.

## 4.1.3 Description of the Backup Parameters

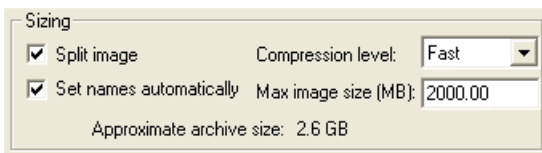
### 4.1.3.1 Common parameters of the Backup Hard Disk operation

Parameters of the backup operation are subdivided into five groups:

- *Split* settings manage the ability to make multivolume images and assign default volume size and the automatic generation of volume filenames
- *Encryption* settings manage the ability to cipher image contents and set the access password
- *Compression* settings manage an ability to squeeze image contents and the compression level
- *Archive label* allows to place custom notes to the image file for easy navigation through images
- *Location* settings allow selecting the most convenient storage to place the image to.

As a matter of fact, all Backup operations contain these parameters, with probably few minor differences.

#### 4.1.3.2 Split settings



The Sizing settings dialog box contains the following elements:

- Sizing** (Section Header)
- ☒ Split image
- Compression level: Fast (Dropdown menu)
- ☒ Set names automatically
- Max image size (MB): 2000.00 (Text input)
- Approximate archive size: 2.6 GB (Text label)

##### Split image

Activate the option to enable automatic breaking of large images in multiple volumes. Otherwise, the program will try to place entire image in a single file.

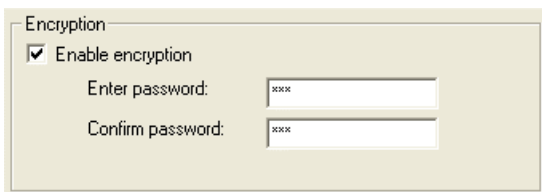
##### Max image size (MB)

This value defines the maximum size of each volume of the image being created. The default value is 600 Mb.

##### Set split file names automatically

When activated, this option forces the program to automatically generate filenames for next volumes of the image. Otherwise, the program will pause after filling each volume to ask the user about the new volume filename until completing the operation.

#### 4.1.3.3 Encryption settings



The Encryption settings dialog box contains the following elements:

- Encryption** (Section Header)
- ☒ Enable encryption
- Enter password: (Text input with masked characters)
- Confirm password: (Text input with masked characters)

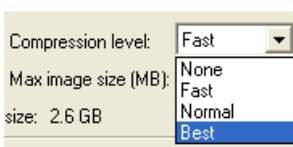
##### Enable encryption

Activate the option to enable ciphering image contents and protect accessing to the image by the password. Encryption reduces the overall operation performance. The deceleration percentage fundamentally depends on the hardware parameters.

##### Enter password & Confirm password

With enabling the encryption, provide the password to be used to access the image. **Note:** the program does not allow "empty" passwords.

#### 4.1.3.4 Compression settings



The Compression settings dialog box contains the following elements:

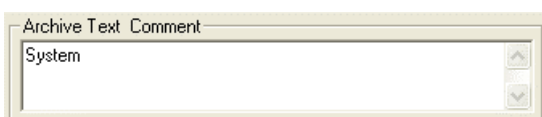
- Compression level: Fast (Dropdown menu)
- Max image size (MB): None (Text input)
- size: 2.6 GB (Text label)
- Fast (Text label)
- Normal (Text label)
- Best (Text label)

##### Compression level

Here you can change the compression level, in case you are willing to use the value other than the default one. The default compression level is defined in the program settings. Compression may significantly squeeze the backup image size, but it reduces the overall operation performance.

The greater level, the higher compression ratio, the slower performance. The deceleration percentage fundamentally depends on the hardware parameters. See [General settings](#) for more details.

#### 4.1.3.5 Archive label

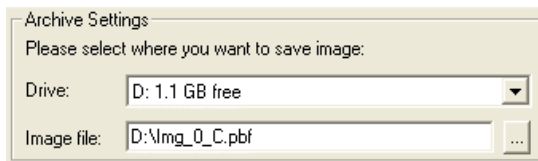


The Archive label dialog box contains the following elements:

- Archive Text Comment (Section Header)
- System (Text input)

You can associate a short descriptive text with the image. When getting [Archive Info](#) or [Restoring Partitions](#), you can inspect the archive label to ensure that you have selected the desired image.

#### 4.1.3.6 Image Location



#### 4.1.3.7 Image file

Here you can choose the desired filename of the backup image.

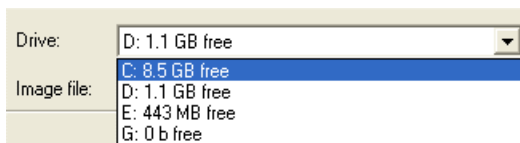
The program generates the default image filename by using the *disk number* and the *drive letter* (or the *partition number*) and suggests placing the image on the local drive with the maximum value of free space.

You can assign another filename, or select another drive or directory by pressing the **Browse** button. In addition, you can manually enter the desired file name and path to the **Image File** field.

#### 4.1.3.8 Drive

The pull-down list of available drives is very useful when selecting the non-default image location. The list contains:

- Mounted local volumes with their drive letter and the amount of available space
- Mapped network drives with their drive letter and the amount of available space
- Unmounted NTFS/Ext2 partitions with their location (*disk number / partition number*). The program accesses unmounted partitions by using the built-in *UFSD driver*



#### 4.1.3.9 The Browse button

Press the button to enter the advanced dialog "Save in file". With using this dialog, you are able to select any location on local and network drives, including unmounted local partitions. See the following section for the details.

#### 4.1.3.10 Selecting unmounted partitions as the target location for saving backup images

When creating the backup image of a partition or a hard disk, you are able to select unmounted local partitions of NTFS and Ext2/Ext3 type as the target location for saving the backup image.

1. Open the "Create an image of partition" dialog
2. Press the **Browse** button (at the bottom of the window) to open the advanced "Save in file" dialog
3. In the dialog, select the "Save in" pull-down list of volumes (it is located at the top of the window)
4. On the pull-down list, click on the item "Non-mounted partitions" (the item is located at the bottom of the list of mapped volumes)
5. The summary list of unmounted local partitions will be displayed.  
The list includes NTFS and Ext2/Ext3 partitions on all local hard disks. Every item contains the *drive number / partition number*, the file system type and the amount of available space.
6. Select an unmounted partition to proceed
7. Next, the program will browse the contents of the selected partition. You can open any directory on the partition being explored
8. Finally, click the "Save" button or press ENTER to select the target location of the backup image.

#### 4.1.4 Running the Backup Operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

In case a multivolume image is being created, the writing of each volume is treated as *suboperation*, and the program also displays information about the suboperation progress.

In case the user disables automatic filename generation, the program pauses after filling each volume and asks for the next volume filename.

By default, the program suggests an automatically generated filename.

## 4.1.5 Comments

### 4.1.5.1 Processing partitions of unknown types

The program allows backing up partitions of any type. By default, the program uses the [fast copying algorithm](#) for copying partitions of the [known file system types](#); other partitions are saved in the *sector-to-sector* copying mode. In the fast copying mode, the program requires the on-partition file system must be in the consistent state.

If the *sector-to-sector* copying mode is activated, the program copies all sectors of the selected partition regardless of the file system type and consistency.

### 4.1.5.2 How the Drive Backup generates filenames for multiple volumes

In fact, the *backup image* is a special database that can keep various types of information. Drive Backup can combine backup images in hierarchic structures. A compound image consists of multiple files including subordinate images. The primary volume of a backup image keeps information about the hierarchic structure and subordinate volumes.

The program supports both automatically generated and manually defined volume filenames. In case automatic generation of volume filenames, the program uses the following rules:

- The filename of the *primary volume* (i.e. the first file of the multivolume image) is actually one defined by the user in the *Backup Partition* dialog (or *Backup Disk* dialog). The default file extension of the primary volume is **.PBF**, but it can be changed by the user.
- By default, the Drive Backup generates the filename of the *primary volume*:

`Img_DDpp.PBF`

where:

- DD** - the two-figure hexadecimal number of the hard disk that contains the partition being archived
- pp** - the two-figure hexadecimal number of the partition being archived

- Filenames of all other volumes of the multivolume backup image meet the requirements of the so-called 8.3 *filename format* and have the following format:

`xxxxDDpp.Tnn`

where:

- xxxx** - the first four characters of the image name (4 characters from the filename of the primary volume)
- DD** - two-figure hexadecimal number of the hard disk that contains the partition being archived
- pp** - two-figure hexadecimal number of the partition being archived
- T** - the key of the partition type:
  - P** – primary partition
  - E** – Extended Partition
  - L** – logical Partition
- nn** - two-figure hexadecimal number of the volume (within the subordinate image)

- By default, the program places all the volumes in the same directory.

For example, the image named "MyLargeImage" will consist of the following files:



Single-volumic archive	Multi-volumic archive	
	Primary partition	Logical partition
MyLargeImage.PBF	MyLargeImage.PBF MyLa0002.P00 MyLa0002.P01 MyLa0002.P02 ...	MyLargeImage.PBF MyLa0007.L00 MyLa0007.L01 MyLa0007.L02 ...

Switch off the automatic filename generation to manually set filenames of volumes. In this case, you are able to place volumes in different directories, on different drives and even on different media. After filling the current volume, the program will pause and ask you for the next volume name.

#### 4.1.5.3 How to backup corrupted partitions

To backup a partition that has the corrupted file system, switch the program to the *sector-to-sector* mode (see the section [Fast copying algorithm](#)):

(menu) General > Settings... > (page) General > Copy all sectors 1:1

By default, the Drive Backup works in the *fast copying* mode. Before executing an operation, the program performs the file system check and accepts only valid file systems. In the *sector-to-sector* mode, the program skips the file system check and just copies all sectors "as is". The image obtained is much larger, but the program allows processing corrupted and unknown partitions.

#### 4.1.6 Backup System and Locked Partitions

The basic difference between *locked* and *unlocked* partitions is that contents of locked partitions are "volatile" and can unpredictably change during the lengthy backup operation (see [Glossary](#)). In this case, the backup image may become inconsistent.

Drive Backup cannot block write operations of other applications, so it tries to reboot the system to a single-tasking environment to eliminate the probability of mutual interference of programs.

- In Windows NT, 2000 and XP, the program can use either the HotBackup mechanism or the so-called "*startup Bluescreen*" phase (HotBackup can be used only if it is enabled [in the program backup settings](#))
- In Windows 95 and 98, the program uses the "true" DOS session as the single-tasking environment
- In Windows ME, the program requires to reboot from a bootable diskette or CD/DVD-ROM

The program uses different components in different versions of Windows. In addition, the processing of locked partitions differs in various Windows versions.

##### 4.1.6.1 Backup locked partitions in Windows NT, 2000 and XP

To process locked or system partitions in Windows NT, 2000 and XP, the program can use one of the two ways – either starts HotBackup mechanism or “startup Bluescreen” phase:

1. Before starting the operation, the program checks whether partition is locked or not
2. If the partition is locked and the HotBackup mechanism is enabled in [the program settings](#) then all the backup operation will be processed without rebooting of the system. If the HotBackup is disabled or the “Optional do HotBackup” mode was set then the program will ask to reboot the system. You should press the **OK** button to reboot the system and complete the operation or press the **Cancel** button to abort the operation

By default, the program pauses the execution until the user makes the choice.

3. The program silently schedules the *BlueScreen Component* to run at the next Windows startup and execute the required operation
4. Then the program reboots the computer
5. At the next system boot-up, the Bluescreen Component executes the operation in place of the Windows-based version. The BlueScreen Component will display the operation progress in the console-like style
6. In case of creating the multivolume backup image with the option **Set split file names automatically** switched off, the program asks the user for a filename of the next volume:

```
Get new filename of the file for subsequent writing.
(Type exit to cancel operation.)
D:\Img_1_Z.p01
```

7. You should choose one of the following actions:
  - Either press ENTER to confirm that you agree to proceed with the current filename.
  - Or change the filename to proceed with another filename.
  - Or clear the filename and type the word "exit" to abort the operation
8. By default, the Drive Backup suggests a new filename, but the user is able to change this value
9. After the BlueScreen Component completes the operation, the Windows session begins and the Windows-based version of the Drive Backup starts up.

#### 4.1.6.2 Limitations of the BlueScreen Component

There are some minor functionality limitations of the BlueScreen Component that come from the inaccessibility of some Windows services during the Startup Bluescreen phase:

- The current version of the BlueScreen Component provided with the Drive Backup interacts with the user in the console-like style. Such useful functions like *Browse disk contents* and *Search files* are not available. If the program asks the user to enter a filename, the user must enter a filename "blindly"
- The BlueScreen Component allows entering only English letters
- Only the *BackSpace* editing key is supported.
- During the *Startup Bluescreen* phase, the network redirector is not functioning. For this reason, do not locate backup images on mapped network drives because their contents will be unavailable at the *Startup Bluescreen* phase.

The detailed information about the interaction between Windows-based and Bluescreen components of the Drive Backup is discussed in the *Technician Manual*.

#### 4.1.6.3 Backup locked partitions in Windows 95 and 98

Windows 95 and 98 include the limited version of the MS-DOS 7. The "true" DOS environment is available after booting to the DOS session (do not confuse with the *DOS prompt* in the Windows session).

1. Before starting the operation, the program checks whether partition is locked or not
2. If the partition appears to be locked, the program asks to reboot the system. Press the **OK** button to reboot the system and complete the operation, press the **Cancel** button to abort the operation
3. The application passes silently the task to the DOS-based version of the program. Then the Windows-based application just runs the DOS-based program
4. The DOS-based version of the program is configured (through the **.PIF**-file) to run in the true DOS session. So that Windows reboots to the DOS session
5. The DOS-based program starts working in the unattended mode displaying the operation progress and statistics
6. On completion of the operation, the program reboots the computer.

#### 4.1.6.4 Limitations of the DOS-based version in the unattended mode

The DOS-based version of program can work either in the interactive mode or in the batch mode. In both cases, it provides full functionality with the only exception of burning images on recordable CD/DVD discs.

There are some minor functionality limitations of the DOS-based version of program while working in the unattended mode. These limitations come mostly from the unavailability of some services in the DOS environment that are available in Windows:

- Avoid using network mapped drives for placing backup images of locked partitions.  
The thing is that usually the DOS environment is not configured for supporting network, so that network resources become unavailable in the DOS session.  
Otherwise, you should manually install and correctly configure the NIC drivers and the Network Client software for DOS
- Do not use USB devices (ZIV, Flash cards etc.) for holding backup images of locked partitions  
DOS does not support USB (and there are no USB drivers for DOS on the market). So that after rebooting to DOS all USB devices become unavailable
- In the unattended mode, the program unconditionally aborts the operation in case bad sectors are detected, or the image file is missed, etc. To get user-friendly behavior of the program, run the program in the interactive mode.
- Take care of providing the DOS session with drivers for CD/DVD drives, SCSI and RAID controllers
- Remember that drive letters associated with particular partitions may differ for DOS and Windows sessions
- Remember that DOS may fail to access large partitions. For example, MS-DOS does not work with partitions that are larger than 8Gb.

The detailed information about interaction between Windows-based and DOS-based components of the Drive Backup is discussed in the *Technician Manual*.

#### 4.1.6.5 Backup locked partitions in Windows ME

The diskette-based version of the program can work either in the interactive mode or in the batch mode. In both cases, it provides full functionality with the only exception of burning images on recordable CD/DVD discs.

The procedure of processing locked partitions and hard disks is described in the section [Working with locked partitions/disks in Windows ME](#).

There are some functionality limitations of the diskette-based version of the program. These limitations coincide with those of the DOS-based version working in the unattended mode (see [Limitations of the DOS-based version in the unattended mode](#)). These limitations come mostly from the unavailability of some services in the DOS environment that are available in Windows:

- Avoid using network mapped drives for placing backup images of locked partitions
- Do not use USB devices (ZIV, Flash cards etc.) for holding backup images of locked partitions
- In the unattended mode, the program unconditionally aborts the operation in case bad sectors are detected or the image file is missed, etc. To get user-friendly behavior of the Drive Backup, run the program in the interactive mode
- The diskette-based version may not work with SCSI and RAID controllers
- Take care of providing the DOS session with drivers for CD/DVD drives. The Recovery Media Builder utility simplifies the process of configuring the diskette for supporting CD & DVD drives
- Remember that the drive letters associated with particular partitions may differ for DOS and Windows sessions
- Remember that DOS may fail to access large partitions. For instance, MS-DOS does not work with partitions that are larger than 8Gb
- Your computer must have the ability to boot from floppy

The detailed information about interaction between Windows-based and the diskette-based versions of the program is discussed in the *Technician Manual*.

The preferred solution is to use the Paragon Recovery CD instead of using the bootable diskette.

#### 4.1.7 Creating Incremental Image

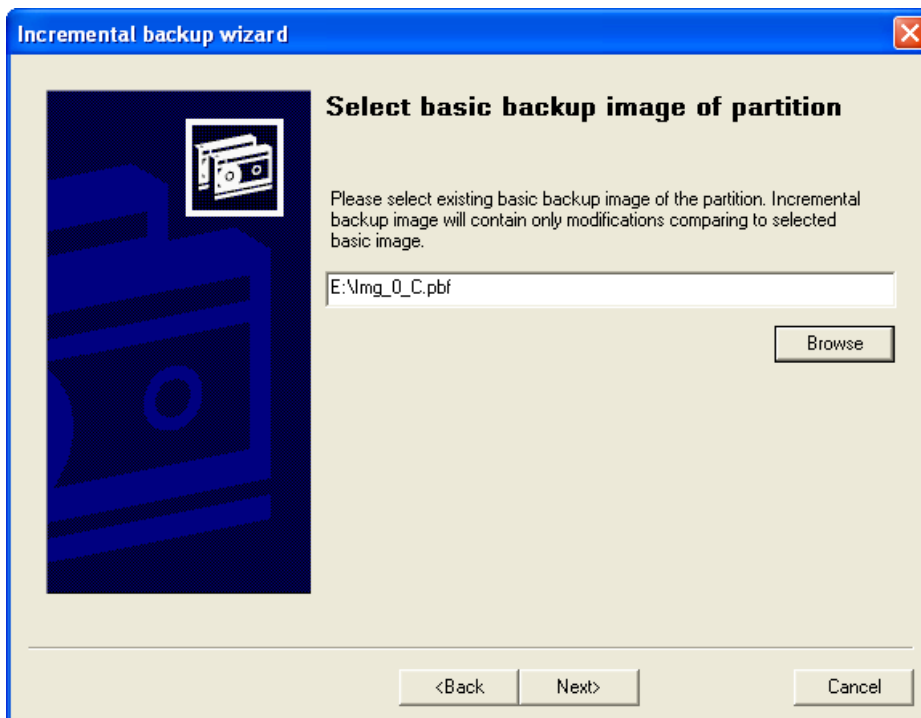
In order to update a backup image you need to select in the main menu:

**Wizards > Create Incremental Image...**

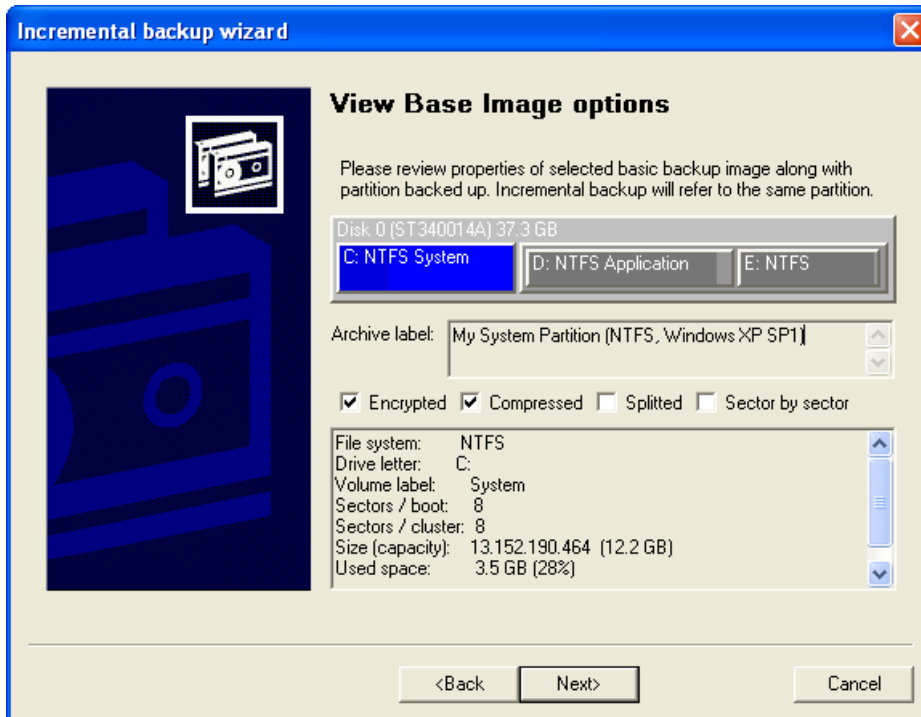
The *Incremental Backup Wizard* opens its first page. This page informs the user of the operation features. Read it carefully and then click the “Next” button to continue.



The second page of the Wizard proposes to define which archive will be updated. The user can type the full path to a backup image on the hard disk or use the standard file browser for that goal. To start the file browser, click the “Browse” button. After the archive is defined click the “Next” button to continue.



The third page allows acquainting with some parameters of the base archive (the archive that will be updated during the operation):



### Archived partition layout

Here, at the top of the window the archived partition layout is displayed as the partition place in the general structure of the hard disk. It contains the information about the file system type, partition size, drive letter assigned to the partition and also about used space capacity.

### Archive label

If a label is assigned to the backup image then it will be displayed at this textual field.

### Encrypted

If the option is activated the backup image data is protected by the password. The user will need to enter the password during the operation.

### Compressed

If the option is activated the backup image data are compressed. The user will need to take it into account while setting up the incremental image options.

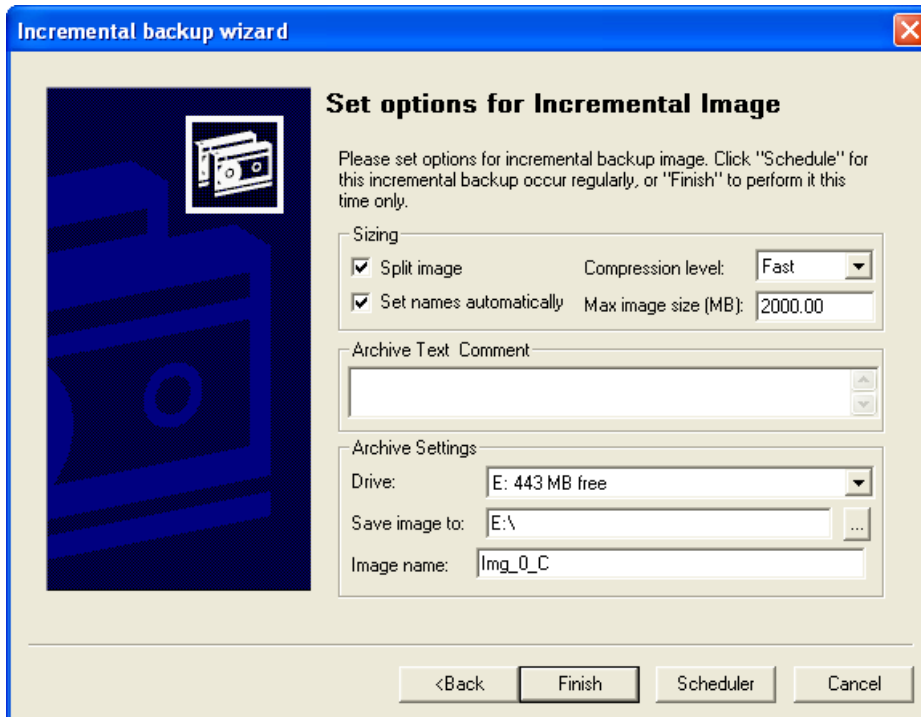
### Split

If the option is activated the backup archive has two or more files.

### Sector by sector

The state of this checkbox displays whether the sector-to-sector copying mode was used during the backup operation or not.

Acquainting with the base archive parameters the user can go to the next page of the Wizard. Click on the Next button for that.



The fourth page allows setting up parameters of the future incremental image. The page has four sections:

### Sizing

This section defines the size of the updated archive. Namely the user can set the following parameters:

- Split image (the incremental image will be split to some files)
- Set names automatically (the program will assign archive file names automatically)
- Compression level (this parameter allows essentially decreasing the size of the archive)
- Max image size [Mb] (this parameter is used while splitting of the backup image – archive files will not exceed the stated value).

### Archive label

Here the user can assign a label to the archive. Sometimes it may help to identify backup images.

### Archive Settings

Locate the new archive on the PC (select a drive letter and directory where the backup file will be placed, then type the archive file name).

When all the described above parameters are defined there will be two ways to proceed:

- Press the “*Finish*” button to start the incremental backup operation immediately. During the operation the program will compare the partition state saved in the base archive with the current state of the same partition. New archive will contain only the difference between the two states, i.e. only those changes, which have been made since the base archive creation.

Please note that the Incremental Backup execution usually takes more time than that of the ordinary backup.

- Press the “*Schedule*” button to place this operation to the program scheduler list. In this case the user should define when the operation starts. The integrated scheduler enables to postpone the archiving for more convenient time or to force the program perform it periodically. The user can read the [Scheduling tasks](#) chapter for more information about the program scheduler.

## 4.2 Burn Partition Images on CD/DVD

This chapter explains how to burn backup images of separate partitions directly on recordable and rewritable CD and DVD discs under the Windows environment.

### 4.2.1 Overview

The program supports *burning* backup images to writable CD/DVD media. This feature is available only in the Windows environment. The function is isolated from the most generic *Backup* function because of some limitations.

In Windows 95, 98 and ME this function is applicable to unlocked partitions only: Drive Backup reboots into DOS to process locked partitions, but the burning hardware is generally unavailable in the DOS environment.

In Windows NT, 2000 and XP the Drive Backup is able to burn images of both unlocked and locked partitions. In case of processing locked partitions, the Drive Backup reboots the system and uses the BlueScreen Component to complete the operation.

#### 4.2.1.1 Media types and CD/DVD drives that are supported in the Burn image function

Drive Backup uses the WinASPI service to access CD burning devices. For this reason the program can successfully use CD/DVD drives that are supported by the operating system. The program supports any media types that are supported by the used CD/DVD burning hardware.

The advantage of the program is that it can use both mapped and unmapped workable CD/DVD burning hardware.

Note that the program requires blank recordable discs, it does not support Multisession CD/DVD, it places one volume per CD and then closes the session so that the disc cannot be added.

### 4.2.2 Initiating the Operation

The actions you should make are very similar to the ones required for initiating the *Backup partition* operation. See the chapter [Initiating the backup operation](#) for detailed explanation of every step.

#### Step 1. Select a partition you want to store on CD/DVD

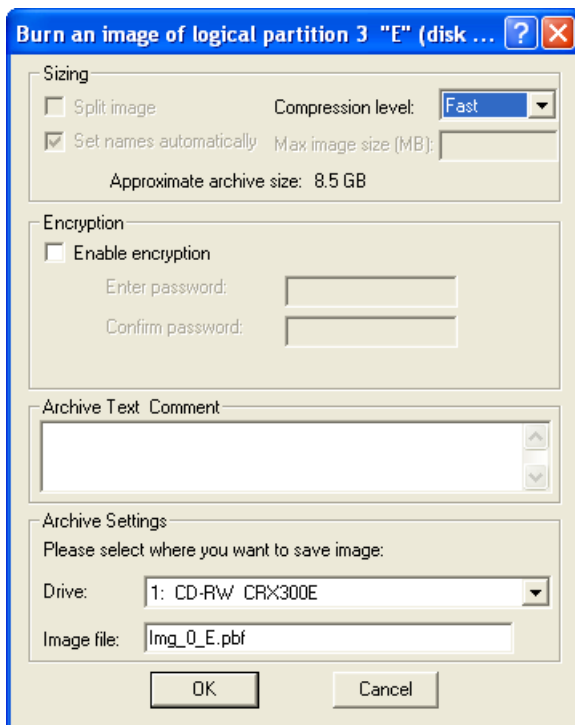
Select some partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions. Do not select *blocks of free space* because the function is disabled for blocks of free space.

#### Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Burn an image of partition to CD**
- call the *popup menu* for the selected partition and select the item:  
**Burn an image of partition to CD**
- Press the **Burn** button on the Main Toolbar.

### Step 3. Define parameters of the operation



Assign properties of the Burn image operation. (see the [Description of the Burn Image parameters](#) chapter)

Initially the program suggests some consistent values for all parameters. In most cases, you just need to press the **OK** button to confirm the operation.

#### 4.2.3 Description of the Burn Image Parameters

Parameters of the Burn Image operation are similar to the parameters of the backup operation (see [Description of the Backup parameters](#)). There are only two differences:

- The image should be located on some CD/DVD burning device
- The user cannot change the splitting parameters.

##### 4.2.3.1 Common parameters of the Burn Image operation

Parameters of the backup operation are subdivided into four groups:

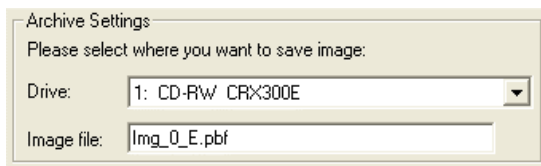
- *Encryption* settings manage the ability to cipher image contents and set the access password
- *Compression* settings manage an ability to squeeze image contents and the compression level
- *Archive label* enables to place custom notes to the image file for easy navigation through images
- *Location* settings enable to select a CD/DVD writable drive that will be used for burning the image.

Generally, parameters for this operation coincide with those of the Backup Partition operation. See the chapter [Description of the Backup parameters](#) for some detailed explanation.

Encryption settings	
<b>Enable encryption</b>	Activate the option to enable ciphering image contents and protect accessing the image by the password
<b>Enter password</b> <b>Confirm password</b>	With enabling the encryption, enter the password to be used to access the image. <b>Note:</b> the program does not allow "empty" passwords.
Compression settings	
<b>Compression level</b>	Change the compression level, in case you are willing to use value other than the default one.
Archive label	
<b>Archive label</b>	You can associate a short descriptive text with the image. It may be helpful when selecting backup images.



#### 4.2.3.2 Image Location



#### Image file

Here you can assign the desired filename of the backup image.

The program generates the default image filename by using the *disk number* and the *drive letter* (or the *partition number*) and suggests burning the image with the first registered CD/DVD burning device on the List.

#### Drive

You can select any available CD and DVD writable drive from the pull-down list of CD/DVD burners.

Drive Backup can use any CD burner that is accessible through the WinASPI service, including devices that have no drive letters assigned. The program lists CD/DVD devices by their model names.

#### 4.2.4 Running the Burn Image Operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

In case the user does not allow [automatic filename generation](#), the program pauses after completing a volume and asks the user for the next volume filename.

By default, the Drive Backup suggests automatically generated filename, but the user can customize this value. See the chapter [How Drive Backup generates filenames for multiple volumes](#) for more details.

1. At the beginning of the real execution of the operation, the Drive Backup roughly evaluates the total image size and the amount of recordable discs required to store the image. The resume is displayed in the *report console* that is located in the middle part of the **Progress Information** window
2. Next, the program starts the burning process.  
If no media is inserted in the CD/DVD drive, the program asks for inserting new empty recordable disk
3. Every media being inserted are tested for the cleanness.  
The non-empty once-recordable discs will be culled.  
The program allows to *erase* rewritable discs (CD/DVD-RW) that are non-empty:
  - The *Quick Erase* assumes only the deletion of the existing formatting structures of the rewritable disc. The operation takes few minutes.
  - The *Full Erase* assumes destroying and filling with zeroes the entire contents of the rewritable disc. The operation may take much time (dozens of minutes).

During the real execution of the operation, the **Operation Progress** window appears. The program displays the detailed statistics of the operation:

- The currently active operation is highlighted
- Elapsed and estimated remaining time for completion of the operation is displayed
- Average read speed, write speed, summarized speed of the operation is displayed
- The complete information about suboperations progress is displayed.

#### 4.2.5 Comments

The *BlueScreen Component* of the program that is used in Windows NT, 2000 and XP supports the *Burn Image* operation. The operation is described in the [Burn Image of locked and system partitions](#) chapter.

##### 4.2.5.1 Limitations of the built-in CD/DVD burning module

- Note that the media you use are to be blank (empty):
  - The recordable discs (CD-R, DVD-R, DVD+R) must be blank
  - The rewritable discs (CD-RW, DVD+RW) that are not blank, will be erased before use

- Multisession CD/DVD are not supported
- During the image burning, the program creates the single-session, ISO-compliant disc (i.e. *Data CD* or *Data DVD*). The program makes the multivolume backup image and places volumes on CDs, one file per disc. Every volume occupies the whole disc, the only exception is the last volume
- The current release of the program does not allow controlling the *write speed* of the CD/DVD burning drive. The program always uses the maximum speed available for the pair "CD burner – recordable disc"
- The current release of the program requires 64Mb of additional physical memory to initiate the CD-burner buffer. Totally, the program may require ~70Mb or more of physical memory during the *Burn Image* operation.

#### 4.2.6 Burn Image of Locked and System Partitions

Generally, the program needs to reboot the system in the single-tasking mode to complete the operation of *Burning an Image* of locked partition. As it is mentioned in the [Executing operations](#) chapter, the program uses the *Startup Bluescreen* service in Windows NT, 2000 and XP. In Windows 95 and 98, the Drive Backup uses the "true" DOS session. In Windows ME, the program requires to reboot the computer from the DOS bootable diskette.

Unfortunately, the program is unable to use CD/DVD burning hardware in DOS. For this reason, you are unable to use the *Burn Image* function on locked and system partitions in Windows 95, 98 and ME.

##### 4.2.6.1 Burn Image of a locked partition in Windows NT, 2000 and XP

In Windows NT, 2000 and XP, the program uses the so-called "*startup Bluescreen*" service to operate locked partitions:

1. Before starting the operation, the program checks whether partition is locked or not
2. If the partition appears to be locked, the program asks to reboot the system. Press the **OK** button to reboot the system and complete the operation, press the **Cancel** button to abort the operation

By default the program pauses the execution until the user makes the choice.

3. The program silently schedules the *BlueScreen Component* to run at the next Windows startup and to execute the required operation
4. Then the program reboots the computer
5. At the next system boot-up, the BlueScreen Component executes the operation in place of the Windows-based version. The BlueScreen Component will display the operation progress in the console-like style
6. If there is no disc inserted, the program displays the following message in the output console:

```
There is no media in CD drive. Insert new disk.
(Type exit to cancel operation.)
```

7. You should choose one of the following actions:
  - Insert a new recordable disc in the CD/DVD drive and press ENTER
  - Or type the word "exit" to abort the operation
8. Then, the Drive Backup tests the disc for emptiness. In case of using rewritable media, the program suggests either to change media or erase existing data:

```
Rewritable media is not empty. Press Enter to try new media.
Type ERASE to erase media. Type EXIT to cancel operation.
```

9. You should choose one of the following actions:
  - Exchange the disc with a new one and press ENTER to precede the operation
  - Or type the word "erase" to erase the inserted media and continue the operation
  - Or type the word "exit" to abort the operation

**Note:** do not try to type in *UPPERCASE*. In fact the user is able to type in *lowercase* only, see the section [Limitations of the BlueScreen Component](#) for more details.

Text editing abilities in the BlueScreen Component:

- Only printable characters and the *BackSpace* key are acceptable
- Other keys (including *CAPSLOCK*, *Ctrl*, *Alt*, *Shift*) are unacceptable
- Only English letters are available
- All alpha letters are entered in the *lowercase*

After the BlueScreen Component completes the operation, the Windows session begins and the Windows-based version of the program starts up.

## 4.3 Backup Extended Partitions on CD/DVD

### 4.3.1 Overview

The Extended Partition is actually the container of the so-called *Logical Partitions* (see [Glossary](#) for more details). The fundamental feature of the Extended Partition is that it contains many partitions inside.

The program provides the ability to backup contents of all *logical partitions* within the single operation. This operation looks like an ordinary *backup operation* that is implemented to the Extended Partition.

Similarly, there is the ability to burn the integral backup image of all logical partitions within the single *Burn image* operation that is implemented to the Extended Partition.

Take into account that any changes in the layout of the Extended Partition and new data added to any logical partition after making the backup image, will be lost after the restoration of the Extended Partition.

The program is unable to place the image of the Extended Partition (or some of its volumes) on logical partitions that belong to the Extended Partition being imaged. One should place the image on a primary partition, on another hard disk, or on removable media.

The main and only peculiar property of the Extended Partition image is that *it always consists of multiple files*. This feature affects on the real execution of the operations (see the section [Running the operations](#)).

In case automatic generating of volume filenames, the Drive Backup uses *filename generating rules* that are described in the section [How Drive Backup generates filenames for multiple volumes](#).

### 4.3.2 Initiating Operations

As a matter of fact, the operation of *creating the backup image* of the Extended Partition is the same as with ordinary partitions. Similarly, the operation of *burning the backup image* of the Extended Partition to CD/DVD recordable discs is the same as with ordinary partitions.

#### 4.3.2.1 How to Backup the Extended Partition

The actions the user should make to initiate the operation are described in the chapter [Initiating the backup operation](#).

The actions you should make are very similar to ones required for initiating the *Backup partition* operation.

#### Step 1. Select the Extended Partition

Select the Extended Partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.

#### Step 2. Select the operation to perform

Select in the main menu: **Partition > Create an image of partition...**

Alternative ways are:

- Call the *popup menu* for the selected partition in any of layout panels (right click of the mouse button) then select the menu item "**Create an image of partition...**"
- Press **Alt+B** keyboard combination
- Press **Backup** button on the Main Toolbar.

#### Step 3. Define parameters of the operation

The parameters of the operation are described in the section [Description of the Backup parameters](#).

#### Brief description of parameters:

Parameters of the backup operation are subdivided in four groups:

- *Encryption* settings manage the ability to cipher image contents and set the access password
- *Compression* settings manage an ability to squeeze image contents and the compression level
- *Archive label* allows to place custom notes to the image file for easy navigation through images
- *Location* settings allow selecting the CD/DVD writable drive that will be used for burning the image.

Generally, the parameters for this operation coincide with the same parameters of the Backup Partition operation.

#### 4.3.2.2 How to Burn image of the Extended Partition

The actions the user should make to initiate the operation are described in the chapter [Initiating the Image Burning operation](#).

##### Brief description of actions:

##### Step 1. Select the Extended Partition

Select the Extended Partition in the *Tree Layout*, on the Partitions Visualization Panel or in the *Partitions List*.

##### Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Burn an image of partition to CD**
- call the *popup menu* for the selected partition and select the item:  
**Burn an image of partition to CD**
- Press **Burn** button on the Main Toolbar.

##### Step 3. Define parameters of the operation

The parameters of the operation are described in the section [Description of the Burn Image parameters](#).

##### Brief description of parameters:

Parameters of the backup operation are subdivided in four groups:

- *Encryption* settings manage the ability to cipher image contents and set the access password
- *Compression* settings manage an ability to squeeze image contents and the compression level
- *Archive label* allows to place custom notes to the image file for easy navigation through images
- *Location* settings allow to select the CD/DVD writable drive that will be used for burning the image.

#### 4.3.3 Running the Operations

The real execution of referring to above operations on the Extended Partition is similar to appropriate operations with ordinary partitions (see the sections [Running the backup operation](#) and [Running the Burn Image operation](#) for more details).

##### 4.3.3.1 The Extended Partition image is the multivolume one

The difference between images of ordinary partition and images of the Extended Partition is that the program always creates the multivolume image for the Extended Partition. The section [How Drive Backup generates filenames for multiple volumes](#) describes the naming rules that Drive Backup uses for auto-generated filenames.

In case of execution the operation *Burn Image* of the Extended Partition, the program always places the image on several discs, In particular, the most first recordable disc will contain just the primary volume of the image that in fact takes only several megabytes.

##### 4.3.3.2 About processing locked Extended Partitions

The Extended Partition itself does contain neither files nor directories that can be used by an operating system or applications. Still, if some of logical partitions appear locked ones, the program is unable to process the Extended Partition without rebooting to the single-tasking environment.

When performing some operation on the entire Extended Partition, Drive Backup checks the lock state of all logical partitions. In case of some logical partition is locked, the program reboots in the appropriate single-tasking environment and executes the operation (see [Executing operations](#)).

The details of performance of locked partitions are described in the chapter [Backup system and locked partitions](#).

#### 4.3.4 Comments

##### 4.3.4.1 How the program works with logical partitions of different types

The Extended Partition may contain several logical partitions having different file system types. The program allows creating an image of such "non-uniform" Extended Partition without any problems.

If the program works in the [fast copying mode](#), it independently processes each logical partition. It analyzes the file system type and automatically switches to the appropriate copying mode. Remember that [known file systems](#) are copied in the *fast copying* mode while the *unknown file systems* are processed in the *sector-to-sector copying* mode.

If the program works in the sector-to-sector copying mode, it independently processes each logical partition, too. The only difference is that Drive Backup saves all sectors of every existing partition.

In any of copying modes, Drive Backup does not save blocks of unpartitioned space within the Extended Partition so that the program will not save deleted logical partitions.

### 4.4 Backup Hard Disks

This chapter explains how to make backup images of entire hard disks on local and network drives, unmounted partitions and removable media under various conditions.

#### 4.4.1 Overview

Drive Backup provides the ability to backup not only separate partitions but also entire hard disks.

Generally, each hard disk contains the controlling records of a partitioning scheme, which is located on the disk (see [Glossary](#)), and the bootstrap code in addition to on-disk partitions. Each of mentioned above disk components is important to keep the availability of on-disk data.

Drive Backup uses knowledge about the internal structure of hard disks in order to make workable images of all disk contents. In case of disk malfunction or corruption of data, the backup image of the hard disk can be used for complete restoration of the system workability.

Take into account that any changes in the layout of the hard disk and new data added to any on-disk partition after the making the backup image, will be lost after the disk restoration.

Locked hard disks are ones having locked partitions.

Drive Backup allows backup all the used contents of the hard disk or only most important parts of the disk that contain the information about the disk layout.

The main and only peculiar property of disk image is that it always consists of multiple files. This feature affects on the real execution of the operations.

In case automatic generating of volume filenames, Drive Backup uses *filename generating rules* that are described in the section [How Drive Backup generates filenames for multiple volumes](#).

#### 4.4.2 Initiating the Operation

As the matter of fact, the operation of *creating the backup image* of the hard disk is similar to the operation of making the images of partitions.

The actions the user should make to initiate the operation are described in the chapter [Initiating the backup operation](#).

The actions you should make are very similar to ones required for initiating the *Backup partition* operation.

##### Brief description of actions:

##### Step 1. Select the hard disk you want to backup

There are two variants:

- Select the hard disk in the Tree Layout panel or on the Partitions Visualization Panel
- Or select any partition, which belongs to the hard disk of interest

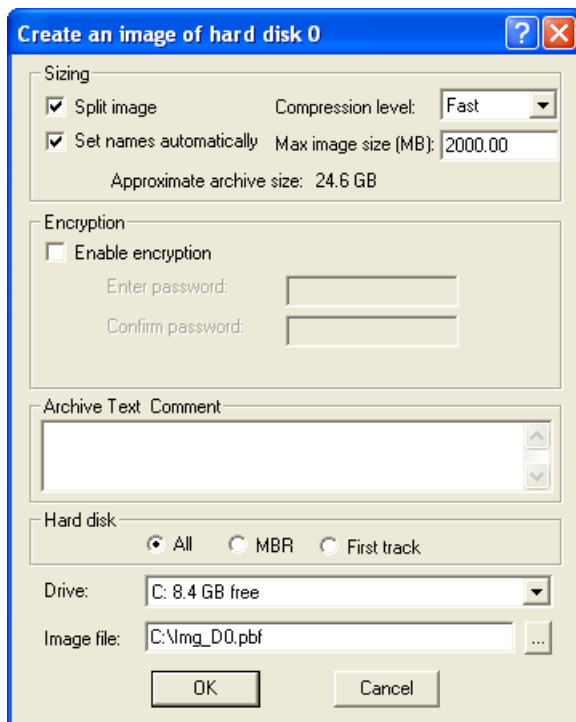
## Step 2. Select the operation to perform

Alternatives:

- Select in the main menu:  
**Hard disk > Create an image of hard disk...**
- In case the hard disk is selected, Call the *popup menu* for the selected partition in any of layout panels (right click of the mouse button)  
then select the menu item **Create an image of hard disk...**
- Press **Ctrl+B** keyboard combination
- Press **Backup** button on the Main Toolbar.

## Step 3. Assign properties of the backup image

Generally, the parameters of the operation are similar to the same parameters of the [Backup partitions](#) operation.



Assign properties of the backup image. You can control:

- archive splitting
- compression level
- encryption parameters
- archive description
- image location
- the part of hard disk contents to be saved.

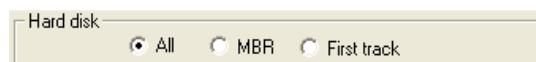
Initially the program suggests some consistent values for all parameters. In most cases, you just need to press **OK** button to confirm the operation.

### 4.4.3 Description of Parameters

Parameters of the Backup the Hard Disk operation are similar to the parameters of the Backup the Partition operation (see [Description of the Backup parameters](#)). There are only differences:

- There is the ability to backup either all contents or just bootable structures of the disk.
- The image must be located either on another hard disk or on removable media.

#### 4.4.3.1 Hard disk section



Here one can select the part of the disk contents that will be placed to the backup image. Available alternatives are:

<b>MBR</b>	Drive Backup will store only the Master Boot Record (MBR) of the hard disk. MBR contains the important information about the disk layout.
<b>First track</b>	Drive Backup will store only the 0 <sup>th</sup> track of the hard disk. The 1 <sup>st</sup> track may contain the executable code of the used boot manager or the disk overlay software that is essential for correct accessing contents of your hard disk.
<b>All</b>	Drive Backup will store all used contents of the hard disk.

#### 4.4.4 Running the Backup of the Hard Disk

The real execution of the referring to above operation is similar to the backup operations with partitions.

After assigning all parameters to desired values press the **OK** button bottom the dialog **Burn an image of a partition**.

#### 4.4.5 Backup Locked Hard Disks

The locked hard disks are ones containing *locked partitions* within (see [Glossary](#)). In particular, the hard disk that contains the Windows system partition is the locked one. Drive Backup requires to reboot to the single-tasking environment to handle a locked partition or a locked hard disk:

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

At the beginning of the operation, Drive Backup checks the lock state of all on-disk partitions. In case any partition is locked, the program reboots in the appropriate single-tasking environment and executes the operation.

The performance of the *Backup of the Hard Disk* operation is similar to the *Backup of locked partitions* operation that is described in the chapter [Backup system and locked partitions](#).

#### 4.4.6 Comments

##### 4.4.6.1 Supported partitioning schemes

*Partitioning scheme* is generally the format of disk partitioning information (see [Glossary](#) for more details).

The current version of Drive Backup effectively supports only hard disks that use the *DOS partitioning scheme*. Still, the program can be configured to somehow support hard disks that contain other partitioning schemes.

Drive Backup uses the knowledge of the structure of the DOS partitioning scheme to recognize partitions and their parameters.

##### 4.4.6.2 How to make images of hard disks with unknown partitioning schemes

If Drive Backup works in the *sector-to-sector copying* mode, it saves all sectors to the image of the hard disk. The program bypasses the analysis of used partitioning scheme, file system types and file system consistency of all partitions. The use of the *Compression* function will reduce the image size.

How to backup hard disks with unknown partitioning schemes:

1. Switch the program to the *sector-to-sector copying* mode:  
**General > Settings > (page) General > Copy all sectors 1:1**
2. Initiate the *Backup Hard Disk* operation  
**Hard Disk > Create an image of hard disk...**



#### 4.4.6.3 Contents of the disk image

Drive Backup uses the knowledge of the structure of the DOS partitioning scheme to recognize partitions and their parameters. In case all contents are selected to be imaged, the program stores the entire 1<sup>st</sup> track of the hard disk, the complete information about the layout of all partitions and all contents of all partitions.

Partitions of unknown types are saved in the *sector-to-sector* copying mode. Partitions of the [known file system types](#) are stored in the fast copying mode.

With each partition, Drive Backup completely stores the bootable code (if exists), the structure of directories, contents of all files, information about files allocation, all file attributes including security information, encryption, compression and access quotas (if available).

## 4.5 Burn Hard Disk Images on CD/DVD

This chapter explains how to burn backup images of hard disks directly on recordable and rewritable CD and DVD discs in Windows environment.

### 4.5.1 Overview

Generally, this function is similar to the function [Burning partition images on CD/DVD](#). Drive Backup supports the *burning* backup images to writable CD/DVD media. This feature is available only in Windows environment.

Note that in Windows 95, 98 and ME this function is not practically applicable to the system and locked hard disks. The reason is that Drive Backup requires rebooting into DOS to process locked partitions in Windows 95/98/ME, but the burning hardware is generally unavailable in DOS environment.

In Windows NT, 2000 and XP Drive Backup is able to burn images of both unlocked and locked hard disks. In case of processing the system or locked hard disk, Drive Backup uses the BlueScreen Component to complete the operation on the locked hard disks (see the section [Backup locked Hard Disks](#)).

### 4.5.2 Initiating the Operation

The actions you should be made are very similar to ones required for initiating the *Backup Hard Disk* operation.

#### Step 1. Select the hard disk you want to store on CD/DVD

There are two variants:

- Select the hard disk in the Tree Layout panel or on the Partitions Visualization Panel
- Or select any partition that belongs to the hard disk of interest

#### Step 2. Select the operation to perform

Variants:

- Select in the main menu:

##### **Hard disk > Burn an image of hard disk to CD**

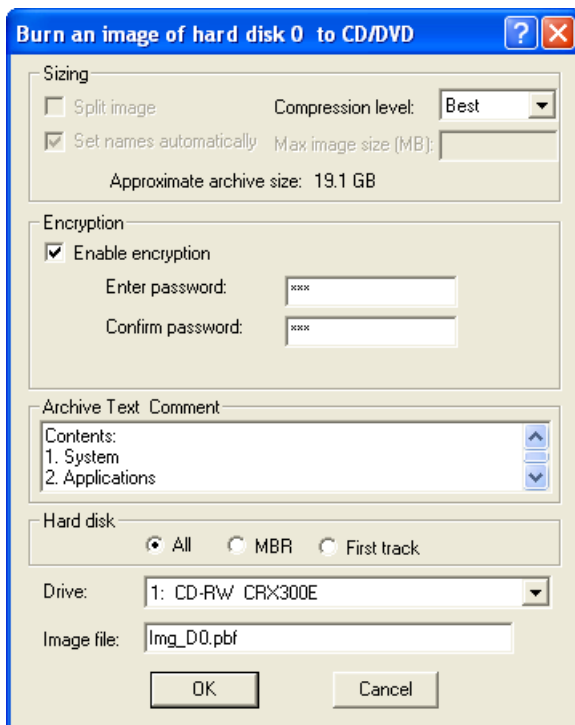
- In case the hard disk is selected, call the *popup menu* for the selected partition in any of layout panels (right click of the mouse button)
- then select the menu item

##### **Burn an image of hard disk to CD**

- In case the hard disk is selected, press **Burn** button on the Main Toolbar.



### Step 3. Define parameters of the operation



Assign properties of the Burn image operation. You can control:

- compression level
- encryption
- archive description
- used CD burning drive
- the part of contents disk to be saved

Initially the program suggests some consistent values for all parameters. In most cases, you just need to press **OK** button to confirm the operation.

#### 4.5.3 Description of the Burn Image Parameters

Parameters of the Burn Image operation are similar to the parameters of the backup operation (see [Description of parameters](#)). There are only two differences:

- The image should be located on some CD/DVD burning device
- The user cannot change the splitting parameters.

##### 4.5.3.1 Common parameters of the Burn Image operation

The general parameters of the Burn Image operation are described in details in the chapter [Burning partition images on CD/DVD](#).

Generally, the parameters for this operation coincide with the same parameters of the Backup Partition operation. See the chapter [Description of the Backup parameters](#) for the detailed explanation.

Encryption settings	
<b>Enable encryption</b>	Set the checkmark ON to enable ciphering image contents and protect accessing to the image by the password.
<b>Enter password</b> <b>Confirm password</b>	With enabling the encryption, provide the password to be used to access the image. <b>Note:</b> the program does not allow "empty" passwords.
Compression settings	
<b>Compression level</b>	Change the compression level, in case of you wish to use the value other than the default one.
Archive label	

<b>Archive label</b>	You can associate a short descriptive text with the image. It may be helpful when selecting backup images.
<b>Hard disk</b>	
<b>All</b>	Drive Backup will store all contents of the hard disk.
<b>MBR</b>	Drive Backup will store only the Master Boot Record of the hard disk.
<b>First track</b>	Drive Backup will store only the 0 <sup>th</sup> track of the hard disk.
<b>Image location</b>	
<b>Image file</b>	Enter the filename of the backup image. The default filename contains the <i>disk number</i> and the <i>drive letter</i> (or the <i>partition number</i> ).
<b>Drive</b>	Select the writable CD drive that should be used to burn discs. The pull-down list contains available CD/DVD-R(W) devices.

#### 4.5.4 Running the Burn Image Operation

Generally, the performance of the *Burn Image of hard disk* operation is same as the performance of the [Burning images of partitions](#) operation.

After assigning all parameters to desired values press the **OK** button bottom the dialog **Burn an image of hard disk**.

#### 4.5.5 Comments

The *BlueScreen Component* of Drive Backup that is used in Windows NT, 2000 and XP supports the *Burn Image of hard disk* operation. The operation is described in the [chapter Burn Image of locked and system hard disks](#).

#### 4.5.6 Burn Image of Locked and System Hard Disks

Generally, Drive Backup needs to reboot the computer in the single-tasking mode to complete the operation of *Burning an Image* of the locked or system hard disk. As it mentioned in the chapter [Executing operations](#), Drive Backup uses the *Startup Bluescreen* service in Windows NT, 2000 and XP. In Windows 95 and 98, the program uses the "true" DOS session. In Windows ME, the program requires to reboot the computer from the DOS bootable diskette.

Unfortunately, Drive Backup cannot use CD/DVD burning hardware in DOS. For this reason, you are unable to use the *Burn Image* function for the locked and system hard disks in Windows 95, 98 and ME.

In Windows NT, 2000 and XP, Drive Backup uses the so-called *startup Bluescreen* service to operate the locked hard disks. Generally, the execution of the operation is very similar to the burning an image of the Extended Partition (see [About processing locked Extended Partitions](#)).

### 4.6 Restore Partition from Backup Image

This chapter explains how to restore data from previously made backup images under various conditions.

#### 4.6.1 Overview

*Restoration from image* is another primary function of the Drive Backup that is complementary to the *Backup* operation (see [Backup separate partitions](#)).

The backup image includes contents of all files and *file system metadata*. The program keeps all information associated with files including the exact structure of directories, location of files on the disk, security information, access quotas and so on. After the restoration, the partition becomes in the pre-backup state.

Take into account that new data added to the partition after making the backup image, will be lost after the partition restoration.

The implementation of this function varies in some cases:

1. In Windows, the operation differs for *unlocked* and *locked* (system) partitions. To process locked partitions, the program need to reboot the computer.
2. The processing of *locked partitions* differs for Windows 95/98, Windows NT/2000/XP and Windows ME.

#### 4.6.1.1 Restrictions

1. Drive Backup allows restoring the image over the existing partition. In this case, the following constraint should be taken into account: Drive Backup is unable to use the image that is located (or holds some of its volumes) on the partition being restored.
2. The program does not allow restoring the image of the hard disk over the partition or over the block of free space.

To inspect the image type and the image contents, use the function [Show Archive Info](#).

#### 4.6.2 Initiating the Operation

Previous versions of Drive Backup traditionally expect that the user chooses a partition or a block of free space and then selects an operation for a chosen object.

Current version of Drive Backup allows also initiating the *Restore* function as an operation over a backup image. Sections below describe both procedures.

##### 4.6.2.1 A traditional procedure of restoration over a partition or free space

###### Step 1. Select a place for the partition to be restored

Select some partition or a block of free space in the Tree Layout panel, or on the Partitions Visualization Panel, or on the List of Partitions.

If the *block of free space* is selected, Drive Backup can fit the restored partition within the bounds of the selected block only.

If the *partition* is selected, Drive Backup can fit the restored partition within the bounds of the selected partition plus right and left adjacent blocks of free space.

See the section [How Drive Backup evaluates space available for restoration of partitions](#) for more details.

###### Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Restore partition from image...**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Restore partition from image...**
- Press Alt+R key combination
- Press **Restore** button on the Main Toolbar.

###### Step 3. Select an image that contains the required partition

Just after calling the *Restore operation* the *Open File* dialog appears. Select some backup image to restore the partition from.

You are able to select any file from any *mounted local drive* or *mapped network drive*. In addition, you can select files on *unmounted partitions* on local hard drives.

In case the image of hard disk is selected, the program generates the error message about the inappropriate image type (see [Restrictions](#) section). Use the [Selective partition restore](#) function to restore a single partition from the image of hard disk or the image of the Extended Partition.

By default, the program displays only .PBF-files that are the primary files of the referential backup archives. Generally, there is the ability to restore selected partitions from the *multi-partition archives* (such as hard disk images and Extended Partition images). The preferred way is to use the function *Selective partition restore*. However, you are able to use the referring to above *Restore partition* function for this purpose:

1. Change the *filtered files type* in the **Files of type** pull-down list from "**Drive Backup Image (\*.pbf)**" to "**All files (\*.\*)**". The list of files should display all files.
2. Select files having the type (i.e. *file extension*) **.P00**, **.L00**, **.E00**. These files correspond to partitions that are included to the multi-partition archives:
  - **.P00** refer to the stored *Primary partition*.
  - **.L00** refer to the stored *Logical partition*.

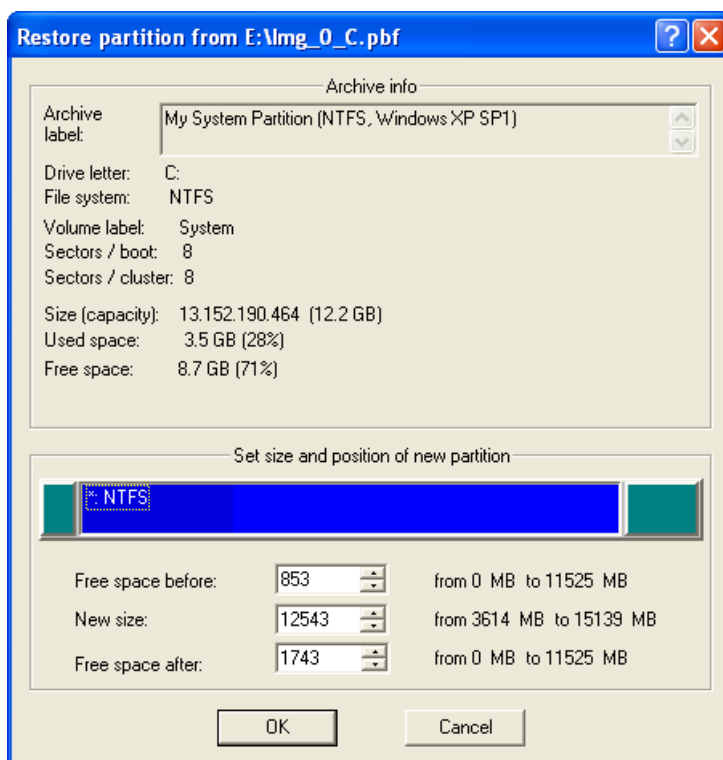
- **.E00** refer to the stored *Extended partition*.

#### Step 4. Define more accurately the future location and size of the restored partition

1. First, Drive Backup checks the image type. In this function, the program admits only images of single partitions and images of Extended Partitions. In case of incorrect image type, the error message appears.
2. Next, Drive Backup checks that the selected image does not contain any of its volumes on the targeted hard disk. The error message appears in case of violation this restriction.
3. In this situation, one should either select another image or move volumes of the image to another partition, another hard disk or to removable media.
4. Next, Drive Backup evaluates disk space available for restoration of the selected image (see [How Drive Backup evaluates space available for restoration of partitions](#)). In case the selected location and selected partition do not meet the requirements; Drive Backup displays the error message.

You should select another image to restore on the selected partition.

5. Next, the program displays the *Restore partition* dialog. This window displays parameters of a partition being saved in the selected backup image.



In the **Archive info** section, the program displays: file system type, capacity, used & free space, archive label.

In the **Set size and position of new partition** section, the program displays the future location of the restored partition. Here, you are able to change the final location and size of the restored partition.

The functionality available in the *Restore partition* dialog is described in the section [Defining the location and size of the restored partition](#). The rules that Drive Backup uses to estimate the available disk space are described in the section [How Drive Backup evaluates space available for restoration of partitions](#).

#### 4.6.2.2 An alternative procedure of restoration of an image

An alternative way to initiate the function is to perform the Restore operation over a selected backup image. The program keeps the database of recently used backup images.

##### Step 1. Select a backup image to be restored

Select some image of a partition on the List of Backup Images. The program displays a type of an image in the first column.

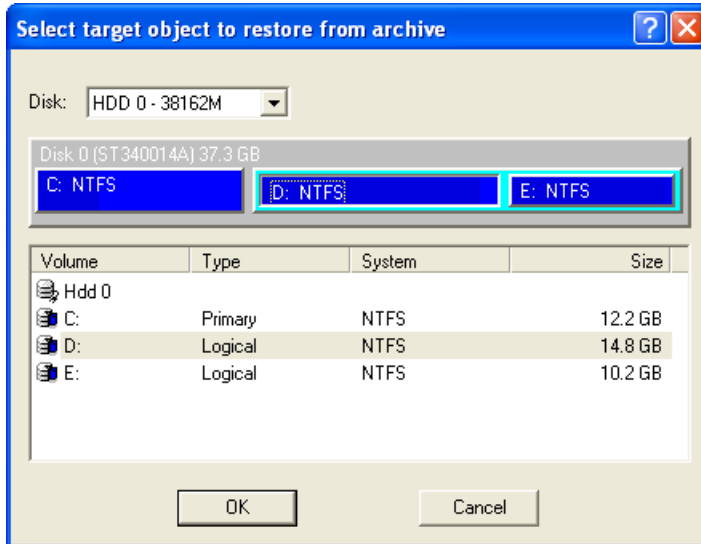
## Step 2. Select the operation to perform

Call the *popup menu* for the selected image, and select the menu item:

**Restore archive...**

## Step 3. Select a location the image should be restored over

The program displays the window "Select target object to restore from archive". This dialog allows selecting destination hard disk and partition for the restoration operation:



The **Disk** pull-down list allows selecting a hard disk where the image should be restored to.

The *Partitions Visualization Panel* displays the current layout of the selected hard disk; it can be used for selecting a desired location for the restored partition. The *List of Partitions* at the bottom duplicates this functionality.

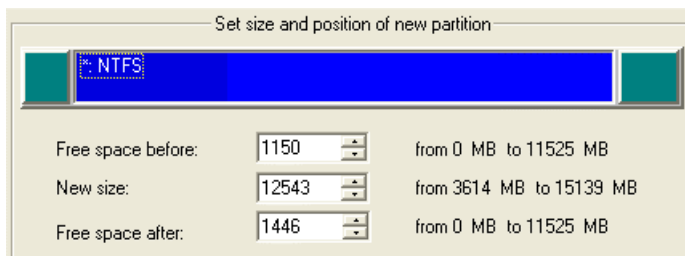
After selecting a location, press OK button to continue restoration.

## Step 4. Define more accurately the future location and size of the restored partition

## Step 5. Apply the operation

Last two steps are the same as in the first case. See the previous section [A traditional procedure of restoration](#) for the detailed explanation.

### 4.6.3 Defining the Location and Size of the Restored Partition



The *Restore partition* dialog provides the ability to fully control the resultant position and the size of the restored partition. The program determines the range of disk space available for placing the restored partition. Briefly:

- In case a *block of free space* was targeted, Drive Backup allows to locate the restored partition within the bounds of the selected block of free space.
- In case a *partition* was targeted, Drive Backup allows to locate the restored partition over the partition and the enveloping blocks of free space. In this case, the initial location of the restored partition coincides with the location of the targeted one.

In any case, the capacity of the restored partition must not exceed the size of the selected range of disk space.

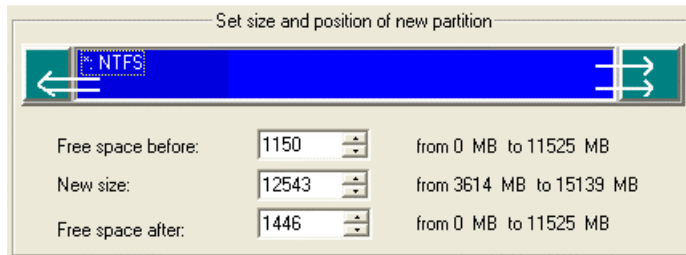
### New Size, Free Space Before, Free Space After

You can move the restored partition and change its size either by using the Partitions Visualization Panel:

- The **Free space before** spinner control defines the position (in Mb) of the restored partition relative to the beginning of the available range of disk space
- The **New size** spinner control defines the size (in Mb) of the restored partition.
- The **Free space after** spinner control defines the amount of trailing free space (in Mb) at the end of the available range of disk space

The *restrictions* the program takes into account are those:

- The partition must totally fit in the range of available disk space
- The partition size must be greater than the amount of used space



The Partitions Visualization Panel and spin controls are synchronized, the changing of any of these elements affects on all other ones.

#### How the spin controls behave:

<b>Free space before</b>	Moves the beginning of the partition (left edge), preferably with keeping the partition size.
<b>New Size</b>	Changes the size of the partition, preferably with keeping the starting position (left edge).
<b>Free space after</b>	Moves the end of the partition (right edge). On increasing the value, it (preferably) keeps the partition size. On decreasing the value, it (preferably) keeps the starting position (left edge) so that the partition expands.

There are rules that take effect in the partition resizing.

### 4.6.4 Running the Restore Operation

After assigning all parameters to desired values press the **OK** button bottom the dialog **Restore partition from image**:

- The operation will be immediately executed, in case of disabling the virtual operations
- Otherwise, the operation will be placed to the *List of Pending Operations* for future execution.

The feature is described in the section [Executing operations](#).

To immediately execute pending operations, just press the **Apply** button on the *Virtual Operations Toolbar*. To permanently enable/disable the virtual execution of operations, change the [program Settings](#).

During the real execution of the operation, the **Operation Progress** window appears. The program displays the detailed statistics of the operation.

For the *Restore partition* operation, the *suboperation* is the reading one volume of the image. In case of using the single-file image, no suboperation statistic is displayed.

In case of using multivolume image, the program may pause and display the *Open File* dialog to ask the user for the next volume filename and location.

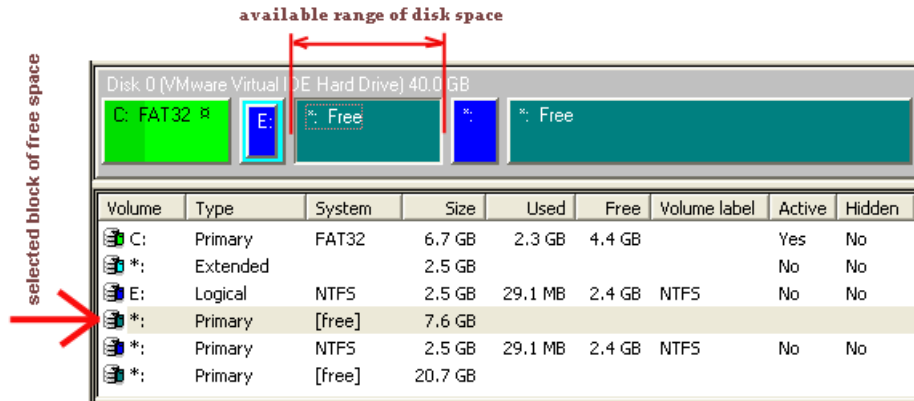
**Note:** this is not the usual behavior of the program. The program pauses the restoration only in the following cases:

- some volumes of the image were moved or renamed
- volumes are located on removable media

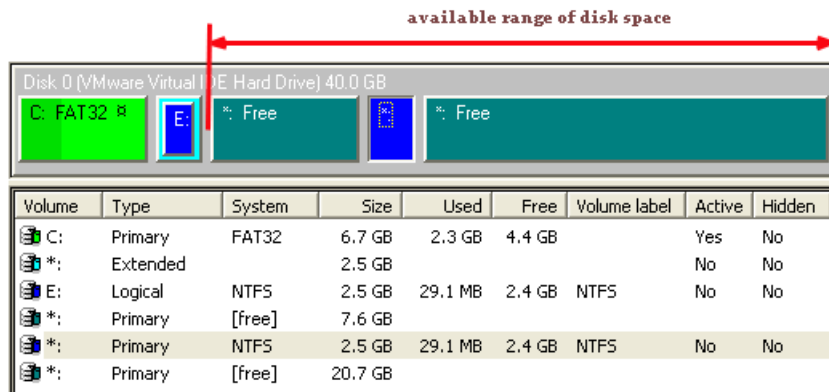
## 4.6.5 Comments

### 4.6.5.1 How Drive Backup evaluates space available for restoration of partitions

The *Restore partition* dialog provides the ability to fully control the resulting position and the size of the restored partition. The program determines the range of disk space available for placing the restored partition:



1. In case a *block of free space* was aimed for placing the restored partition, Drive Backup allows to locate the target partition within the bounds of the selected block of free space only. The capacity of the restored partition must not exceed the size of the selected block of free space. In addition, in this case the program selects the beginning of the free block as the initial location of the restored partition.



2. In case an *existing partition* was aimed, Drive Backup includes to the available range the selected partition, the left adjacent block of free space (if exists), and the right adjacent block of free space (if exists). The capacity of the restored partition must not exceed the size of the summary range of disk space. The initial location of the restored partition coincides with the beginning of the selected partition (if the restored partition can fit to the range). Otherwise, Drive Backup moves forward the initial location.
3. The range of available disk space should be greater than the initial size of the restored partition. It is the *primary condition* of the ability of restoration.

### 4.6.5.2 How to avoid bad sectors during the restoration

In case of restoring data to the bad sectors, the resulting partition may become corrupted. To avoid losing data because of bad sectors, select the *surface test* to the value other than **None**.

(menu) **General > Settings... > (page) General > Surface test**

In this case, the program performs the surface test prior to the data restoration over the range of disk space that will be occupied by the restored partition. In case of detecting bad or unreliable sectors, the program will mark them *bad* and will not place data to those sectors.

The additional surface test noticeably increases the overall time required to complete the operation, also the algorithm that bypasses bad sectors significantly slows down the performance. Use this feature only in case you suspect that there are bad sectors in the location you have chosen for the partition restoration.



#### 4.6.6 Restoration of Locked Partitions

Drive Backup allows restoring the image over the existing partition. As the matter of fact, Drive Backup deletes the existing partition prior to the real restoration of data. Still, there could be a situation when the targeted partition is modified by another program, e.g. some file is edited. In this case, Drive Backup is unable delete partition or uniting the old partition structure being restored with the new data.

To avoid the damage of data consistency, Drive Backup reboots the system to a single-tasking environment in order to eliminate the interference of other programs.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

##### 4.6.6.1 Restoration over locked partitions in Windows NT, 2000 and XP

In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase to operate the locked partitions:

1. Before starting the operation, the program checks whether partition is locked or not.
2. If the partition appears is the locked one, the program asks for reboot the system. Press **OK** button to reboot the system and complete the operation, press **Cancel** button to abort the operation.

By default, the program pauses the execution until the user makes the choice.

3. The program silently schedules the *BlueScreen Component* to run at next Windows startup and to execute the required operation.
4. Then the program reboots the computer.
5. At the next system boot-up, the Bluescreen Component executes the operation in place of the Windows-based version. The BlueScreen Component will display the operation progress in the console-like style.
6. In case of using the multivolume image having some volumes:

- moved to another location
- placed on removable media (such as CD/DVD-ROM)

the program may fail to find automatically the sequel of the multivolume image. In this case, the program asks the user for the filename of the next volume. The most bottom lines of the console output will be the following:

```
Get new filename of the file for subsequent reading.
(Type exit to cancel operation.)
D:\Img_1_8.p01
```

7. You should choose one of the following actions:
  - Change the filename to proceed with another filename
  - Or clear the filename and type the word "*exit*" to abort the operation
8. By default, Drive Backup suggests the filename that is registered in the archive. But the problem is that the program has failed to open the volume (otherwise it would continue working without pausing). At this moment, the user must *guess right* the filename to continue with the restoration.
9. After the BlueScreen Component completes the operation, the Windows session begins and the Windows-based version of Drive Backup comes up.

## 4.7 Selective Partition Restore

The function of *Selective partition restore* provides the ability to restore one or several partitions from *multi-partition images* in one operation.

### 4.7.1 Overview

The *Selective partition restore* is only the extended variant of the function [Restore Partition from an Image](#) function. The only difference is that it provides more convenient mechanism of multiple partitions restoration from multi-partition images: the user can restore several partitions in one operation, and each restored partition can be resized during the restoration. In fact, the *Selective Restore* function consists of multiple restoration suboperations.

Take into account that Drive Backup does not combine new data with restored ones. It irrevocably destroys the existing partition that is targeted for the selective restoration of saved partitions.



#### 4.7.1.1 Restrictions

Drive Backup allows restoring the image over the existing partition. In this case, the following constraint should be taken into account: Drive Backup is unable to use the image that is located (or holds some of its volumes) on the partition being restored.

### 4.7.2 Initiating the Selective Restore Operation

#### Step 1. Select a block of free space to restore partitions to

For the *Selective Restore* function, either a *block of free space* or an existing partition can be targeted as the future location of restored partitions. The targeted space can be selected either in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions. See the section [How Drive Backup evaluates space available for restoration of partitions](#) to understand the rules Drive Backup follows.

#### Step 2. Select the operation to perform

Variants:

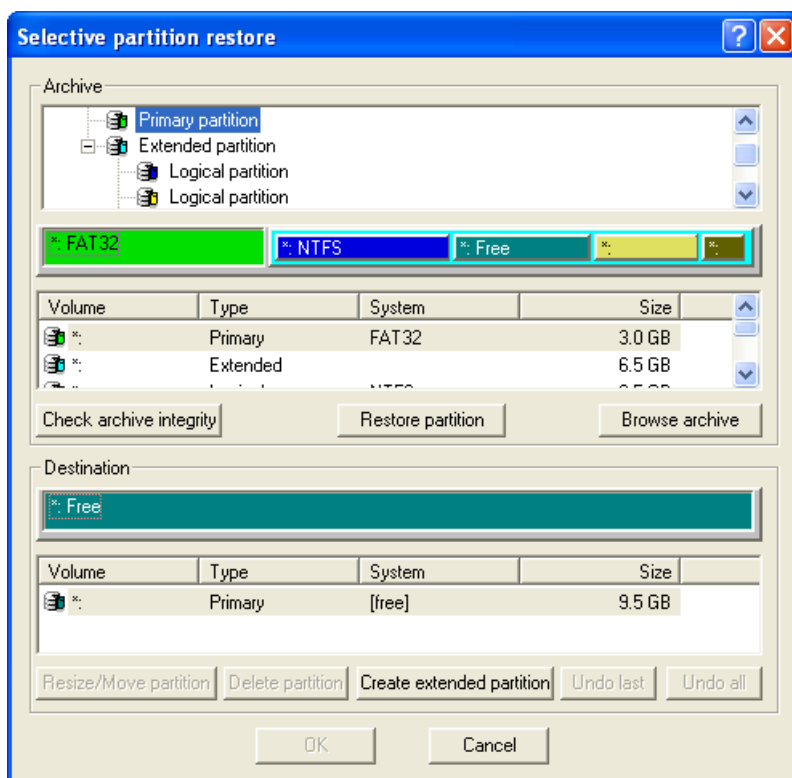
- Select from the main menu:  
**Partition > Selective partition restore**
- Select from the main menu:  
**Hard disk > Selective partition restore on Hdd**
- Call the *popup menu* for the targeted partition and select the menu item:  
**Selective partition restore**

#### Step 3. Select an image that contains required partitions

After calling the *Selective Restore* operation, the *Open File* dialog appears. Select some backup image to restore a partition.

The *Selective Restore* function is applicable to images of hard disks, Extended Partitions and single partitions. You are able to select backup images from mounted local drives, mapped network drives and unmounted partitions on local hard drives.

After the image has been selected, the program opens the *Selective Partition Restore* dialog. It displays the layout of partitions included in the selected image, indicates most common parameters of partitions (type, size and file system) and provides the functionality of image checking and exploring, restoring partitions, changing size and location of restored partitions. The functionality of the dialog is described in the section [Description of the Selective Partition Restore dialog functionality](#).



#### Step 4. Select a partition to restore

Select the desired partition in the Archive section (either in the Tree Layout, or on the Partitions Visualization Panel, or on the List of Partitions). The Archive Tree Layout and Archive List of Partitions display only partitions and skip blocks of free space. The Partitions Visualization Panel demonstrates the real structure of stored partitions.

#### Step 5. Select a desired location for restored partition

First, select a *block of free space* in the Destination section (either on the Partitions Visualization Panel or on the List of Partitions).

If the selected partition can be restored to the selected block of free space, the button **Restore partition** becomes *enabled*. Otherwise, this button remains *disabled* (the button label remains grayed and recessed).

Press the **Restore partition** button to schedule the restoration of the selected partition on the to-do list.

#### Step 6. Change the size and location of the restored partition

You are allowed to resize and move the restored partition(s) within the available range of disk space:

- Either use *drag-&-drop* technique on the Partitions Visualization Panel.
- Or select a restored partition in the Destination List of Partitions and then press the button **Resize/Move Partition** in the bottom of the window.

This functionality is described in the section [Description of the Selective Partition Restore dialog functionality](#).

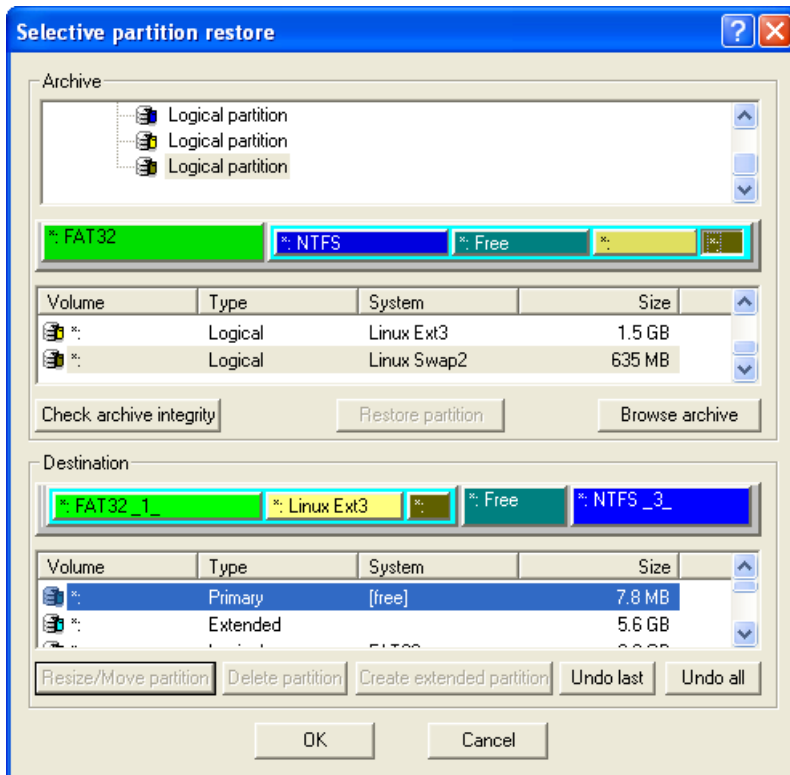
#### Step 7. Repeat two previous steps for other restored partitions

The program allows restoring multiple partitions within the single operation. The steps 5 & 6 should be repeated for each partition to be restored.

**Note:** You must definitely select both the partition to be restored (in the Archive panel) and the targeted block of free space (in the Destination panel).

### 4.7.3 Description of the Selective Partition Restore Dialog Functionality

The *Selective Partition Restore* dialog displays the layout of partitions included in the selected image and indicates most common parameters of partitions such as type, size and file system type:



The window is divided into two sections:

**The Archive section** reveals the layout of stored partitions with three panels: the Archive Tree Layout, the Archive Visualization Layout and the Archive List of Partitions. You can check the archive integrity, browse contents of imaged partitions and select partitions to be restored.

**The Destination section** displays the future layout of restored partitions with its own Destination Visualization Layout and Destination List of Partitions. The section provides re-partitioning functionality that may be appropriate: the restored partitions may be deleted, resized and moved within the available range of the disk space.

In fact, the *Selective Partition Restore* function consists of multiple suboperations, so it supports the own list of suboperations. The Destination section provides the ability to edit this list.

#### 4.7.3.1 The functionality of the *Selective Partition Restore* dialog

All the dialog functionality is available through operation buttons (the redistribution of restored partitions functionality is also available through *drag-&-drop* technique, see [Partitions Visualization Panel](#)):

##### Archive panel: Check archive integrity

Press this button to validate the backup image. The function is described in the chapter [Check archive integrity](#).

##### Archive panel: Browse archive

Press this button to run the built-in tool named *Image Explorer*. The utility allows to browse the backup image, including the browsing contents of separate partitions having types FATxx, NTFS or Ext2/3 with the ability to extract separate files and directories from the backup image.

The features and functionality of the [Image Explorer](#) utility is described in the chapter Supplementary utilities.

##### Archive panel: Restore partition

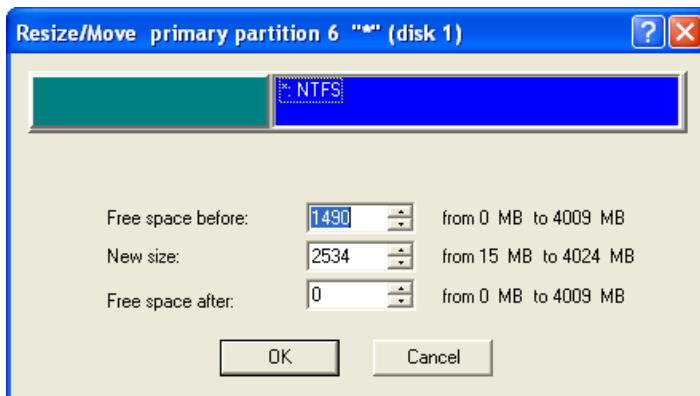
Press this button to schedule the restoration of the partition that is selected in the **Archive** panel to the block of free space that is selected in the **Destination** panel.

**Note:** this button is enabled only in case the user really selects in both **Archive** panel and **Destination** panel.

##### Destination panel: Resize/Move partition

Press this button to open the *Resize/Move dialog* for the selected partition.

**Note:** the button is enabled only for restored partitions in the Destination panel. The partition must have the known file system type (see [Known file systems](#) for more details).



The functionality of the *Resize/Move* dialog is similar to the functionality of the *Restore partition* dialog. This dialog provides the ability to fully control the resulting position and the size of the selected restored partition.

The final capacity of the restored partition cannot exceed the size of the selected range of disk space and cannot be less than the amount of used space.

The program determines the range of disk space available for placing the restored partition (see [How Drive Backup evaluates space available for restoration of partitions](#)).

#### Destination panel: Delete partition

Press this button to delete the restored partition.

**Note:** The button becomes enabled only in case of selecting some restored partition in the Destination panel.

As the matter of fact, this function simply removes the partition to delete from the list of restorable partitions – the program won't make idle actions of restoration and further deletion of a partition.

#### Destination panel: Create Extended Partition

Press this button to create the Extended Partition within the range of available disk space.

**Note:** the function is available only under the following conditions:

- The user has selected a block of free space in the Destination panel.
- There is no Extended Partition on the targeted hard disk.
- The total amount of Primary partitions is less than four (4).

When the button **Create Extended Partition** is pressed the program creates the Extended Partition over the selected block of free space.

The last two conditions are the common limitations on the ability to create the Extended Partition.

The total amount of primary partitions is fundamentally limited to 4, and the creation of the Extended Partition allows placing more partitions on the hard disk.

#### Destination panel: Undo last

Press this button to cancel the latest operation that was scheduled in the *Selective Partition Restore* dialog. The function is similar to the **Undo** operation for the global List of Pending Operations (see the section [Virtual operations](#)).

#### Destination panel: Undo all

Press the button to cancel the all operations that was scheduled in the *Selective Partition Restore* dialog. The function is similar to the **Undo All** operation for the global List of Pending Operations (see the section [Virtual operations](#)).

### 4.7.4 Running the Selective Restore Operation

After assigning all parameters to desired values, press the **OK** button bottom the dialog **Selective Partition Restore**.

For the *Selective Partition Restore* operation, the *suboperation* is the restoration of one partition from the image.

In case of using multivolume image, the program may pause and display the *Open File* dialog to ask the user for the next volume filename and location. The program behaves in this fashion only in case of locating volumes are on removable media or in case of some volumes of the image were moved or renamed.

## 4.7.5 Comments

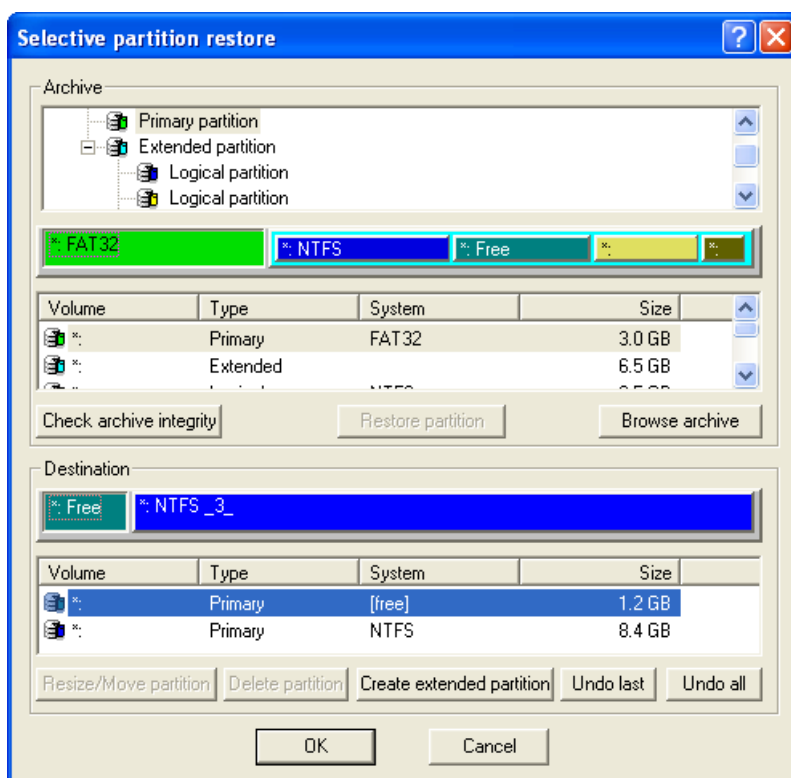
### 4.7.5.1 Conditions on the size of the block of free space

As it was mentioned in the section [How Drive Backup evaluates space available for restoration of partitions](#), Drive Backup requires the partition being restored must fit the targeted range of disk space.

Concerning the *Selective Partition Restore* operation, in every iteration each restored partition must have the initial size less than the size of the targeted block of free space.

The picture placed below demonstrates such a kind of mistaken situations:

The selected FAT32 partition is almost empty, and it is less than the overall size of the range of available space. Still, its size exceeds the size of currently selected block of free space.



In this situation, Drive Backup cannot restore the selected FAT32 partition.

## 4.8 Restore Hard Disk from Backup Image

This chapter explains how to restore hard disks from previously made backup images under various conditions.

### 4.8.1 Overview

In terms of Drive Backup, a "restoration of hard disks" means retrieving all informational components of a hard disk: all partitions, the Partition Table and bootstrap code. During the operation, the program destroys all previous disk contents and replaces them with saved ones.

Any changes in the disk layout will be irreversibly lost after the disk restoration.

New data, which are added to any partition after making the backup image of the hard disk, will be irreversibly lost after the disk restoration.

Note, if your aim is only add partitions from a backup image to the currently used hard disk, with keeping some of its contents, you should use [Selective Partition Restore](#) function instead of *Restore Hard Disk*.

Drive Backup supports several kinds of backup images:

- Images of single partitions,  
containing only data from one Primary or Logical partition.
- Images of multiple partitions,  
e.g. images of Extended Partitions.  
Such images include multiple subordinate images.
- Images of the 1<sup>st</sup> track of a hard disk,  
including only 1<sup>st</sup> track saved (most OS-independent boot managers occupy 1<sup>st</sup> track; with this option, it's possible duplicating boot managing software).
- Images of MBR sector,  
including only MBR sector saved.
- Images of entire hard disk.  
These images include MBR, 1<sup>st</sup> track, Partition Table and all on-disk partitions. These images consist of multiple subordinate images.

In addition, the program displays type of contents for backup images, which are included on the *List of Backup Images*.

#### 4.8.1.1 Restrictions

In case of restoration the hard disk, the following constraint should be taken into account:

- Drive Backup is unable to use the image that is located (or holds some of its volumes) on partitions, which belong the targeted hard disk.

#### 4.8.2 Initiating the Operation

Previous versions of Drive Backup traditionally expect that the user chooses a hard disk and then selects an operation for a chosen object.

Current version of Drive Backup allows also initiating the *Restore* function as an operation over a backup image. Sections below describe both ways.

##### 4.8.2.1 A traditional procedure of restoration over a hard disk

With this way, the program allows restoring the following objects:

- It can restore all disk contents from images of a hard disk;
- It can restore 1<sup>st</sup> track from images of 1<sup>st</sup> track;
- It can restore MBR bootstrap code from images of MBR

In the traditional restoration procedure, the program does not allow using images of partitions, in order to exhibit the behavior compatible with old versions of the program.

#### Step 1. Select the hard disk to be restored

There are two variants:

- select a hard disk in the Tree Layout panel or on the Partitions Visualization Panel.
- select any partition that belongs a hard disk of interest.

#### Step 2. Select the operation to perform

Variants:

- Select in the main menu:

**Hard disk > Restore hard disk from image...**

- Press the **Ctrl+R** key combination.
- In case a hard disk is selected, Press **Restore** button on the Main Toolbar.

- In case a hard disk is selected, call the *popup menu* for the selected partition in any of layout panels (right click of the mouse button)
- then select the menu item

### Restore hard disk from image...

#### Step 3. Select an image that should be used for hard disk restoration

The program displays the *Open File* dialog in order that the user selects an image to be used for restoration.

It is allowed selecting files from any *mounted local drive*, on *mapped network drive* and on *unmounted partitions* from local hard disks.

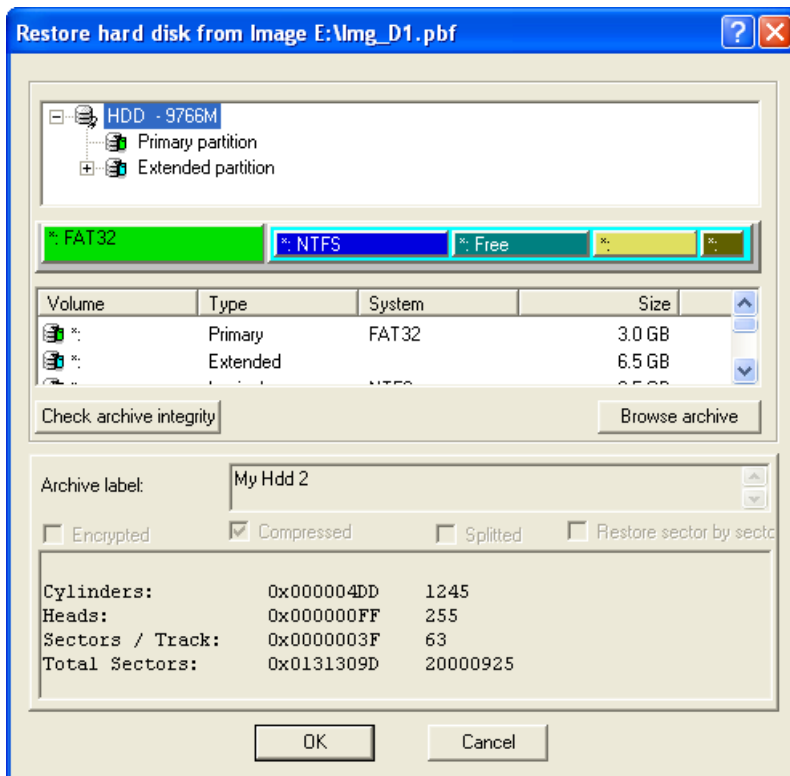
At this stage, the program can generate following error messages:

- In case the selected image is located on the hard disk that was selected for restoration, the program displays the error message.
- In case the selected image contains too much used data, which cannot be put into the selected hard disk, the program displays the error message.

In any of these cases, one should choose another image for disk restoration.

#### Step 4. Inspect contents of the hard disk image

The program displays the *Restore Disk from Image* dialog:



The user can see properties of saved hard disk configuration:

- amount of partitions
- type, file system and size for each partition
- image properties (compression, encryption, label etc)
- information about hard disk geometry

#### 4.8.2.2 An alternative procedure of restoration of an image

An alternative way is to perform the *Restore* operation over a selected backup image. The program keeps the database of recently used backup images (see the chapter [Archives List Panel](#)).

With this way, the program allows restoring the following objects:

- It can restore all or selective partitions from images of a hard disk;
- It can restore 1<sup>st</sup> track from images of 1<sup>st</sup> track;
- It can restore MBR bootstrap code from images of MBR;
- It can replace current disk layout by a single partition restored from images of partitions.
- It can replace current disk layout by selective partitions restored from multi-partition images

#### Step 1. Select a backup image to be restored

Select an image on the List of Backup Images. The program displays a type of an image in the first column.

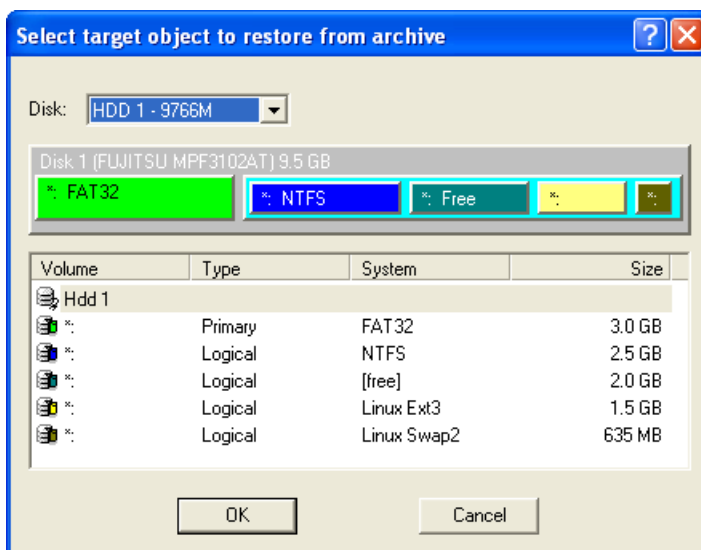
#### Step 2. Select the operation to perform

Call the *popup menu* for the selected image, and select the menu item:

**Restore archive...**

#### Step 3. Select an object that should be restored from the image

The program displays the window "Select target object to restore from archive":



This dialog allows selecting destination object for the restoration. The detailed description is given in the next section [Description of the dialog Select target object to restore](#).

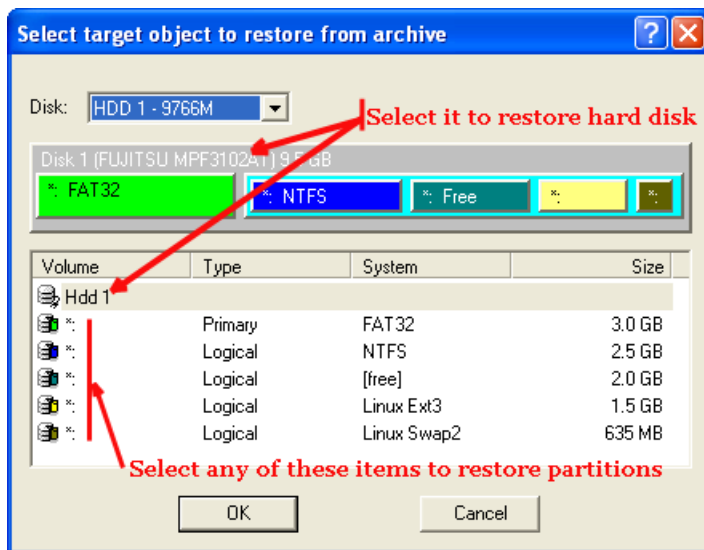
#### Step 4. Inspect image contents and select ones to be restored

The program displays the **Selective Partition Restore** dialog in order the user is able customizing disk layout that should be restored.

The functionality of this dialog is same with the [Selective partition restore](#) function.



#### 4.8.2.3 Description of the dialog Select target object to restore



#### Disk

This pull-down list allows selecting a hard disk, which contains a targeted object.

The *Partitions Visualization Panel* and the *List of Partitions*, which are placed below, display contents of the selected hard disk that can be restored from the selected backup image. Either of these controls can be used for selecting a restorable object.

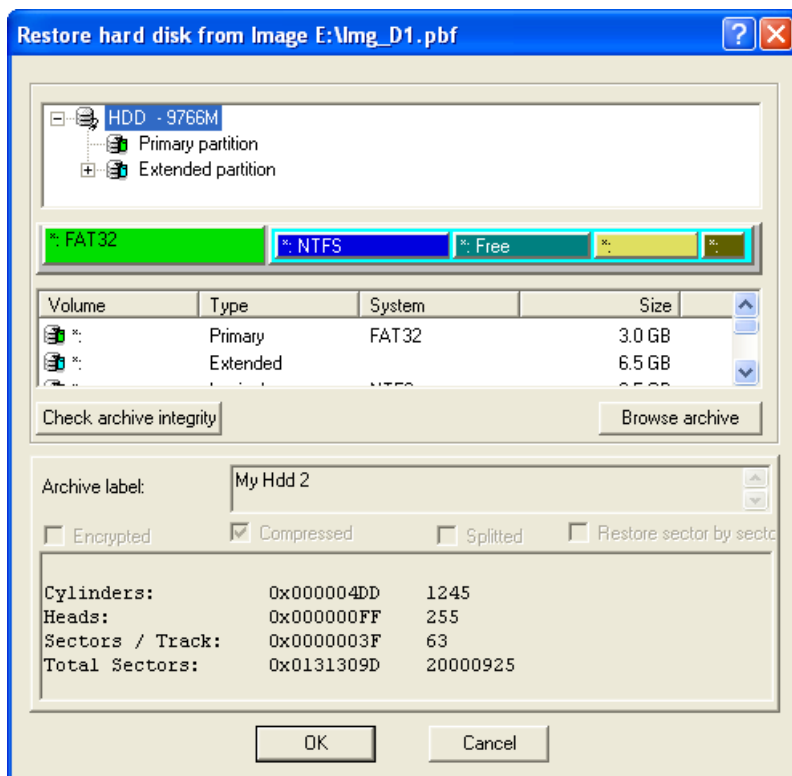
The table below exhibits rules, which Drive Backup follows:

Image type	Which disk components:	
	Are displayed	Can be restored
HDD	<ul style="list-style-type: none"> <li>• Hard disk</li> <li>• Partitions</li> </ul>	<ul style="list-style-type: none"> <li>• Entire hard disk</li> <li>• Selective partitions</li> </ul>
Partition	<ul style="list-style-type: none"> <li>• Hard disk</li> <li>• Partitions</li> </ul>	<ul style="list-style-type: none"> <li>• A disk with single partition</li> <li>• A selected partition</li> </ul>
First Track	Hard disk	1 <sup>st</sup> track of the selected hard disk
MBR	Hard disk	MBR of the selected hard disk

#### 4.8.3 Description of Restore Hard Disk Dialog

In fact, the *Restore Hard Disk* dialog is very similar to the [Show Archive Info](#) one. It provides the following functionality:

- Confirm or cancel the operation
- Explore properties of saved objects
- Check integrity of the selected image
- Explore contents of saved partitions



Hereafter the brief description of available functionality:

### Check archive integrity

Press this button for immediate performing the [Check Archive Integrity](#) operation.

This option allows making certain about usability of the selected backup image prior the real execution of the operation.

### Browse archive

Press this button to browse the archive contents with using the [Image Explorer](#) built-in tool.

Image Explorer allows exploring files and directories from partitions, which are saved in the image, opening files in the read-only mode and extracting separate directories and files from the backup image.

### Archive label and archive options

The grayed controls exhibit information about the selected archive: the descriptive text (Archive Label), whether or not Compression, Encryption, Splitting were implemented to the archive.

### The upper part of the window

contains the group of panels (List of Partitions, Partitions Visualization Panel, Tree-Layout), which represent the layout of disk contents saved in the selected image. Each of these panels can be used for selecting disk contents in order to inspect its properties.

### The lower part of the window

displays properties of the selected object:

☐ HDD

- In case a "hard disk" object is selected, the program displays properties of a saved hard disk (commonly named *hard disk geometry* see [Glossary](#) for more details):

<b>Cylinders</b>	Amount of <i>Cylinders</i> on the saved hard disk
<b>Heads</b>	Amount of <i>Heads</i> on the saved hard disk)
<b>Sectors/Track</b>	Amount of <i>Sectors per Track</i> on the saved hard disk
<b>Total Sectors</b>	The total amount of sectors on the saved hard disk

 Primary partition

- In case a "partition" object is selected, the program displays properties of a selected partition:

<b>File system</b>	File system that is placed on the selected partition
<b>Drive letter</b>	--- not available for partitions from backup images ---
<b>Volume label</b>	Volume label of the selected partition; can be used for distinguishing partitions in case of <i>Selective Partition Restore</i> .
<b>Sectors/boot</b>	Amount of sectors reserved for the bootable code on the selected partition. In fact, this information of least importance for most users.
<b>Sectors/Cluster</b>	<i>Cluster Size</i> value expressed in Sectors. Halve this value to get the <i>Cluster Size</i> value in Kbytes.
<b>Size (capacity)</b>	Capacity of the selected partition in bytes and Mbytes
<b>Used space</b>	Amount of used data on the selected partition, percentage and the real value in Mbytes
<b>Free space</b>	Amount of free space on the selected partition, percentage and the real value in Mbytes

#### 4.8.3.1 Restoring multivolume archives

Multivolume images consist of multiple files, which can be placed in different directories, on different disks and removable media.

When creating an image, the program saves information about location of volume of an image. Alternatively, during the restoration from a multivolume image, the program searches volumes on their original location for completing the process without user's intervention.

In case of some files were renamed or moved to another location, the program pauses working and displays the *Open File* dialog in order to the user points next volume location manually.

**Note:** this is not a usual behavior of Drive Backup. The program pauses the restoration only in the following cases:

- some volumes of the image were moved or renamed
- volumes are located on removable media

The program will automatically restore multivolume image in "unattended" fashion, in the following cases:

- All volumes of the image remain on their original locations, and all of them are placed on local hard disk(s).
- All volumes of the image are picked up in the same directory on a local hard disk.

#### 4.8.4 Restoration of Locked Hard Disks

Drive Backup allows restoring the image over the partitioned hard disk. This operation is very similar to the restoration of locked partitions (see the section [Restoration of locked partitions](#)).

## 4.9 Copy Partition

This chapter explains how to copy single partitions that are placed on local hard disks under various conditions.

### 4.9.1 Overview

*Copy* is another primary function of Drive Backup. The copying of partitions can be used for:

- Cloning "sample" partitions
- Making backup copies of working partitions

One can duplicate partitions to protect oneself from downtime in case of system malfunction. The partition can be copied back to the original place within a few minutes or can be used simply for copying separate files.

Drive Backup allows to copy partitions of any type. Partitions of unknown file system types are always copied in the *sector-to-sector* copying mode, and both the copy and the original have the same size.

As for partitions of [known file system types](#), the program provides the ability to copy them either in the [fast copying mode](#) or in the *sector-to-sector* mode. In addition, the possibility is given to automatically change the partition size during the copying process.

Drive Backup duplicates all used partition data including files, the exact structure of directories and *file system metadata*: location of files, security information, access quotas and so on.

The implementation of the Copy Partition function varies in some cases:

1. In Windows, the operation differs for *unlocked* and *locked* (system) partitions. To process locked partitions, the program needs to reboot the computer.
2. In turn, the processing of *locked partitions* differs for Windows 95/98, Windows NT/2000/XP and Windows ME.

#### 4.9.1.1 Where original and duplicate partitions can be located

Currently, Drive Backup only allows copying partitions that are located on non-removable local hard disks. Hard disks should be connected to IDE, SCSI or RAID controllers and should be available in the operating system (see [Comments](#) for more details).

The program allows copying partitions within the single hard disk and between local hard disks of types mentioned above in any combination. In particular, it is possible to copy partitions from IDE to SCSI disks and vice-versa.

The program allows copying primary partitions into the Extended Partition (so that a primary partition becomes a logical one). In addition, logical partitions can be copied outside the Extended Partition (so that a logical partition becomes a primary one).

#### 4.9.1.2 Restrictions

##### Limitations in supported media

- The current version of Drive Backup does not support removable hard disks such as USB, PCMCIA or LPT hard disks or FLASH cards
- The program cannot copy partitions on remote hard disks. LAN, USB, LPT/COM and other type connections are not supported
- Finally, the program does not allow to copy contents of formatted removable media as separate partitions on hard disks

In addition, the significant restriction of the current version of Drive Backup is that it supports only DOS partitioning scheme (see [Glossary](#)).

##### Functionality limitations

Drive Backup allows to copy partitions only to blocks of free space.

To copy a partition over another one, use the following method:

1. Delete the targeted partition
2. Select the partition that should be copied
3. Copy the selected partition to the block of free space.

### 4.9.2 Initiating the Operation

The *Copy Partition* operation can be initiated in several ways that differ in their user friendliness and flexibility. According to your aims, you can choose either the fast method based on the *drag-&-drop* technique or the accurate method based on entering parameters in the *Copy Partition* dialog.

#### 4.9.2.1 Using the drag-&-drop technique

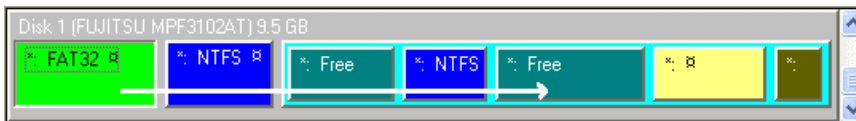
The *drag-&-drop* technique is available only in case the virtual execution of operations is enabled in the *Smart* and *Virtual Execution* modes (see chapter [Virtual operations](#)).

The *drag-&-drop* technique for the *Copy Partition* operation is supported in all layout panels (the Tree Layout panel, the Partitions Visualization Panel and the List of Partitions):

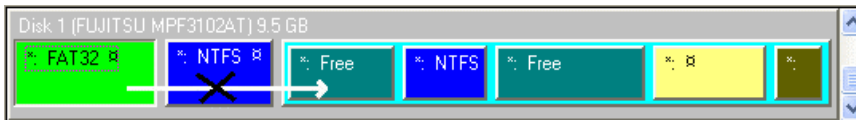
- Select the partition you want to copy
- Press and hold the primary (=left) mouse button
- Then press and hold the **Ctrl** keyboard key
- Drag a partition to a block of free space
- Drop it to the desired position.

During the dragging a partition, the program indicates the availability of the operation for the current position:

**The program is able to copy the partition to this place:**



**The program cannot copy the partition to this place:**



See the [Comments](#) for more details about copying rules and constraints.

#### 4.9.2.2 Drag-&-drop copying limitations

The *drag-&-drop copying* is only enabled in the *Virtual Execution mode*. See the section [Virtual operations](#) for more details. Remember, you can switch on/off the *Virtual Execution mode* from the program's Settings:

**(menu) General > Settings... > (page) Virtual operations > Enable virtual operations**

The *drag-&-drop copying* allows to copy a partition without changing its size (within the single operation).

#### 4.9.2.3 Using the Copy Partition dialog

The *Copy Partition* dialog provides the full functionality of the Copy function: one can copy a partition to any available disk, set accurately any admissible position for the duplicate partition and define precisely its final size.

The actions you should make are similar to ones required for initiating other operations.

##### Step 1. Select the partition you want to copy

Select a partition in the Tree Layout panel or on the Partitions Visualization Panel, or on the List of Partitions. In any case, the partition will be highlighted in all three panels. The function is not available for blocks of free space.

##### Step 2. Select the operation to perform

Variants:

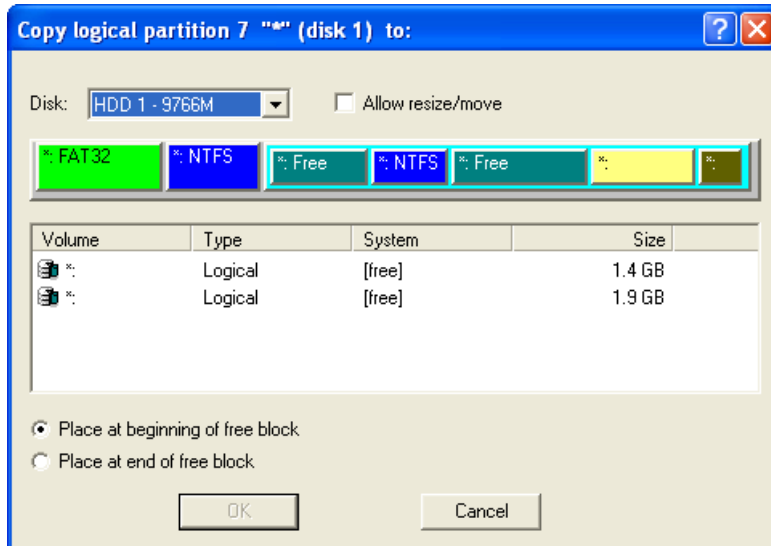
- Select in the main menu:  
**Partition > Copy partition...**
- Call the *popup menu* for the selected partition in any of layout panels (click the right mouse button) then select the menu item:  
**Copy partition...**
- Press the **Alt+C** keyboard combination
- Press the **Copy** button on the Main Toolbar.

### Step 3. Define parameters of the operation

In the *Copy Partition* dialog, you can define the properties of the duplicate partition: targeted disk, position and size of the duplicate partition. The section [Description of the parameters](#) contains the detailed description of the dialog's functionality.

## 4.9.3 Description of the Parameters

### 4.9.3.1 Copy partition dialog



#### Disk

Select the hard disk on which the duplicate partition should be placed.

After selecting the targeted hard disk, the program displays the current disk layout on the [Partitions Visualization Panel](#) that is located in the *Copy Partition* dialog. The *List of Available Places* placed below contains only the list of free blocks (on the selected disk) that match [the constraints on the disk space for copying partitions](#).

Initially, the *List of Available Places* includes only blocks of free space that are larger than or equal in size of the original partition.

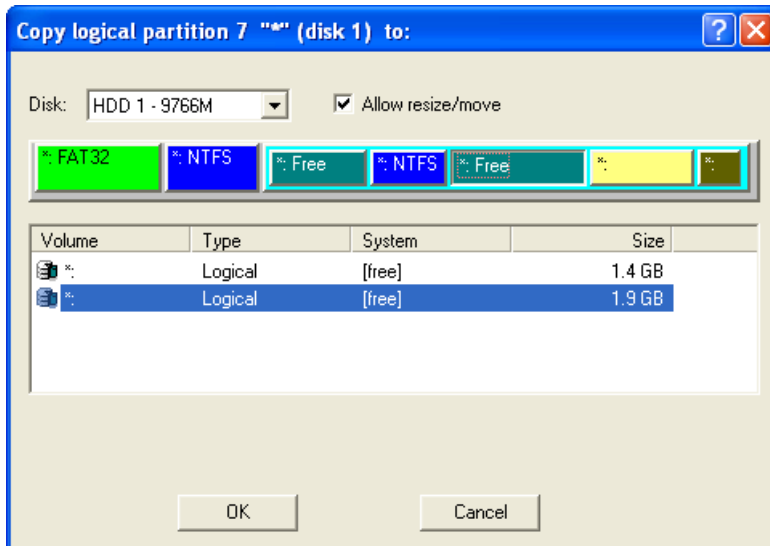
If the *List of Available Places* remains empty, there is no appropriate place to copy the selected partition. Choose another hard disk for duplicating the partition.

#### Allow resize/move

Set this checkmark to allow the program to simultaneously change the size of the duplicate partition during the copying process. In Drive Backup, this feature is named *autoresize*.

The state of the checkmark affects the *List of Available Places* and the available functionality of executing the operation (see [Comments](#) for more details).

If the checkmark is marked, the *List of Available Places* includes blocks of free space that are larger than the amount of data on the selected partition (see the picture below). The partition can fit additional free blocks in case it performs partition shrinking.



On the picture: the 2<sup>nd</sup> partition was selected to copy. Initially, it can be copied only to the logical block of free space. After *resize/move* enabling, the selected partition can also be copied to the primary block of free space (because this free block is larger than the amount of on-partition data).

#### Place at beginning of free block

#### Place at end of free block

These radio buttons allow fast aligning of the partition to the right or the left edge of the selected block of free space.

When the **Allow resize/move** checkmark is deactivated, the position of the duplicate partition is selected.

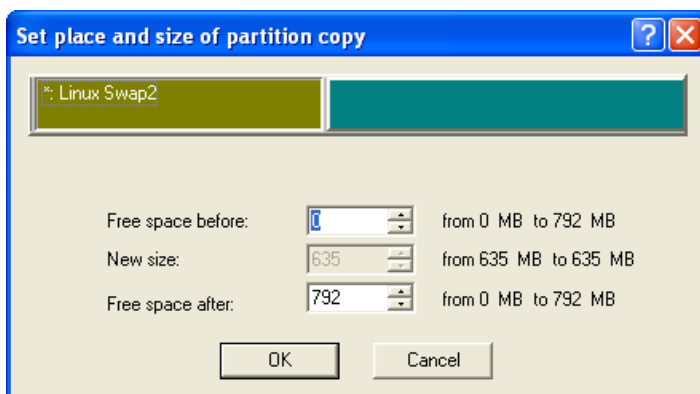
In case the **Allow resize/move** checkmark is marked, the program ignores the state of these radio buttons but uses the *Resize/Move Partition* dialog for defining the position and size of the duplicate partition.

#### The List of Available Places

Finally, select an item on the *List of Available Places*. The program will copy the partition to the selected block of free space.

#### 4.9.3.2 Resizing & moving the duplicate partition

In case the **Allow resize/move** checkmark is marked, the program automatically runs the [Resize/Move Partition](#) dialog to accurately define the position and size of the duplicate partition:



Use three spinner controls or the drag-&-drop technique to locate and change the size of the duplicate partition.

The Partitions Visualization Panel and spin controls are synchronized, and thus when changing any one of these elements it affects all other ones as well.

**Behavior of spin controls:**

<b>Free space before</b>	Moves the beginning of the partition (left edge), preferably maintaining the partition size.
<b>New Size</b>	Changes the size of the partition, preferably maintaining the starting position (left edge).
<b>Free space before</b>	Moves the end of the partition (right edge). On increasing the value, it (preferably) maintains the partition size. On decreasing the value, it (preferably) maintains the starting position (left edge) so that the partition expands.

There are rules that affect the partition resizing. See the section [How Drive Backup evaluates space available for partition copying](#) for more details.

**4.9.4 Comments****4.9.4.1 How Drive Backup evaluates space available for partition copying**

In case of copying a partition without changing its size, the program uses the following rules when placing the duplicate partition:

**For partitions that are copied in the *sector-to-sector* mode:**

1. The program always keeps the partition size. The resizing is not available.
2. The starting position of the partition (the left edge) is aligned to the boundary of the corresponding cylinder, in accordance with the rules of the DOS partitioning scheme.
3. The ending edge remains "as is". In particular, it can become unaligned to the boundary of the corresponding cylinder (for example, after copying the primary partition to the Extended Partition or after copying the logical partition outside the Extended Partition).

**For partitions of *known types* that are copied in the *fast copying* mode:**

1. The beginning and ending edges of the duplicate partition are aligned in accordance with the rules of the DOS partitioning scheme:
  - ⇒ Ending positions of all partitions are aligned to the end of corresponding cylinders.
  - ⇒ Starting positions of logical partitions are aligned to the second track (track #1) of corresponding cylinders.
  - ⇒ The beginning of the most first primary partition, which begins from the cylinder#0, is aligned to the track #1.
  - ⇒ Starting positions of other primary partitions are aligned to beginning of corresponding cylinders.
2. In case of copying a partition without changing its size, the program keeps the amount of cylinders that a partition holds. So that:
  - ⇒ Primary partitions are slightly reduced when they have been copied to the Extended Partition.
  - ⇒ Logical partitions are slightly expanded when they have been copied outside the Extended Partition.

In case of copying a partition and simultaneously changing its size, the program uses the following rules for placing the duplicate partition:

1. The partition boundaries are aligned in accordance with the rules of the DOS partitioning scheme.
2. The size of the partition can be selected between the following values:
  - ⇒ It cannot exceed the size of the selected block of free space
  - ⇒ It must be larger than the on-partition used space.
  - ⇒ The used space is estimated as the summary size of clusters that are used by files, directories and file system metadata.

The program tries to keep important partition parameters such as the *File system Type* and the *Cluster Size* intact where possible.

Thus, the program does not change these partition properties for NTFS and FAT32 partitions within the large range of partition size values.

This is not so with FAT16 partitions: the doubling of the partition size usually requires the *Cluster Size* doubling. Drive Backup automatically performs a cluster size modification when changing the partition size.



In addition, the size of FAT16 partitions is limited to the value of 2GB. Windows NT 4.0 supports FAT16 partitions up to 4GB in size (in this case the *Cluster Size* value is 64K). Unfortunately other operating systems do not support 64K cluster size. Drive Backup supports the 64K cluster size (see [Settings overview](#)).

#### 4.9.4.2 Converting FAT16 to FAT32 during the automatic resizing

FAT16 partitions are limited to the value of 2GB (see comments above). Nevertheless, Drive Backup enables the expanding of FAT16 partitions over the 2GB boundary. In fact, the program can automatically convert the FAT16 file system to FAT32. In case such conversion is required, the program displays the warning message.

There is the ability to inhibit this warning (see chapter Settings overview, section [General settings](#)):

(menu) **General > Settings...** > (page) **General > (checkmark) Convert FAT16 to FAT32 automatically**

In this case, the program automatically converts FAT16 partitions to FAT32 without warning.

#### 4.9.5 Copying Locked and System Partitions

Drive Backup allows to copy locked and system partitions. In case other software or the operating system modifies contents of the partition being copied, the program stops the operation as it cannot make the valid duplicate. To complete the copying of a locked/system partition, Drive Backup reboots the system to a single-tasking environment in order to eliminate the interference of other programs.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

See the section [Working with locked/system partitions and hard disks](#) for more details.

##### 4.9.5.1 Copying locked partitions in Windows NT, 2000 and XP

In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase to operate the locked partitions:

1. Before starting the operation, the program checks whether the partition is locked or not.
2. If the partition appears to be locked, the program requests a system reboot. Press the **OK** button to reboot the system and complete the operation. Press the **Cancel** button to abort the operation.

By default, the program pauses the execution until the user makes the choice.

3. The program silently schedules the *BlueScreen Component* to run the next Windows startup and to execute the required operation.
4. Then the program reboots the computer.
5. At the next system boot-up, the Bluescreen Component executes the operation in place of the Windows-based version. The BlueScreen Component will display the operation progress in a console-like style.

##### 4.9.5.2 Copying locked partitions in Windows 95 and 98

Windows 95 and 98 include the limited version of the MS-DOS 7. The "true" DOS environment is available after booting to the DOS session (do not confuse this with the *DOS prompt* in the Windows session).

1. Initially, the program tries to copy the partition without rebooting to DOS. The operation continues until the end or until another software writes to the original partition.
2. When the original partition has been modified, the program asks for a reboot of the system. Press the **OK** button to reboot the system and complete the operation, press the **Cancel** button to abort the operation.
3. The application passes the task unnoticeable for the user to the DOS-based version of the Drive Backup. Then the Windows-based application simply runs the DOS-based program.
4. The DOS-based version of the Drive Backup is configured (through the .PIF-file) to run in the true DOS session. Windows should reboot to the DOS session.
5. The DOS-based program works in the unattended mode displaying the operation progress and statistics.
6. When the operation has been completed, the program reboots the computer.

##### 4.9.5.3 Using the Drive Backup diskette in Windows ME

The diskette-based version of Drive Backup can work either in the interactive mode or in the batch mode. In both cases, it can copy partitions as in the Windows-based version.

There are some functionality limitations of the diskette-based version of Drive Backup. These limitations arise from the unavailability of some services in the DOS environment that are available in Windows:

- In the unattended mode, the program unconditionally aborts the operation in case bad sectors are detected, missing the image file or similar problems. To obtain the user-friendly behavior of Drive Backup, run the program in the interactive mode
- The diskette-based version may not work with SCSI and RAID controllers that do not have their own BIOS
- Remember that DOS may fail to access large partitions. For instance, MS-DOS does not work with partitions that are larger than 8GB
- Your computer must have the ability to boot from floppy

The preferred solution is to use the Paragon Recovery CD instead of the bootable diskette.

## 4.10 Copy Hard Disk

This chapter explains how to copy contents of local hard disks to other ones under various conditions.

### 4.10.1 Overview

Drive Backup provides the ability to copy not only separate partitions but also entire hard disks.

During the hard disk copying process, the program moves controlling records of used *partitioning scheme*, the bootstrap code and on-disk partitions. The *Hard Disk Copying* operation cannot be substituted by simply copying all on-disk partitions.

Generally, Drive Backup allows the user to copy hard disks that are partitioned with any partitioning scheme, in the *sector-to-sector copying mode* (see [Fast copying algorithm](#)). For disks that use *DOS partitioning scheme*, the program provides many functional extensions for the disk copying operation:

- Drive Backup supports the [fast copying mode](#) for partitions of [known file system types](#). This functionality significantly reduces the elapsed time for disk copying because the program transfers only the used data.
- In case the disk contains partitions of both *known* and *unknown* file system types, the program automatically switches between fast copying and sector-to-sector modes.
- Drive Backup provides the ability of automatic proportional *resizing* of all partitions, which have known file system types, during the operation. This functionality extension may be very useful in upgrading hard disk(s) to larger ones.
- Finally, Drive Backup supports selective copying of partitions. Some partitions can be skipped, others can be copied more than once, changing their size, relative order and position.

Drive Backup duplicates disks in a way that allows successfully migrating boot managing software to another hard disk. For example, standard bootstrap code, Paragon Boot Manager and LILO can successfully work on cloned hard disks without re-installation.



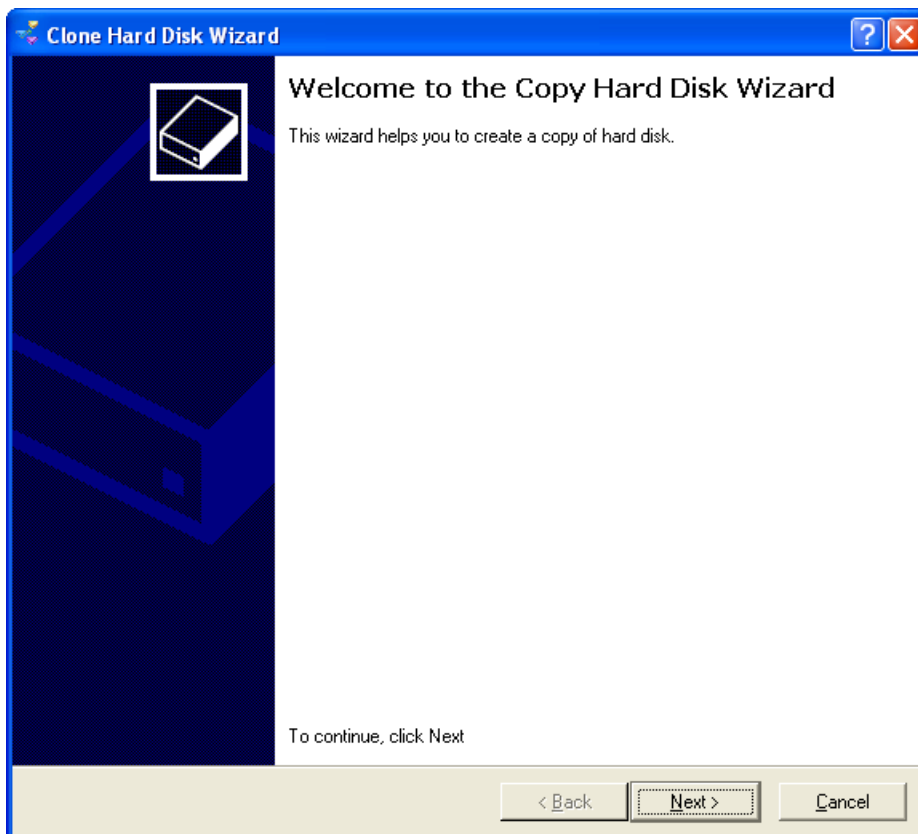
By using the *Copy Hard Disk* operation, the program irreversibly destroys old contents of the targeted hard disk, replacing them with new data and the new layout of partitions

### 4.10.2 Initiating the Operation

Select in the main menu:

**Wizards > Copy Disk**

After the *Copy Disk Wizard* opens its first page:

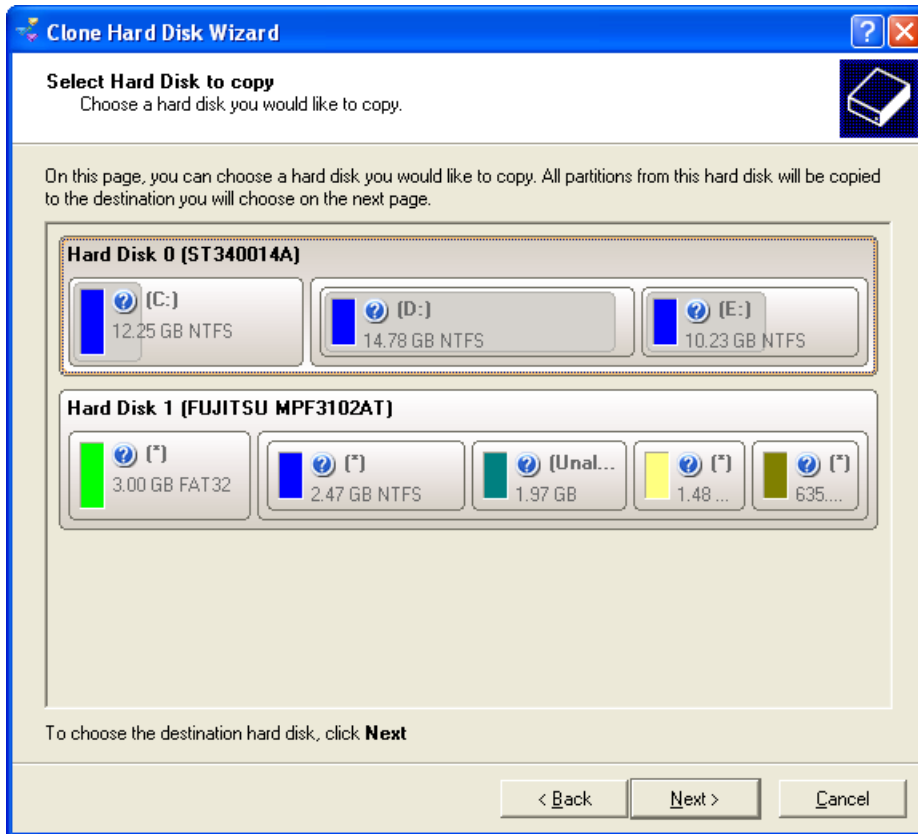


This page informs the user what kind of tasks the wizard is able to assist with.

Click on the “Next” button to continue.

The second page of the Wizard displays the local disks layout allowing the user to select a hard disk to be copied. Available disks and their partitions are represented on the Partitions Visualization Panel, elements of which allow estimating introduced changes. Here the user can see the following partition parameters:

- a hard disk number assigned by the operating system,
- the hard disk model,
- a file system type,
- the volume of used space on each partition
- the free disk space.



The selected disk is shaded with diagonal hatch.

Click on the Next button to continue working with the Wizard.

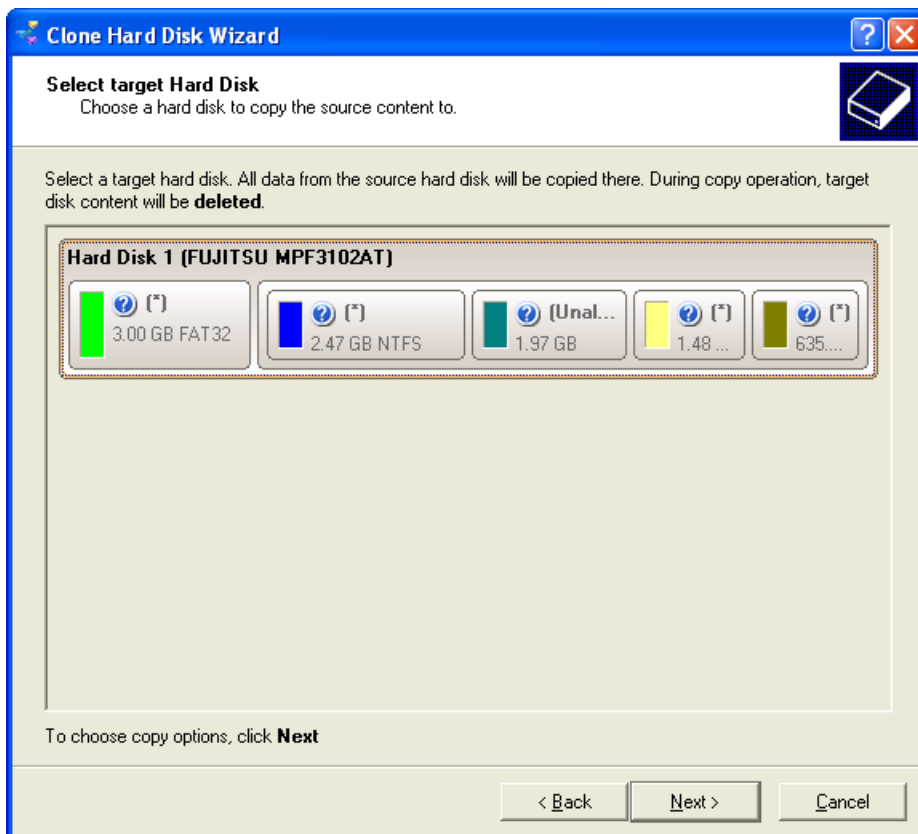
On the third page the user is able to see the layout of disks where the selected disk would be copied. The page contains every fixed hard disk available in the system, except for the source hard disk.

By default, the 1<sup>st</sup> hard disk on the List is selected. Be careful when changing the targeted hard disk, if you do not intend to overwrite all the contents of Disk#0.



All information on a disk, which is selected as a target will be destroyed

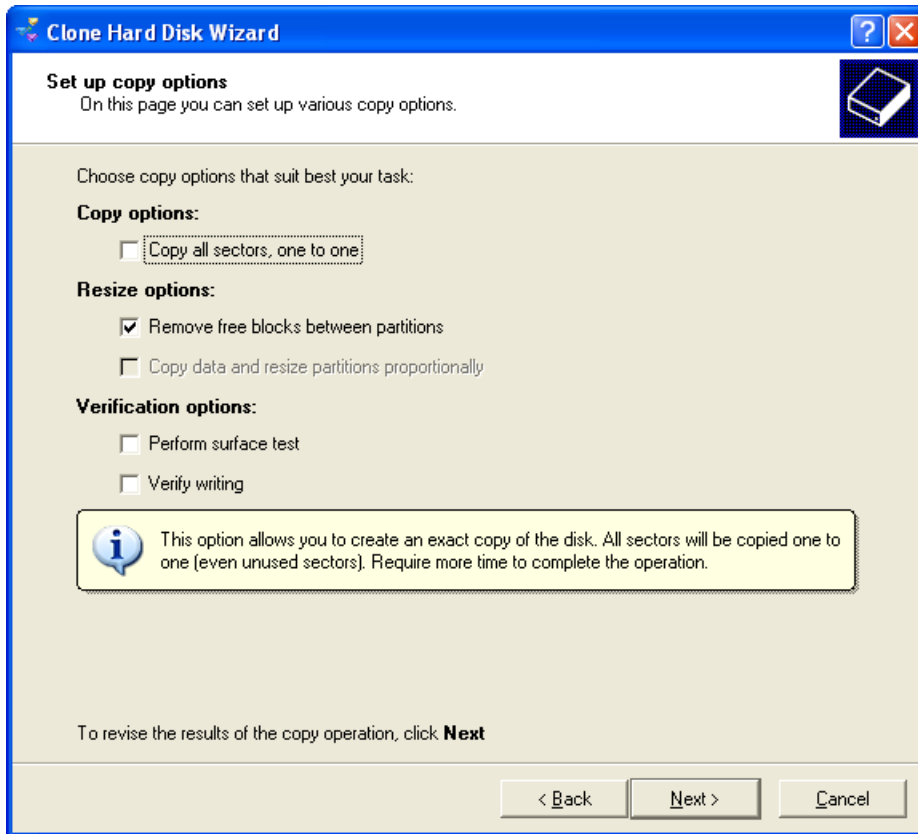
Select a destination disk and then click on the Next button.



The fourth page is attended for setting the parameters of the copy operation. The parameters are subdivided into three sections:

- Copy options
- Resize options
- Verification options

Each section contains one or more checkboxes. To switch an option simply tick the corresponding checkbox.



### Copy options

This section contains the option that allows setting the so-called [sector-to-sector copy mode](#).

### Resize options

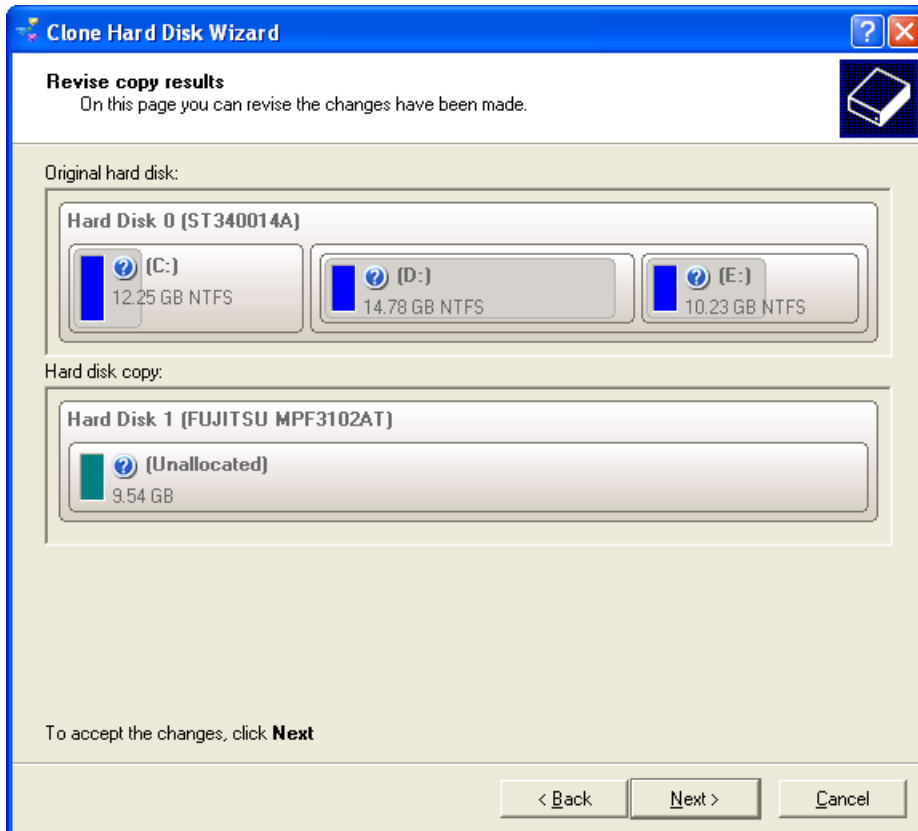
This section allows switching on two useful options:

- Remove free blocks between partitions. If this option is active, the program does not keep blocks of free space between partitions on the targeted hard disk.
- Copy data and resize partitions proportionally. If this option is active, the program changes the size of partitions in the same proportion keeping their relative order intact. The option can be useful when upgrading a hard disk to a larger one.

### Verification options

This section allows the user to define a set of fault detection tests including *the Surface test* and the *Writing Verification test*.

By clicking on the Next button the Revise operation result page appears. The page allows you to revise the planning changes of the disk layout. The user can compare states of the disk structure before and after the Wizard job. The information is represented in the graphical variant. If all the changes are acceptable please click on the "Next" button to continue or correct the operation parameters.



By clicking on the “Next” button you accept the planned changes and start the copying process.

When the operation finishes, the last page will open which informs you about completing the planned actions.

### 4.10.3 Running the Operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The program displays information concerning the operation performance.

The program treats the copying of each partition as a suboperation, and the program displays suboperation statistics.

The operation is lengthy. The true performance fundamentally depends on the hardware and the operating system being used.

### 4.10.4 Comments

#### 4.10.4.1 Cloning the system hard disk in Windows 2000 and XP

Drive Backup is frequently used for cloning or distributing system hard disks. In case of performing this action with Windows 2000/XP system disk, a specific procedure is required in order to avoid problems with the duplicate hard disk.

1. Connect both source and destination disks to the computer. Boot the computer and run Drive Backup (any version for any platform).
2. Using Drive Backup, clone the source disk to the destination one.
3. (!) Shutdown the computer.
4. (!) Disconnect (physically) the source hard disk.
5. (!) Boot the computer from the destination hard disk. No problems should occur during the startup process.

After completing these actions, you can use both hard disks separately or together on the same computer without any problems.

Consider that Windows 2000 and XP keep information of all mounted and dismounted partitions on all hard disks that have been connected to the system in a special database. Partitions are identified by the hard disk serial number and the relative partition's order. The database of partitions is periodically updated. During cloning hard disks, this database is duplicated on the destination disk.

Usually, users do not perform two last steps, i.e. they remain the source hard disk connected at the initial startup of the destination disk. At startup, Windows finds the old hard disk, retrieves the drive letters of its partitions from the old records, adds new drive letters for partitions on the destination disk, and updates the database.

After the source disk has been disconnected, the single destination disk becomes unused: Windows is unable to boot from this disk because essential system data is associated with absent drives.

#### 4.10.5 Working with Locked and System Hard Disks

The *Copy Hard Disk* operation requires that both source and destination hard disks are to be unlocked (see [Glossary](#)):

- The program needs to destroy contents of the destination disk at the beginning of the operation. If a partition on the destination disk is locked, an operating system or other applications are still able to use this partition. The untimely deletion of disk contents may violate functionality of other software.
- The program requires the contents of the source disk to remain unchanged during the data copying process. If some partitions on the source disk are locked, other software can modify the disk contents. In this case, the program cannot copy disk contents securely.

To complete the disk copying of/to a locked/system hard disk, Drive Backup reboots the system to a single-tasking environment in order to eliminate the interference of other programs.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

Generally, the copying of locked hard disks is like copying locked partitions.

### 4.11 Create Partition

This chapter explains how to create new partitions by using Drive Backup ; in addition, it contains the description of partitioning rules and limitations.

#### 4.11.1 Overview

Drive Backup provides the ability to create new partitions on partitioned hard disks by using the *DOS partitioning scheme* (see [Glossary](#)).

##### 4.11.1.1 Restrictions

1. The program allows creating new partitions only within blocks of unpartitioned space. It cannot "convert" a free space on an existing partition to a new partition!  
The procedure for creating a new partition from a free space on an existing partition is described in the section [How to make a new partition from a free space in another partition](#).
2. Do not use the *Create Partition* function in order to undelete the last deleted partition. Use the [Undelete Partition](#) function instead.
3. The program cannot create new partitions on *Dynamic Disks*. The current version of the program supports only hard disks that use the *DOS partitioning scheme* (in Windows 2000 and XP these disks are named *Basic Disks*).
4. Empty hard disks are automatically partitioned with the *DOS partitioning scheme*, creating a partition of any type.
5. New partitions are aligned to the boundaries of the beginning and ending cylinders in accordance with the rules of the *DOS partitioning scheme* (see [Partition alignment rules](#)).
6. According to rules of the DOS partitioning scheme, some combinations of partitions cannot be created:
  - ⇒ Two (2) Extended Partitions on the hard disk cannot be created.
  - ⇒ Five or more Primary partitions on the hard disk cannot be created.
  - ⇒ In case the Extended Partition is on the disk, only three (3) Primary partitions are allowed on the hard disk.
  - ⇒ In case four (4) Primary partitions are already present on the disk, the Extended Partition cannot be created.

However, the number of Logical Partitions is not limited.

#### 4.11.2 Initiating the Operation

The actions you should make are similar to the ones required for initiating other operations.



### Step 1. Select a location of a new partition

Select a block of free space (unpartitioned disk space) in the Tree Layout panel, or on the Partitions Visualization Panel, or on the List of Partitions. The newly created partition will be located within the selected free block.

The program differentiates between *Primary* free space and *Logical* free space:

- Within the *Logical* free space, only *Logical* partitions can be created
- Within the *Primary* free space, *Primary* partitions or the Extended Partition can be created only when the partitioning rules are not violated (see [Limitations of the DOS partitioning scheme](#))

### Step 2. Select the operation to perform

Variants:

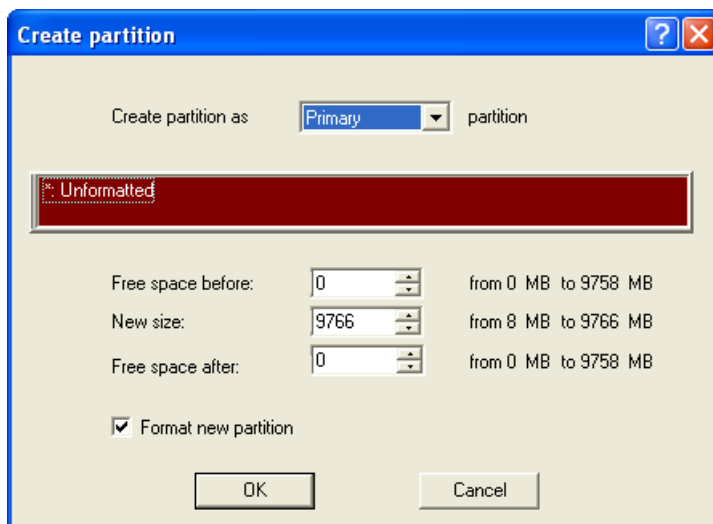
- Select in the main menu:  
**Partition > Create ...**
- Call the *popup menu* for the selected block of free space in any of layout panels (right click of the mouse button), then select the menu item:  
**Create...**
- Press the **Alt+N** keyboard combination
- Press the **Create** button on the Main Toolbar.

### Step 3. Assign properties of a new partition

After selecting a free block, the *Create Partition* dialog appears.

The *Create Partition* dialog allows the user to assign the accurate position and size of a new partition. In addition, there is the ability to format a new partition after it has been created.

## 4.11.3 Description of the Parameters



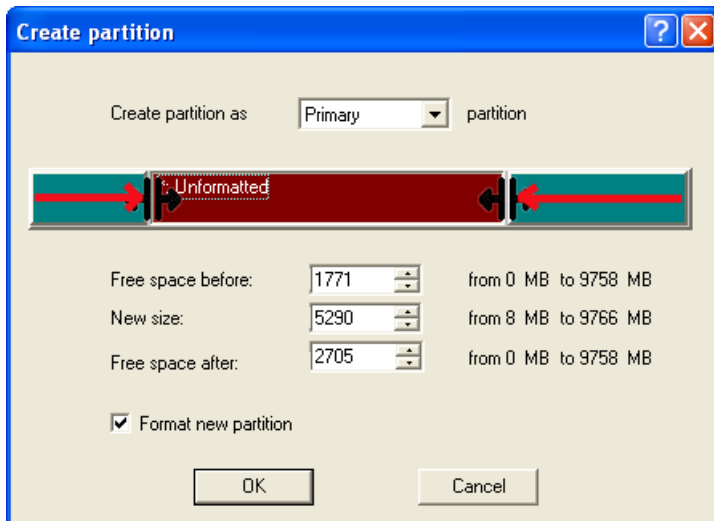
### Create partition as ...

Select the desired kind of new partition in this pull-down list. As a matter of fact, the available alternatives fundamentally depend on the type of the selected block of free space:

- Within the *Logical* free space, only *Logical* partitions can be created
- Within the *Primary* free space, *Primary* partitions or the Extended Partition can be created, in case the partitioning rules are not violated (see [Limitations of the DOS partitioning scheme](#))

### New Size, Free Space Before, Free Space After

The capacity of the new partition must not exceed the size of the selected block of free space. You can freely define the position and size of the new partition within the targeted block of free space by using the [Partitions Visualization Panel](#):



In addition, you can use three *spinner* controls placed at the bottom:

- The **Free space before** spinner control defines the position (in MB) of the new partition relative to the beginning of the block of free space.
- The **New size** spinner control defines the size (in MB) of the new partition.
- The **Free space after** spinner control defines the amount of trailing free space (in Mb) at the end of the new partition.

#### How the spin controls behave:

<b>Free space before</b>	Moves the beginning of the partition (left edge), preferably by maintaining the partition size.
<b>New Size</b>	Changes the size of the partition, preferably by maintaining the starting position (left edge).
<b>Free space after</b>	Moves the end of the partition (right edge). On increasing the value, it (preferably) keeps the partition size. On decreasing the value, it (preferably) keeps the starting position (left edge) so that the partition expands.

The *Partitions Visualization Panel* and *spinners* are synchronized, changing any of these elements affects all other as well.

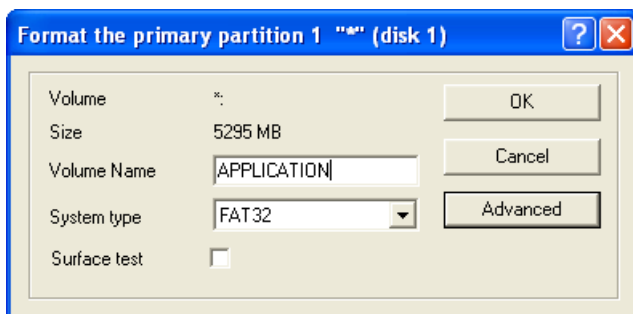
For real partition creation, the program will approximate these values to accommodate user-defined values to the partitioning rules that are effective for the *DOS partitioning scheme* so that the final values may slightly differ from the entered ones.

#### Format new partition

The program allows the user to fill the new partition with a file system.

Activate this checkmark in order to immediately format the newly created partition. Otherwise, the partition will remain unformatted (so that it will not be ready for usage).

The program allows defining parameters of a file system that will occupy the new partition by calling the *Format Partition* dialog (see the next section).

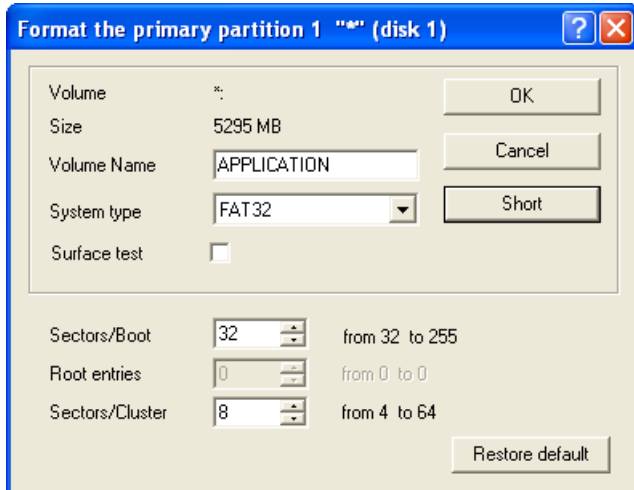


#### 4.11.3.1 Formatting a new partition

The appearing *Format Partition* dialog is identical to the one described in the chapter [Format Partition](#).

The simple form of the dialog allows the user to select the File system Type and define the so-called *Volume Label* for the partition.

The advanced form of the dialog allows the user to define important file system properties such as *Cluster Size* (**Sector/Cluster** spinner control) and amount of sectors per boot code (**Sector/Boot** spinner control). For FAT16 file system, the amount of *Root Entries* can be changed as well:



#### 4.11.4 Comments

##### 4.11.4.1 Limitations of the DOS partitioning scheme

The current version of Drive Backup fully supports the *DOS partitioning scheme*. The program follows the limitations of the DOS partitioning scheme when creating new partitions.

##### Practical limitations

- Only one Extended Partition can be created on a hard disk.
- Only four Primary Partitions can be created on a hard disk, or three Primary Partitions and one Extended Partition.
- The number of Logical Partitions within the Extended Partition is not limited.
- All newly created partitions are aligned in accordance with rules of the DOS partitioning scheme and the current disk geometry (see the section [Partition alignment rules of the DOS partitioning scheme](#)).
- The program does not change the order of *entries* in the *Partition Table* for existing partitions (see the section [Order of Partitions](#)).

##### 4.11.4.2 General structure of the DOS partitioning scheme

The DOS partitioning scheme keeps the information of partitions located on the disk in the *Partition Table*. The *Partition Table* consists of elements, which describe partitions: location, size, file system type and "Active" flag. These elements are usually named *entries* or *slots* of the Partition Table.

The first sector of the hard disk (sector #0) is occupied with the *Master Boot Record* (MBR). It contains the primary part of the Partition Table and the so-called *bootstrap code* – a very small program responsible for the initiation of the boot-up process.

##### Primary Partitions

The primary part of the Partition Table contains only four entries. The partitions that are registered in these records are named *Primary Partitions*. It is only possible to have a maximum of four primary partitions on the disk.

The specific property of primary partitions is that the standard *bootstrap* is able to initiate operating systems from them.

##### Extended Partition

One of the primary partitions can be marked as the *Extended Partition*.

The Extended Partition is used to expand the Partition Table in order to provide the ability of allocating many partitions. The Extended Partition begins with the extension of the Partition Table, which sometimes is named *Extended Partition Table* (EPT).

### Logical Partitions

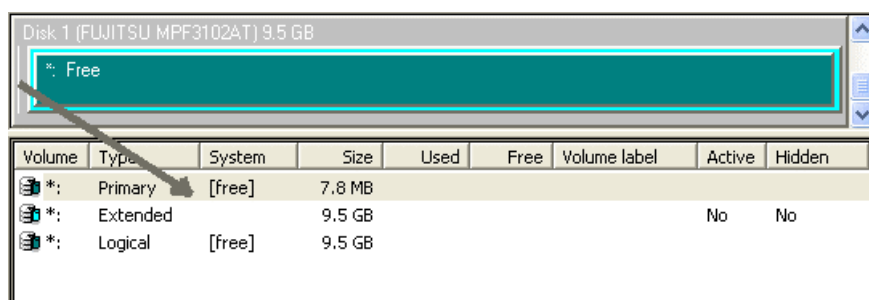
Partitions that are registered in the Extended Partition Table are named *Logical Partitions*. All Logical Partitions must be nested within the Extended Partition. The number of logical partitions is not limited.

#### 4.11.4.3 Partition alignment rules of the DOS partitioning scheme

While creating new partitions, Drive Backup follows common *partition alignment rules* that are compatible with all operating systems and disk management utilities.

#### Alignment rules

1. The *ending edge* of every partition is aligned to the end of the appropriate cylinder.
2. The Primary Partition, which is located at the beginning of the hard disk, starts from the 1<sup>st</sup> Track of the 0<sup>th</sup> Cylinder. The 0<sup>th</sup> Track is occupied by the *MBR* and boot managing software.
3. Other Primary Partitions start from the beginning of the appropriate cylinders.
4. Logical Partitions start from 1<sup>st</sup> Tracks of appropriate cylinders. The 0<sup>th</sup> tracks of these cylinders are occupied by the *EPT* records.
5. The Extended Partition should start from the beginning of the first cylinder that it occupies. In case the Extended Partition is located at the beginning of the disk, it starts from the 1<sup>st</sup> Cylinder (see the picture below) because the beginning of the 0<sup>th</sup> Cylinder is occupied by MBR.



An unused part of the 0<sup>th</sup> Cylinder potentially can be used for the creation of a small Primary Partition.

#### 4.11.4.4 Order of Partitions

The *order of partitions* may affect the partition accessibility and the assignment of drive letters in various operating systems: DOS, Windows and Linux are among them. The creation of a new partition can change their relative order and violate references to partitions.

Partitions can be enumerated by their natural location on a disk, or by the index of respective *entries* in the *Partition Table*. Generally, these enumerations are not identical: the order of entries coincides with the natural order of partitions for Logical Partitions, however, this is not true for Primary Partitions.

From here on problems may occur:

- Linux enumerates partitions according to the order of entries. The creation of a new partition in front of existing partitions changes references to sequent partitions on the disk. These changes are taken in effect at the system reboot.

Disk	Partition	Symbolic name in Linux
1 <sup>st</sup>	1 <sup>st</sup> primary	/dev/hda1
	2 <sup>nd</sup> primary	/dev/hda2
	1 <sup>st</sup> logical	/dev/hda5
2 <sup>nd</sup>	1 <sup>st</sup> primary	/dev/hdb1
	1 <sup>st</sup> logical	/dev/hdb5

- Windows 95, 98 and ME use a rather intricate algorithm for assigning drive letters to partitions of supported type. A creation of a new FAT16/FAT32 partition on any of hard disks may shift drive letters after the system reboot. This operation does not only affect drive C:.

- Generally, Windows NT, 2000 and XP save the physical location of all partitions in the Registry and use this information for assigning drive letters. The creation of a new partition does not violate drive letters of *mounted partitions*.

There is another problem with Windows NT, 2000 and XP. The OS loader (NTLDR in these systems) enumerates primary partitions by the number of respective entry in the Partition Table. Partitions numbers are used by NTLDR for locating the *Windows System Partition* during the startup. The creation of a new primary partition may rarely lead to the inability to start Windows NT/2000/XP. It is impossible to observe all probable scenarios, but the creation a new primary partition **before** the system partition is a potentially dangerous operation!

In addition, the problem of changing the order of primary partitions can be solved by editing the BOOT.INI system file that is responsible for configuring NTLDR (see [Glossary](#)).

Drive Backup does not change the order of entries in the Partition Table. Such logic allows avoiding the problem mentioned above in many cases.

The other side of the problem is that *Windows Disk Administrator* system utility automatically re-sorts entries in the Partition Table according to the natural order of partitions, without making corrections in system files. When new primary partitions are created with the Windows Disk Administrator, and in case alternate use of both Drive Backup and Windows Disk Administrator, Windows bootable files may be left disorganized.

## 4.12 Format Partition

This chapter explains how to format existing or newly created partitions with Drive Backup; in addition, it discusses some file system limitations related to the *Format* function.

### 4.12.1 Overview

A partition should contain some *file system* to be used for keeping data; a partition itself is only a continuous range of disk space that is marked as "exploitable" in the *Partition Table* (see [Glossary](#)).

The process of installing a file system is commonly known as *formatting*. There are a large variety of file systems have been developed. Drive Backup can format partitions of the following file systems:

- FAT12 & FAT16
- FAT32
- NTFS
- Ext2
- Ext3
- ReiserFS
- Linux Swap v. 2
- HPFS

#### 4.12.1.1 Restrictions

The current version of Drive Backup creates NTFS ver. 1.2 (it corresponds to abilities of Windows NT 4.0). For this reason, the feature *Access Quotas* is not available on NTFS partitions formatted with Drive Backup . To obtain the *Access Quotas* feature, use the Windows 2000/XP FORMAT tool instead.

### 4.12.2 Initiating the Operation

The actions you should make are similar to the ones required for initiating other operations.

#### Step 1. Select a partition to be formatted

Select an existing *Primary* or *Logical* partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions. The operation is not enabled for the Extended Partition and for blocks of free space.

#### Step 2. Select the operation to perform

Variants:

- Select in the main menu:

**Partition > Format...**

- Call the *popup menu* for the selected partition, then select the menu item:

#### Format...

- Press the **Alt+F** keyboard combination
- Press the **Format** button on the Main Toolbar.

### Step 3. Assign format properties

After selecting the operation, the *Format Partition* dialog appears (see [Description of the parameters](#)).

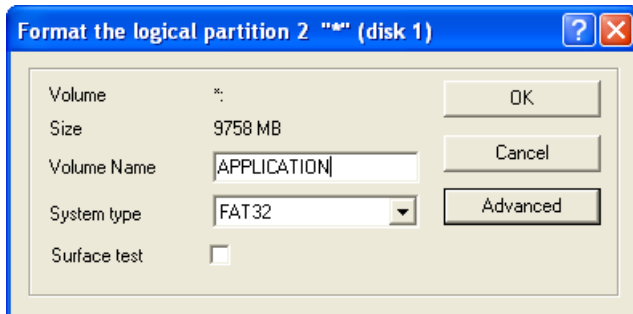
The *Format Partition* dialog allows the user to define the label of the partition and to choose the file system type, which should be placed on the partition.

In addition, there is the ability to control important parameters of the installed file system such as *cluster size*, amount of entries in the *Root* directory and size of the on-partition boot area.

### 4.12.3 Description of the Parameters

The program provides the *Simple* and the *Advanced* forms of the *Format Partition* dialog.

The *Simple* form allows the user to select the file system type and define the volume name:



#### Volume Name

Enter the *Volume Name* for the selected partition in this textual field. The Volume Name is an unimportant parameter of a logical drive that can be used for drive identification. See the chapter [Glossary](#) for more details on *Volume Name*.

#### System type

Select the desired file system type from this pull-down list. By default, the program suggests keeping the File system Type and the Volume Name.

The program allows the user to create the following file systems:

- FAT12 & FAT16
- FAT32
- NTFS
- Ext2
- Ext3
- ReiserFS
- Linux Swap v. 2
- HPFS

In fact, the program displays only file systems that can be correctly placed to the selected partition, taking the capacity of the selected partition into account. For example, the program will not allow FAT16 file system for partitions that are larger than 2GB, or FAT32 for partitions that are less than 128MB. Look at section [Capacity limitations for different file systems](#) for more details.

#### Surface test

Set this checkmark so that the program performs the surface test on the formatted partition. In this case, the program will find bad and unreliable sectors and mark them unused in the *file system metadata*.

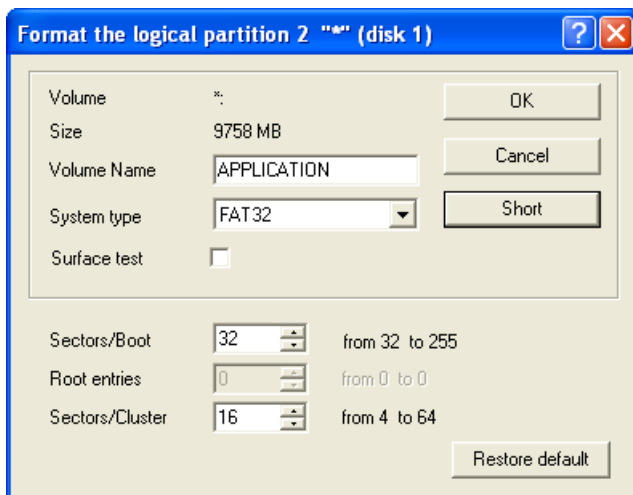
The program supports several levels of surface test thoroughness (see the description of the *Surface test* option in chapter Settings overview, section [General settings](#)):

Surface Test used during format	Surface Test level in the Settings	Description
Normal	None	No surface test
Normal	Normal	Single-pass read test
Extreme	Extreme	Three-pass read & write test

### Advanced (button)

Press this button to access advanced format features. The Advanced form of the *Format Partition* dialog allows the user to control important parameters of the installed file system:

- Cluster Size
- Amount of entries in the Root Directory
- Size of Boot Area



### Sectors/Boot

This parameter is available exclusively for FAT16 and FAT32 file systems.

Set the number of sectors to be reserved for the boot area on the partition in this *spinner* control. The program relies on the rules of FAT file systems when the available range and default value for this parameter are to be determined.

### Root entries

This parameter is available exclusively for FAT16 file system.

Set the maximum amount of files/directories to be placed in the Root Directory on the FAT16 partition. The program relies on the rules of FAT16 file system when the available range and default value for this parameter are to be determined.

In FAT12 and FAT16 file systems, the Root Directory is the essential directory. The capacity of the Root Directory cannot be changed until the partition has been re-formatted.

For example, you have formatted FAT16 partition so that the capacity of the Root is 64. Then, if you populate this partition with files, you are unable to place more than 64 files in the root of the volume. The only way to place more files in the root is to create directories and place files inside these. Nevertheless, you are still unable to make more than 64 directories in the Root directory.

### Sectors/Cluster

This parameter is available for all [known file systems](#) (excepting HPFS and Linux Swap 2).

Define the *Cluster Size* for the formatted partition in this *spinner* control. The program relies on the rules of these file systems when the available range and default value for this parameter are to be determined.

Drive Backup reports the Cluster Size value as the *Sectors per Cluster* ratio. To get the Cluster Size in KB, simply divide this value into half.

The important file system parameter: the *Cluster Size* affects significant characteristics such as the input-output performance of file operations on the volume, the waste space percentage and so on. In Windows 2000 and XP, some advanced features of the NTFS file system are only available in case the *Cluster Size* is 4KB or less.

#### Restore default (button)

Press this button to reset to the default values of the *Cluster Size*, *Amount of Root Entries* and *Size of Boot Area* parameters.

#### Short (button)

Press the button to return to the Simple form of the *Format Partition* dialog. This form includes the Format Partition function, which applies the default values for the *Cluster Size*, *Amount of Root Entries* and *Size of Boot Area* parameters for the partition being formatted.

### 4.12.4 Running the Operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The formatting takes only a few seconds: it simply makes clean file system metadata and an empty Root Directory.

However, the Surface Test suboperation can take some time. The real value of the elapsed time fundamentally depends on the size of the new partition, hardware performance and the software platform being used.

On modern disk models, the *Normal* surface test may take 0.5 - 2 minutes per 1GB of capacity. For the *Extreme* surface test, the elapsed time is approximately 6 times more.

### 4.12.5 Comments

#### 4.12.5.1 Capacity limitations for different file systems

The maximum capacity varies for each file system. The maximum capacity is derived from the maximum cluster size available in the file system and from the maximum amount of clusters. The last value depends on the bit capacity of cluster index in the file system.

File system	Max Cluster	Max amount of clusters	Max partition capacity
FAT16	32K	$2^{16}$	2 GB
FAT32	32K	$2^{28}$	8 TB
NTFS	32K	$2^{64}$	$\sim 6 \cdot 10^8$ TB
Ext2/Ext3	4K	$2^{32}$	16 TB
ReiserFS	8K	$2^{64}$	$\sim 1.5 \cdot 10^8$ TB

#### 4.12.5.2 Default Cluster Size values

Capacity	NTFS		FAT32
< 512 MB	0.5 K	(1 sector/cluster)	4K
< 1 GB	1 K	(2 sectors/cluster)	4K
< 2 GB	2 K	(4 sectors/cluster)	4K
< 4 GB	4 K	(8 sectors/cluster)	4K
> 4 GB	8 K	(16 sectors/cluster)	4K
> 8 GB	16 K	(32 sectors/cluster)	8K
> 16 GB	32 K	(64 sectors/cluster)	16K

Windows 2000 and XP provide advanced services for NTFS partitions such as contents compression and encryption. These services are available only on partitions that have a cluster size of 4KB or less.

In case NTFS partitions are formatted with Drive Backup, take care to change the cluster size from the default value to 8 sectors / cluster in order to use advanced capabilities of NTFS partitions.

The table above exhibits default *Cluster Size* values for partitions of different size. NTFS partitions, which require manual diminishing of cluster size to enable advanced features of NTFS, are yellow-shaded.



#### 4.12.6 Formatting Locked and System Partitions

Drive Backup allows to format locked and system partitions. This operation requires the computer to be rebooted before completion. The partition formatting unconditionally destroys an existing on-partition file system, so that it violates any unfinished read-write activity.

To avoid the damage of data consistency, Drive Backup reboots the system to a single-tasking environment in order to eliminate the interference of other programs.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

As a matter of fact, the formatting of a partition, which is in use, may seem illogical (e.g. you are using a partition and want to destroy it at the same time). It is recommended to re-check your actions to avoid the destruction of used data.

### 4.13 Delete Partition

This chapter explains how to delete existing partitions with Drive Backup.

#### 4.13.1 Overview

Drive Backup allows the user to delete partitions on hard disks that have been partitioned with the *DOS partitioning scheme* (see [Glossary](#)). The program removes references to the partition from the *Partition Table*, so that information from the deleted partition becomes inaccessible. The freed disk space can be used to create more partitions or can be added to an existing partition.

Information from the deleted partition can be retrieved, in case the block of disk space remains unpartitioned. Drive Backup provides a convenient and powerful function called [Undelete Partition](#) that allows the user to find and restore deleted partitions within blocks of unpartitioned space.

Data from the deleted partition do not disappear from the disk but merely are unavailable in the operating system. Specially designed software allows retrieving an entire partition or separate files from it. In particular, confidential information can be analyzed and retrieved from deleted partitions.

##### 4.13.1.1 Restrictions

The current version of Drive Backup works exclusively with the *DOS partitioning scheme*.

#### 4.13.2 Initiating the Operation

These actions are similar to ones required for initiating other operations.

##### Step 1. Select a partition to be removed

Select a single existing partition of any kind (*Primary*, *Logical* or *Extended Partition*) in the Tree Layout panel, or on the Partitions Visualization Panel, or on the List of Partitions. The selected partition will be deleted.



In case the Extended Partition is selected, all *Logical* partitions within the Extended Partition will also be removed

##### Step 2. Select the operation to perform

Variants:

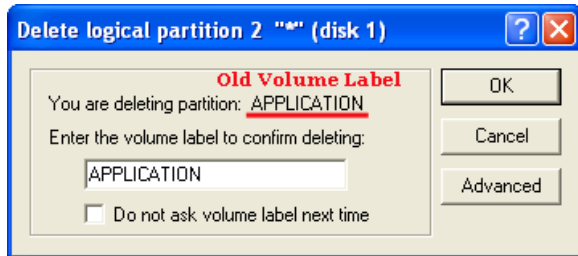
- Select in the main menu:  
**Partition > Delete...**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Delete...**
- Press the **Alt+D** keyboard combination
- Press the **Delete** button on the Main Toolbar.

### Step 3. Confirm the partition deletion

After selecting a partition, the *Delete Partition* dialog appears.

With the *Delete Partition* dialog, Drive Backup asks to confirm the partition removal. In addition, the program can wipe the partition during the deletion process.

#### 4.13.3 Description of the Parameters



##### You are deleting partition:

This text contains the current value of the *Volume Label* of the selected partition. In case the partition has no the *Volume Label* assigned to it, the "NO NAME" text will be displayed.

The Volume Label is used for additional deletion confirmation from the user.

##### Enter the volume label to confirm deleting:

To confirm the deletion of the selected partition, enter its Volume Label. The actual Volume Label value is displayed above.

When no *Volume Label* has been assigned to the partition, enter the text "NO NAME".

Generally, this confirmation is used to give the user a chance to rethink his actions.

##### Do not ask volume label next time

Mark this checkmark to inhibit the confirmation of partition deletion. This option is similar to the option in the program's settings (see chapter Settings overview, section [General settings](#)).

In fact, Drive Backup minimizes the hazard of an occasional deletion of a partition. The virtual deletion can be undone; in case partition has been physically removed, the [Undelete Partition](#) function enables the user to retrieve the partition.

#### 4.13.4 Running the Operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The deletion of a partition takes only a fraction of a second. However, the program waits until Windows accommodates the modification of the disk layout. This operation may take 5-20 seconds in Windows 2000 and XP.

#### 4.13.5 Comments

A deletion of partition(s) may disorganize the drive letters assigned to each partition in DOS and in Windows 95, 98, ME.

In Windows NT, 2000 and XP, a deletion of a primary partition, which was located in front of the Windows system partition, may lead to the inability to boot Windows. This problem can be solved by editing the BOOT.INI system file.

#### 4.13.6 Deleting Locked and System Partitions

Drive Backup allows the user to delete locked and system partitions. This operation requires the computer to be rebooted before completion. Deleting a partition disables the accessibility of the partition, so that it violates any unfinished read-write activity. In turn, this may lead to severe problems in the functionality of other software.

To avoid these kinds of problems, Drive Backup reboots the system to a single-tasking environment in order to eliminate the interference of other programs.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.

- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

As a matter of fact, the deletion of a partition being in use may seem illogical (e.g. you are using a partition and want to destroy it at the same time). It is recommended to re-check your actions to avoid the destruction of used data.

## 4.14 Undelete Partition

This chapter explains how to return to occasionally deleted partitions with Drive Backup.

### 4.14.1 Overview

Drive Backup provides the ability to find and recover deleted partitions. This function is usually known as "*undelete*". The undelete feature minimizes the hazard of occasional partitions deletion.

When deleting a partition, disk management software only removes the references to a partition in the Partition Table (see chapter [Delete Partition](#)) so that a previously deleted partition can still be recovered (in case of valid restoration of the record in the Partition Table). A restored partition will be fully functional, as long as other partitions were not created, moved or exceeded the disk space occupied by the partition. For this reason, the program enables the *Undelete Partition* function only for blocks of free space.

To find a partition, the program scans sectors to detect service structures of a file system, which were installed on a deleted partition. The program is able to find and correctly restore only Primary and Logical partitions of known file system types (see the section [Restrictions](#)).

Drive Backup identifies deleted partitions by the initial fragments of a file system. There have been situations when the program finds "phantom" partitions, i.e. spaces that only seem to be deleted partitions. The user can undelete a partition and then check a file system or browse its contents (using Drive Backup ) to see whether it is a real partition or not.

Usually, Phantom partitions do not pass the file system integrity check because their "contents" appear to be corrupted. The user can simply delete a phantom partition and make a new attempt.

#### 4.14.1.1 Restrictions

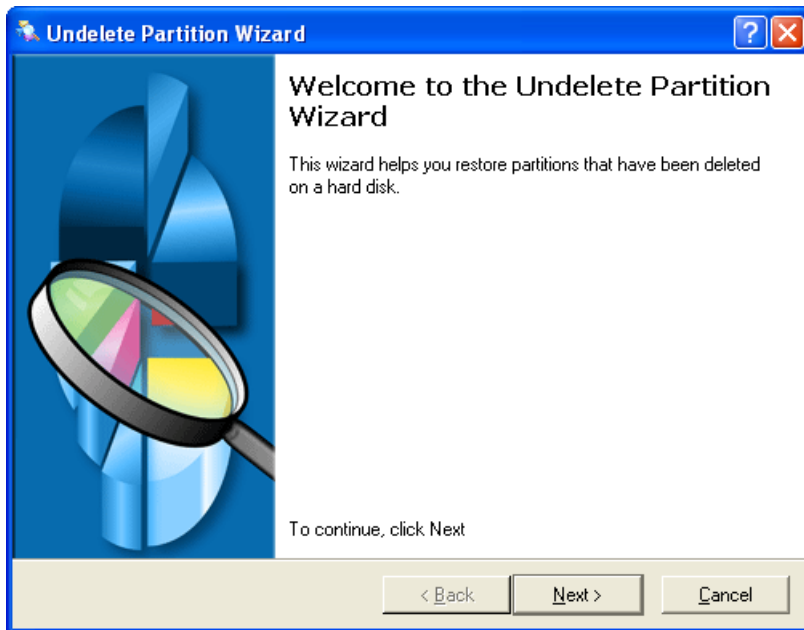
- The current version of Drive Backup allows restoring one partition per *Undelete Partition* operation. To undelete several deleted partitions, multiple undelete sessions are required.
- The current version of Drive Backup only supports *DOS partitioning scheme*. In Windows 2000 and XP, these disks are named Basic Disks. Deleted partitions on Dynamic Disks cannot be restored!
- The program allows the restoration of partitions for the following types:
  - FAT16 & FAT32
  - NTFS
  - Ext2 & Ext3
  - ReiserFS
- The program cannot un-delete partitions, which include a corrupted boot sector.
- Drive Backup is unable to retrieve partitions that have been *wiped-&-deleted* with Drive Backup, Disk Wiper or similar software especially designed for complete and irreversible destruction of data.

### 4.14.2 Initiating the Operation

Select in the main menu:

**Wizards > Undelete partitions**

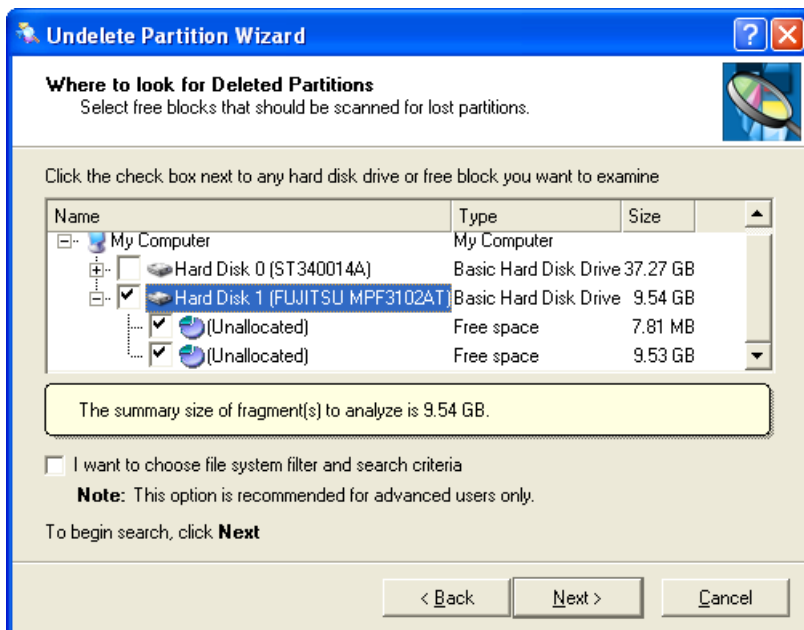
The *Undelete Partition Wizard* commences with its first page:



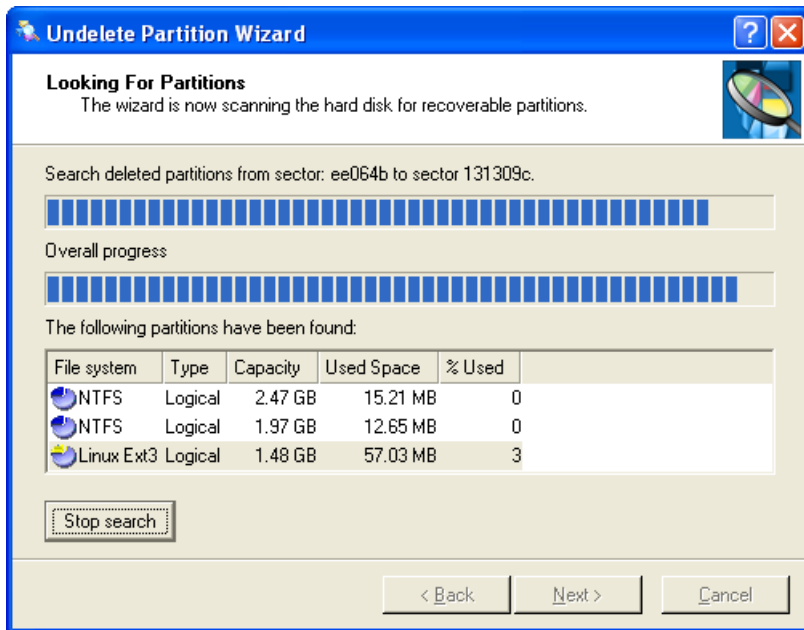
This page informs the user of the kind of tasks the wizard is able to assist.

Click on the “Next” button to continue.

The second page of the Wizard displays a tree-like list of available disks and their partitions. Click on a node of a hard disk allows the user to open or close the list of its partitions. To restore deleted partitions a block of free disk space on the List is to be found and then marked. The chosen item will be highlighted and a prompt (under the list) will display the summary size of the analyzed partition.



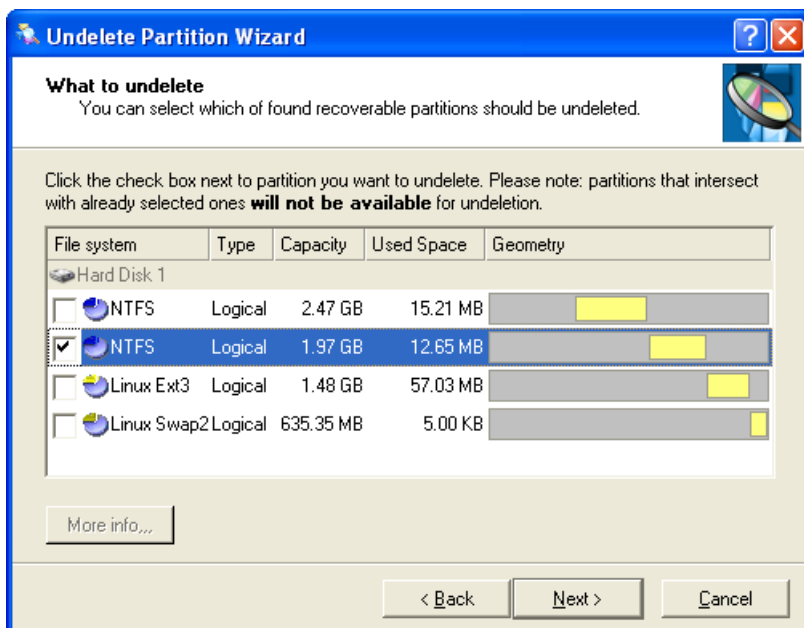
The checkbox “**I want to choose file system and search criteria**” is to be marked when the partition to be un-deleted has been selected. However, this implies a good knowledge of the hard disk structure (see [description below](#)). Click on the “Next” button to start searching with the widest search parameters. It will take longer but will provide intricate analysis of the selected free space block.



During the search process, the Wizard displays a progress bar with values of the analyzed space boundary sectors. Here the user has the possibility to stop the search at any time by clicking the corresponding button “**Stop search**”. The search results are displayed in a table placed under the progress bar. Here the following parameters of found partitions are displayed:

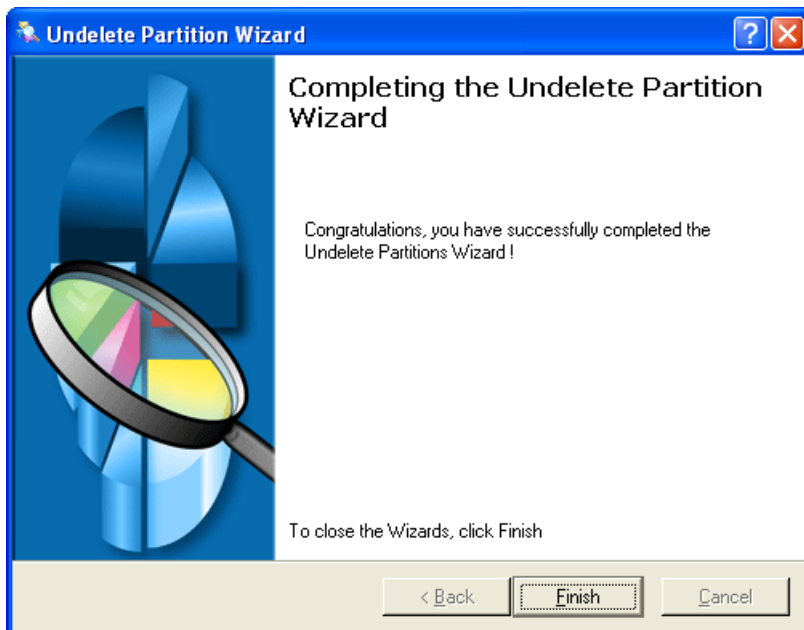
<b>File system</b>	File system type
<b>Type</b>	The partition type
<b>Capacity</b>	The absolute partition's capacity. In fact, this value is a little greater than the file system capacity
<b>Used space</b>	Includes files, file system metadata and reserved space
<b>Used</b>	Amount of used space (by percent)

When the process is completed, the Wizard displays the location of each partition that has been found. It helps to distinguish whether partitions intersect each other or not. **Note:** the program can undelete only one of intersected partitions.



To undelete a partition the user needs to mark the corresponding checkbox and click on the “Next” button. The next page of the Wizard displays detailed information on the un-deleting operation. The future actions of the program are

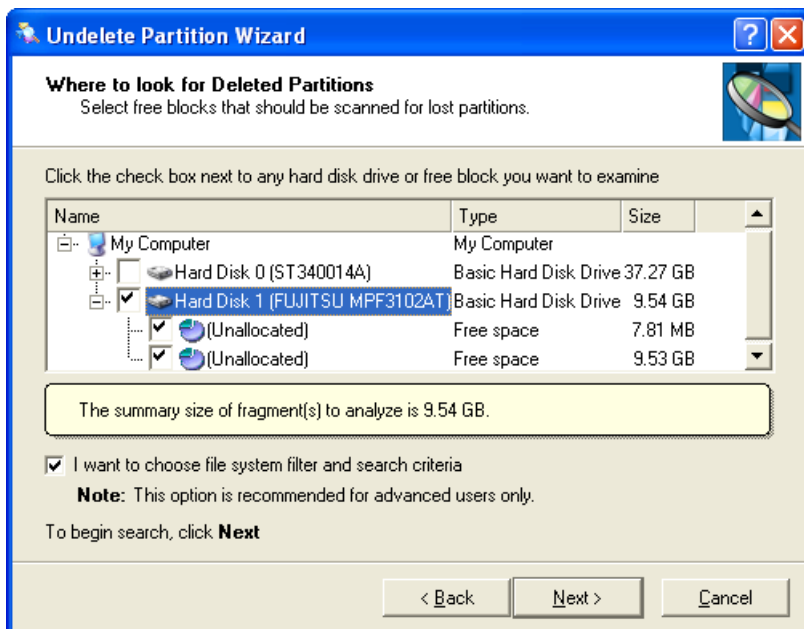
represented at this stage – these actions may be canceled by the user. If necessary, the user can go back to previous pages of the Wizard and correct the task.



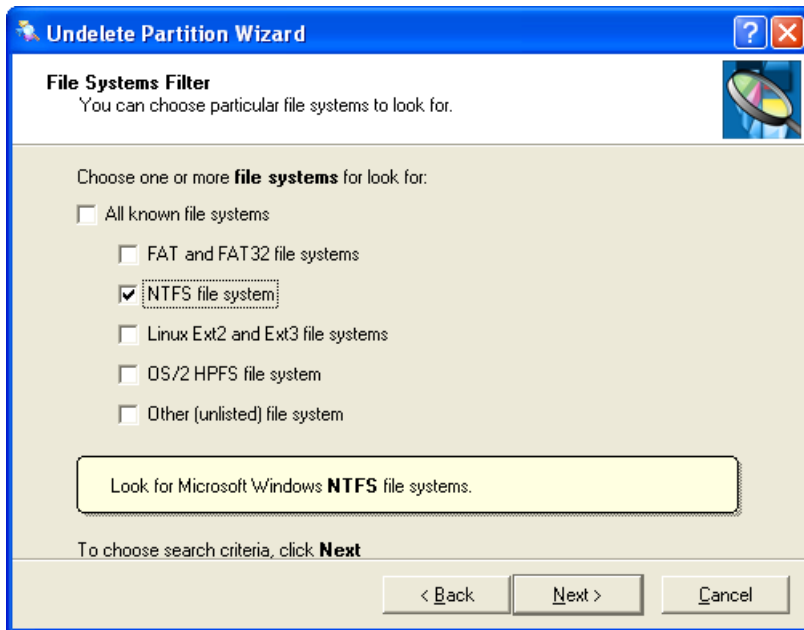
By clicking on the “Next” button the user accepts the modifications that are to be made to the disk layout. On the next page the user is able to complete preparations and start the un-deleting process by clicking on the Finish button.

#### 4.14.2.1 Search criteria

The Wizard is able to find a deleted partition more quickly when its file system type and the criteria for such a search have been defined. To define these parameters the user marks the checkbox “**I want to choose file system and search criteria**” which is located under the list of free disk space to be searched (the second wizard page).

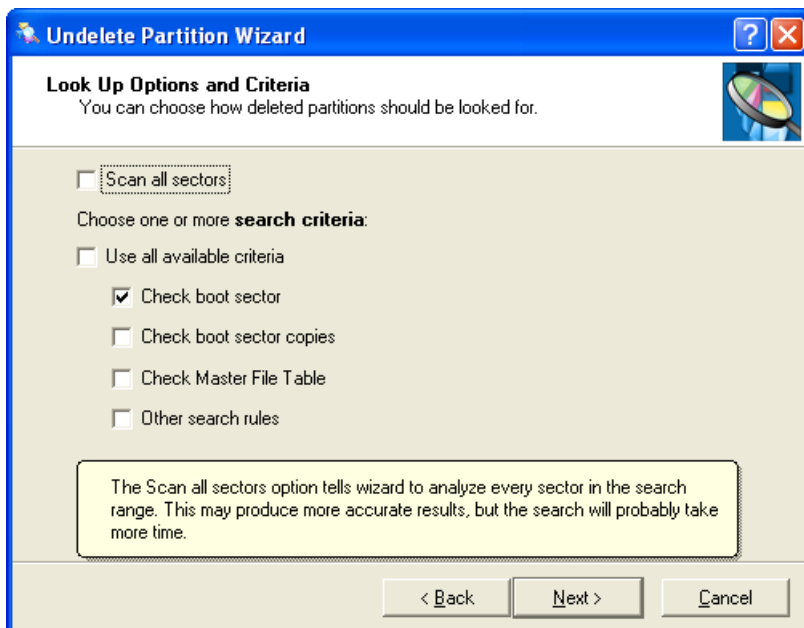


By clicking on the Next button the user is directed to the list of known file system types.



When the user chooses one of file system types the program prompt displays additional information concerning the user's choice at the bottom of the page. By default, the "All known file systems" item is selected. To choose another variant deactivate the marked checkbox to cancel the default setting. After this the user is able to choose a file system type of the deleted partition by marking the corresponding checkbox.

The next page allows the user to define the search criteria.



### Scan all sectors

Set this checkmark to allow an extensive search of deleted partitions. This feature finds deleted partitions that do not meet the rules of partition alignment in the DOS partitioning scheme.

This option significantly slows down the search process. In addition, it can lead to the detection of phantom partitions.

### Use all available criteria

All the criteria displayed below will be used for the search. To specify parameters please unmark this option.

### Check boot sector

Choosing this option forces the program to take into account the information of the disk layout which is kept in the boot sector. For example, similar information can contain the mentioned partitioning scheme being used and the starting records of the Partition Table.

### Check boot sector copies

Several disk software tools create copies of the boot sector. Similar copies can also be useful in the course of the search process.

### Check Master File Table

If you are looking for deleted NTFS partition, do not forget to select this option. The Master File Table (MFT) is a catalogue of all partition files in a NTFS file system, thus a search and analysis of the MFT offers the program valuable information about deleted partitions.

To apply the selected criteria and start the search, please click on the “Next” button. The following steps will be the same as it were described in the previous section.

## 4.14.3 Comments

### 4.14.3.1 Alignment of undeleted partitions

When *undeleting* partitions, Drive Backup only updates records in the Partition Table, so that an undeleted partition becomes available. The program does not perform additional actions to adjust the starting position and capacity of a partition to the actual *hard disk geometry*. The partition alignment rules are discussed in the section [Create Partition > Partition alignment rules of the DOS partitioning scheme](#), the hard disk geometry is discussed in the [Glossary](#). This feature allows to un-delete partitions, which have allocations that mismatched the *partition alignment rules*.

This feature substantially extends the class of retrievable partitions. Such a functional flexibility is of value for users:

- who use multiple operating systems on the single computer.
- who frequently switch a hard disk over multiple computers.

It is to be considered that *partition alignment rules* rely on hard disk geometry. On modern systems, the *hard disk geometry* is not the native feature of a device but only a firmware dependable (or a software programmable) representation of hard disk parameters. The same hard disk can have a different geometry on various computers and even in different operating systems on the same computer. A partition may appear misaligned in the actual system if it was created (or modified by Drive Backup) under other conditions.

Drive Backup allows the user to detect and retrieve deleted partitions even when a mismatching of the actual hard disk geometry occurs with the one used to create the partition. Most of the modern operating systems and disk managing tools can successfully work with misaligned partitions.

### 4.14.3.2 Known problems with Undeleting misaligned partitions

When deleted partitions are being searched, Drive Backup retrieves information from a boot sector of a found partition in order to distinguish its type (Primary or Logical). Formally, Logical Partitions are located within the Extended Partition, and Primary Partitions are outside. However, in case the user manages to change the capacity of the Extended Partition this rule may be violated.

Primary and Logical partitions meet different alignment requirements (see the section [Create Partition > Partition alignment rules of the DOS partitioning scheme](#)), so that an un-deleting of a logical partition outside the Extended Partition, as well as an un-deleting of a primary partition inside the Extended Partition makes a retrieved partition misaligned. The following sections mention known problems with misaligned partitions.

### 4.14.3.3 Undeleting a Logical Partition outside the Extended Partition

This operation is can be used securely, a Logical Partition can be retrieved outside the Extended Partition without any problems which results in a Primary partition. Modern operating systems will recognize and successfully access such partitions. Old versions of MS-DOS can fail to recognize partitions of this kind.

### 4.14.3.4 Undeleting a Primary Partition inside the Extended Partition

Under some conditions, this operation can damage an undeleted partition. Conditions are as follows:

- Searching deleted partitions within the Extended Partition,
- A deleted *Primary* partition is found,
- It is located behind an existing Logical Partition,
- It is aligned to the beginning of an appropriate Cylinder (valid for primary partitions, but not for logical ones).



In this case, the program is unable to undelete the partition correctly. After completing the operation, the undeleted partition becomes "*unformatted*".

To solve this problem, use the following procedure:

1. Move boundaries of the Extended Partition in order to exclude the location of the deleted primary partition from the Extended Partition.
2. Run the Undelete Partition operation again
3. Search deleted partitions. The program will find this partition once again.
4. Restore this partition as a Primary one.

The partition will be restored correctly.

## 4.15 Mount Partition

This chapter describes how to assign drive letters (mount) and dismount partitions in Windows NT, 2000 and XP with Drive Backup.

### 4.15.1 Overview

Drive Backup allows the user to assign or change drive letters to existing formatted partitions. This function is available exclusively in Windows NT, 2000 and XP.



This functionality is not available in DOS and Windows 95, 98 and ME because these operating systems do not support customizing the assignment of drive letters

Operating systems require a name (e.g. *drive letter*), which is assigned to a partition. DOS and Windows 95, 98, ME automatically assign drive letters to all partitions of supported file system types during the startup. These operating systems do not allow drive letters to be altered.

Instead, Windows NT, 2000 and XP allows the drive letters to be freely changed, deleted or the ability of adding letters to partitions that are supported by these operating systems. Windows provides the Windows Disk Administrator utility for assigning and changing drive letters. Instead, Drive Backup can be used for this purpose.

### 4.15.2 Initiating the Operation in the Windows-based Version

The actions are similar to ones required for initiating other operations.

#### Step 1. Select an existing partition

Select any *Primary* or *Logical* partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.

The operation is not available for the Extended Partition.

#### Step 2. Select the operation to perform

Variants:

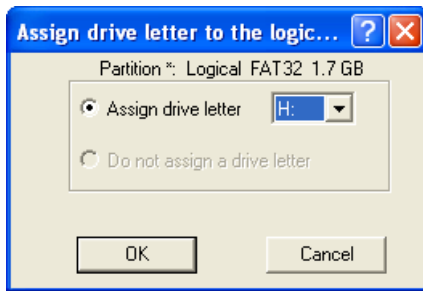
- Select in the main menu:  
**Partition > Mount...**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Mount...**

#### Step 3. Assign or change drive letter

After selecting a partition, the *Mount Partition* dialog appears.

The *Mount Partition* dialog allows assigning, changing or deleting a drive letter that is associated with a partition.

### 4.15.3 Description of the Parameters



#### Partition

This text contains a brief description of the selected partition. It is used for notification purposes only.

#### Assign drive letter

Set this radio button to assign a drive letter to a non-mounted partition, or to change a drive letter for already mounted partition.

The pull-down list contains unused drive letters that can be associated with the selected partition.

#### Do not assign a drive letter

Set this radio button to remove the drive letter associated with a partition from the system. By default, the program suggests this action for mounted partitions. The action of drive letter removal is also named *dismounting*.

### 4.15.4 Running the Operation

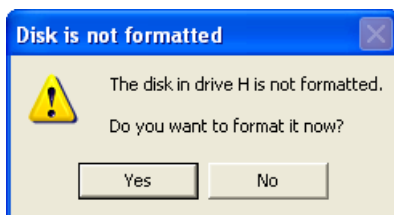
During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The mounting/dismounting of a partition takes several seconds: the program waits until Windows accommodates the changing of the disk layout. This operation may take 5-20 seconds in Windows 2000 and XP.

### 4.15.5 Comments

#### 4.15.5.1 Mounting partitions with unsupported file system types

Drive Backup allows the user to mount partitions of any file system type, including ones not supported by an operating system. In this case, a partition has a drive letter assigned; but when trying to explore the partition's contents, the user receives the error message:



#### 4.15.5.2 Manipulating drive letters in Windows 95, 98 and ME

DOS and Windows 95, 98 and ME automatically assign drive letters to partitions during the system startup. These operating systems scan partitions in the predefined order, which cannot be changed, and successively assign drive letters to unhidden FAT16 and FAT32 partitions. In case IFS drivers for other file systems are installed, Windows can additionally mount partitions of other types.

The order in which Windows scans through partitions is as follows:

1. The active partition on the first hard disk takes the drive letter C:
2. Windows scans the first primary partitions on all other hard disks.
3. Windows scans all logical partitions on the first hard disk, then it adds logical partitions on the second hard disk, and so on.
4. Finally, it adds residue primary partitions on all hard disks.

The legal way of "dismounting" partitions in DOS and Windows 95, 98 and ME is to *Hide* unnecessary partitions. Disadvantages of this method are as follows:

- Other partitions may change their drive letters.
- A system reboot is required to apply changes.

#### 4.15.6 Dismounting Locked Partitions

Drive Backup allows the user to dismount locked partitions. Locked partitions are used by other software. An untimely dismounting of locked partitions may lead to unpredictable results.

To avoid the mentioned problems, Drive Backup reboots the system to a single-tasking environment in order to eliminate the interference of other programs. In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.

As a matter of fact, the dismounting of a partition being used may seem illogical (e.g. using a partition and trying to cancel its accessibility at the same time). It is recommended to re-check you're the made actions to avoid the corruption of used data.

### 4.16 Changing Partition Attributes

This chapter explains how to change partition attributes ("Hidden" flag, "Active" flag, Partition ID, Volume Label) with Drive Backup.

#### 4.16.1 Set a Partition Active/Inactive

##### 4.16.1.1 Overview

Drive Backup allows selecting an active partition on a hard disk. A system will boot from an *Active* (or *bootable*) partition at startup (see [Glossary](#) for more details).

The *Set active/Set inactive* operation is available exclusively for Primary Partitions.

The "Active" flag is kept in entries of the Partition Table. The standard MBR bootstrap code uses this flag to define which primary partitions should be used to boot the system.

By changing an active partition, one can manage an operating system to be activated on the next reboot.

##### 4.16.1.2 Initiating the operation

The operation can be activated from the main program's menu or from the partition's popup menu. For inactive partitions, only the **Set active** operation is available. For active partitions, only the **Set inactive** operation is available.

#### Step 1. Select a Primary Partition to be activated/deactivated

Select an existing primary partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.



The *Set Active/Set Inactive* operation is enabled only for Primary Partitions

#### Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Set active...**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Set active...**

#### 4.16.1.3 Comments

##### About setting active/inactive locked and system partitions

The *Set Active/Inactive* operation does not interfere with file input-output operations. No reboot is required to change the "Active" flag for locked partitions.

##### Multiple active partitions

Potentially, Drive Backup allows setting all primary partitions inactive, or setting multiple primary partitions active. In the last case, the program displays a warning message.

Both situations may lead to problems, which can occur at the next system reboot:

- In case there are no active partitions on a hard disk, the standard bootstrap is unable to continue the startup process. The error message will be displayed:

DISK BOOT FAILURE, INSERT SYSTEM DISK AND PRESS ENTER

- In case there are multiple active partitions on a hard disk, the standard bootstrap is unable to continue the startup process. The error message will be displayed:

Invalid partition table

##### 8Gb boundary limitation

Another problem results from the standard bootstrap code limitation: the standard MBR code is unable to continue the startup process from primary partitions that begin beyond the 1023<sup>rd</sup> Cylinder. On most modern disk subsystems, the 1023<sup>rd</sup> Cylinder corresponds to approximately 8GB of disk space. This limitation is sometimes referred to as the "8GB boundary limitation".

In case the active partition starts beyond the 8GB from the beginning of the disk, the standard MBR code displays the error message:

Invalid partition table

### 4.16.2 Hide/Unhide Partition

#### 4.16.2.1 Overview

Drive Backup allows *hiding* and *un-hiding* partitions. Operating systems do not mount "hidden" partitions, preventing getting access to their contents (see [Glossary](#) for more details).

This function is available exclusively for Primary and Logical Partitions.

The function can be used in the following cases:

- Managing partitions availability in DOS, Windows 95, 98, ME, Windows NT and XP.
- Managing drive letters assigning in DOS and Windows 95, 98 and ME.
- Manual un-hiding of previously copied partitions.

#### 4.16.2.2 Initiating the operation

The operation can be activated from the main program's menu or from the partition's popup menu. For hidden partitions, only the **Unhide** operation is available, For un-hidden partitions, only the **Hide** operation is available.

##### Step 1. Select a partition to hide/unhide

Select an existing partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.

##### Step 2. Select the operation to perform

Variants:

- Select in the main menu:

**Partition > Hide...**

- Call the *popup menu* for the selected partition, then select the menu item:

**Hide...**

#### 4.16.2.3 Comments

##### About hiding locked partitions

The *Hide/Unhide* operation does not interfere with file input-output operations. No reboot is required to change the "Hidden" flag for locked partitions.

##### Hiding bootable partitions

Potentially, Drive Backup allows the hiding of bootable partitions. Unfortunately, most operating systems cannot boot from hidden partitions.

##### Hiding partitions in Windows 2000

Unfortunately, Windows 2000 and XP ignore the "Hidden" flag. These operating systems allow the mounting and accessing of hidden NTFS, FAT32 and FAT16 partitions. Windows 2000 and XP allow the user to mount partitions of any type through the intermediation of the internal programming interface (so-called WinAPI) within the current Windows session.

However, there is a method to prevent a partition from assigning drive letters automatically at Windows startup: the *Partition ID* should be changed to the of 0x12 or 0xDE value (see chapter [Change Partition ID](#)). By the way, this method is recommended by Microsoft in the document "Windows XP OEM Preinstallation Kit, Design Notes".

##### About hiding the entire Extended Partition

This operation is disabled in Drive Backup.

Windows 2000 and XP cannot process hidden Extended Partitions correctly. The system may crash at the stage of accommodating disk layout changes, or it may generate errors at the system startup.

### 4.16.3 Change Partition ID

The chapter explains how to change Partition IDs with Drive Backup.

#### 4.16.3.1 Overview

*Partition ID* is an identifier of a file system that is placed in the partition. Partition ID is saved in the Partition Table; it is used to quickly detect partitions of supported types.

By manually changing the Partition ID value, it is possible to manipulate the accessibility of partitions.

#### 4.16.3.2 Initiating the operation

The actions are similar to ones required for initiating other operations.

##### Step 1. Select a partition

Select an existing partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.

##### Step 2. Select the operation to perform

Variants:

- Select in the main menu:

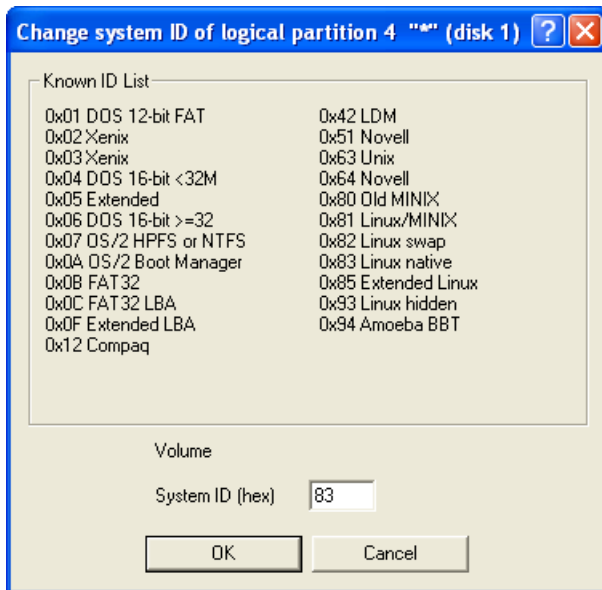
**Partition > Modify > Change partition ID...**

- Call the *popup menu* for the selected partition, then select the menu item:

**Modify > Change partition ID...**

##### Step 3. Assign new Partition ID value

After selecting a partition, the *Change partition ID* dialog appears:



With this dialog, the user is able to observe and modify the Partition ID value for the selected partition.

#### 4.16.3.3 Description of parameters

##### System ID (hex)

The textual field contains a hexadecimal presentation of the Partition ID. Generally, the Partition ID should be presented as 1-2 digits hexadecimal number; only hexadecimal digits {0..9, A..F} are allowed to be used.

##### Volume

This parameter simply displays the Volume Label of the selected partition. This information is to notify the user.

##### Known ID List

The section simply provides information about some frequently used Partition IDs. This information is to notify the user.

#### 4.16.3.4 Running the operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The operation takes several seconds: the program waits until Windows accommodates the changing of the disk layout. This operation may take 5-20 seconds in Windows 2000 and XP.

#### 4.16.3.5 Comments

##### How operating systems use Partition ID

DOS and Windows 95, 98, ME, NT and XP rely on the Partition ID value when searching for partitions with supported file system types. These operating systems do not allow using partitions with unknown IDs.

Linux actually ignores the Partition ID value. Windows 2000 ignores this value (except for some special values).

##### The Partition ID value can be used for the following purposes:

- Hiding partitions in Windows 2000, by changing the Partition ID to 0x12 or 0xDE values.
- For simple conversion, e.g. converting Dynamic Disks back to the Basic ones. This option is available only for hard disks that were initially partitioned as Basic Disks, and then converted from Basic to Dynamic ones.

##### Changing Partition ID for locked partitions

This action does not require a reboot because the Changing Partition ID operation does not violate file input-output activity.

#### 4.16.4 Set Label of a Partition

The chapter explains how to change the *Partition Label* parameter with Drive Backup.

##### 4.16.4.1 Overview

The *Partition Label* is a small textual field (up to 11 characters) that is located in the partition's boot sector. This value is detectable by any partitioning tool; it is used for notification purposes only.

##### 4.16.4.2 Initiating the operation

The actions are similar to ones required for initiating other operations.

##### Step 1. Select a partition

Select an existing partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.

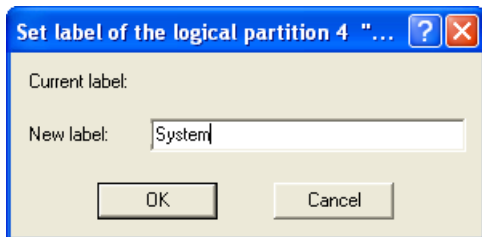
##### Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Modify > Set Label...**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Modify > Set Label...**

##### Step 3. Assign the new Partition Label

After selecting a partition, the *Change partition label* dialog appears:



With this dialog, the user is able to observe and modify the Partition Label value for the selected partition.

##### 4.16.4.3 Description of parameters

###### Current label

This parameter simply displays the current Partition Label value of the selected partition. This information is for notification.

###### New label

Enter new value of the Partition Label. The length of the Label is limited to 11 characters.

##### 4.16.4.4 Running the operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The operation takes several seconds: the program waits until Windows accommodates the changing of the disk layout. This operation may take 5-20 seconds in Windows 2000 and XP.

##### 4.16.4.5 Changing Label of locked and system partitions

Drive Backup can change the Partition Label of locked and system partitions. This operation requires a rebooting of the computer to be completed.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.

- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

## 4.17 Supplementary Functions

This chapter describes the supplementary functionality available in Drive Backup.

### 4.17.1 Retest Surface

#### 4.17.1.1 Overview

Drive Backup allows performing additional surface tests on existing partitions and blocks of free space.

This option allows the user to detect unreliable sectors on a hard disk. Unfortunately, the current version of the program does not support the retrieving of data located in bad sectors.

#### 4.17.1.2 Initiating the operation

The actions are similar to ones required for initiating other operations.

The operation is available for partitions of any type and for blocks of free space. It can be activated from the main program's menu or from the partition's popup menu.

#### Step 1. Select a Partition or a Block of Free space

Select a partition or a block of free space in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.

#### Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Retest surface...**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Retest surface...**

#### 4.17.1.3 Running the operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The *Retest surface* operation takes a long while; the actual value of elapsed time depends on the size of a partition (or a free block) being tested, hardware performance and the [Surface test](#) settings.

#### 4.17.1.4 Comments

The primary purpose of this function is to detect bad and unreliable sectors on existing partitions. In case bad sectors are detected in a used partition, exit the Drive Backup session and use a standard disk-checking tool from the operating system in use (**CHKDSK**, **SCANDISK**, **e2fsck** and so on).

#### 4.17.1.5 Retest surface on locked partitions

The program is able to test the surface of locked and system partitions. The operation requires a rebooting of the computer to be completed.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.



## 4.17.2 Check File System Integrity

### 4.17.2.1 Overview

Drive Backup can check the file system integrity on existing FAT16, FAT32 and NTFS partitions. This function can be used for detecting file system errors before applying other operations on a partition.

Most useful operations require the targeted partition to have a valid file system to be processed; otherwise the program cancels this operation and all consecutive virtual operations on the *List of Pending Operations*.

The advantage of Drive Backup is that it can check many different types of both mounted and non-mounted partitions. Unfortunately, the current version of the program cannot fix file system errors, but can detect them.

### 4.17.2.2 Initiating the operation

The actions are similar to ones required for initiating other operations.

The operation is available for primary and logical partitions, which are formatted to the following file system types: FAT16, FAT32, NTFS. The program can check both mounted and non-mounted partitions.

The function can be activated from the main program's menu or from the partition's popup menu.

#### Step 1. Select a Partition to be checked

Select a formatted partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions.

#### Step 2. Select the operation to perform

Variants:

- Select in the main menu:  
**Partition > Check file system integrity**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Check file system integrity**

### 4.17.2.3 Running the operation

During the real operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The *Check file system integrity* operation takes a long while; the actual value of elapsed time depends primarily on the amount of data being stored on the targeted partition.

### 4.17.2.4 Comments

The primary purpose of this function is the preliminary detection of erroneous partitions, since they cannot be handled by the program. In case file system errors are detected, exit the Drive Backup session and use a standard disk-checking tool from an appropriate operating system (**CHKDSK**, **SCANDISK** and so on).

### 4.17.2.5 Check file system integrity on locked partitions

The program can check the file system on locked and system partitions. The operation requires a rebooting of the computer to be completed.

- In Windows 95 and 98, Drive Backup uses the "true" DOS session as the single-tasking environment.
- In Windows NT, 2000 and XP, Drive Backup uses the so-called "*startup Bluescreen*" phase.
- In Windows ME, Drive Backup requires to reboot from a bootable diskette or CD-ROM.

## 4.17.3 Check Archive Integrity

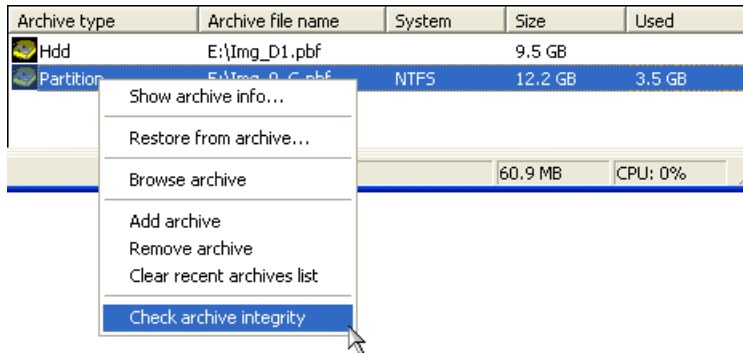
### 4.17.3.1 Overview

The program provides an ability performing the archive integrity check for backup images. The function allows distinguishing between valid and corrupted images prior using them.

#### 4.17.3.2 Initiating the operation

The *Check archive integrity* function is available only from application's interface, it does not support virtual execution. Either execution mode the program is switched to, the integrity check is always executed in the *Immediate Execution* mode.

The operation is available only for backup images listed on the *List of Backup Images* via the context menu. The program automatically appends the *List of Backup Images* at cases of creating new backup images and opening existing ones.



To perform the integrity check, select an image from the *List of Backup Images* and call the context menu. Select the item **Check archive integrity**.

#### 4.17.3.3 Running the operation

During the operation execution, the **Progress Information** window appears (see the section [Progress Information](#) for more details).

The operation takes a long while. Real performance depends on:

- The integrity checking algorithm used during the image creation
- File input-output system performance.

### 4.17.4 View Partition/Hard Disk Properties

#### 4.17.4.1 Overview

Drive Backup can obtain general information about hard disks and partitions. The program displays not only the standard information, such as capacity, used space or file system type, but also has advanced information, such as *hard disk geometry*, *Cluster Size*, exact partition location, and so on. This information can be used to reveal erroneous situations, finding faults and so on.

#### 4.17.4.2 Running the operation

The actions are similar to ones required for initiating other operations.

##### Step 1. Select an interesting object (a disk or a partition)

Select a hard disk or a partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions. In any case, it will be highlighted in all three panels.

##### Step 2. Select the operation to perform

Variants:

- Call the *popup menu* for the selected object and select the item:

##### Properties

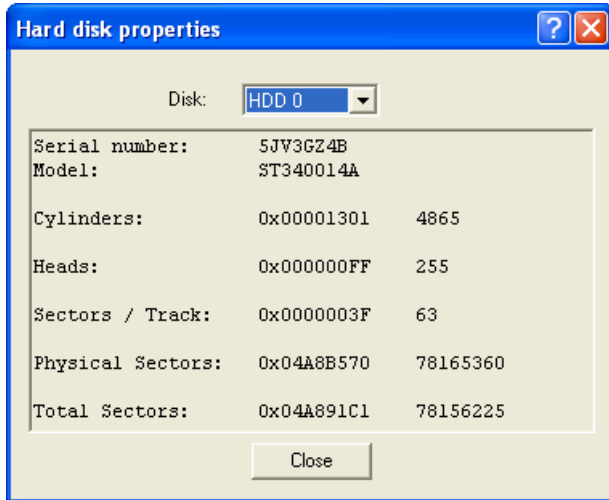
- Press the **Properties** button on the Main Toolbar.
- Select in the main menu:

**Hard disk > Hard disk properties...** (for hard disks)

**Partition > Properties** (for partitions)

- Press **Alt+Enter** to display the Partition properties.
- Press **Ctrl+I** to display the Hard Disk properties.
- Press the **Copy** button on the Main Toolbar.

#### 4.17.4.3 Hard Disk Properties



#### Disk

This pull-down list allows the user to choose a hard disk to observe its properties.

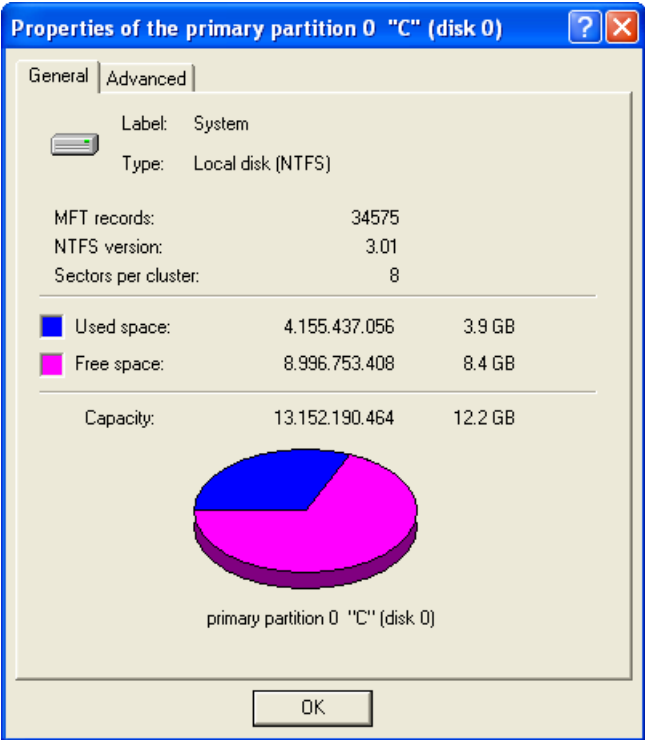
The program displays the following information about a hard disk:

<b>Serial number</b>	This OEM information can be unavailable in DOS, Linux and in some cases in Windows 95/98/ME environments.
<b>Model</b>	
<b>Cylinders</b>	These parameters constitute the actual <i>Hard Disk Geometry</i> .
<b>Heads</b>	
<b>Sectors / Track</b>	The program displays both the decimal and the hexadecimal representation of these values.
<b>Physical Sectors</b>	The maximum disk capacity value as reported by the hardware.
<b>Total Sectors</b>	The maximum disk capacity value as reported by the operating system. This value is actually derived from the <i>Hard Disk Geometry</i> : $\langle \text{Total Sectors} \rangle = \langle \text{Cylinders} \rangle * \langle \text{Heads} \rangle * \langle \text{Sectors/Track} \rangle$

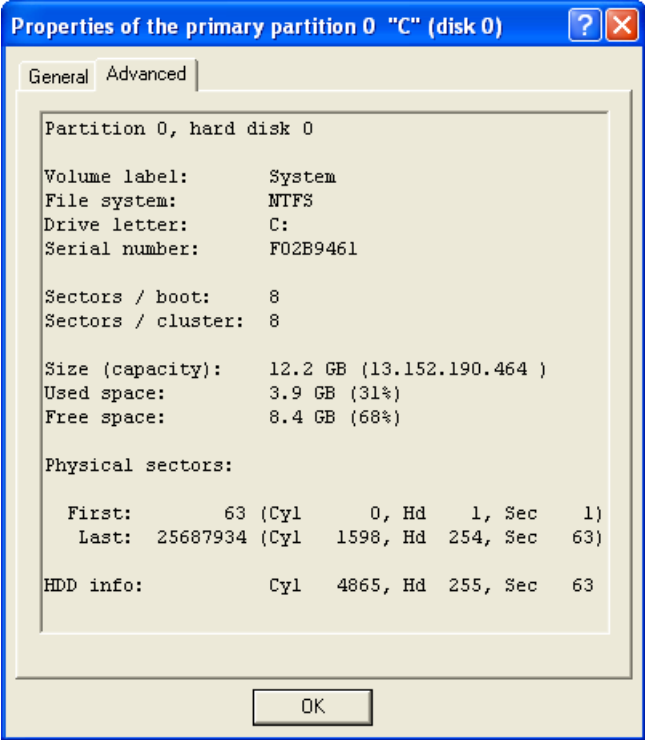
#### 4.17.4.4 Partition Properties

The *Partition Properties* window contains two tabs.

The first one includes general information about a partition that is usually available in Windows for mounted partitions.



This tab displays the file system type, volume label, capacity, amount of used and free space, the Cluster Size value, the size of the Bootable Area and the capacity of the Root Directory. The Root Directory capacity is only important to the FAT16 file system. The program displays no Root entries for other file systems.



The second tab contains advanced information about a partition:

Partition #, disk #	Includes the partition's index on a disk, and the disk index as reported by the operating system.
Volume label	Partition's Volume Label value, which is saved in the boot sector, available for FAT16, FAT32, NTFS and HPFS file systems
File system	File system type (only for <a href="#">known file systems</a> )
Drive letter	Drive letter that is assigned to a partition in the operating system.

	In DOS, the program can fail to reveal drive letters for partitions being mounted by IFS drivers (such as NTFSDOS)
<b>Serial number</b>	Partition's Serial Number taken from the boot sector
<b>Sectors / boot</b>	The <i>Bootable Area</i> size
<b>Sectors / cluster</b>	The <i>Cluster Size</i> value
<b>Size (capacity)</b>	The absolute partition's capacity: $\text{<Capacity>} = (\text{<Last Sector>} - \text{<First Sector>}) * \text{<Sector Size>}$ In fact, this value is a bit greater than the file system capacity.
<b>Used space</b>	Includes files, file system metadata and reserved space: $\text{<Used Space>} = \text{<Capacity>} - \text{<Free Space>}$
<b>Free space</b>	Amount of free space taken from the file system.
<b>First physical sector</b>	The address of the first partition's sector, expressed in both the C/H/S and the linear addressing formats
<b>Last physical sector</b>	The address of the first partition's sector, expressed in both the C/H/S and the linear addressing formats
<b>HDD info</b>	The actual <i>Hard Disk Geometry</i> of a disk holding the partition.

### 4.17.5 Show Archive Info

This chapter describes how to inspect contents of existing backup archives by using the Drive Backup.

#### 4.17.5.1 Overview

The function *Show Archive Info* allows preliminary inspecting backup archives for better recognizing their contents, finding images of required partitions or hard disks, browsing archived contents and verifying image integrity.

The program keeps a separate list of archives that were created or opened by the program. The [Archives List panel](#) displays archives placed in this list. By default, the program includes every successfully created archive on the List. In addition, the program includes each backup archive that is opened for the first time, by the following functions:

- *Show Archive Info*
- Restore Partition
- Restore Hard Disk
- Selective Partition Restore
- Check archive integrity
- Browse Archive

The list of archives can be edited manually; the *popup menu* for the Archive List panel includes **Add archive** and **Delete archive** items, which allow customizing the archive.

#### 4.17.5.2 Inspecting archives listed in the Archives List panel

To inspect a listed archive, use the following routine:

##### Step 1. Select an interesting archive

Select an archive in the Archives List panel.

##### Step 2. Select the operation

Call the *popup menu* for the selected archive and then choose the item:

**Show archive info...**

After these actions, the *Archive Info* dialog should appear (see next sections for more details and its functionality explanation).

#### 4.17.5.3 Inspecting arbitrary archives

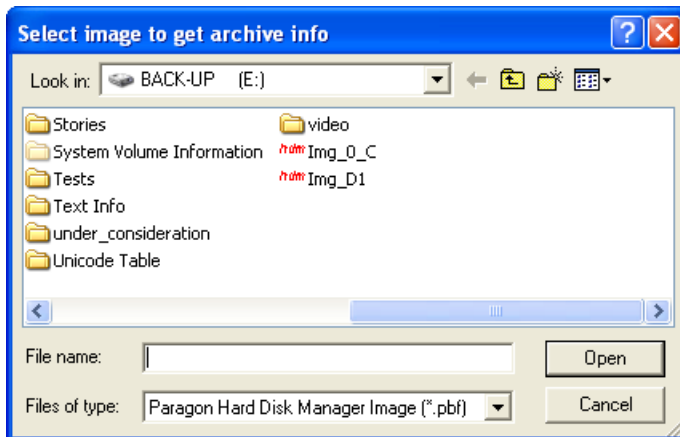
To inspect an archive that is not included in the Archives List yet, use the following procedure:

##### Step 1. Select the operation

Select the menu item in the main program's menu:

## General > Show archive Info

### Step 2. Select an archive file

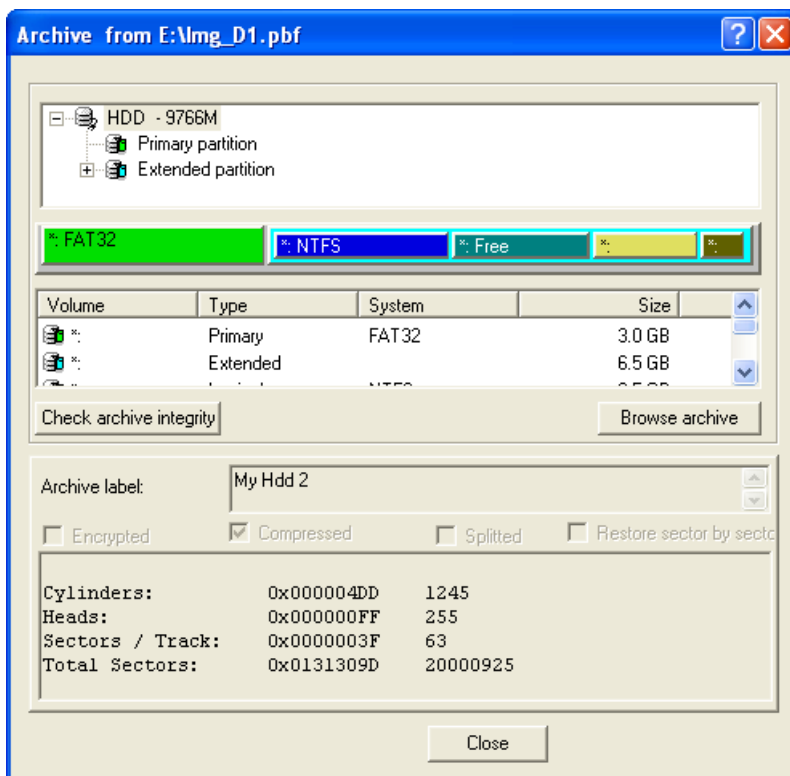


The program displays the advanced *Open File* dialog, which allows selecting files on:

- Mounted local volumes
- Mounted local removable media
- Mapped network drives
- Unmounted FAT16, FAT32, NTFS, Ext2 and Ext3 partitions

After these actions, the *Archive Info* dialog should appear (see the next section for more details and its functionality explanation).

#### 4.17.5.4 Description of the Archive Info dialog



Drive Backup supports multiple formats of backup archives:

- Archives of a single partition
- Archives of multiple partitions
- Archives of hard disks
- Archives of 1<sup>st</sup> track
- Archives of MBR

The *Archive Info* dialog reveals contents of archives of any type in similar fashion. Archives of a hard disk are the most complex ones. The picture placed above displays layout of a hard disk archive.

The **top section** of the dialog contains the *Tree Layout*, the *Partitions Visualization Panel* and the *List of Partitions* panels. They show the disk layout and basic properties of partitions.

When an object is selected in either of these panels, extended information about the selected object is displayed in the **bottom section** of the dialog.

In addition, the dialog provides the ability of performing some operation on the selected archive:

#### Check archive integrity

Press this button to perform the [Check archive integrity](#) operation on the selected archive.

#### Browse archive

Press this button to perform the [Browse archive](#) operation on the selected archive.

#### 4.17.5.5 Comments

The **bottom section** of the dialog displays the following information about selected objects:

##### Partition

<b>File system</b>	File system that is placed on the selected partition
<b>Drive letter</b>	--- not available for partitions from backup images ---
<b>Volume label</b>	The partition's Volume Label. It can be useful for distinguishing between partitions in case of selective restoration of partitions.
<b>Sectors/boot</b>	The Bootable Area size.
<b>Sectors/Cluster</b>	<i>Cluster Size</i> value expressed in Sectors. Halve this value to get the <i>Cluster Size</i> value in Kbytes.
<b>Size (capacity)</b>	The partition's Capacity (in bytes and Mbytes)
<b>Used space</b>	Amount of used data on the selected partition
<b>Free space</b>	Amount of free space on the selected partition

##### Hard disk, 1<sup>st</sup> Track, MBR

<b>Cylinders</b>	Reveals the <i>Hard Disk Geometry</i>
<b>Heads</b>	
<b>Sectors/Track</b>	
<b>Total Sectors</b>	The hard disk capacity expressed in Sectors

#### 4.17.6 Show CD/DVD Burners Info

##### 4.17.6.1 Overview

Drive Backup allows obtaining the list of available CD and DVD writing drives that can be used in the function [Burn partition image on CD/DVD](#). This function is available only in the Windows-based and the Linux-based versions of the program.

The DOS-based version of the program does not support CD and DVD burners. It does not provide an ability of burning archives on recordable CD/DVD discs.

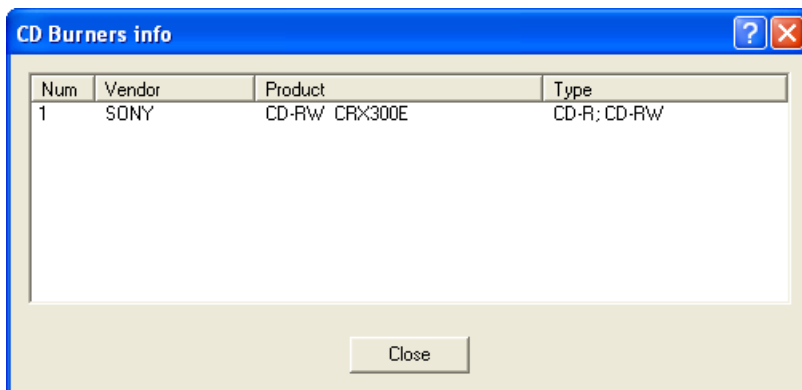
In Windows environment, the program can use all CD/DVD burners supported by the Win32 ASPI service: these devices should be listed in the Device Manager, but they need not having drive letters assigned.

##### 4.17.6.2 Initiating the operation

To obtain the List of available CD and DVD burning devices, select the menu item:

**General > CD/DVD Burners...**

The program will display the **CD Burners Info** window:



The program reveals the following information about burning devices:

<b>Vendor</b>	OEM code (Original Equipment Manufacturer code)
<b>Product</b>	The model name. This value is provided by the device drivers, so that it can differ from the device model in case of using generic and non-original drivers
<b>Type</b>	Lists all supported media types. (in fact, this the only important information about a CD/DVD burning device)

## 4.17.7 Browse Partition

### 4.17.7.1 Overview

The windows-based version of Drive Backup includes the *Partition Explorer* utility, which provides the ability to browse mounted and unmounted partitions of FAT16, FAT32, NTFS, Ext2 and Ext3 file system types.

The Partition Explorer utility is described in chapter [Partition Explorer](#). Partition Explorer allows the user to browse, export and import files and folders from a partition, rename and delete files and folders, create new folders and open documents by associated applications.

### 4.17.7.2 Initiating the operation

The actions are similar to ones required for initiating other operations.

#### Step 1. Select a partition to browse

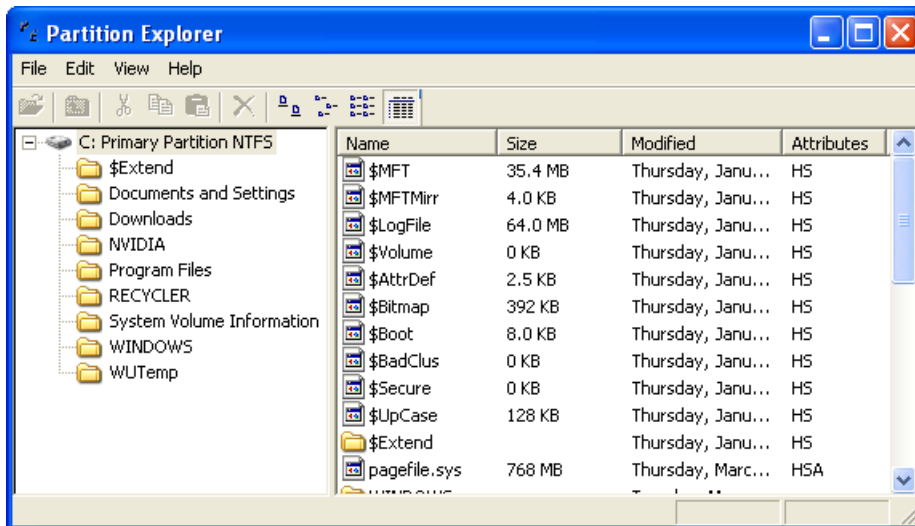
Select an existing *Primary* or *Logical* partition in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions. The operation is not enabled for the Extended Partition and for blocks of free space.

#### Step 2. Select the operation to perform

- Select in the main menu:  
**Partition > Browse partition**
- Call the *popup menu* for the selected partition, then select the menu item:  
**Browse partition**

After these actions, Drive Backup will start the Partition Explorer utility to browse the selected partition:





See chapter [Partition Explorer](#) to learn more about using this utility.

## 4.17.8 Browse Archive

### 4.17.8.1 Overview

The windows-based version of the program is integrated with the *Paragon Image Explorer* utility that provides the ability of browsing contents of partitions of FAT16, FAT32, NTFS, Ext2 and Ext3 file system type, which are saved in a backup archive.

The Image Explorer utility is described in the chapter [Image Explorer](#). Briefly, Image Explorer allows browsing and exporting files and folders from an archive and opening documents by associated applications.

### 4.17.8.2 Initiating the operation

#### Step 1. Select an archive to browse

Select an archive presented in the [Archives List panel](#).

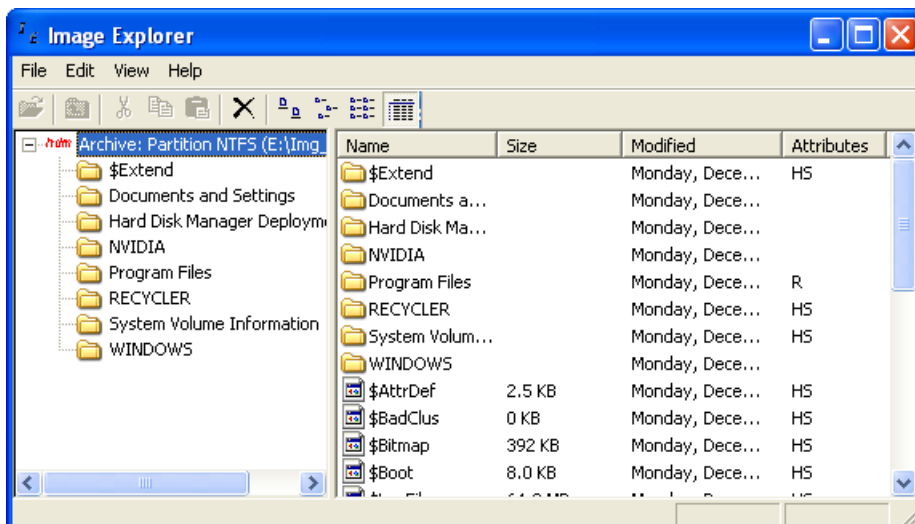
In case an interesting archive is not listed yet, add it to the Archives List by calling the popup menu for the Archives List panel and by selecting the item **Add archive...**

#### Step 2. Select the operation to perform

Call the *popup menu* for the selected archive, and then select the menu item:

#### **Browse archive**

After these actions, the Drive Backup will start the integrated *Image Explorer* utility for browsing the selected archive.



See the chapter [Image Explorer](#) to learn more about usage of the utility.

## 4.17.9 View Sectors

### 4.17.9.1 Overview

Drive Backup includes a simple disk editing tool, which allows the user to directly access and edit disk sectors, save and restore sectors from files, navigate through file system metadata and so on.

The built-in *Disk Editor* is not an end-user tool. The current version of Disk Editor can be used primarily for troubleshooting.

### 4.17.9.2 Starting the Disk Editor

The *View Sectors* function can be applied exclusively to partitions and hard disks. Drive Backup limits Disk Editor to navigate within sectors of a selected object: if a partition has been selected, the program will only explore the partition's sectors.

#### Step 1. Select an object to view its sectors

Select a partition or a hard disk, which needs to be explored, in the Tree Layout panel, on the Partitions Visualization Panel or on the List of Partitions. In any case, the object will be highlighted in all three panels. The function is not available for *blocks of free space*.

#### Step 2. Select the operation to perform

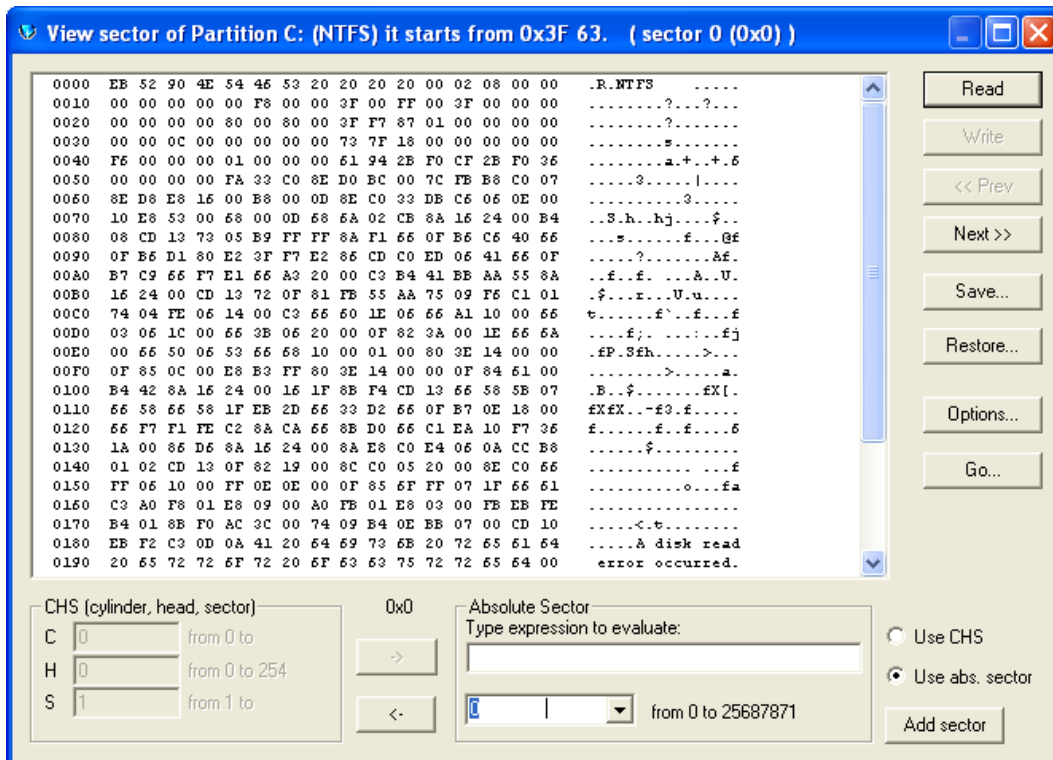
If a hard disk is selected:

- Select the item in the main menu:  
**Hard disk > View sectors**
- Call the *popup menu* for the selected hard disk, then select the item:  
**View sectors**

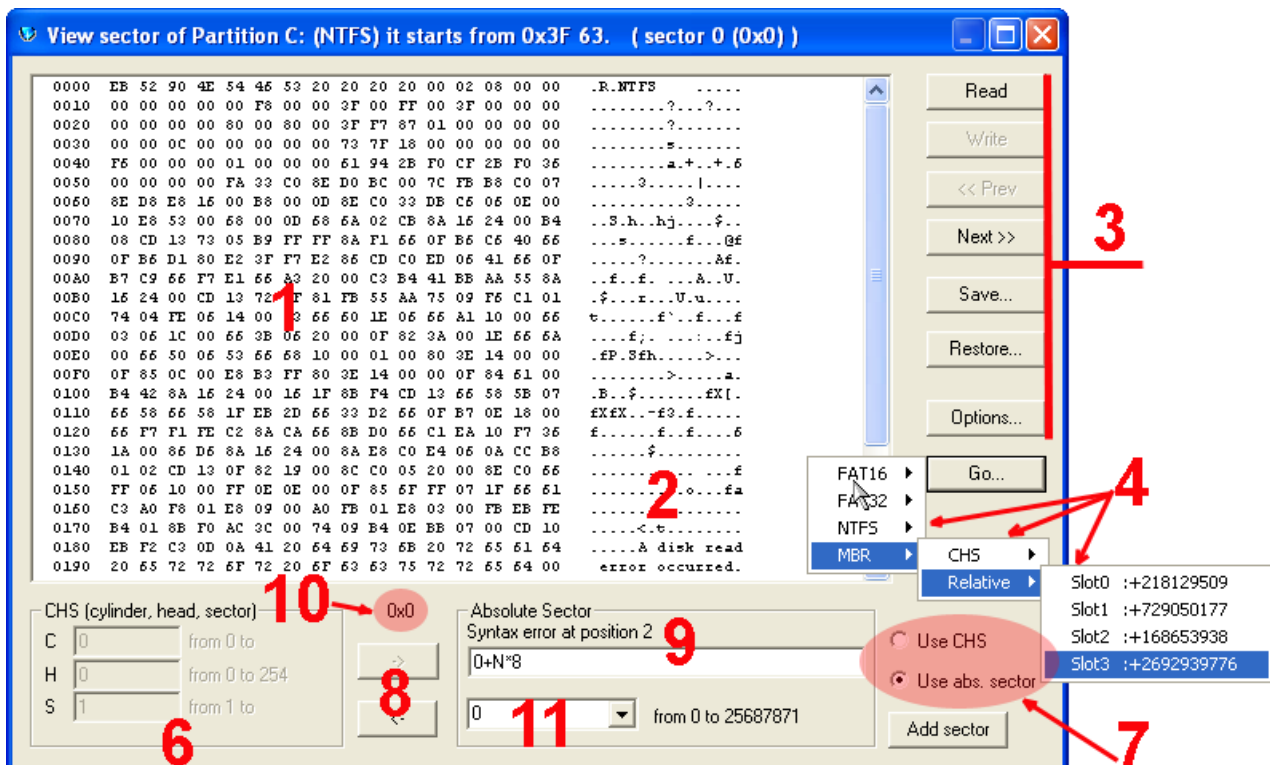
If a partition is selected:

- Select the item in the main menu:  
**Partition > Modify > View sectors**
- Call the *popup menu* for the selected hard disk, then select the item:  
**Modify > View sectors**

After these actions, the *View Sectors* dialog appears:



#### 4.17.9.3 Functionality description



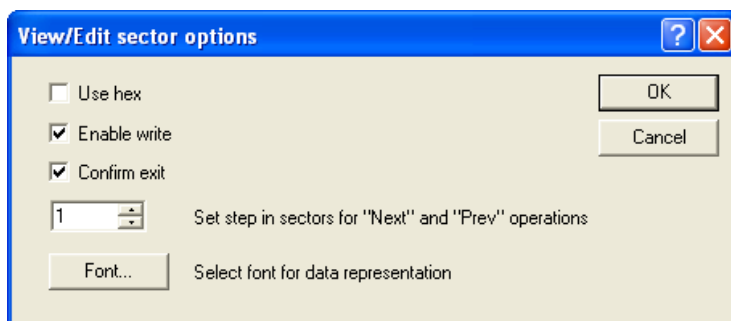
The *View Sectors* window includes the following components:

1. The hexadecimal representation of the sector's contents, which are divided into lines, 16 bytes per line. Each byte is represented by the two hexadecimal digits (0..9, A..F). The left-most column contains the offset values of lines within the sector (expressed in hexadecimal numbers, 0x000 to 0x200).  
The "hex numbers" text can be edited and written back to the disk.
2. The textual representation of the sector's content, which are divided into lines, 16 characters long. This text cannot be edited.
3. Controlling buttons:

<b>Read</b>	Re-read sector contents. All changes made in the editor are cancelled.
<b>Write</b>	Write changes to the disk.
<b>&lt;&lt;Prev</b>	Show to the "previous" sector.
<b>Next&gt;&gt;</b>	Show to the "next" sector. The real step is defined in the Options.
<b>Save...</b>	Save a group of sectors (beginning from the current one), in a file.
<b>Restore...</b>	Overwrite a group of sectors (beginning from the current one), by contents of a file.
<b>Options...</b>	Define options of the Disk Editor.
<b>Go...</b>	Fast navigation between servicing structures (see below).

4. Fast navigation controlling menus.  
The fast navigation menus are available only for sectors, which are "lookalike" servicing sectors of the *DOS partitioning scheme* or boot sectors of the FAT16, FAT32 or NTFS file systems.  
The current sector is interpreted as a servicing one, and the program interprets its data as references to the most important elements of a file system or a partitioning scheme.
5. A group of controls that allow the user to navigate through sectors in the mode of the *absolute addressing of sectors*. In this mode, the index of a sector is independent from the actual *Hard Disk Geometry*.
6. A group of controls that allow navigating through sectors in the mode of *C/H/S addressing of sectors*. In this mode, the address of a sector fundamentally depends on the actual *Hard Disk Geometry*.
7. The group of the *choice* controls that alter the current addressing mode.
8. A group of buttons that allow the translating of a sector's address between the two addressing modes. They do not alter the actual addressing mode, allowing only to inspect the sector's address in the other addressing model.
9. The textual box that allows the setting of the sector's address by the given formula.  
Enter a valid arithmetic expression in this text box and press the ENTER key to jump to the appropriate sector.
10. The textual mark that displays the offset of the currently selected byte in the hexadecimal text (section (1)).  
When the textual cursor is moved through the hex numbers, this mark displays the actual position within the sector.
11. This control allows the user to manually enter the number of a sector to be displayed next. The pull-down list contains the list of favorite addresses. Press the **Add sector** button in order to add the number of the current sector to the list of favorite addresses.

#### 4.17.9.4 Disk Editor Options



##### Use hex

Set this option ON in order to force the program to display the sector address value in hexadecimal format.

##### Enable write

Set this checkbox in order to be able to edit sector contents and restore sectors from files.

### Confirm exit

If this option is activated, the program produces a confirmation message when exiting the Disk Editor tool. This feature simply prevents an occasional closing of the *View Sectors* window.

### Set step in sectors for "Next" and "Prev" operations

This control allows the regulation of the number of sectors that will be skipped when jumping to the next or previous sector.

### Font...

Press this button in order to select the font that will be used for displaying sector contents in the View Sectors dialog.

#### 4.17.9.5 Fast navigation menu

The *Fast navigation menu* allows a quick positioning of the Disk Editor to a location on a disk or partition that contains system information.

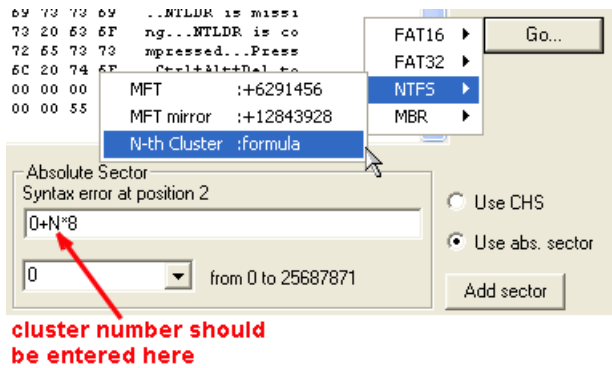
The Fast navigation menu is activated by clicking on the **Go** button.

#### Structure

FAT16		Interpret the sector as the Boot Sector of a FAT16 file system
	1 <sup>st</sup> FAT	Find the first copy of FAT (the 1 <sup>st</sup> sector occupied by FAT)
	2 <sup>nd</sup> FAT	Find the second copy of FAT
	Root	Find the Root Directory
	2 <sup>nd</sup> Cluster	Find the 2 <sup>nd</sup> cluster of the FAT16 partition
	N <sup>th</sup> Cluster	Find the N <sup>th</sup> cluster.
FAT32		Interpret the sector as the Boot Sector of a FAT32 file system
	1 <sup>st</sup> FAT	Find the first copy of FAT (the 1 <sup>st</sup> sector occupied by FAT)
	2 <sup>nd</sup> FAT	Find the second copy of FAT
	Root	Find the Root Directory
	2 <sup>nd</sup> Cluster	Find the 2 <sup>nd</sup> cluster of the FAT16 partition
	N <sup>th</sup> Cluster	Find the N <sup>th</sup> cluster.
NTFS		Interpret the sector as the Boot Sector of a NTFS file system
	MFT	Find the 1 <sup>st</sup> sector occupied by the MFT (Master File Table)
	MFT mirror	Find the 1 <sup>st</sup> sector occupied by the MFT-mirror (a servicing object, that is the backup copy of the MFT's 1 <sup>st</sup> cluster)
	N <sup>th</sup> Cluster	Find the N <sup>th</sup> cluster.
MBR		Interpret the sector as a Partition Table sector (MBR or EPT)
	CHS	Use the C/H/S addresses of partitions
	Slot 0	Find a partition that is referenced by the Slot#0 of MBR/EPT
	Slot 1	Find a partition that is referenced by the Slot#1
	Slot 2	Find a partition that is referenced by the Slot#2
	Slot 3	Find a partition that is referenced by the Slot#3
	Relative	Use linear addresses of partitions
	Slot 0	Find a partition that is referenced by the Slot#0 of MBR/EPT
	Slot 1	Find a partition that is referenced by the Slot#1
	Slot 2	Find a partition that is referenced by the Slot#2
	Slot 3	Find a partition that is referenced by the Slot#3

#### 4.17.9.6 Navigating the N<sup>th</sup> Cluster

When the item "N<sup>th</sup> Cluster" of the *Fast navigation menu* is selected, the program places an arithmetic expression in the *Formula Box* (9):



The expression includes a character "N", which should be replaced manually by the desired number of a cluster.

## 4.17.10 Generate Scripts

### 4.17.10.1 Overview

The program provides the ability of the batch processing of disk management operations. The program includes separate command line utilities for working in the unattended mode, which are generally named *Paragon Script Interpreter* (PSI):

- The utility **SCRIPTS.EXE** is included to the Windows-based version
- The utility **PSI.EXE** is included to the DOS-based version
- The utility **PSI** is included to the Linux-based version

These utilities take job tasks from so-called *script files*. A *script file* is just a textual file written in the *Paragon Scripting Language*, it contains the description of operations to be executed and program's settings that should be applied to these operations.

The interactive versions of the program provide the ability of generating a script file from accumulated virtual operations. The resulting script file can be used "as is", or it can be used as a template for building custom script files.

With using this feature, one can automate the disk/partition backup routines or cloning procedures of almost any complexity. The *Paragon Scripting Language* supports all operations that are available in interface-managed versions. In addition, it supports the conditional execution, subroutines, repeatable iterations, disk/partition properties analysis, errors management and even the controllable console-like input-output features.

### 4.17.10.2 Initiating the operation

Let's remind that the program generates scripts only from virtual operations that are accumulated on the *List of Pending Operations*.

#### Step 1. Switch on the Virtual Execution mode for all operations

Open the program's Settings and force the virtual execution for all operations (see the chapter [Settings overview](#) for more details):

(menu) General > Settings >  
(tab) Operations > Virtual operations are enabled

#### Step 2. Execute required operations virtually

The next step is to emulate all operations that should be executed by the Script Interpreter in the automated mode. The user should execute these operations virtually in the Windows-based interactive application.

(!) Do not apply accumulated pending operations!

#### Step 3. Select the operation to perform

Select the following menu item:

General > Generate Script

This menu item remains disabled if there are no operations accumulated on the *List of Pending Operations*.

#### Step 4. Define parameters of the operation

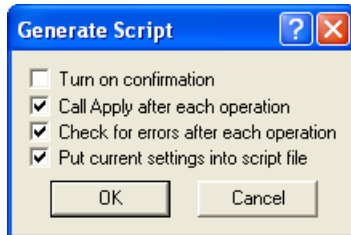
The appropriate dialog appears.

The user is able customizing some supplementary features of the generated script file, such as including of error management, enabling or disabling interactivity with the user and so on. See the next section for more details.

#### Step 5. Select a filename for a newly created script

Finally, the program suggests choosing a filename for a new *script file*. The default file extension that is reserved for scripting files is *.PSL*. However, a script can be saved under any filename.

##### 4.17.10.3 Description of parameters



This dialog allows controlling a script's code that will be generated.

#### Turn on confirmation

When this option is active, the program inserts the command:

`confirmation on`

This command enables to pause the script execution in order to acquire input information from the user. For example, the program will pause when creating a multivolume archive (with the volume filenames generating option switched off), when the program needs erasing a non-empty rewritable CD and so on.

When the confirmation mode is switched off, the program does not pause the script execution. Instead, it behaves as if the user always selects a default answer to each question. In this mode, the program really does not need the user intervention. However, in some cases the program will simply abort operations.

#### Call Apply after each operation

When this option is active, the program inserts the `apply all` command after each disk management operation. Otherwise, the `apply all` command will be included only once, after the last operation.

The thing is that the script processing module works like the interactive application; it accumulates operations in its own List of Pending Operations. The script command `apply all` is similar to the **Apply** action in the interactive application, it forces executing all pending operations.

There is the difference between the applying of a large list of pending operations and the stepwise execution of multiple operations, e.g. in case of processing of *locked partitions*. See the Paragon Scripting Language Manual for more details.

#### Check for errors after each operation

When this option is active, the program inserts a code, which checks the status of a last executed operation and halts the script processing on errors of any kind.

This feature is useful, if a set of operations should be applied to the same partition. If some operation fails for any reason, the error checking code cancels sequent data modifications and prevents them from further corruption.

In some situations, this feature can be a drawback, if operations are independent from each other. For example, a backup operator wrote a script that creates an incremental backup of first two partitions of all hard disks, and he intends using this script for unattended processing of office computers. On computers having only single partitions on the 1<sup>st</sup> disk, this script wouldn't save contents of other hard disks. In case of switching off the error checking (at least between independent operations), the program will save all available partitions.

### Put current settings into script file

When this option is active, the program inserts the actual program's settings to the `settings ... endsettings` section.

Otherwise, the program omits the `settings ... endsettings` section.

#### 4.17.10.4 Comments

All versions of the *Script Interpreter* have similar usage rules. PSI supports several command line keys. To obtain the usage prompt, one should run the utility from the command line with `-h` parameter:

```
in Windows:  scripts.exe -h
in DOS:      psi.exe -h
in Linux:    psi -h
```

The program will display the prompt screen:

```
PSI: Paragon Script Interpretator 09:57
Usage: C:\Program Files\Paragon Software\Hard Disk Manager Professional\WinHDM\scripts.exe [parameters]
Parameters:
-h, --help           - Shows this screen and exits.
-v, --version       - Shows version number and exits.
--verbose           - Verbose output. (Default: disable).
-s, --silent        - Silent output. (Default: disable).
-x, --expert        - Expert mode (use with caution). (Default: disable).
-n, --nochs         - Don't use CHS geometry. (Default: disable).
-e, --ebios         - Use EBIOS. (Default: disable).
-p:<parameter>=<value> - Specifies parameter for script.
                        Value must be in decimal format.
-s:<parameter>=<value> - Specifies string parameter for script.
-wno               - Disables all warnings. (Default: enable).
-errnum <number>   - Specifies number of errors will be displayed.
-o <output file>    - Specifies output file. (Default: psi.out).
                    To turn off writing output file, use: -o none
--input "<script>"  - Specifies script from command line.
<input file>      - Specifies input file. (Default: psi.in).
```

### The Windows-based utility SCRIPTS.EXE

The **SCRIPTS.EXE** utility is located in the same directory with the Windows-based application. By default, it is the folder:

```
C:\Program Files\...\Drive Backup\winDBTL
```

### The DOS-based utility PSI.EXE

The **PSI.EXE** utility is located in the `scripts` subfolder of the directory containing the DOS-based version of Drive Backup. By default, it is the folder:

```
C:\Program Files\...\Drive Backup\DosDBTL\scripts
```

The program is packed in the **SRPTPACK.EXE** self-extracting archive. Before using the utility, one should extract all contents of the **SRPTPACK**.

### The Linux-based utility (PSI)

The **PSI** utility is located on the Linux-based bootable CD of Drive Backup, in the folder:

```
/usr/local/bin
```

and on the original location on the bootable CD:

```
/mnt/cdrom/usr/local/bin
```

However, the on-CD Linux is configured so as the user can run the utility from any location.

### How to execute scripts

All versions of the *Script Interpreter* are used in the same fashion:



1. Run an interactive version of Drive Backup and prepare a script file as it described in the above sections.
2. Run the *Script Interpreter* from the command line in the following fashion:  
In Windows: `<path>scripts.exe <path><script-file>`  
In DOS: `<path>psi.exe <path><script-file>`  
In Linux: `psi <path><script-file>`

The *Script Interpreter* supports the *silent* and the *verbose* working modes. In the verbose mode, the program outputs the detailed report executed operations on the console. In the silent mode, no information is displayed.

However, in any of these modes the *Script Interpreter* produces the report file that is named **PSI.OUT**. In addition, the utility also keeps two log files, the **STUBACT.LOG** and the **PWLOG.TXT**.

#### 4.17.11 Update MBR

This chapter explains how to retrieve the standard bootstrap code with Drive Backup

##### 4.17.11.1 Overview

Drive Backup allows the user to overwrite the current bootable code in the MBR by the standard bootstrap code.

This feature can repair corrupted bootable code on a hard disk, which is due to various reasons such as "boot virus" attacks or malfunction in the boot managing software.

##### 4.17.11.2 Initiating the operation

###### Step 1. Select a hard disk that requires updating MBR

There are two variants:

- Select a hard disk in the Tree Layout panel or on the Partitions Visualization Panel.
- Select any partition that belongs to the hard disk of interest.

###### Step 2. Select the operation to perform

Alternatives:

- Select in the main menu:  
**Hard disk > Update MBR**
- When the hard disk is selected, call the *popup menu* for the selected hard disk in any of the layout panels (right click of the mouse button), then select the menu item:  
**Update MBR**
- Press the **Ctrl+E** keyboard combination

Drive Backup supports only the *Immediate* execution for the *Update MBR* operation. The program always performs this operation immediately after the initiation, without considering the execution mode.

##### 4.17.11.3 Comments

- This operation irreversibly destroys the boot managing software that occupies the MBR.
- Contents of the Partition Table are kept intact.
- A partition from which the system has been booted previously, remains active to allow the system to start from this partition next time as well.

#### 4.17.12 Send Log-files

##### 4.17.12.1 Overview

Drive Backup simplifies the procedure of sending a support request to the Support Team. Generally, support engineers require technical details of the user's computer, disk layout and performed operations. Most of this information is kept in LOG-files, which the program stores.

After activating this function, the program starts the default mail client, and generates a template request e-mail with attached compressed LOG files. The user is only to include a generic description of the problem.

#### 4.17.12.2 Performing the operation

Select from the main menu:

**Help > Troubleshooting > Send log files**

The program will make the following actions:

1. Compress LOG files by using the built-in compressing module.
2. Start the default mail client registered in the system.

The mail client starts with a support query template with the attached compressed LOG-files.

Finally, the user is to fill in the support request form, describe the problem in its detail and send the email to the Support Team.

#### 4.17.12.3 Comments

##### LOG files

Drive Backup keeps the following LOG-files:

<b>STUBACT.LOG</b>	Contains extended information about parameters and performance of every executed operation and changes being made to the disk layout.
<b>PWLOG.TXT</b>	Contains brief information about the operations and extended information about the state of all hard disks.
<b>BioNTlog.TXT</b> or <b>Bio95log.TXT</b>	An OS-dependent supplementary LOG-file from BIOxx.DLL. It may contain valuable information on Windows NT/2000/XP-managed systems.

LOG files are in readable textual format; they contain information about the performance of Drive Backup and the most common information about the hard disks' layout. These files do not include confidential information on system settings, user documents or other entities.

The request template is included in the file **AUTOREQUEST\_ENG.TXT**, which is located in the subfolder "**Resource**".

##### Error sending mail

In Windows, in case the program fails to start the default mail client, the following system error message appears.

To solve the problem:

- Check the settings of a default mail client and default Internet connection.
- Run the Internet Connection Wizard and create a new mail account.
- In the Internet Explorer settings, choose a default mail client.

An alternative routine is as follows:

1. Run the mail client while Drive Backup is running.
2. Repeat sending the LOG files (while the mail client is open).

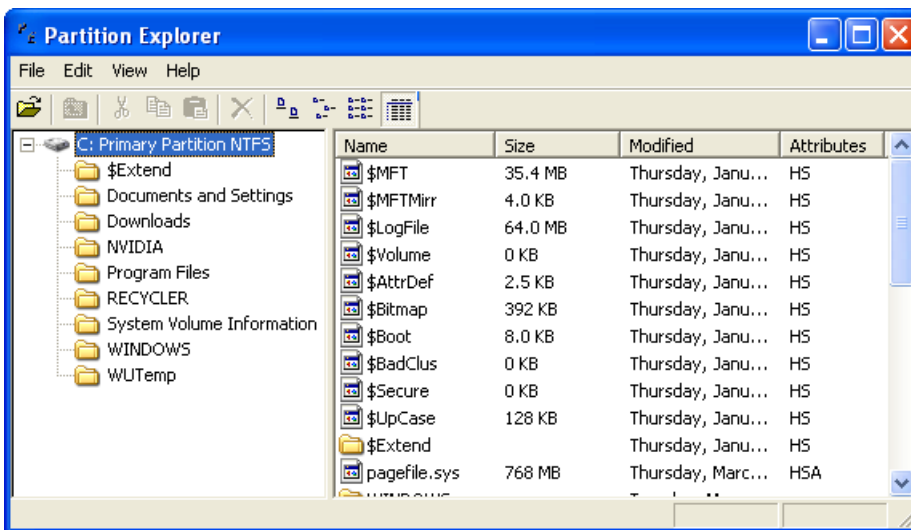
## 5 Supplementary Utilities

This chapter describes the supplementary utilities that are included in the Drive Backup package.

### 5.1 Partition Explorer

The Windows-based version of Drive Backup includes the *Partition Explorer* utility.

*Partition Explorer* provides the ability of browsing and editing contents of FAT16, FAT32, NTFS, and Ext2/Ext3 partitions.



The program uses built-in OS-independent drivers to access partitions, which work with both mounted and unmounted partitions.

Partition Explorer supports the following functionality:

1. Browsing contents of single partitions or entire hard disks
2. Exporting single and multiple files and folders
3. Importing single and multiple files and folders
4. Creating new folders and files
5. Renaming and deleting files and folders
6. Opening documents from browsed partitions

In addition, the utility enables an easy access of NTFS metadata.

#### 5.1.1 Opening and Editing Documents

When the user opens a document in the Partition Explorer, the utility actually copies a file into the Windows TEMP directory, and then opens the duplicate file by an appropriate application that is registered in Windows for this type of file.

Consider that the utility is unable to copy the modified document back, which has been opened in this manner. To modify the document, the user should follow the procedure:

1. Export the appropriate file
2. Open the document in Windows, in the usual fashion
3. Complete editing the document
4. Import the appropriate file with the Partition Explorer.

## 5.2 Image Explorer

### 5.2.1 Overview

The Windows-based version of the program includes the *Paragon Image Explorer* utility.

*Image Explorer* provides the ability of browsing contents of backup archives made by the program. Exactly, the program supports only FAT16, FAT32, NTFS, and Ext2/Ext3 partitions saved in backup images.

Image Explorer supports the following functionality:

1. Browsing contents of images of single partitions or hard disks
2. Exporting single and multiple files and folders from any images
3. Opening documents from browsed partitions.

### 5.2.2 Opening and Editing Documents

When the user opens a document in the Image Explorer, the utility actually copies the file to the Windows TEMP directory, and then it opens the duplicate file by an appropriate application, which is registered in Windows for this type of files.

One should take into account that any changes made in a duplicate file, will not be saved back to the original document.

## 5.3 Image Mounter

*Image Mounter* is a Windows-based system utility, intended to work conveniently with existing backup archives (images). One of the main and most useful functions of the program is the possibility of mounting images that are able to use assigned drive letters instead of names of backup archives and their paths.

The program has to offer advanced tools for searching and organizing backup archives on local disks as well.

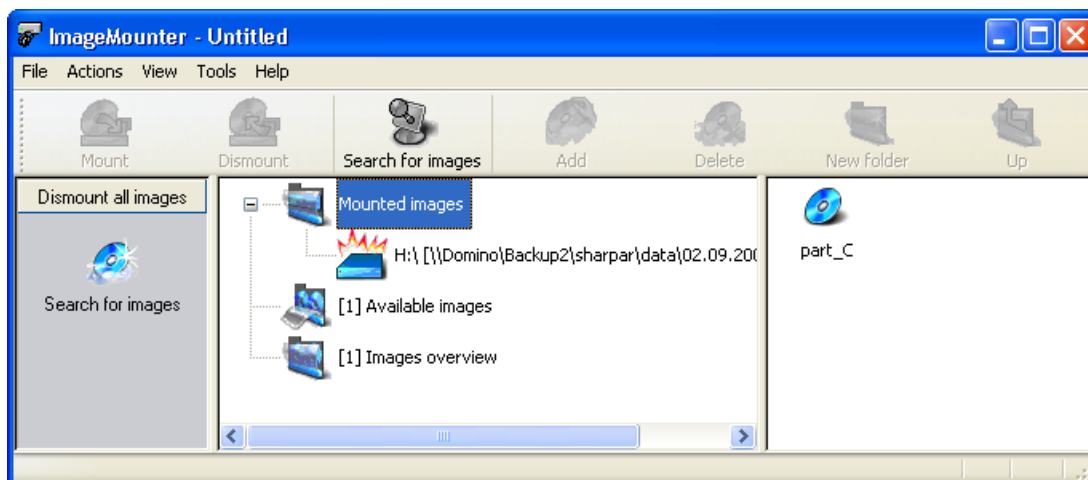


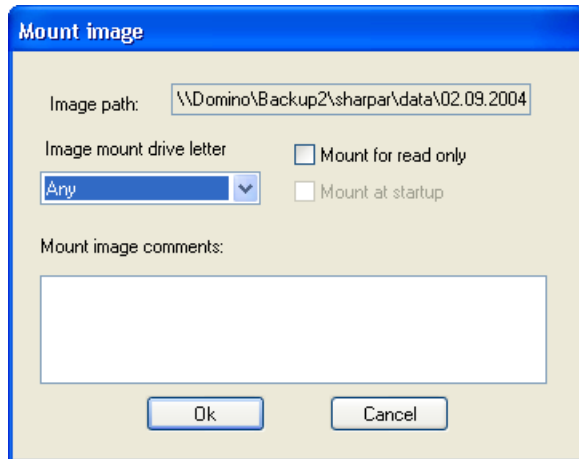
Image Mounter supports the following functionality:

1. Searching Images (*Image Mounter* includes a special tool for searching images on local disks. This tool is named *Find Wizard*)
2. Adding New Images (*new images can be added* to the database)
3. Creating New Folder (the user can organize the database by placing images in separate folders. To *create a new folder* the user should)
4. Moving Images to a Folder
5. Renaming an Image or a Folder
6. Deleting an Image or a Folder
7. Mounting / Dismounting Images (the program allows the mounting of images by assigning drive letters to them. This makes working with images much easier. The user can simply enter a drive letter instead of having to enter the entire path to the mounted image)

### 5.3.1 Mounting / Dismounting Images

To mount the selected image the user should:

- Select in the Main menu:  
**Actions > Mount**
- Or click the **Mount** button in the Tool bar,
- Or call the context-sensitive menu for an image and then select the **Mount** item.



At the top of the *Mount Image* dialog the full path to the selected image is displayed. The user can apply the following controls:

- *Image mount drive letter*. This is a pull-down menu with a list of free drive letters. The user can select a drive letter to be assigned to the image.
- *Mount for read only*. This is a checkbox that allows mounting the image as a read-only element of the file system.
- *Mount image comments*. This text field contains a short description of the image.

Click the OK button to apply the changes.

To dismount the selected image the user should:

- Select in the Main menu:  
**Actions > Dismount**
- Or click the **Dismount** button in the Tool bar,
- Or call the context-sensitive menu for a mounted image and then select the **Dismount** item.

The user can dismount all images by selecting in the Main menu:

**Actions > Dismount All**

## 5.4 Recovery Media Builder

Drive Backup provides a possibility to prepare a set of recovery tools on external media (CD, DVD or floppy disks). The tool set can help in case of corrupting the operating system. So the user can boot the computer even if the operating system cannot do it any more. Creation of such recovery tools is performed with the *Recovery Media Wizard*.



### 5.4.1 Settings

The Recovery Media Wizard allows the user to make proper settings and then start the operation in accordance with the entered parameters. In our case we set parameters of the future recovery tool defining:

- **Type of the recovery media the user is creating.** The recovery tools can be placed either on a CD/DVD disc or on a floppy disk
- **Contents of the recovery set.** The recovery tools may include the standard Recovery Media image (it is a part of the installation package) or software, defined by the user. In the last case the user can record a beforehand-prepared image setting the path to the image file on the disk
- **A recording device.** Appropriate external media (CD/DVD or a floppy disk) should be inserted into the selected device
- **CD/DVD writing parameters** (in case the user selects this kind of media). Writing parameters include writing speed (maximum or minimum) and the ability of ejecting the recorded disc after completing the operation.

The program supports CD-R, CD-RW, DVD-R, DVD+R, DVD-RW and DVD+RW discs. If the inserted disc is not empty the Wizard suggests erasing its contents. If the user confirms the operation the program erases the re-writable disc's contents and starts recording.

### 5.4.2 Results

The Recovery Media Wizard starts the operation after completing the settings mentioned above. As a result the user receives recovery media, which can be used in most emergency cases.

If you purchase the program online, you can get Recovery Media as ISO-image files. The Recovery Media Builder burns them to physical CD/DVDs.

## 5.5 Net Burner

Net Burner enables workgroup users to share a CD/DVD recordable device over the local network. A shared CD/DVD recordable device gives network users a possibility to record compact discs without installing these devices on the computers. The iSCSI technology, which is implemented in the utility, allows using not only local network but also the global one to work with remote CD/DVD devices.

Net Burner includes three components:

- *iSCSI Target Service* – a component, which allows remote devices (a CD/DVD recorder, for instance) to be recognized in the network as iSCSI targets and as a result to be available for the client computers.
- *Net Burner Server* – a component, which allows setting and managing remote CD/DVD Recorders. It can be used either on the side of the server, where a device is installed, or on the client side or on any computer connected to the same network.
- *Net Burner Client* – a component, which allows establishing network connection and making a remote CD/DVD recordable device available to the system for use on the client computer.

## 5.6 Recovery CD

Paragon Recovery CD may be the last resort to secure data in case a system failure or crash. Paragon Recovery CD is a bootable CD, which includes the Linux version of Drive Backup. Using the Paragon Recovery CD the user can find and restore occasionally deleted partitions, restore partitions from the hard disk, and make them bootable as well. One can also find and retrieve important files from a dead system.

### 5.6.1 Features Overview

Paragon Recovery CD supports the following main features:

- Linux or PTS DOS Booting,
- NTFS Support for Linux,
- NTFS/Ext2-3FS Support for PTS DOS,
- Network Drives Support,
- Partition operations,
- Simple Recovery Wizard,

#### 5.6.1.1 Linux or PTS DOS Booting

The Recovery CD allows the user to select which system the Utilities should use:

- Linux
- PTS DOS.

Similar functionality is given in both cases. After rebooting the computer from the Recovery CD, Linux or PTS DOS will be loaded into the memory of the user's computer, so that the hard disk is not needed in this case. Both operating systems will enable the user to perform operations on the hard disk.

There are several restrictions in PTS DOS mode:

- No support for network access.
- Read-only NTFS/Ext2-Ext3FS access.

The user has the option to boot in Linux Safe Mode.

##### 5.6.1.1.1 Linux Safe Mode

Rebooting the computer in Linux Safe mode is helpful in a number of non-standard situations, such as interfering hardware settings. In this case, only the basic files and drivers (such as hard disk drivers, a mouse driver, and a keyboard driver) will be loaded.

#### 5.6.1.2 Supported file systems

The Linux and PTS DOS versions differ in accessing different file system partitions.

OS /File System	FAT-32/ FAT16	Ext2/Ext3FS	NTFS
PTS DOS	read/write	read-only	read-only
Linux	read/write	read/write	read/write

Paragon Recovery CD provides a special NTFS – Ext2FS driver to access partitions of these file systems under PTS DOS.

### 5.6.1.3 Network Drives Support

There is a special tool for network configurations that gives the user the opportunity to network computer's hard disks for back up and restores operations, in case the user has a local network. A Network Configuration Wizard provides step-by-step instructions and an easy-to-use interface. The Network Configuration Wizard works only with Linux. PTS DOS does not offer a network access to local computers.

## 5.6.2 System Requirements

To use the Paragon Recovery CD on a computer, check if the system meets the following requirements:

- IBM AT compatible computer with Pentium family CPU,
- CD-ROM drive,
- On-board BIOS supports the ability "Boot from CD",
- at least 64 MB of RAM,
- VGA-compatible monitor,
- Mouse (recommended),

The PTS DOS version of the Recovery Utilities requires more memory – a minimum of 128MB of RAM.

In case the computer is connected to a local network, use the network options provided by the Recovery CD; a network card with a transfer rate of 100Mb/c is recommended.

## 5.6.3 How to Burn a Recovery CD

The Recovery CD is a bootable CD containing Drive Backup specially configured to work with Linux and PTS DOS.

This helpful tool is available by downloading the Paragon Recovery CD image and burning it to a blank recordable CD, if the product has been purchased and registered via Internet.

### 5.6.3.1 Download the ISO image of Recovery CD

The downloadable ISO image of Paragon Recovery CD is available for all registered customers at the Company web-site, Service System <http://ess.paragon.ag/paragon/site>. If the user purchased the Product on-line, one should register on the company's web-site, and then download the ISO image of the Recovery CD containing that particular product.

### 5.6.3.2 Burn Recovery CD

The ISO image of the Recovery CD should be burned to a recordable CD/DVD. This task can be completed by the [Recovery Media Builder](#) or by any other CD/DVD burning software, e.g. "Easy CD Creator" from Roxio or "Ahead Nero - Burning Rom" from Ahead Software AG. Instructions are to be found at: <http://kb.paragon.ag/>.

How to use the Recovery Media Builder:

- Run the Recovery Media Builder
- Insert a blank disc into a writable CD/DVD drive
- Mark the option "User specified CD/DVD image (.iso file)"
- Choose an ISO file to burn to CD/DVD
- Choose the CD/DVD device to be used to burn the CD/DVD
- Click the "Next" button to complete the process.

## 5.6.4 How to Use the Recovery CD

### 5.6.4.1 How to boot from the Recovery CD

Paragon Recovery CD is a Linux based bootable CD. To load an operating system (Linux or PTS DOS) into the memory of a computer, Linux loader LiLO is used. After the user has inserted the Recovery CD into the CD/DVD drive and has restarted the computer, LiLO displays the Boot menu:

- Linux English (will be loaded by default),
- Linux German,
- Linux Russian,
- Linux, Safe mode,



- PTS DOS



If the LILO boot menu is not displayed after restarting the computer, check if the computer is configured to start from a CD/DVD: BIOS should have an option "Load from CD first"



The Recovery CD may have other localization options

To move within the menu use the computer keyboard.

Once the user has chosen Linux/Linux Safe Mode or PTS DOS option, the available hardware will be detected automatically and a proper Linux/PTS DOS kernel will be assembled.



In the Linux Safe mode, only the basic set of drivers (such as hard disk, monitor, keyboard drivers and others) will be loaded

#### 5.6.4.2 Linux Utility menu (Start-up menu)

When Linux is loaded, the "Linux Start-up menu" appears:

- File Manager MC (Midnight Commander)
- Drive Backup
- Configure network connections
- Simple Recovery Wizard
- Linux command line
- Power off
- Reboot

To shift along menu items use the cursor keys of the computer keyboard and a mouse.

##### 5.6.4.2.1 File Manager MC (Midnight Commander)

The standard Linux file manager "Midnight Commander" allows the user to browse files and folders and perform standard file operations.

##### 5.6.4.2.2 Drive Backup (Linux version)

Drive Backup supports creating, deleting, and formatting of partitions on a hard disk and more advanced operations on partitions, such as resizing, moving, copying, merging and undeleting.

##### 5.6.4.2.3 Configure network connections

A special tool is provided, which allows access to network computers in case a local network exists. A Network Configuration Wizard, which provides step-by-step instructions and easy-to-use interface is available. PTS DOS does not support Network Drive Access.

##### 5.6.4.2.4 Linux command line

Linux Command line mode provides a root access to all standard Linux functions by typing the operating system commands in command line (recommended for experienced Linux users only).

##### 5.6.4.2.5 Power off

Turns off the power of the computer.

##### 5.6.4.2.6 Reboot

Restarts the computer after the necessary changes have been made.

#### 5.6.4.3 Loading Linux Safe-Mode

In case the user runs Linux Safe Mode, the Start-up menu will be displayed, which appears to be identical to the standard Linux system loading procedure.

#### 5.6.4.4 PTS DOS localization menu

Once chosen, PTS DOS displays a localization menu, which contains a selection of three language interfaces and the PTS DOS command line mode option:

- English
- German
- Russian
- PTS DOS command line.

Specific language Interfaces have the same PTS DOS Start-up menu options.



There may be other localization options provided by the given Recovery CD

#### 5.6.4.4.1 PTS DOS command line

By choosing the PTS DOS command line mode the user gains root access to all standard DOS functions through the command line of the operating system (recommended for experienced DOS users only).

#### 5.6.4.5 PTS DOS utility menu (DOS Start-up menu)

Each language PTS DOS Start-up menu includes:

- Paragon Boot Manager
- Simple Recovery Wizard
- NTFS - Ext2FS driver

#### 5.6.4.5.1 NTFS- Ext2FS Driver

To access non-DOS file systems under DOS the user needs to install the Paragon IFS driver (to be found in the PTS DOS menu). The current version supports NTFS, Ext2FS, Ext3FS access.

### 5.6.5 Recording Data CD from a Failed Hard Disk

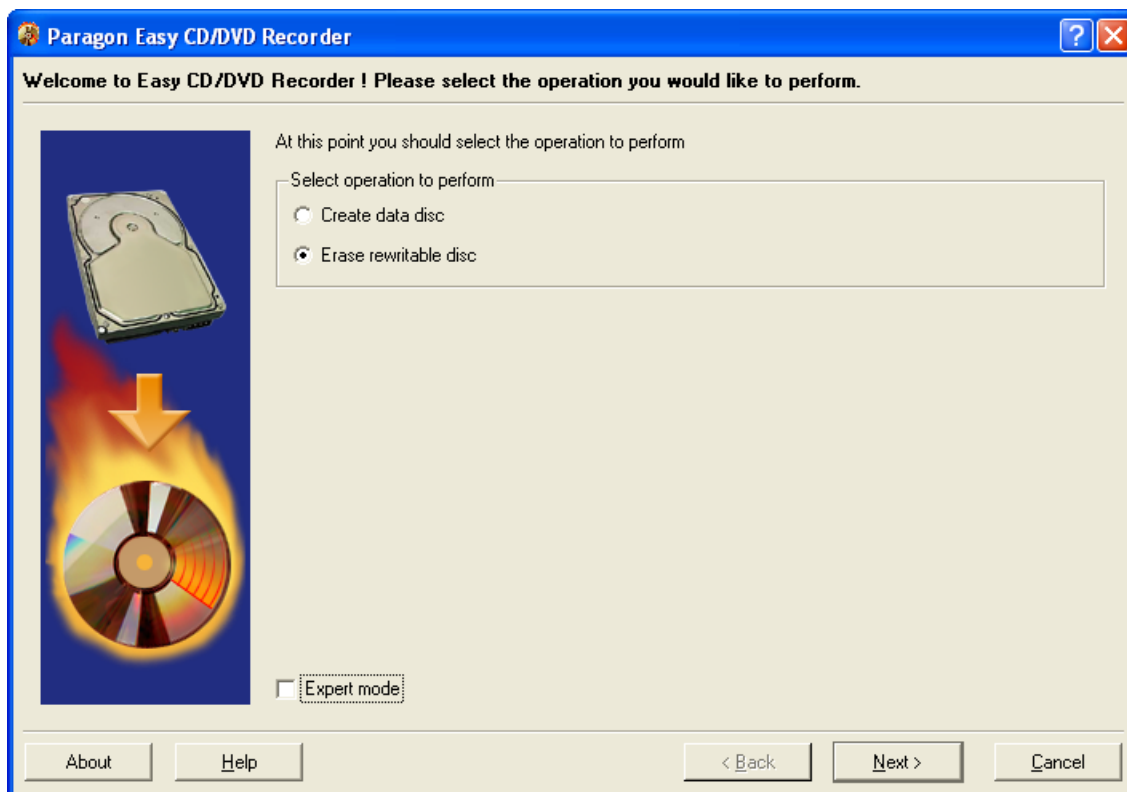
*Easy CD/DVD Recorder* is a program that offers the opportunity to save data from a failed hard disk onto a compact disc. All that is needed is a CD/DVD Recordable device installed on the computer with an inserted recordable compact disc. The program supports CD-R, CD-RW, DVD-R, DVD+R, DVD-RW and DVD+RW discs.

To start *Easy CD/DVD Recorder* click the corresponding item in the Recovery CD menu.

The program has two running modes – *Plain* and *Expert*. The first one is intended for situations when the user does not want to spend any time on detailed settings. *Easy CD/DVD Recorder* uses the default parameters, which are optimal in most cases. If knowledge and time allows the user to set the parameters of the recording process, one should select the Expert mode. To switch between the two modes, use the “*Expert mode*” checkbox at the foot of the first dialog of the program. The advantages of the Expert mode are explained in [a special section of this chapter](#).

#### 5.6.5.1 Plain mode

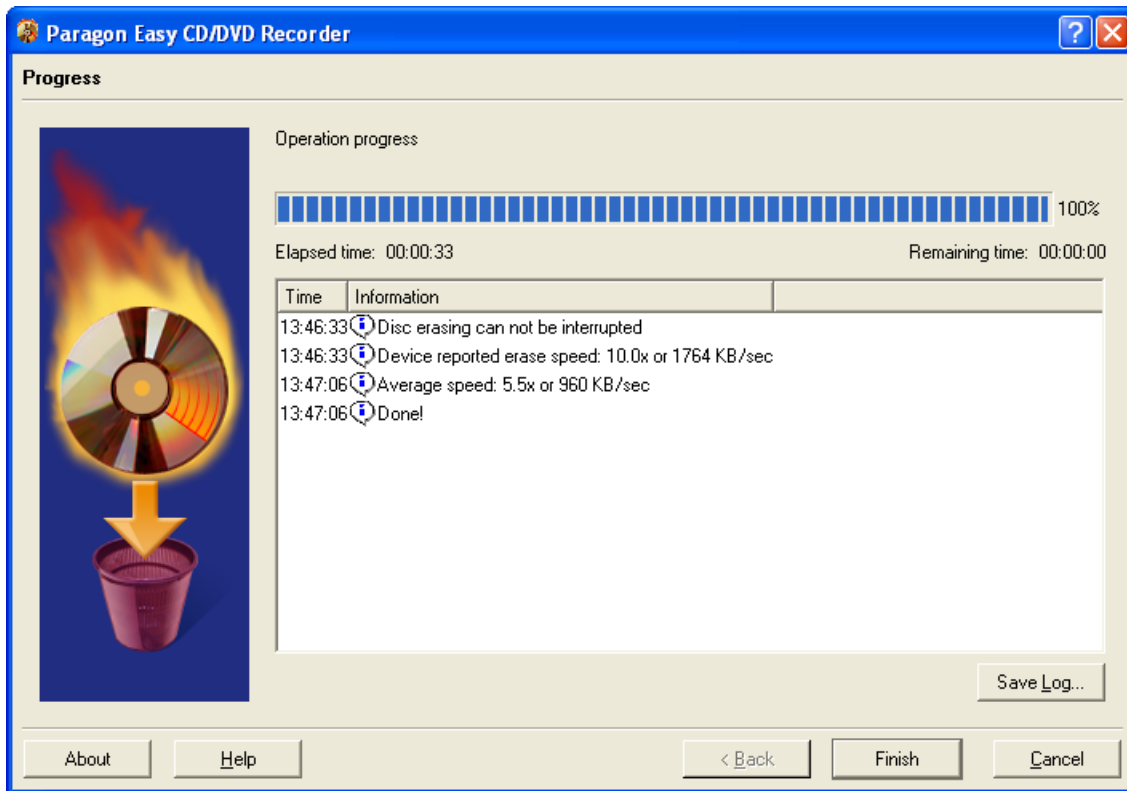
Initially, the program allows the user to **erase** the CD-RW, DVD-RW or DVD+RW disc in case it is not blank.



The user should select the “*Erase rewritable disc*” checkbox and then click the “Next” button to start the operation. If for the Expert mode has been activated in the first dialogue window, the next page will allow the user to [set some parameters of the erasing process](#). If the Expert mode has been switched off, the program starts the operation using the default values of the parameters, which are appropriate in most cases.

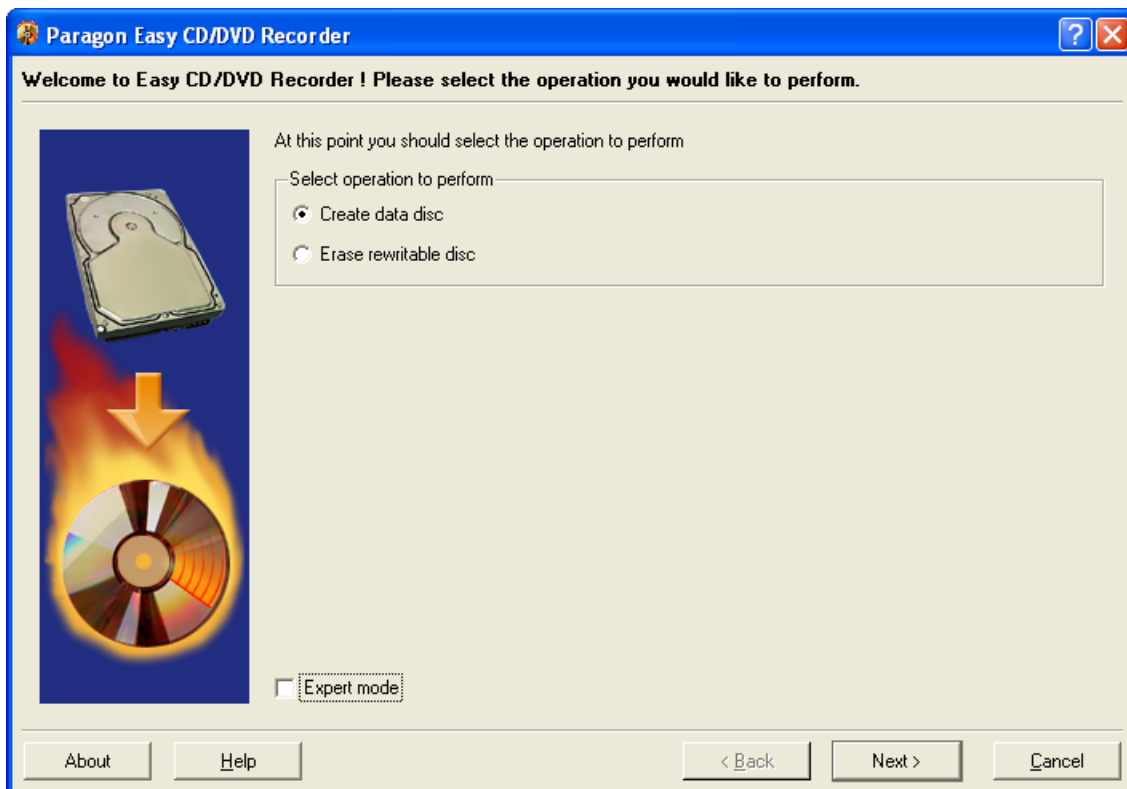
During the entire erasing process the program displays the following:

- the operation progress (by percentage),
- the elapsed time,
- the current operation step.

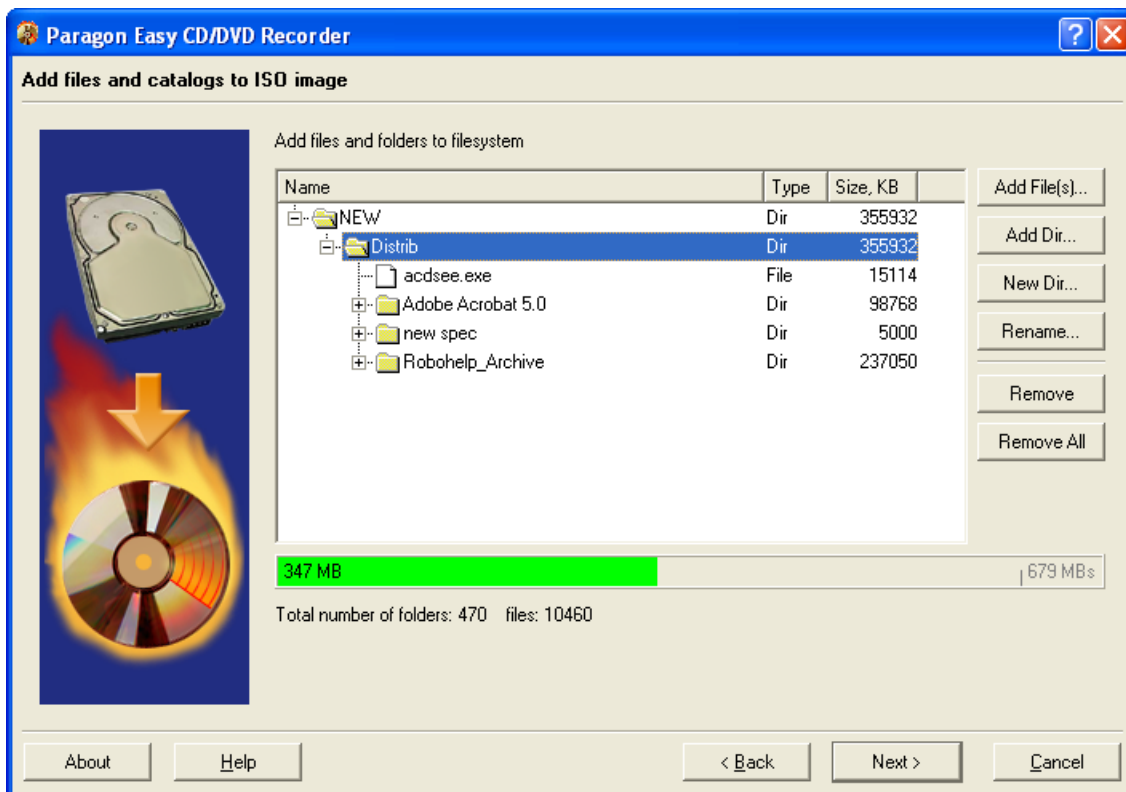


When the operation has been completed, the user returns to the initial page where the recording process can now be started.

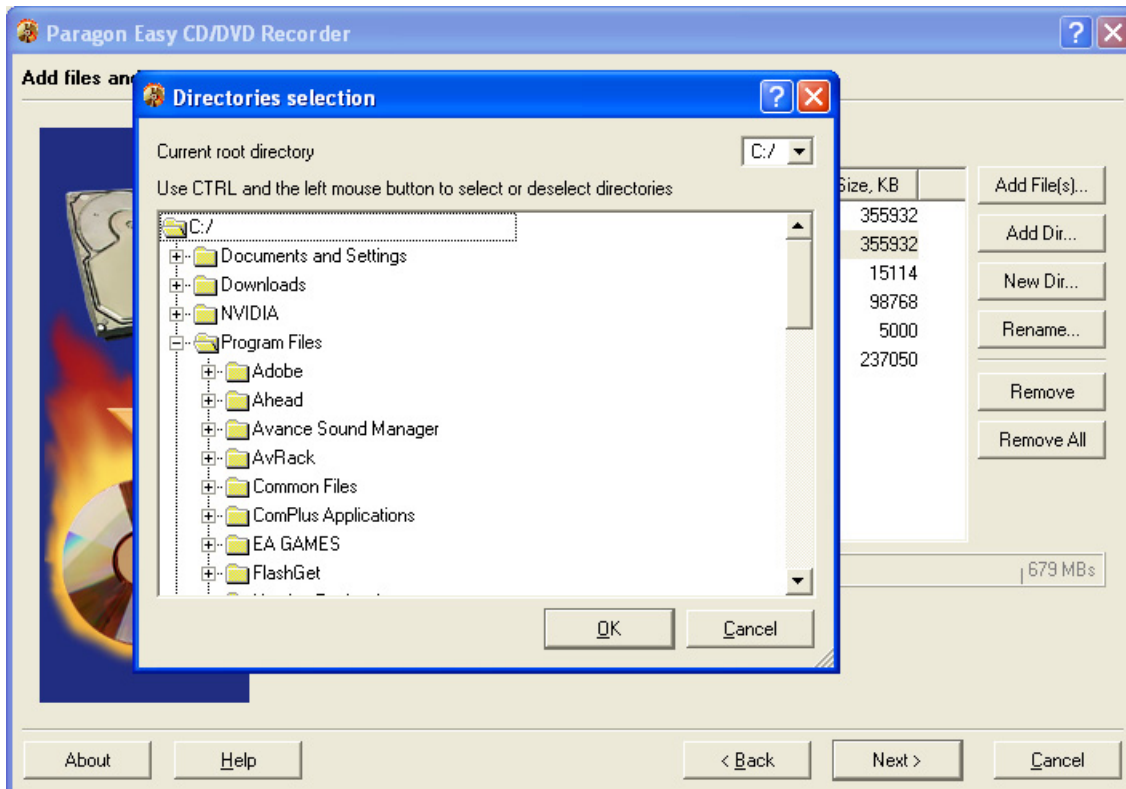
If the user has a blank compact disc one should select the “*Create data disc*” checkbox and click the “Next” button to setup this operation.



**The first step is to form the recording compact disc content.** It is necessary to select the directories and files on the local hard disk, which are to be recorded. By clicking the “*Add File(s)*” button the user opens a file browser window that allows the user to select files on a hard disk for the given compact disc project. The added files are displayed on a tree-like list that represents the future content of the compact disc.

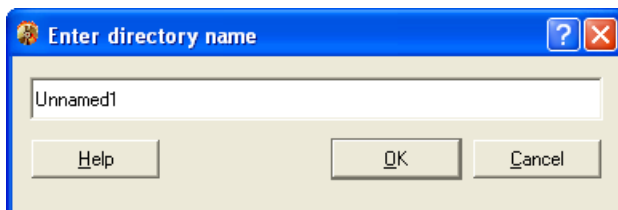


There is also the possibility to add an entire directory. Click the “*Add Directory*” for that. Then, the user simply has to point to a directory in the opened file browser and click the “OK” button. The bar at the foot of the dialog displays the volume of the used space. When the project volume exceeds the volume that is available on the user’s compact disc, the corresponding part of the bar will be colored red.

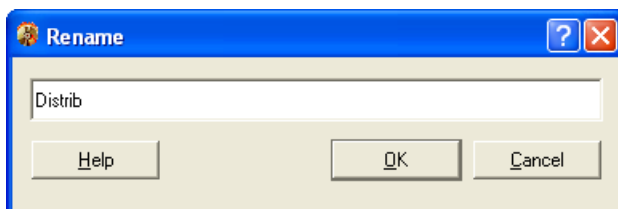


If one wants to collect files into a single directory on the compact disc:

1. click the “*New Directory*” button,
2. type the name of new directory in the appeared form,
3. click the “OK” button,
4. and move the files into the created directory.



The user can also rename any of the project’s directories by using the “*Rename*” button and then by typing a new name.

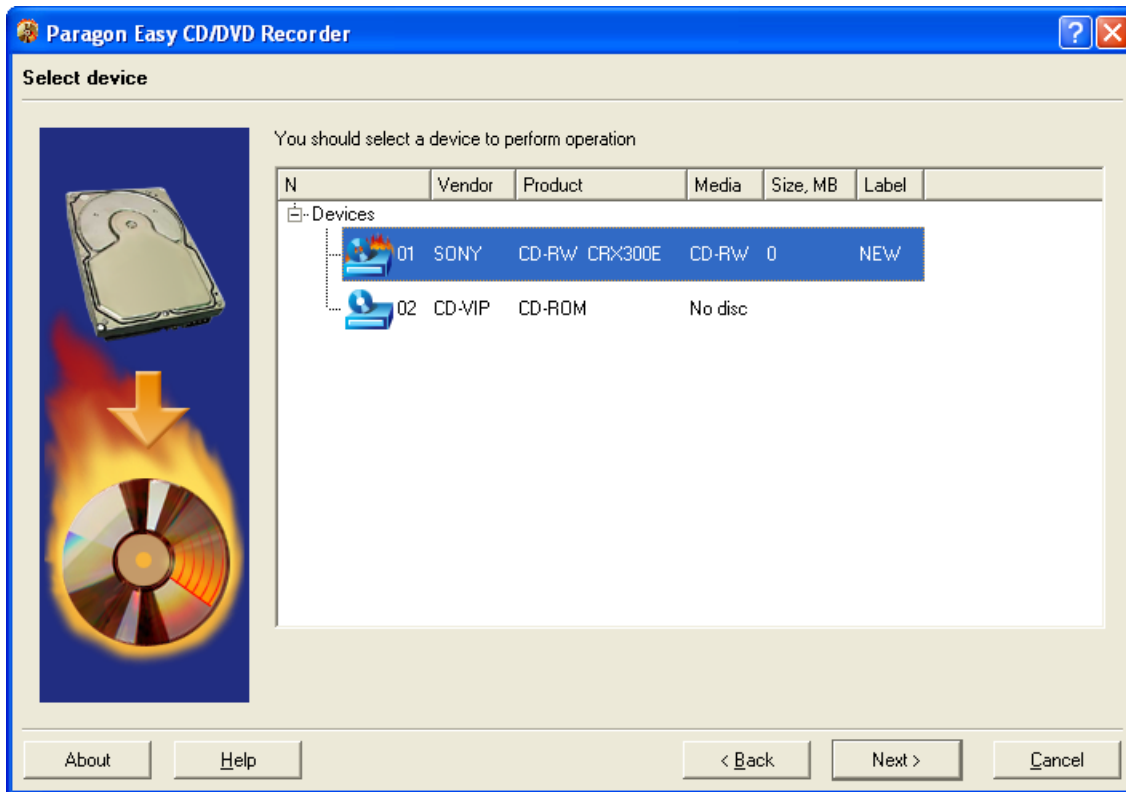


When the compact disc content has been formed, click the “Next” button to continue with the other settings.

**The second step is selecting a device to be used to record to CD.** The corresponding window of the program displays the list of all devices available. Each item on the List contains information about the recorder drive, i.e.:

- its vendor,
- its model,

- the type of inserted media,
- the size of the inserted media (in MB),
- and its label (if existing).



The user should select one of the devices and then click the “Next” button to start the CD/DVD burning operation. If the Expert mode has been activated in the first dialogue window, the next page will allow the user to [set some parameters of the recording process](#). If the Expert mode has been switched off, the program starts the operation using the default values of the parameters, which are appropriate in most cases.

The next window displays information about the operation progress, including:

- the operation progress (by percentage),
- the elapsed time,
- the current operation step.

By finishing, the program informs the user of a successful completing of the record process.

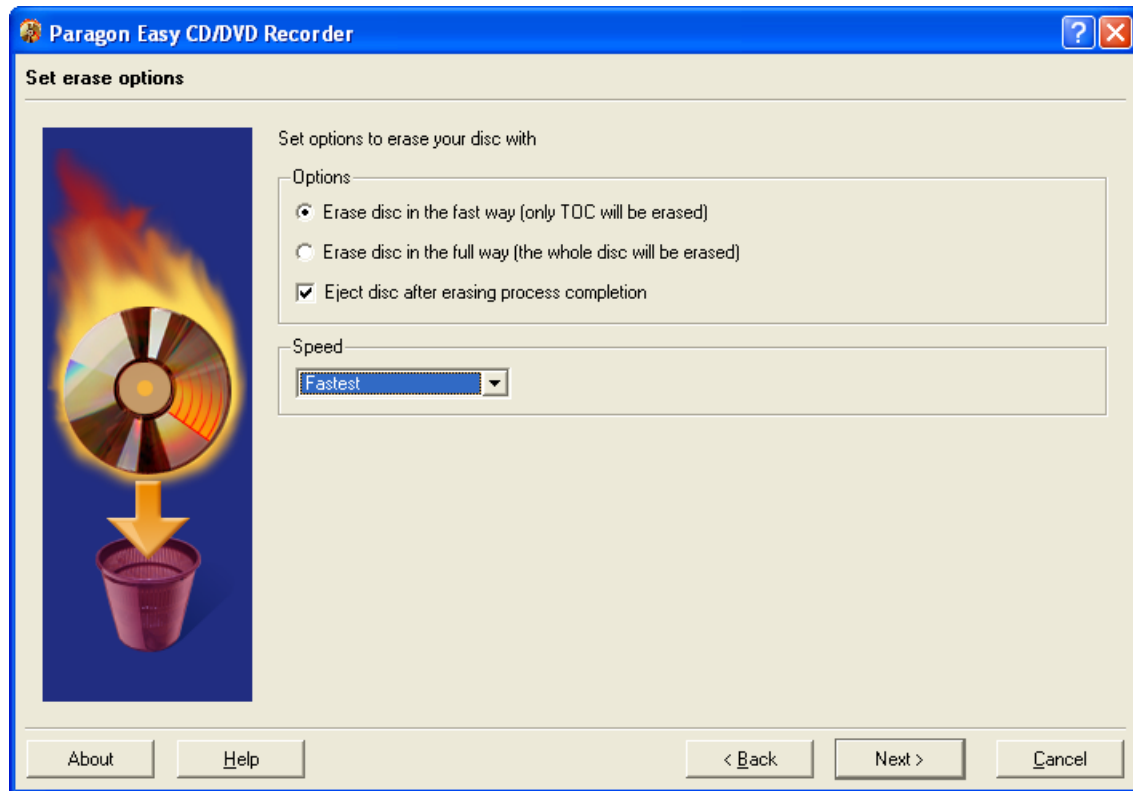
### 5.6.5.2 Expert mode

To use the Expert mode mark the corresponding checkbox at the foot of the program’s welcome page. In this case the user will have more control of the performing operations and more control requires more knowledge. The user is advised to have clear understanding of the recording process to be able to use this mode.

When the Expert mode has been switched on, the settings of erasing and recording operations will have to offer some additional options. These options described below are available on special dialogs after selecting a recording device.

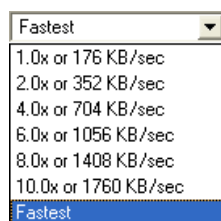
#### 5.6.5.2.1 Expert options for erasing operation

- Whether the user wants the whole disc erased or only a TOC (a Table of Content), the two radio buttons “*Erase disc in the fast way*” and “*Erase disc in the full way*” will assist setting up one of the two erasing variants.



The fast erasing method simply erases the TOC of a disc. This procedure is relatively fast and takes only a few minutes. Fast erasing produces only good results with good equipment and "unworn" media. In case of using "worn-out" media, write errors may accumulate on the disc. The full erase method allows to avoid similar problems and, in addition, lengthens the lifetime of an intensively used rewritable disc.

- The next checkbox "*Eject disc after erasing process completion*" enables the program to automatically eject media after the erasing procedure has been completed.
- In the separate section named "*Speed*", the user is able to set the speed for the erasing operation. This section contains a pull-down menu which displays the values of *erasing speed*. The option called "**Fastest**" automatically selects the optimal speed, taking the parameters of both drive and disc into account. The "**Fastest**" option is a default setting. In fact, the manual selection of erasing speed values is normally only necessary when using worn-out or low-quality discs.

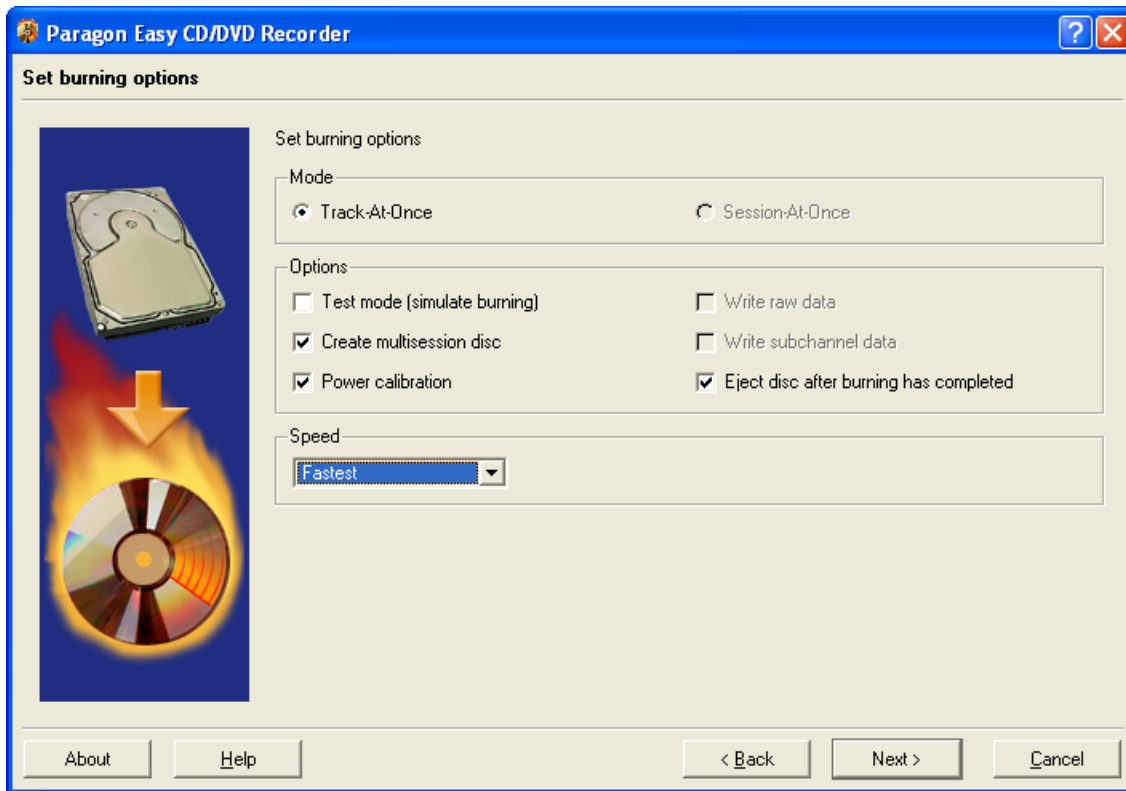


After the described parameters setting the user should click the "Next" button to start the operation.

#### 5.6.5.2.2 Expert options for recording operation

The recording process has more parameters in comparison to the erasing process. In this case, the program shows two expert mode dialogs, which is then followed by the device selection dialog – "*Burning options*" and "*File system type*".



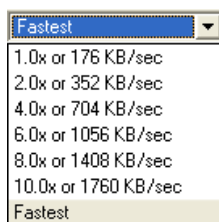


The **Burning options** page includes parameters such as:

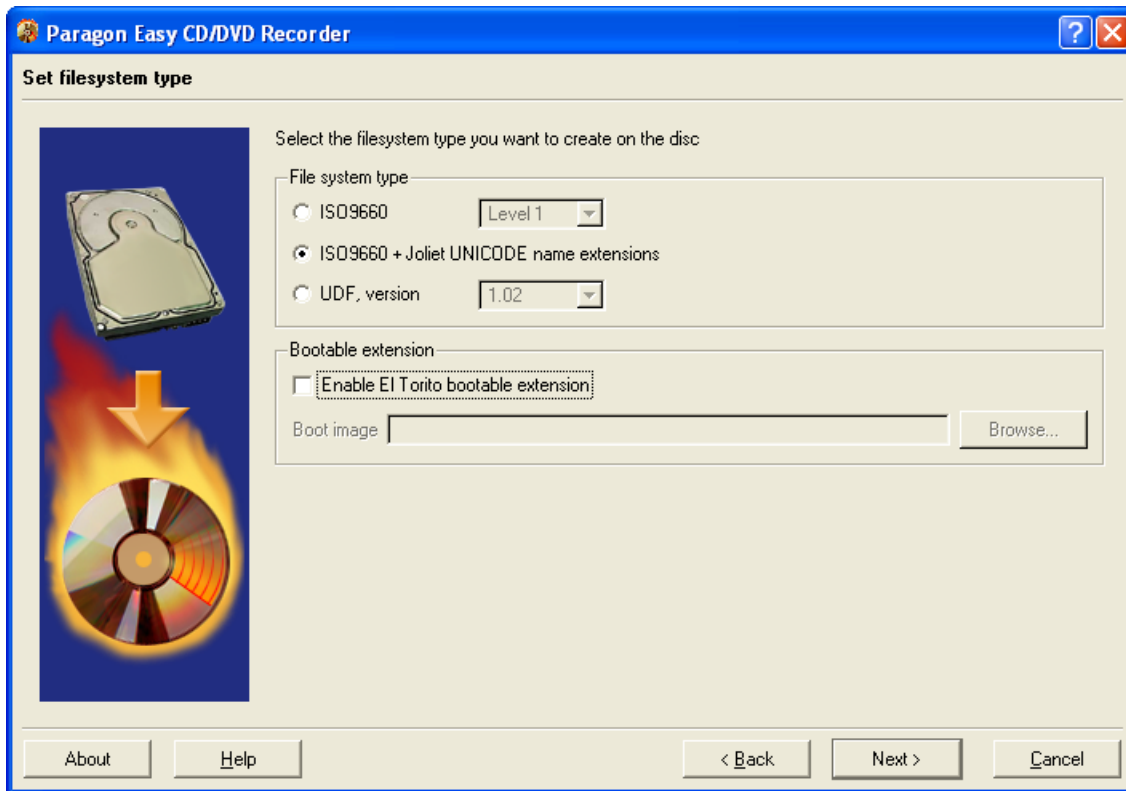
- “*Mode*” allows the user to set one of two recording modes – “*Track-at-once*” or “*Session-at-once*”.

In Track-at-Once recording mode, the recording laser is switched off after completing each track, and is turned back on again when the next track is to be written. In Session-at-Once mode, all tracks (within a session) are written without switching off the recording laser.

- “*Options*” allows the user to switch a set of important options ON/OFF:
  - “Test mode” – the program sends data to a CD/DVD drive in the usual manner, however, the recording laser is underpowered which means that no real writing is performed.
  - “Create multisession disc” – in this case the recording disk will not be closed, which normally disables additional writing to the disc.
  - “Send optimum power calibration” – the program forces the CD/DVD drive to perform a laser calibration before starting the recording process.
  - “Eject disc after burning has completed” – the program automatically ejects media after completing the recording procedure.
- In the “*Speed*” section the user is able to set the speed of the recording process. This section contains a pull-down menu that displays the values for the *recording speed*. The option “**Fastest**” automatically selects the optimal speed, taking the parameters of both drive and disc into account. The “**Fastest**” option is a default setting.



After setting the described parameters, click the “Next” button to continue.



The **File system type** page includes the two sections:

- The “*File system type*” section allows the user to select one of the next three types:
  - ISO9660
  - ISO9660 + Joliet UNICODE name extensions
  - UDF
- “*Bootable extension*” provides the possibility to make a disc bootable. For the field “Boot image” the user has to type the full filename and path to the image that will be used during the recording operation. One can also use the “Browse” button, which opens a standard file browser utility to find the image on the user’s local disk.

After setting the described parameters, click the “Next” button to start the operation.

### 5.6.6 Typical Recovery Scenarios

There are many problems that the user can solve with the Recovery CD. This chapter includes scenarios of several typical tasks:

- Backing up the most important data before reinstalling the operating system
- Fixing incorrect settings of the BOOT.INI file.

#### 5.6.6.1 Backup the most important data before reinstalling the operating system

The process of re-installing an operating system destroys all data on the system partition. The user is recommended to save important data files located on the system partition beforehand. Should Windows fail to function properly, the Paragon Recovery CD can help solve the problem. The following steps are recommended:

- Insert the Paragon Recovery CD into the CD/DVD drive.
- Reboot the computer.
- Choose the “File Manager MC” item from the Linux Start-up menu or choose the PTS DOS command line. Both these options enable the user to copy important information from the unbootable system partition to a safe place of the computer. The user can also copy them to other local network computers. (To configure the network connections, use the Network Configuration Wizard at the Linux Start-up menu).
- Eject the Paragon Recovery CD from the CD/DVD drive.



If the user wants to use PTS DOS to retrieve files from the NTFS or Linux file system partition, a special NTFS – Ext2FS driver will be necessary to be able to run the PTS DOS command line. This can be achieved by selecting the NTFS - Ext2FS driver option from the PTS DOS Start-up menu

Now the user can start the re-installation process.

#### 5.6.6.2 Fixing incorrect settings of the BOOT.ini file

Restoring the primary bootable system partition may sometimes result in a mismatch of the number for the system partition registered in the BOOT.INI and the actual number of the restored partition on the disk; this can cause software conflicts during a Windows startup. The same problem can occur with other disk managing tools such as FDISK or Windows Disk Administrator.

When the number for the Windows system partition is invalid, the following error message will appear after Windows starts loading:

windows could not start because the following file is missing or is corrupt:  
<windows root>\system32\hal.dll.  
Please re-install a copy of the above file.

The problem can be fixed by one the following methods:

- Editing the BOOT.INI file
- Using the “*Change Primary Slot*” function of the Drive Backup .

##### 5.6.6.2.1 Solving the problem by editing the BOOT.INI

- Insert the Paragon Recovery CD into the CD/DVD drive.
- Reboot the computer.
- Choose the “File Manager MC” option from the Start-up menu of a Linux version. Using the F4 key in the Midnight Commander edit the BOOT.ini file.
- In the file BOOT.INI find the string fragment:

[operating systems]

multi(0)disk(0)rdisk(0)partition(1)\WINDOWS...

- Change the number of the Windows system partition (in a string fragment: `partition(x)`). **Note.** Partitions are numbered starting from 1, while disks are numbered starting from 0.
- Reboot the computer.

##### 5.6.6.2.2 Solving the problem with Drive Backup

- Insert the Paragon Recovery CD into the CD/DVD drive.
- Reboot the computer.
- Choose the “Drive Backup ” option from the Start-up menu.
- Choose the option Modify in submenu “Partition”.
- Select the Windows system partition and change its position in the Partition Table using the function *Change Primary Slot*.

## 6 Glossary

### Locked partitions

In terms of Drive Backup, locked partitions have files open for writing. In fact, locked partitions cannot be used to work exclusively for Drive Backup.

Under multi-tasking environments such as Windows or Linux, several applications can access the same on-disk objects simultaneously. The uncoordinated multiple access can damage or destroy the object. The mechanism of a lock avoids this kind of problem.

### Unlocked partitions

Unlocked partitions can be locked to be used exclusively by Drive Backup; unmounted partitions are usually unlocked.

### Locked and unlocked hard disks

From Drive Backup's point of view, hard disks are placeholders for partitions. Should any of the on-disk partitions be locked, the entire hard disk will be treated as locked. On the other hand, if no locked partitions exist on the disk, it will be considered as unlocked.

### Partitioning schemes

Generally, the *Partitioning scheme* is a set of rules, constraints and the format of on-disk structures that keep information of the partitions that are located on the hard disk.

There are several partitioning schemes, which can be used. The most popular partitioning scheme is the so-called *DOS partitioning scheme*. It was introduced by IBM and Microsoft to be able to use multiple partitions in the disk subsystems on IBM PC compatible computers.

Another popular partitioning scheme is the so-called *LDM* (Logical Disks Model) that originates from UNIX mainframe systems. The Veritas Executive accommodates the simplified version of LDM to the Windows 2000 operating system.

Windows 2000 and XP support two quite different partitioning schemes: the old DOS partitioning scheme and the new Dynamic Disk Management (*DDM*). The problem is that older versions of Windows do not support DDM. In addition, most hard disk utilities do not support it as well.

### Hard disk Geometry

Traditionally, the used space of a hard disk is logically divided into *Cylinders*, Cylinders are divided into *Tracks* (or *Heads*), and Tracks are divided into *Sectors*.

The triad of values {[Sectors-per-Track], [Tracks-per-Cylinder], [Amount-of-Cylinders]} is usually named *Hard Disk Geometry* or *C/H/S geometry*.

Tracks and Cylinders are enumerated from "0", while Sectors are enumerated beginning with "1".

These disk parameters play an essential role in the *DOS Partitioning scheme*. The *alignment* of partitions takes the parameters of the hard disk geometry into consideration.

Modern hardware uses an advanced scheme for the *linear addressing* of Sectors, which assumes that all on-disk sectors are continuously enumerated from "0". To allow backward compatibility with older standards, modern hard disks can additionally emulate C/H/S geometry.

### MBR & 1<sup>st</sup> track of the Hard Disk

The 0<sup>th</sup> sector of the disk is named *MBR* (Master Boot Record). MBR contains important information about the disk layout:

- The partitioning scheme.
- The starting records of the Partition Table.
- The standard bootstrap code (or the initial code of boot managers, disk overlay software or boot viruses).

Generally, the 0<sup>th</sup> sector is used for similar purposes in all existing partitioning schemes.

The capacity of the MBR is not sufficient to place sophisticated boot programs. This means that the on-boot software uses the entire 0<sup>th</sup> track of the hard disk in addition to the 0<sup>th</sup> sector because it is not included in any partition.

For example, boot managing utilities such as LILO, GRUB and Paragon Boot Manager are located in the 0<sup>th</sup> track.

### Extended Partition

The Extended Partition is the exception. Ordinary partitions are reserved for a file system, the Extended Partition, on the other hand, is not used for this purpose. It is used for extending the Partition Table of the disk. Formally, the Extended Partition is the container of so-called Logical Partitions. The fundamental feature of the Extended Partition is that it contains many partitions.

### Active partition

The *active* partition (or *bootable* partition) is used to boot an operating system at the PC startup when the system starts from a hard disk containing this partition.

In the DOS partitioning scheme, only Primary Partitions can be active because of the limitations of the standard bootstrap.

### Hidden partitions

The concept of hidden partitions was introduced in the IBM OS/2 Boot Manager. Operating systems do not mount "hidden" partitions, thus preventing access to their contents.

A method of hiding partitions consists in changing the Partition ID value that is saved in an appropriate entry of the Partition Table. This is achieved by XOR-ing the Partition ID with the 0x10 hexadecimal value.

This method only works when the set of used Partition ID values is very limited, since large sets of used Partition IDs can lead to confusing file system types; for example, Ext2 partitions are marked with the 0x83 Partition ID value. A hidden Ext2 partition would be marked with the 0x93 Partition ID value, which is identical with the Amoeba File system Partition ID.

### Partition ID

The *Partition ID* (or File system ID) is the identifier of a file system that is placed in the partition. The partition ID is used to quickly detect partitions of supported types. Some of the operating systems rely completely on the Partition ID when distinguishing supported partitions, while others again do not.

The partition ID is saved in appropriate entries of the Partition Table. It takes up only 1 byte of space.

### Partition Label

The *Partition Label* (sometimes also referred to as *Volume Label*) is a small textual field (up to 11 characters) that is located in the partition's boot sector. This value is used for notification purposes only. It is detectable by any partitioning tool including DOS' FDISK utility.

Modern operating systems use other methods to save the Volume Label within the file system, e.g. as a special hidden file. The Volume Label is able to contain a relatively large amount of text in multiple languages.

In general, the Volume Label and the Partition Label are rather different.

### BOOT.INI file

BOOT.INI is the textual configuration file for NTLDR, which is the specific boot-managing tool in Windows NT, 2000 and XP. This file contains the reference to the Windows system partition amongst other parameters.

By editing BOOT.INI, it is possible to fix several problems concerning the disorganizing of the Windows startup process. Potentially, troubles of this kind may occur when creating or deleting primary partitions in Windows NT/2000/XP managed systems.

The section [operating systems] of the BOOT.INI file lists bootable partitions in the following manner:

```
[operating systems]
```

```
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Professional" /fastdetect
```

```
C:\="Microsoft windows"
```

The combination

```
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
```

defines the Windows system partition. To create an alternative bootable configuration, simply copy this line around the original one, and change the *partition's number* `partition(x)` to another value.

From this point, the startup menu will contain multiple boot configurations, which enables the user to try another boot configuration in case the first one should fail.

### File system metadata

The servicing structures of a file system, which contain information about allocating files and directories, security information etc, are named *file system metadata*.

File system metadata are invisible for users and ordinary applications because accidental modifications of the metadata usually make a partition unused.

### Cluster

The *Cluster* is the minimum unit of disk space for a file.

Traditionally, a file system divides disk space of a partition into clusters of fixed size to improve the performance. Each cluster is a group of sectors; the amount of sectors should be a power of two, ranging from 1 to 128.

An operating system reserves a whole number of clusters for every file, regardless of the actual file size. The remainder of the last file's cluster is not used and is referred to as *waste space* (or *slack space*).

The waste space may use a noticeable amount of on-partition space. For example, Temporary Internet Files ( a lot of small files) normally use 20% to 70% of slack space.

To reduce the amount of slack space, the *Cluster Size* value needs to be reduced. On the contrary, reducing the *Cluster Size* value decreases the performance of the file input-output operations.

### Serial Number

In the DOS partitioning scheme, every hard disk and every partition has a *Serial Number*, which consists of 32 bits and is represented by an 8-figure hexadecimal value.

The hard disk's Serial Number is stored in the MBR. Its value is assigned when the MBR sector is initialized by standard disk managing tools from Microsoft, such as Windows Disk Administrator and FDISK utility.

In fact, the hard disk's Serial Number is not important for most operating systems and software. It is known that Windows NT, 2000 and XP store hard disks' Serial Number values in the database of assigned drive letters.

A partition's Serial Number is stored in its Boot Sector (in FAT16, FAT32 and NTFS file systems). Its value is assigned when the partition is formatted.

In fact, the partition's Serial Number does not play an important role for most operating systems and software.

### Root Directory

The top-level directory of a formatted logical drive is named the *Root Directory*. The Root Directory includes other files and directories.

In modern file systems (e.g. Ext2/Ext3, FNTFS and even FAT32), the Root Directory does not differ from other directories in properties. This is not the case for old FAT12 and FAT16 file systems.

On FAT12 and FAT16 partitions, the Root Directory is placed outside the common space used for saving files. The place for the Root Directory is allocated at the moment when a partition is being formatted. The maximum amount of files and directories that can be placed in the Root Directory is limited to a value, which depends on the size of the Root Directory. This value cannot be reduced or enlarged until the partition is re-formatted.

According to FAT16 standards, the Root Directory takes a whole number of sectors, and each directory entry takes 32 bytes. On modern disks, the sector size is usually 512 bytes. This means that the capacity of the Root Directory is a number that is divisible by 16.