

Maxtor MaxBlast™ 5

User's Guide



Maxtor®

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Table of Contents

Chapter 1. Introduction.....	8
1.1 What is Maxtor MaxBlast?	8
1.2 New in Maxtor MaxBlast	8
1.3 System requirements and supported media	8
1.3.1 <i>Minimum system requirements</i>	8
1.3.2 <i>Supported operating systems</i>	9
1.3.3 <i>Supported file systems</i>	9
1.3.4 <i>Supported storage media</i>	9
1.4 Technical support.....	9
Chapter 2. Maxtor MaxBlast installation and startup	10
2.1 Installing Maxtor MaxBlast	10
2.2 Extracting Maxtor MaxBlast	11
2.3 Running Maxtor MaxBlast.....	11
2.4 Upgrading from Previous Versions of Maxtor MaxBlast.....	11
2.5 Removing Maxtor MaxBlast	11
Chapter 3. General information.....	12
3.1 Disc/partition images.....	12
3.2 Viewing disc and partition information.....	12
Chapter 4. Using Maxtor MaxBlast.....	13
4.1 Main program window	13
4.2 Available operations	14
Chapter 5. Creating image backup archives	16
5.1 The image backup procedure	16
5.1.1 <i>My Computer backup</i>	16
5.1.2 <i>Selecting the backup destination</i>	16
5.1.3 <i>Selecting the image backup options</i>	17
5.1.4 <i>Providing a comment</i>	17
5.1.5 <i>Image backup process</i>	17
5.2 Setting image backup options	19
5.2.1 <i>Compression level</i>	19
5.2.2 <i>Backup priority</i>	19
5.2.3 <i>Archive-splitting</i>	20
5.2.4 <i>Media components</i>	20
5.2.5 <i>Additional settings</i>	21
Chapter 6. Restoring the image backup data.....	22
6.1 Restore under Windows or boot from CD?.....	22
6.1.1 <i>Network settings in bootable media</i>	22
6.2 Restoring discs/partitions or files from images	23
6.2.1 <i>Starting the Image Restore Data Wizard</i>	23
6.2.2 <i>Archive selection</i>	23
6.2.3 <i>Restoration type selection</i>	23
6.2.4 <i>Selecting a disc/partition to restore</i>	24
6.2.5 <i>Selecting a target disc/partition</i>	24
6.2.6 <i>Changing the restored partition type</i>	25
6.2.7 <i>Changing the restored partition file system</i>	26
6.2.8 <i>Changing the restored partition size and location</i>	26
6.2.9 <i>Assigning a letter to the restored partition</i>	26
6.2.10 <i>Restoring several discs or partitions at once</i>	27
6.2.11 <i>Setting restore options</i>	27
6.2.12 <i>Image Restoration summary and executing restoration</i>	27

6.3	Setting restore options	27
6.3.1	<i>Restoration priority</i>	28
6.3.2	<i>Additional settings</i>	28
Chapter 7.	Creating bootable media	29
Chapter 8.	Other operations.....	31
8.1	Validating backup archives.....	31
8.2	Viewing logs	31
Chapter 9.	Exploring archives and mounting images	33
9.1	Exploring an archive.....	33
9.2	Mounting an image	34
9.3	Unmounting an image	36
Chapter 10.	Transferring the system to a new disc	37
10.1	General information.....	37
10.2	Security.....	38
10.3	Executing transfers.....	38
10.3.1	<i>Selecting Clone mode</i>	38
10.3.2	<i>Selecting source disc</i>	38
10.3.3	<i>Selecting destination disc</i>	39
10.3.4	<i>Partitioned destination disc</i>	40
10.3.5	<i>Old and new disc partition layout</i>	40
10.3.6	<i>Selecting partition transfer method</i>	40
10.3.7	<i>Partitioning the old disc</i>	41
10.3.8	<i>Old and new disc partition layouts</i>	42
10.3.9	<i>Cloning summary</i>	42
10.4	Cloning with manual partitioning.....	43
10.4.1	<i>Old and new disc partition layouts</i>	43
Chapter 11.	Adding a new hard disc	44
11.1	Selecting a hard disc.....	44
11.2	Creating new partitions.....	44
11.3	Disc add summary.....	45
Appendix A.	Partitions and file systems.....	46
A.1	Hard disc partitions.....	46
A.2	File systems	46
A.2.1	<i>FAT16</i>	46
A.2.2	<i>FAT32</i>	47
A.2.3	<i>NTFS</i>	47
Appendix B.	Hard discs and BIOS setup.....	48
B.1	Installing hard discs in computers	48
B.1.1	<i>Installing a hard disc, general scheme</i>	48
B.1.2	<i>Motherboard sockets, IDE cable, power cable</i>	48
B.1.3	<i>Installation modes, jumpers</i>	49
B.2	BIOS	50
B.2.1	<i>Setup utility</i>	50
B.2.2	<i>Standard CMOS setup menu</i>	51
B.2.3	<i>Arranging boot sequence, advanced CMOS setup menu</i>	52
B.2.4	<i>AwardBIOS</i>	53
B.2.5	<i>Hard disc initialization errors</i>	56

Chapter 1. Introduction

1.1 What is Maxtor MaxBlast?

Maxtor MaxBlast makes it easy to work with your new Maxtor disc drives. MaxBlast lets you quickly install your new disc drive, with wizards that guide you through the processes of creating and formatting partitions on your disc drive.

MaxBlast also lets you transfer your data to your new Maxtor disc drive in minutes. The software migrates everything – your operating systems, applications, documents and personal setting – to your new disc drives just as you had them. After you migrate, you can keep using your PC just like before. You can then keep your old drive as a backup or use MaxBlast to store your image backups.

Using powerful imaging technology, MaxBlast lets you create image backups of all the data on your computer, entire discs or individual partitions. The unique technology developed by Acronis and implemented in Maxtor MaxBlast allows you to create exact, sector-by-sector disc backups, including all operating systems, applications and configuration files, software updates, personal settings and all of your data. If failures occur that block access to information or affect system operation, or if you accidentally delete necessary files, you'll be able to use the image backup to easily restore the system and lost data.

You can store backups on almost any PC storage device: local hard drives, network drives or a variety of IDE, SCSI, FireWire (IEEE-1394), USB (1.0, 1.1 and 2.0) and PC Card (formerly called PCMCIA) removable media drives, as well as CD-R/RW, DVD-RW, DVD+R/RW, magneto-optical, Iomega Zip and Jaz drives.

Wizards and a user-friendly, Windows XP-styled interface will make your work more convenient. Just answer a few simple questions and let Maxtor MaxBlast take care of everything else! When a system problem occurs, the software will get you up and running in short order.

1.2 New in Maxtor MaxBlast

- **Direct backup to FTP servers**
- **Explore archives** – easily search and recover particular files in archives just as in Windows Explorer
- **One-click image backup** – launch the image backup wizard by right-clicking on a disc, file or folder icon and selecting **Image Backup** in the context menu. The program will automatically mark the selected item for image backup

1.3 System requirements and supported media

1.3.1 Minimum system requirements

Maxtor MaxBlast requires the following hardware:

- At least one Seagate Technology or Maxtor disc drive
- Pentium processor or higher
- 128 MB RAM
- FDD or CD-RW drive for bootable media creation
- Mouse (recommended).

1.3.2 Supported operating systems

- Windows® 2000 Professional SP 4
- Windows® XP SP 2
- Windows® XP Professional x64 Edition
- Windows® Vista

Maxtor MaxBlast also enables creation of a bootable diskette or CD-R/W that can back up and restore a disc/partition on a computer running any PC-based operating system including Linux®.

1.3.3 Supported file systems

- FAT16/32
- NTFS
- Ext2/Ext3
- ReiserFS
- Linux SWAP

If a file system is not supported or is corrupted, Maxtor MaxBlast can copy data using a sector-by-sector approach.

1.3.4 Supported storage media

- Hard disc drives
- Networked storage devices
- FTP servers*
- CD-R/RW, DVD-R/RW, DVD+R (including double-layer DVD+R), DVD+RW, DVD-RAM**
- USB 1.0 / 2.0, FireWire (IEEE-1394) and PC card storage devices
- Floppy discs, ZIP®, Jaz® and other removable media

* An FTP server must allow passive mode for file transfers. Data recovery directly from FTP server requires the archive to consist of files of no more than 2GB. It is recommended that you change the source computer firewall settings to open Ports 20 and 21 for both TCP and UDP protocols and disable the **Routing and Remote Access** Windows service.

** Burned write-once discs cannot be read in Windows NT 4 without third-party software. Burned rewritable discs cannot be read in Linux without kernel patch.

1.4 Technical support

Users of legally purchased copies of Maxtor MaxBlast are entitled to free technical support. If you experience problems installing or using Maxtor products that you can't solve yourself by using this guide, then please contact Maxtor Technical Support.

Chapter 2. Maxtor MaxBlast installation and startup

2.1 Installing Maxtor MaxBlast

To install Maxtor MaxBlast:

- Run the Maxtor MaxBlast setup file.
- In the Install Menu, select the program to install: Maxtor MaxBlast.
- Follow the install wizard instructions on the screen.



Typical, **Custom** and **Complete** installation is available. Having pressed **Custom**, you can choose to install, besides Maxtor MaxBlast, **Bootable Media Builder** and **Bart PE plug-in**.

With **Bootable Media Builder** you can create bootable discs (see details in *Chapter 7. Creating bootable media*). You might not need this tool if you purchased a boxed product that contains a bootable CD. Installing the **Bootable Media Builder** will allow you to create bootable media or its ISO image at any time from the main program window or running **Bootable Media Builder** on its own.

The well-known **Bart PE** utility is used to boot into a Windows-like environment from CD. Applications are installed into Bart PE in the form of plug-ins. Choosing Bart PE plug-in installation (disabled by default) provides the ability to include Maxtor MaxBlast in a Bart PE plug-in tab. The plug-in files will be placed to the installation folder along with other program files. Maxtor does not provide technical support troubleshooting using the Bart PE environment.



When installed, Maxtor MaxBlast creates a new device in the Device Manager list (**Control Panel -> System -> Hardware -> Device Manager -> Maxtor Devices -> Maxtor MaxBlast Image Backup Archive Explorer**). Do not disable or uninstall this device, as it is necessary for connecting image archives as virtual discs (see *Chapter 9. Exploring archives and mounting images*).

2.2 Extracting Maxtor MaxBlast

When installing Maxtor MaxBlast, you can save the setup (.msi) file on a local or network drive. This will help when modifying or recovering the existing component installation.

To save a setup file:

- Run the Maxtor MaxBlast setup file.
- In the Install Menu, right-click on the program name and select **Extract**.
- Select a location for the setup file and click **Save**.

2.3 Running Maxtor MaxBlast

You can run Maxtor MaxBlast in Windows by selecting **Start -> Programs -> Maxtor -> Maxtor MaxBlast -> Maxtor MaxBlast** or clicking on the appropriate shortcut on the desktop.

If your disc data is totally corrupted and you cannot boot, load the standalone Maxtor MaxBlast version from the bootable media, supplied with the retail box or created by you using the Bootable Media Builder. Then you will be able to restore the disc from its previously created image.

2.4 Upgrading from Previous Versions of Maxtor MaxBlast

If you have a previous version of Maxtor MaxBlast installed (i.e., software not Powered by Acronis), the new version will not replace that software. You can remove the old version and install your new DiscWiazrd software.

We highly recommend that you create bootable media after installing Maxtor MaxBlast.

2.5 Removing Maxtor MaxBlast

Select **Start -> Settings -> Control panel -> Add or remove programs -> <Maxtor MaxBlast> -> Remove**. Then follow instructions on the screen. You may have to reboot your computer afterwards to complete the task.

Chapter 3. General information

3.1 Disc/partition images

A backup archive (also called in this guide “image backups”) is a file or a group of files that contains a copy of all information stored on selected discs/partitions.

Backing up discs and partitions is performed in a special way: Maxtor MaxBlast stores a sector-by-sector snapshot of the disc, which includes the operating system, registry, drivers, software applications and data files, as well as system areas hidden from the user. This procedure is called “creating a disc image,” and the resulting backup archive is often called a disc/partition image.



Maxtor MaxBlast stores only the portions of your hard disc that contain data (for supported file systems). Further, it does not back up swap file information (pagefile.sys under Windows NT/2000/XP) and hiberfil.sys (a file that keeps RAM contents when the computer goes into hibernation). This reduces image size and speeds up image creation and restoration of the data.



A partition image includes all files and folders independent of their attributes (including hidden and system files), boot record, FAT (file allocation table), root and the zero track of the hard disc with master boot record (MBR).



A disc image includes images of all disc partitions as well as the zero track with master boot record (MBR).

By default, files in all Maxtor MaxBlast image backup archives have a “.tib” extension.

It is important to note that you can restore individual files and folders from disc/partition image backups. To do so, mount the image as a virtual disc (see *Chapter 9. Exploring archives and mounting images*) and copy the selected files and/or folders to your Maxtor disc drive.

3.2 Viewing disc and partition information

You can change the way data is represented in all schemes you see in various wizards.

To the right are three icons: **Arrange Icons by**, **Choose Details** and **i (Display the properties of the selected item)**, the last duplicated in the context menu invoked by right-clicking objects.

To sort messages by a particular column, click the header (another click will switch the messages to the opposite order) or **Arrange Icons by** button and select the column.

To select columns to view, right-click the headers line or left-click the **Choose Details** button. Then flag the columns you want to display.

If you click the **i (Display the properties of the selected item)** button, you will see the selected partition or disc properties window.

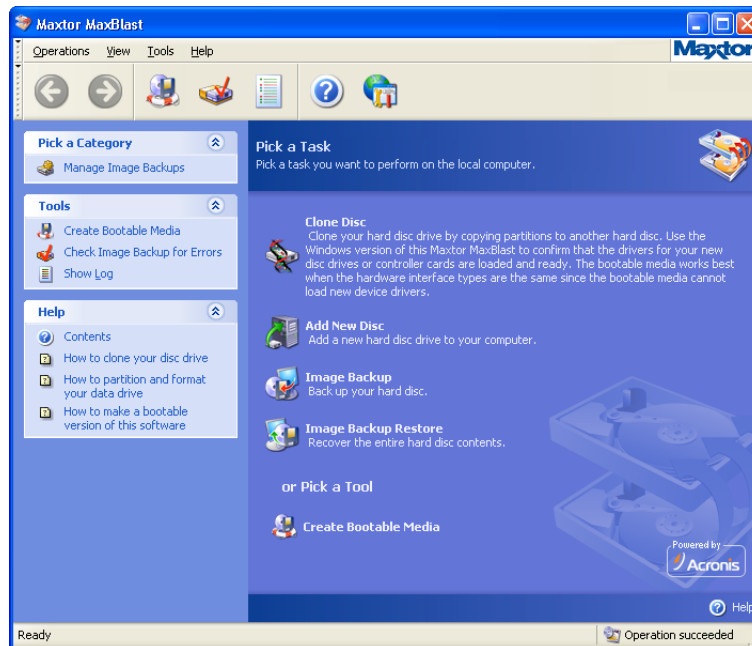
This window contains two panels. The left panel contains the properties tree and the right describes the selected property in detail. The disc information includes its physical parameters (connection type, device type, size, etc.); partition information includes both physical (sectors, location, etc.), and logical (file system, free space, assigned letter, etc.) parameters.

You can change the width of a column by dragging its borders with the mouse.

Chapter 4. Using Maxtor MaxBlast

4.1 Main program window

The main program window contains the menu, the toolbar, the sidebar and the main area. The main area contains operation icons, while the sidebar features the **Category**, **Tools** and **Help** panels.



Most of the operations are represented two or even three times in different window areas, providing several ways to select them for more convenience. For example, you can start an operation or tool by clicking its icon in the main area or by selecting the same item from the appropriate category on the sidebar, the **Operations** or **Tools** menu.

The main window contains operation icons divided into three groups.

The **Task** group contains the following operations:

- **Clone Disc** – copy the data from one drive to another
- **Add New Disc** – partition and format a new drive as additional storage
- **Image Backup** – create a backup archive
- **Image Restore** – restore data from a previously created archive

The **Tools** group contains the following items:

- **Validate Backup Archives** –mount disc/partition images as virtual drives, run the archive integrity checking procedure
- **Create Bootable Media** – run the bootable media creation procedure

Program menu

The program menu bar features the **Operations**, **View**, **Tools** and **Help** items.

The **Operations** menu contains a list of the available operations.

The **View** menu contains items for managing the program window look:

- **Toolbars** – contains commands that control toolbar icons

-
- **Common Task Bar** – enables/disables the sidebar
 - **Status Bar** – enables/disables the status bar

The **Tools** menu contains the following items:

- **Explore Backup Archive** – explore file-level archives or mount disc/partition images as virtual drives
- **Validate Backup Archive** – run the archive integrity-checking procedure
- **Create Bootable Media** – run the bootable media creation procedure
- **Show Log** – open the Log Viewer window
- **Options** – open a window for editing default backup/restore options, setting text appearance (fonts) etc

The **Help** menu is used to invoke help and obtain information about Maxtor MaxBlast.

Status bar

At the bottom of the main window, there is a status bar divided into two parts. The left side briefly describes the selected operation; the right side indicates operation progress and results. If you double-click on the operation results, you will see the logs window.

Taskbar notification area icon

During most of the operations, a special indicator icon appears in the Windows taskbar notification area (the right portion of the status bar with the clock). If you mouse over the icon, you will see a tool tip indicating the operation's progress. This icon doesn't depend on the main program window being open.

4.2 Available operations

You can perform the following operations on the computer.

- **Back up and restore data, including system discs/partitions**

Click **Image Backup** or **Image Restore**, then follow the wizard's instructions. See details in *Chapter 5. Creating image backup archives* and *Chapter 6. Restoring the image backup data*.

- **Browse logs of Maxtor MaxBlast operation**

Click **Logs** in the **Manage Tasks** group or select the **Show Log** tool on the sidebar to navigate to the Event Log window. See details in *8.2 Viewing logs*.

- **Set up backup/restore options**, such as backup process priority or files overwriting mode.

Select **Tools** -> **Options** -> **Default image backup options** or **Default image restoration options** and make settings. See details in *5.2 Setting image backup options* and *6.3 Setting restore options*.

- **Validate backup archives wherever they reside, be it local, network or removable media**

Click **Validate Backup Archive** in the **Tools** group on the sidebar, then follow the wizard's instructions. You can also access this wizard via the **Backup Archives** category. See details in *8.1 Validating backup archives*.

- **Explore any archive's contents and restore individual files from any archive**

Click **Explore and Validate Backup Archives** in the **Tools** group or select the **Backup Archives** category on the sidebar to navigate to the Manage Backup Archives window. Then select **Explore Backup Archive** and follow the wizard's instructions. See details in *9.1 Exploring an archive*.

- **Mount partitions' images to explore and modify their contents, or to restore individual files**

Click **Explore and Validate Backup Archives** in the **Tools** group or select the **Backup Archives** category on the sidebar to navigate to the Manage Backup Archives window. Then select **Mount Image** and follow the wizard's instructions. See details in *9.2 Mounting an image*.

- **Unmount previously mounted partition images**

Click **Explore and Validate Backup Archives** in the **Tools** group or select the **Backup Archives** category on the sidebar to navigate to the Manage Backup Archives window. Then select **Unmount Image** and follow the wizard's instructions. See details in *9.3 Unmounting an image*.

- **Transfer the system to a new hard disc**

Click **Manage Hard Discs** in the **Tools** group or select the **Hard Discs Management** category on the sidebar to navigate to the Manage Hard Discs window. Then select **Clone Disc** and follow the wizard's instructions. See *Chapter 10. Transferring the system to a new disc*.

- **Format partitions on a new hard disc**

Click **Manage Hard Discs** in the **Tools** group or select the **Hard Discs Management** category on the sidebar to navigate to the Manage Hard Discs window. Then select **Add New Disc** and follow the wizard's instructions. See *Chapter 11. Adding a new hard disc*.

- **Create bootable media or its ISO image**

See *Chapter 7. Creating bootable media*.

Chapter 5. Creating image backup archives

To be able to restore the lost data or roll back your system to a predetermined state, you should first create an image backup of your computer. Backing up the entire system disc (creating a disc image) enables you to restore the system in minutes in case of severe data damage or hardware failure. Moreover, the imaging procedure is much faster than copying files, and may significantly speed the backup process when it comes to backing up large volumes of data (see details in *3.1 Disc/partition images*).

5.1 The image backup procedure

5.1.1 My Computer backup

Create a backup image of any set of your computer's hard discs and partitions.

1. Invoke the **Create Image Backup Wizard** by clicking on the image backup operation icon in the main program window and select **My computer**.

Or, you can launch the wizard directly from the Windows Explorer window. To do so, right-click on a disc icon and select **Image Backup** in the context menu. In this case, the program will automatically set **My Computer** mode and mark the selected disc for backup.

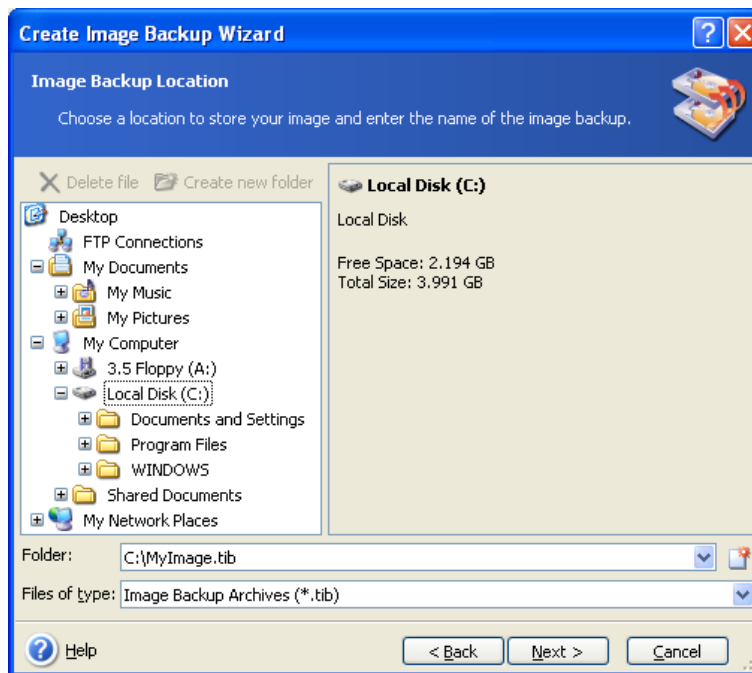
2. Select individual discs or partitions for your image backup. You can also select a random set of discs and partitions in any combination (e.g., partition 1 from disc 1 and partitions 1 and 2 from disc 2) for your image backup.

3. Go to *5.1.2 Selecting the backup* .

5.1.2 Selecting the backup destination

Select the destination place for the image backup and specify the name of the image backup archive.

Enter the new file name in the **Folder** line, or use the file name generator (the button to the right of the line where you enter the name of the image backup). If you select an existing full backup file, it will be overwritten and you will see a message prompt. Overwriting a full backup means that you discard the entire old archive and start creating a new one.



The “farther” you store the archive from the original folders, the safer it will be in case of data damage. For example, saving the archive to another hard disc will protect your data if the primary disc is damaged. Data saved to a network disc, FTP server or removable media will survive even if all your local hard discs are down.



See notes and recommendations for supporting FTP server in *1.3.4 Supported storage media*.

5.1.3 Selecting the image backup options

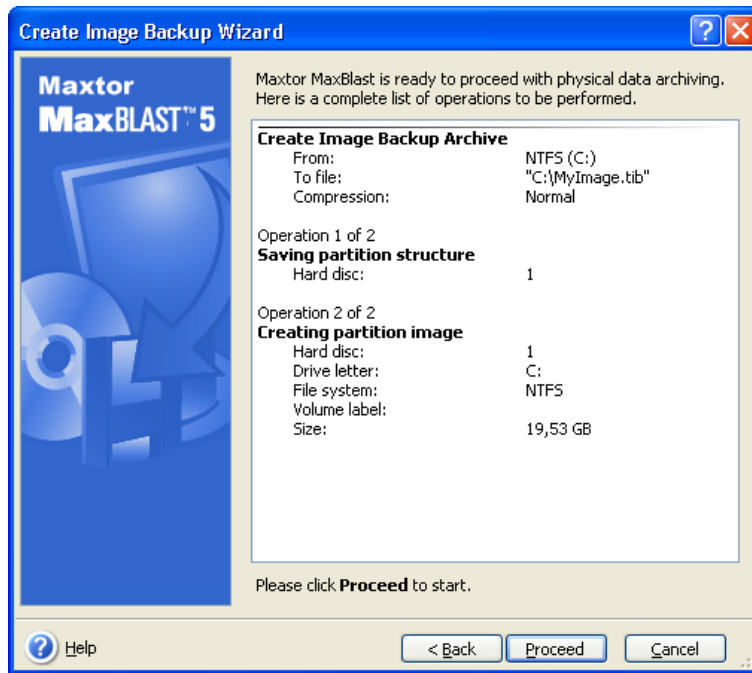
Select the backup options (that is, backup file-splitting, compression level, etc.). You can **Use default options** or **Set the options manually**. If the latter is the case, the settings will be applied only to the current backup task. Alternatively, you can edit the default options from the current screen, and your settings will be saved as the default for future image backup operations. See *5.2 Setting image backup options* for more information.

5.1.4 Providing a comment

If you create more than one image backup, we recommend that you enter a descriptive comment for your image archives in order to help you select which data to restore. However, you can choose not to add any notes to your image backup. The backup file size and creation date are automatically appended to the description, so you do not need to enter this information.

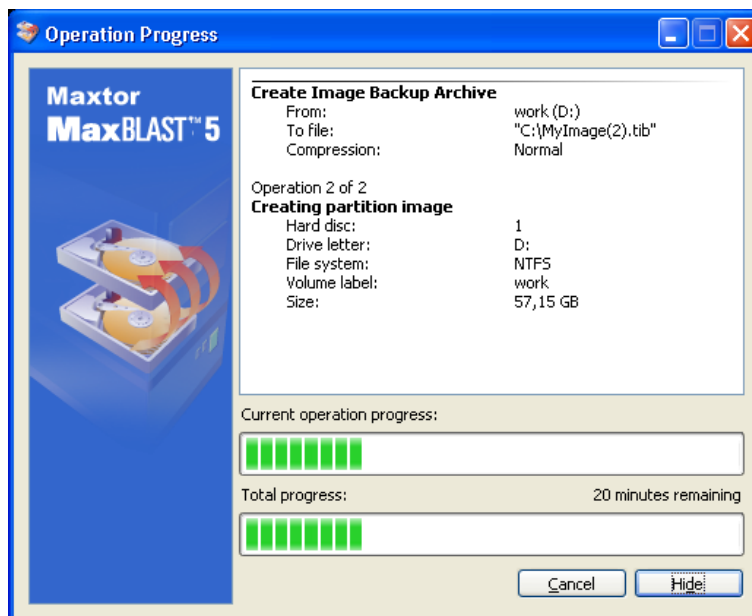
5.1.5 Image backup process

At the final step, the backup task summary is displayed. Up to this point, you can click **Back** to make changes in the created task. Clicking **Proceed** will launch the task execution.



The task progress will be shown in a special window. You can stop the procedure by clicking **Cancel**.

You can also close the progress window by clicking **Hide**. The image backup creation will continue, but you will be able to start another operation or close the main program window. In the latter case, the program will continue working in the background and will automatically close once the backup archive is ready. If you prepare some more backup operations, they will be queued to take place after the current operation is completed.



You may want to adjust the backup process priority. To do so, click on the process icon in the System Tray and select Low, Normal, or High priority from the menu that appears. For information on how to set the default priority, see *5.2.2 Backup priority*.



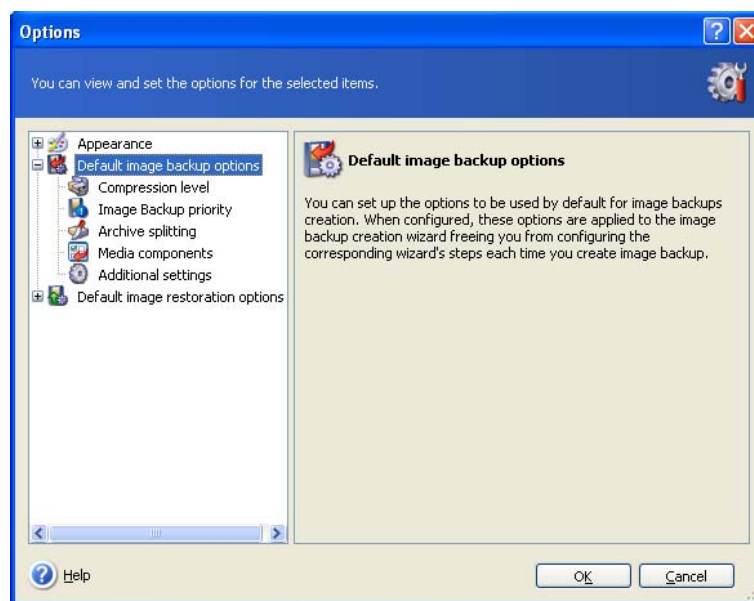
If you burn an archive to several removable media, be sure to number them, since you will have to insert them in order during the restoration.

You might want to see the log when the task is completed. To view the log, click the **Show Operation Logs** button on the toolbar.

5.2 Setting image backup options

To view or edit the default backup options, select **Tools -> Options -> Default Image Backup Options** from the main program menu.

You can edit the default (or set the temporary) backup options while creating a backup task as well.



5.2.1 Compression level

The preset is **Normal**.

If you select **None**, the data will be copied without any compression, which may significantly increase the backup file size. However, if you select **Maximum** compression, the backup will take longer to create.

The optimal data compression level depends on the type of files stored in the archive. For example, even maximum compression will not significantly reduce the archive size if the archive contains essentially compressed files, like .jpg, .pdf or .mp3.

Generally, it is recommended that you use the default **Normal** compression level. You might want to select **Maximum** compression for removable media to reduce the number of blank discs required.

5.2.2 Backup priority

The preset is **Low**.

The priority of any process running in a system determines the amount of CPU usage and system resources allocated to that process. Decreasing the backup priority will free more resources for other CPU tasks. Increasing the backup priority may speed up the backup process as it takes resources from other currently running processes. The effect will depend on total CPU usage and other factors.

5.2.3 Archive-splitting

Sizeable backups can be split into several files that together make the original backup. A backup file can be split for burning to removable media or saving on an FTP server (data recovery directly from an FTP server requires the archive to be split into files of no more than 2GB).

The preset is **Automatic**. With this setting, Maxtor MaxBlast will act as follows.

When backing up to the hard disc: If the selected disc has enough space and its file system allows the estimated file size, the program will create a single archive file.

If the storage disc has enough space, but its file system does not allow the estimated file size, Maxtor MaxBlast will automatically split the backup into several files.



Although a hard drive's capacity can be as much as 2TB, FAT16 and FAT32 file systems have a 4GB file size limit. Therefore, if you are going to back up the entire disc, an archive file might easily exceed this limit.

If you do not have enough space to store the image on your hard disc, the program will warn you and wait for your decision as to how you plan to fix the problem. You can try to free some additional space and continue or click **Back** and select another disc.

When backing up to a diskette, CD-R/RW or DVD±R/RW: Maxtor MaxBlast will ask you to insert a new disc when the previous one is full.

Or, you can select **Fixed size** and enter the desired file size or select it from the drop-down list. The backup will then be split into multiple files of the specified size. That comes in handy when backing up to a hard disc with a view to burning the archive to CD-R/RW or DVD±R/RW later on.



Creating images directly on CD-R/RW or DVD±R/RW might take considerably more time than it would on a hard disc.

5.2.4 Media components

The preset is **disabled**.

When backing up to removable media, you can make this media bootable by writing to it additional components. Thus, you will not need a separate rescue disc.

Choose the basic components necessary for boot and restoring data on the **General** tab.

The **Maxtor One-Click Restore** is a minimal addition to your rescue media, allowing one-click data recovery from an image archive stored on this media. This means that at boot from the media and clicking "restore", all data will be silently restored to its original place. No options or selections such as resizing partitions will be possible.

If you want more functionality during restoration, write a standalone version of **Maxtor MaxBlast** to the rescue disc. Then you will be able to configure the restore task using Restore Data Wizard.

Under **Advanced** tab you can select full, safe or both Maxtor MaxBlast loader version. The safe version does not have USB, PC card or SCSI drivers and is useful only in case the full version does not load. If you have other Maxtor products, such as Maxtor Disc Director Suite, installed on your computer, the bootable versions of these programs' components will be offered as **Advanced** as well.

5.2.5 Additional settings

1. Validate backup archive upon operation completion

The preset is **disabled**.

When enabled, the program will check integrity of the just created or supplemented archive immediately after backup.

2. Ask for first media while creating backup archives on removable media

The preset is **enabled**.

You can choose whether to display the **Insert First Media** prompt when backing up to removable media. With the default setting, backing up to removable media may be not possible if the user is away, because the program will wait for someone to press **OK** in the prompt box. Then, if the removable media is available (for example, CD-R/RW inserted) the task can run unattended.

Chapter 6. Restoring the image backup data

6.1 Restore under Windows or boot from CD?

As mentioned above (see 2.3 *Running Maxtor MaxBlast*), Maxtor MaxBlast can be run in several ways. We recommend that you first try to restore data running Maxtor MaxBlast under Windows, because this method provides more functionality. Boot from the bootable media only if Windows does not load or if you need to restore the image backup to a blank drive.

The boot CD from which you loaded the program does not keep you from using other CDs with backups. Once Maxtor MaxBlast is loaded entirely into RAM, you can remove the bootable CD to insert the archive disc.



Be careful! Disc letters in standalone Maxtor MaxBlast might sometimes differ from the way Windows identifies drives. For example, the D: drive identified in the standalone Maxtor MaxBlast might correspond to the E: drive in Windows.

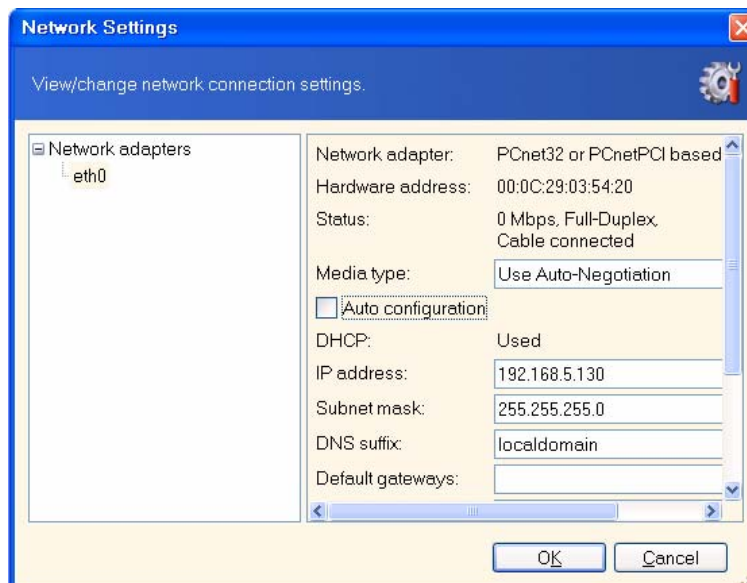


If a backup image is located on bootable media, you might have a choice of using Maxtor One-Click Restore. This operation always restores the entire physical disc. Therefore, if your disc consists of several partitions, all of them must be included in the image. Any partitions that are missing from the image will be lost. Please make sure that the image contains all disc data or you do not need the partitions that are not imaged before using Maxtor One-Click Restore. For more information on Maxtor One-Click Restore see 5.2.4 *Media components*.

6.1.1 Network settings in bootable media

When running from bootable media, Maxtor MaxBlast may not detect the network. Such might be the case if there is no DHCP server in your network or your computer address was not identified automatically for some reason.

To enable connection, specify network settings manually in the window, available at **Tools -> Options -> Network adapters**.



6.2 Restoring discs/partitions or files from images

To restore a partition (disc) from an image, Maxtor MaxBlast must obtain **exclusive access** to the target partition (disc). This means no other applications can access it at that time. If you receive a message stating that the partition (disc) can not be blocked, close applications that use this partition (disc) and start over. If you cannot determine which applications use the partition (disc), close them all.

6.2.1 Starting the Image Restore Data Wizard

Invoke the **Image Restore Data Wizard** by clicking on the restore operation icon in the main program window.

6.2.2 Archive selection

1. Select the archive.



If the archive is located on removable media, e.g. CD, first insert the last CD and then insert discs in reverse order when the Restore Data Wizard prompts you.

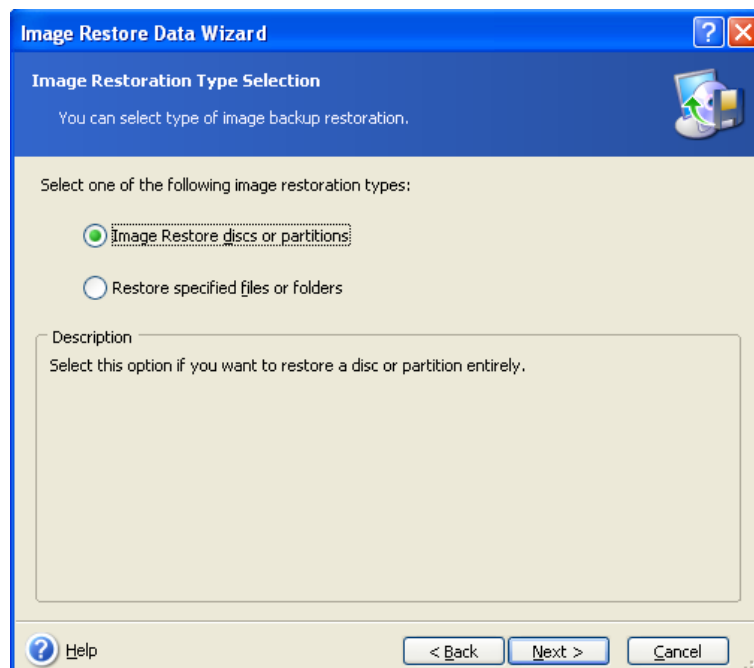


Data recovery directly from an FTP server requires the archive to consist of files of no more than 2GB. If you suspect that some of the files are larger, first copy the entire archive (along with the initial full backup) to a local hard disc or network share disc. See notes and recommendations for supporting FTP server in *1.3.4 Supported storage media*.

If you added a comment to the archive, it will be displayed to the right of the drives tree. If the archive was protected with a password, Maxtor MaxBlast will ask for it. The partitions layout, the comment and the **Next** button will be unavailable until you enter the correct password.

6.2.3 Restoration type selection

Select what you want to restore:



Restore specified files or folders

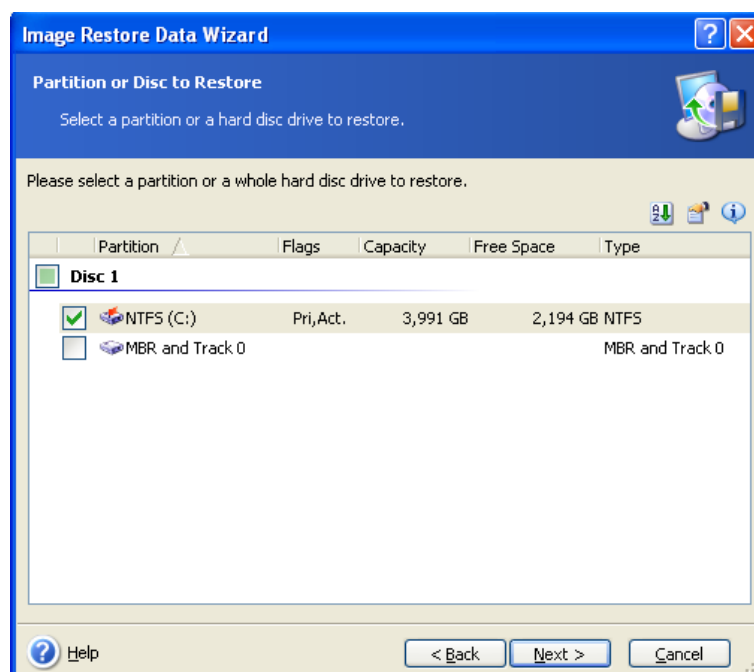
With this selection, you will be further asked to select where to restore selected folders/files (original or new location), choose files/folders to be restored and so on. These steps look like those in file archive restore. However, watch your selection: if you are to restore files instead of disc/partition, uncheck the unnecessary folders. Otherwise you will restore a lot of excess files. Then you will be taken directly to Restoration Summary screen (*6.2.12 Image Restoration summary and executing restoration*).

Restore discs or partitions

Having chosen a discs/partitions recovery type, you will have to make all settings described below.

6.2.4 Selecting a disc/partition to restore

The selected archive file can contain images of several partitions or even discs. Select which disc/partition to restore.



Disc and partition images contain a copy of track 0 along with MBR (master boot record). It appears in this window in a separate line. You can choose whether to restore MBR and track 0 by checking the respective box. If you are recovering your system, include the MBR in the restore operation since it is critical for your system boot up.

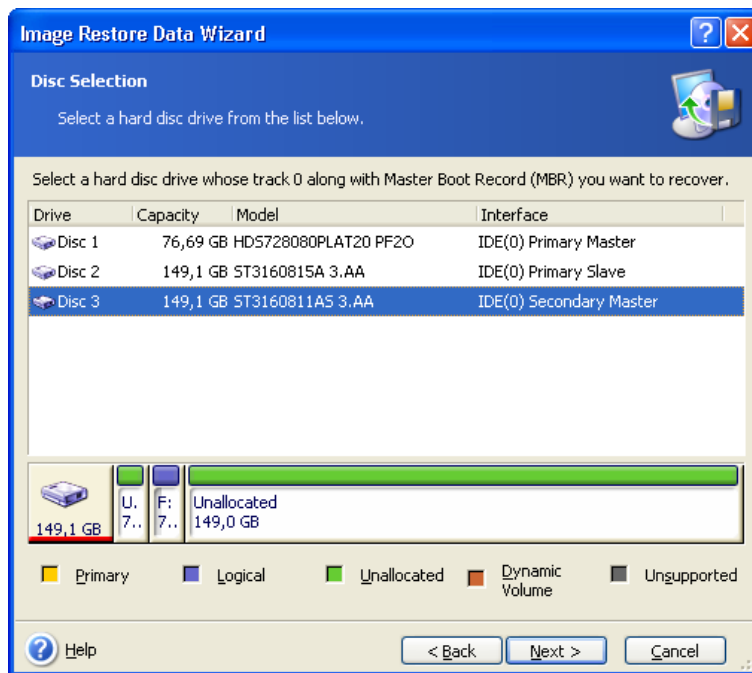
6.2.5 Selecting a target disc/partition

1. Select a target disc or partition where you want to restore the selected image. You can restore data to its initial location, to another disc/partition or to an unallocated space. The target partition should be at least the same size as the uncompressed image data.



All the data stored on the restored partition will be replaced by the image data, so be careful and watch for non-backed-up data that you might need.

2. When restoring an entire disc, the program will analyze the target disc structure to see if the disc is free.



If there are partitions on the target disc, you will be prompted by the **Nonempty Destination Hard Disc Drive** window stating that the destination disc contains partitions, perhaps with data.

You will have to select between:

- **Yes, I want to delete all the partitions on the destination hard disc before restoring** – all existing partitions will be deleted and all their data will be lost.
- **No, I do not want to delete partitions** – no existing partition will be deleted, discontinuing the recovery operation. You will then have to cancel the operation or return to select another disc.



Note that no real changes or data destruction will be performed at this time! For now, the program will just map out the procedure. All changes will be implemented only when you click **Proceed** in the wizard's final window.

To continue, select the first choice and click **Next**. You will be taken directly to step *6.2.10 Restoring several discs or partitions at once*.

6.2.6 Changing the restored partition type

When restoring a partition, you can change its type, though it is not required in most cases.

To illustrate why you might need to do this, let's imagine that both the operating system and data were stored on the same primary partition on a damaged disc.

If you are restoring a system partition to the new (or the same) disc and want to load an operating system from it, you will select **Active**.

If you restore a system partition to another hard disc with its own partitions and OS, most likely you will need only the data. In this case, you can restore the partition as **Logical** to access the data only.

By default, the original partition type is selected.



Selecting **Active** for a partition without an installed operating system could prevent your computer from booting.

6.2.7 Changing the restored partition file system

Though seldom required, you can change the partition file system during its restoration. Maxtor MaxBlast can make the following file system conversions: **FAT 16 -> FAT 32, Ext2 -> Ext3**. For partitions with other native file systems this option is not available.



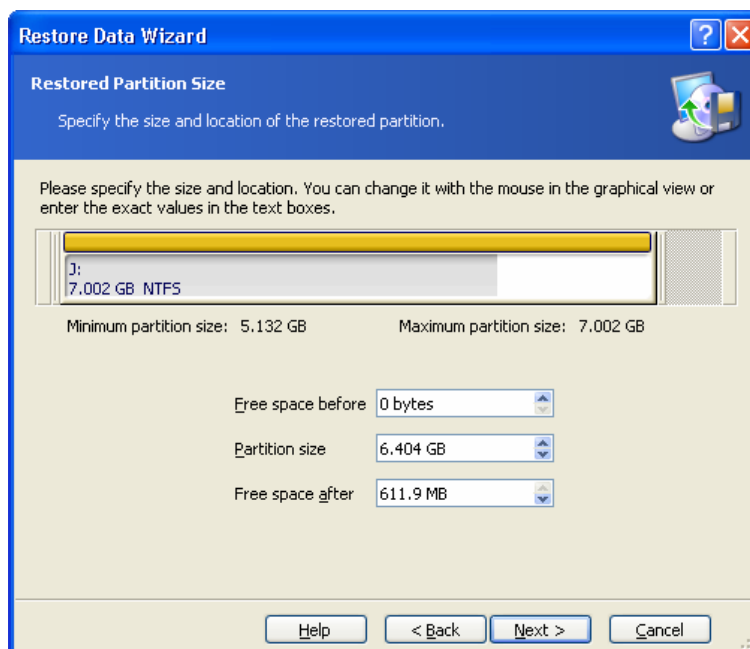
Let us imagine you are to restore a partition from an old, low-capacity FAT16 disc to a newer disc. FAT16 would not be effective and might even be impossible to set on the high-capacity hard disc. That's because FAT16 supports partitions up to 4GB, so you will not be able to restore a 4GB FAT16 partition to a partition that exceeds that limit without changing the file system. It would make sense here to change the file system from FAT16 to FAT32.

However, keep in mind that not all operating systems support FAT32. MS-DOS, Windows 95 and Windows NT 3.x, 4.x do not support it and will not be operable after you restore a partition and change its file system. These can be normally restored on a FAT16 partition only.

6.2.8 Changing the restored partition size and location

You can resize and relocate a partition by dragging it or its borders with a mouse or by entering corresponding values into the appropriate fields.

Using this feature, you can redistribute the disc space between partitions being restored. In this case, you will have to restore the partition to be reduced first.



These changes might be useful if you are to copy your hard disc to a new high-capacity one by creating its image and restoring it to a new disc with larger partitions.

6.2.9 Assigning a letter to the restored partition

Maxtor MaxBlast will assign an unused letter to a restored partition. You can select the desired letter from a drop-down list. If you set the switch to **No**, no letters will be assigned to the restored partition, hiding it from OS.

You should not assign letters to partitions inaccessible to Windows, such as to those other than FAT and NTFS.

6.2.10 Restoring several discs or partitions at once

During a single session, you can restore several partitions or discs, one by one, by selecting one disc and setting its parameters first and then repeating these actions for every partition or disc to be restored.

If you want to restore another disc (partition), select **Yes, I want to restore another partition or hard disc drive**. Then you will return to the partition selection window (6.3.4) again and will have to repeat the above steps. Otherwise, don't set this switch.

6.2.11 Setting restore options

Select the options for the restoration process (that is, restoration process priority etc.). You can **Use default options** or **Set the options manually**. If the latter is the case, the settings will be applied only to the current restore task. Or, you can edit the default options from the current screen. Then your settings will be saved as default. See *6.3 Setting restore options* for more information.

6.2.12 Image Restoration summary and executing restoration

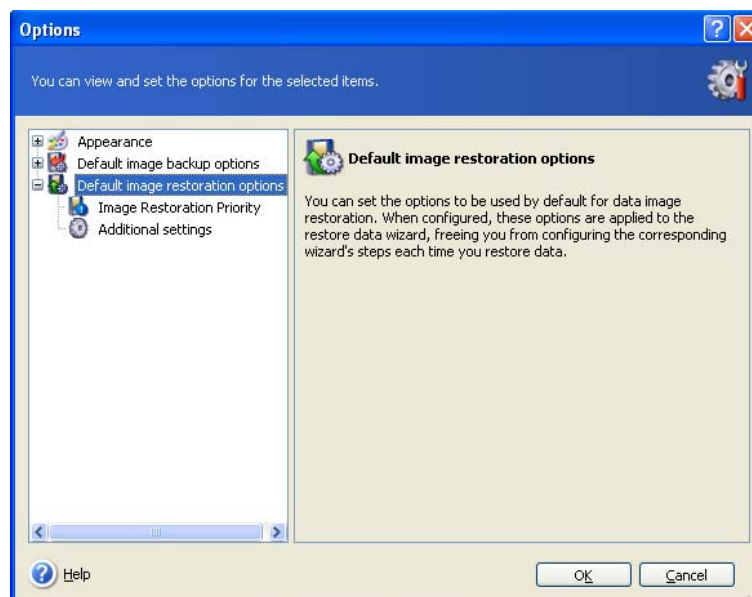
At the final step, the restoration summary is displayed. Up to this point, you can click **Back** to make changes in the created task. If you click **Cancel**, no changes will be made to disc(s). Clicking **Proceed** will launch the task execution.

The task progress will be shown in a special window. You can stop the procedure by clicking **Cancel**. However, it is critical to note that the target partition will be deleted and its space unallocated – the same result you will get if the restoration is unsuccessful. To recover the “lost” partition, you will have to restore it from the image again.

6.3 Setting restore options

To view or edit the default restore options, select **Tools -> Options -> Default Image Restoration Options** from the main program menu.

You can edit the default (or set the temporary) restore options while creating a restore task as well.



6.3.1 Restoration priority

The preset is **Low**.

The priority of any process running in a system determines the amount of CPU usage and system resources allocated to that process. Decreasing the restoration priority will free more resources for other CPU tasks. Raising restoration priority may speed up the restore process as it takes resources from other currently running processes. The effect will depend on total CPU usage and other factors.

6.3.2 Additional settings

1. You can choose whether to restore file date and time from the archive or assign the files the current date and time.
2. Before data is restored from the archive, Maxtor MaxBlast can check its integrity. If you suspect that the archive might have been corrupted, select **Validate backup archive before restoration**.
3. Having restored a disc/partition from an image, Maxtor MaxBlast can check the integrity of the file system. To do so, select **Check file system after restoration**.



Verification of the file system is available only when restoring disc/partitions using FAT16/32 and NTFS file systems.

Chapter 7. Creating bootable media

You can run Maxtor MaxBlast on a bare metal system or crashed computer that cannot boot. You can even back up discs on a non-Windows computer, copying all its data, sector-by-sector, into the backup archive. To do so, you will need bootable media with the standalone Maxtor MaxBlast version.

If you purchased the boxed product, you already have such a bootable CD, because the installation CD contains, besides the program installation files, the Maxtor MaxBlast standalone bootable version.

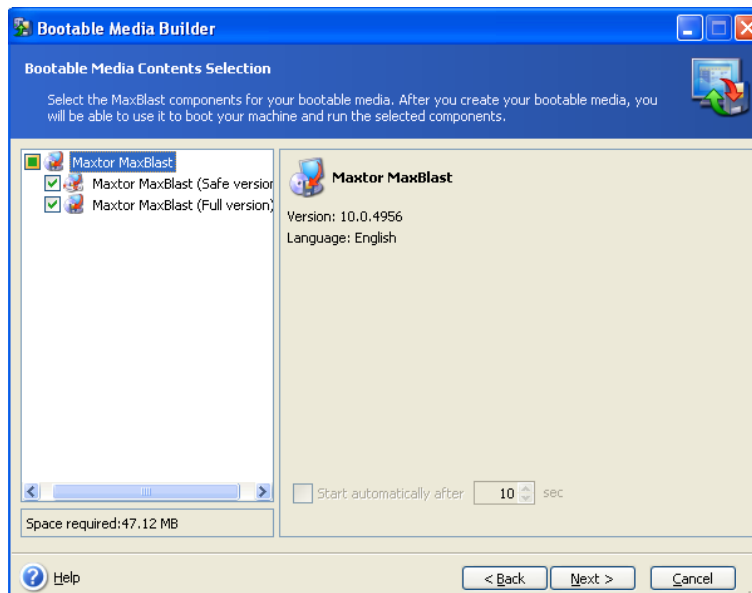
If you downloaded Maxtor MaxBlast from the Web, you can create such media using the Bootable Media Builder. For this, you will need a CD-R/RW blank, DVD±R/RW blank, several formatted diskettes (the wizard will tell you the exact number), or any other media your computer can boot from, such as a Zip drive.

Maxtor MaxBlast also provides the ability to create an ISO image of a bootable disc on the hard disc. You can then burn that ISO file to a CD for booting your machine.



If you have chosen not to install the Bootable Media Builder during Maxtor MaxBlast installation, you will not be able to use this feature.

1. Click **Create Bootable Media** on the toolbar or the sidebar, or select **Create Bootable Media** from the **Tools** menu. You can also run the Bootable Media Builder without loading Maxtor MaxBlast by selecting **Programs -> Maxtor -> Maxtor MaxBlast -> Bootable Media Builder** from the **Start** menu.
2. Select which components of Maxtor programs you want to place on the bootable media.



Maxtor MaxBlast offers the following components:

- **Maxtor MaxBlast full version**

Includes support of USB, PC Card (formerly PCMCIA) and SCSI interfaces along with the storage devices connected via them, and therefore is highly recommended

- **Maxtor MaxBlast safe version**

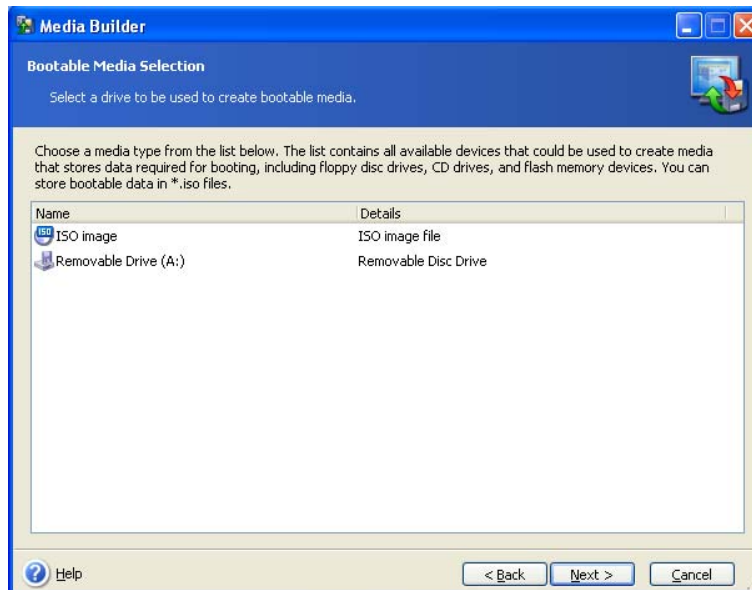
Does not include USB, PC Card, or SCSI drivers. Recommended for use in cases where problems running the full version occur

To find more about components of other Maxtor products, see their respective user guides.

3. Select the type of bootable media (CD-R/RW, DVD±R/RW or 3.5" diskettes) to create. If your BIOS has this feature, you can create other bootable media such as removable USB flash drives. You can also choose to create a bootable disc ISO image.



When using 3.5" diskettes, you will be able to write on a diskette (or a set of the diskettes) only one component at a time (for example, Maxtor MaxBlast). To write another component, start Bootable Media Builder once again.



4. If you are creating a CD, DVD or any removable media, insert the blank disc so the program can determine its capacity. If you choose to create a bootable disc ISO image, specify the ISO file name and the folder in which to place it.

5. Next, the program will calculate how many blank discs are required (in case you have not chosen ISO or CD) and give you time to prepare them. When you are finished, click **Proceed**.

After you create a boot disc, mark it and keep it in a safe place.

Please keep in mind that the backups created by a later program version may be incompatible with the previous program versions. For this reason, we highly recommend that you create new bootable media after you update Maxtor MaxBlast.

Chapter 8. Other operations

8.1 Validating backup archives

To be certain that your archives are not damaged, you can check their integrity.

1. To invoke the **Backup Archive Validation Wizard**, click **Validate Backup Archive** on the toolbar. You can also access this wizard via the **Backup Archives** category.
2. Select the archive to validate.



3. Clicking **Proceed** in the summary window will launch the validation procedure. After the validation is complete, you will see the results window. You can cancel checking by clicking **Cancel**.

8.2 Viewing logs

Maxtor MaxBlast allows you to view its working logs.

To invoke the log window, select **Show log** on the toolbar or from the **Tools** menu.

The log browsing window contains two panes: the left one features the log list, while the right one shows selected log contents.

The left panel can contain up to 50 logs. If there are more, you can browse the list using the **More** and **Less** buttons with the left and right arrows.

To delete a log, select it and click **Delete**.

If any step was terminated by an error, the corresponding log will be marked with a red circle with a white cross inside.

The right window features the list of steps contained in the selected log. The three buttons to the right control message filters: the white cross in the red circle filters error messages, the exclamation sign in a yellow triangle filters warnings, and the "i" in the blue circle filters information messages.

To select columns (step parameters) to display, right-click the headers line or left-click the **Choose Details** button. Then check the desired parameters.

To sort messages by a particular parameter, click its header (click again to reverse order) or the **Arrange Icons by** button (the second from the right) and select the desired parameter.

You can also change column width by dragging the borders with a mouse.

Chapter 9. Exploring archives and mounting images

Maxtor MaxBlast offers two kinds of archive contents management: mounting image backups and exploring for both images and file-level archives. Both operations are performed via the **Backup Archives** category.

Exploring image backups lets you view their contents and copy the selected files to the hard disc.

Mounting images as virtual drives lets you access them as though they were physical drives. This means that:

- a new disc with its own letter will appear in the drives list
- using Windows Explorer and other file managers, you can view the image contents as if they were located on a physical disc or partition
- you will be able to use the virtual disc in the same way as the real one: open, save, copy, move, create, delete files or folders. If necessary, the image can be mounted in read-only mode

Please keep in mind that, though both file archives and disc/partition images have a default ".tib" extension, only **images** can be mounted. If you want to view file archive contents, use the Explore operation. The following is a brief summary of the Explore vs Mount operation:

	Explore	Mount
Archive type	Disc or partition image	Partition image
Assigning a letter	No	Yes
Archive modification	No	Yes (in R/W mode)
Files extraction	Yes	Yes

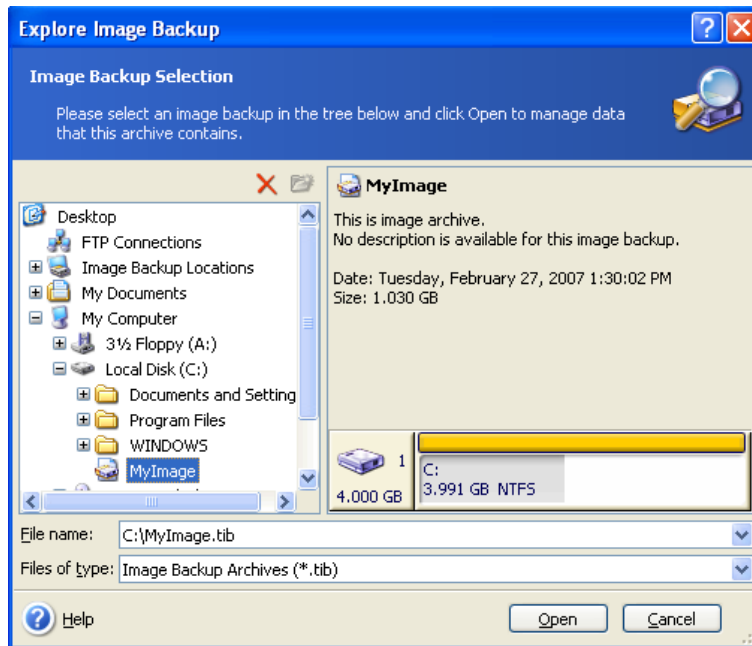


The current version of Maxtor MaxBlast can mount or explore an image archive only if all its volumes reside in the same directory. If your archive spans several CD-R/RW discs and you wish to mount the image, you should copy all volumes to a hard disc drive or network drive.

9.1 Exploring an archive

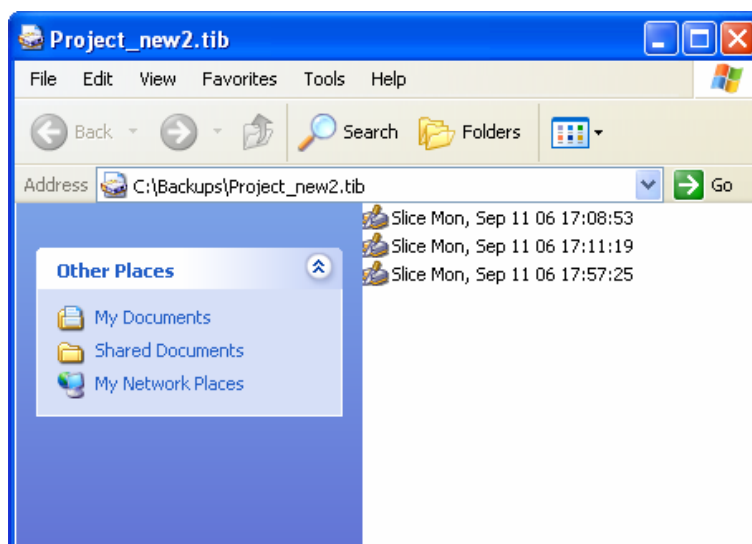
1. Click **Explore and Validate Backup Archives** in the **Tools** group or select the **Backup Archives** category on the sidebar to navigate to the Manage Backup Archives window. Then select **Explore Backup Archive**. Or, you can select **Tools -> Explore Backup Archive** in the main program menu.

2. Select an archive from the drive tree and click **Open**.



If you added a comment to the archive, it will be displayed to the right of the drives tree.

3. The program opens a Windows Explorer window displaying the archive contents.



Double-click the slice icon to view the data saved in the backup. You can copy any file or folder from the backup being explored and paste it to any hard disc folder.

9.2 Mounting an image

1. Invoke the **Mount Image Wizard** by selecting **Operations -> Mount Image** in the main program menu.

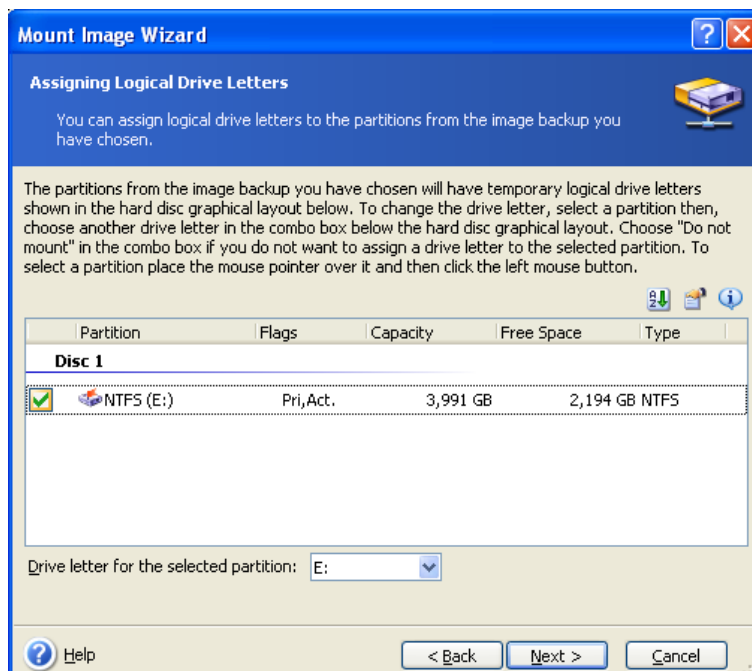
2. Select the archive from the drives tree.



If you added a comment to the archive, it will be displayed to the right of the drives tree. If the archive was protected with a password, Maxtor MaxBlast will ask for it. Neither the partitions layout, nor the **Next** button will be enabled until you enter the correct password.

4. Select a partition to mount as a virtual disc. (Note that you cannot mount an image of the entire disc except in the case when the disc consists of one partition).

You can also select a letter to be assigned to the virtual disc from the **Drive letter** drop-down list. If you do not want to assign a letter to the virtual drive, select **Do not assign**.



5. Select whether you want to mount image in **Read-only** or **Read/Write** mode.

6. If you select **Read/Write** mode, the program assumes that the connected image will be modified. It is strongly recommended that you list the forthcoming changes in the Comment section to this file.

7. The program displays a summary containing a single operation. Click **Proceed** to connect the selected partition image as a virtual disc.

8. After the image is connected, the program will run Windows Explorer, showing its contents. Now you can work with files or folders as if they were located on a real disc.

You can connect multiple partition images. If you want to connect another partition image, repeat the procedure.

9.3 Unmounting an image

We recommend that you unmount the virtual disc after all necessary operations are finished, as keeping up virtual discs takes considerable system resources. If you do not unmount the disc, it will disappear after your computer is turned off.

To disconnect the virtual disc, click **Unmount Image** and select the disc to unmount. You can also do this in Windows Explorer by right-clicking on the disc icon and selecting **Unmount**.

Chapter 10. Transferring the system to a new disc

10.1 General information

Sooner or later, most computer users find that their hard disc is too small. If you just don't have space for more data, you can add another disc just for data storage as described in the following chapter.

However, you might find that your hard disc does not have enough space for the operating system and installed applications, preventing you from updating your software. In this case, you have to transfer the system to a higher-capacity hard disc.

To transfer the system, you must first install the disc in the computer (see details in the *Appendix B. Hard discs and BIOS setup*). If your computer doesn't have a bay for another hard disc, you can temporarily install it in place of your CD drive or use a USB 2.0 connection to the external target disc. If that is not possible, you can clone a hard disc by creating a disc image and restoring it to a new hard disc with larger partitions.

There are two transfer modes available: automatic and manual.

In the automatic mode, you will only have to take a few simple actions to transfer all the data, including partitions, folders and files, to a new disc, making it bootable if the original disc was bootable.

There will be only one difference between these discs – partitions on the newer disc will be larger. Everything else, including the installed operating systems, data, disc labels, settings, software and everything else on the disc, will remain the same.



This is the only result available in the automatic mode. The program can only duplicate the original disc layout to the new one. To obtain a different result, you will have to answer additional questions about cloning parameters.

The manual mode will provide more data transfer flexibility.

1. You will be able to select the method of partition and data transfer:

- as is
- new disc space is proportionally distributed between the old disc partitions
- new disc space is distributed manually

2. You will also be able to select operations to perform on the old disc:

- leave partitions (and data!) on the old disc
- remove all information from the old disc
- create new partitions on the old disc (and remove all the old information)



On program screens, damaged partitions are marked with a red circle and a white cross inside in the upper left corner. Before you start cloning, you should check such discs for errors using the appropriate operating system tools.

10.2 Security

Please note the following: if the power goes out or you accidentally press **RESET** during the transfer, the procedure will be incomplete and you will have to partition and format or clone the hard disc again.

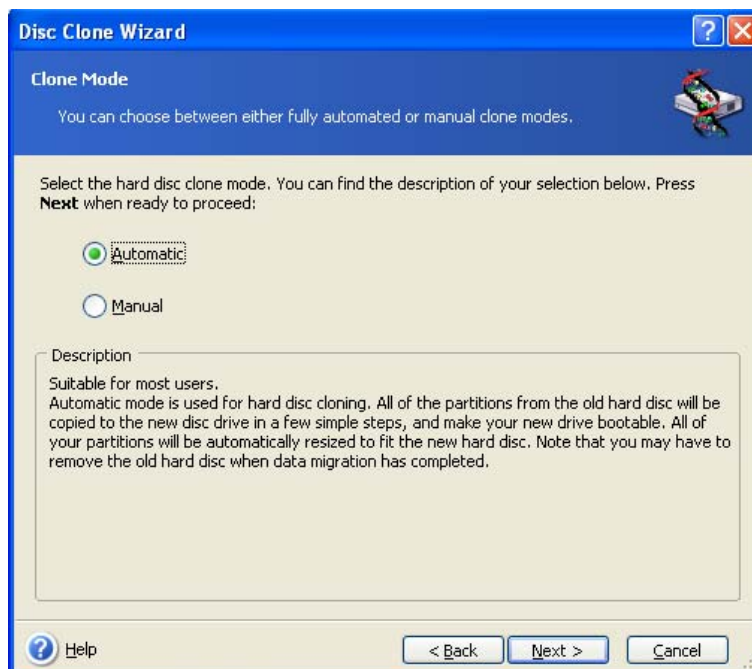
No data will be lost because the original disc is only being read (no partitions are changed or resized) until data transfer is completed.

Nevertheless, we do not recommend that you delete data from the old disc until you are sure it is correctly transferred to the new disc, the computer boots up from it and all applications work.

10.3 Executing transfers

10.3.1 Selecting Clone mode

You will see the **Clone mode** window just after the welcome window.

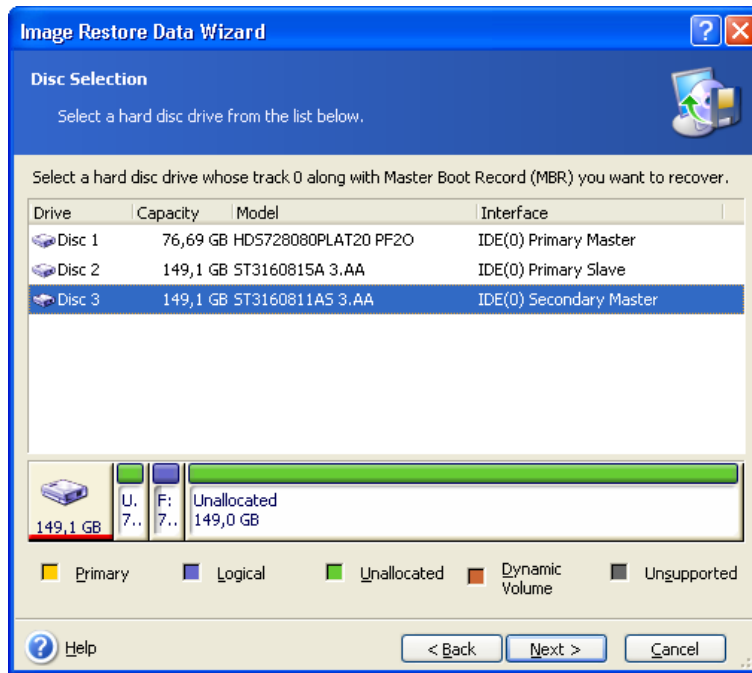


We recommend using automatic mode in most cases. The manual mode can be useful if you need to change the disc partition layout.

If the program finds two discs, one partitioned and another unpartitioned, it will automatically recognize the source disc as the partitioned disc and the destination disc as the unpartitioned disc. In such a case, the next two steps will be bypassed.

10.3.2 Selecting source disc

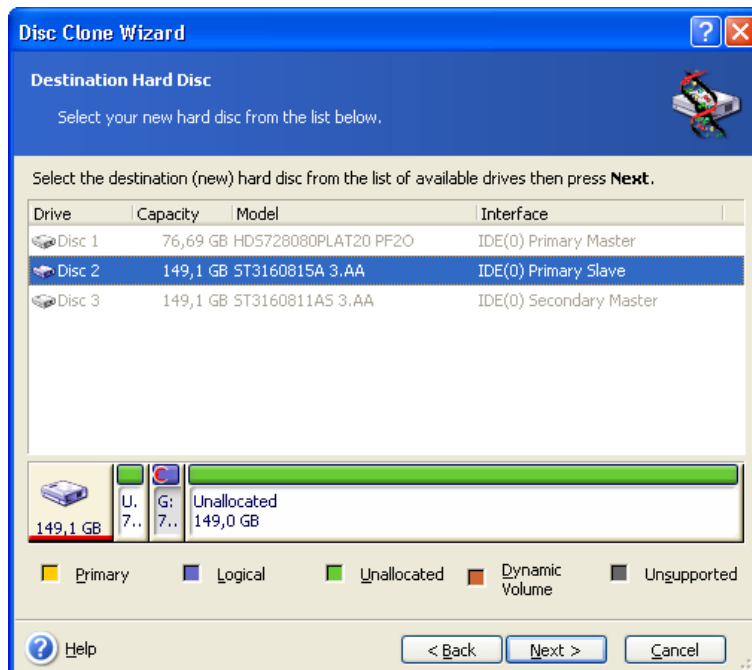
If the program finds several partitioned discs, it will ask you which is the source (i.e. the older data disc).



You can determine the source and destination using the information provided in this window (disc number, capacity, label, partition and file system information).

10.3.3 Selecting destination disc

After you select the source disc, you have to select the destination where the disc information will be copied.



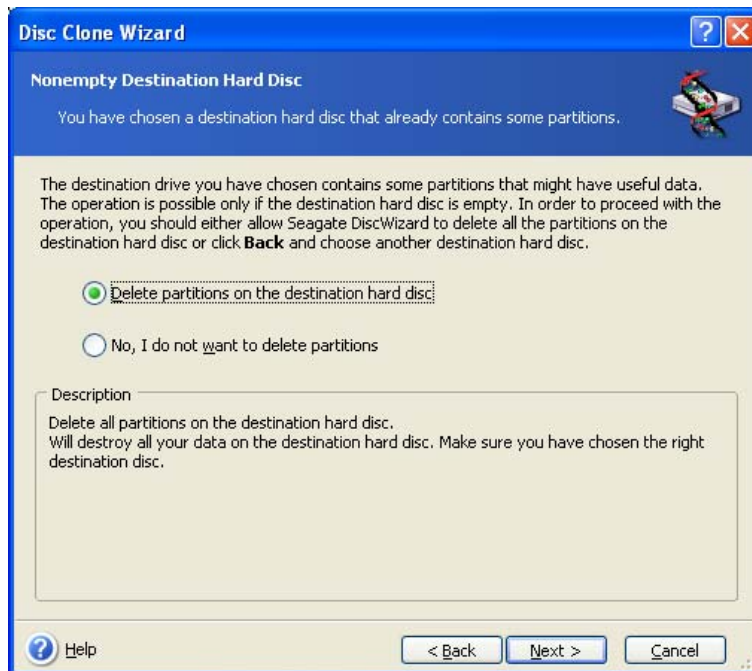
The previously selected source becomes grayed-out and disabled for selection.



If either disc is unpartitioned, the program will automatically recognize it as the destination and bypass this step.

10.3.4 Partitioned destination disc

At this point, the program checks to see if the destination disc is free. If not, you will be prompted by the **Nonempty Destination Hard Disc** window stating that the destination disc contains partitions, perhaps with data.



You will have to select between:

- **Delete partitions on the destination hard disc** – all existing partitions will be deleted during cloning and all their data will be lost.
- **No, I do not want to delete partitions** – no existing partition will be deleted, discontinuing the cloning operation. You will have to cancel this operation and return to select another disc.

To continue, select the first choice and click **Next**.



Note that no real changes or data destruction will be performed at this time! For now, the program will just map out cloning. All changes will be implemented only when you click **Proceed**.

10.3.5 Old and new disc partition layout

If you selected the automatic mode, the program will ask you for nothing further. You will see the window graphically illustrating information (as rectangles) about the source disc (partitions and unallocated space) and the destination disc layout.

Along with the disc number, some additional information is provided: disc capacity, label, partition and file system information. Partition types — primary, logical and unallocated space — are marked with different colors.

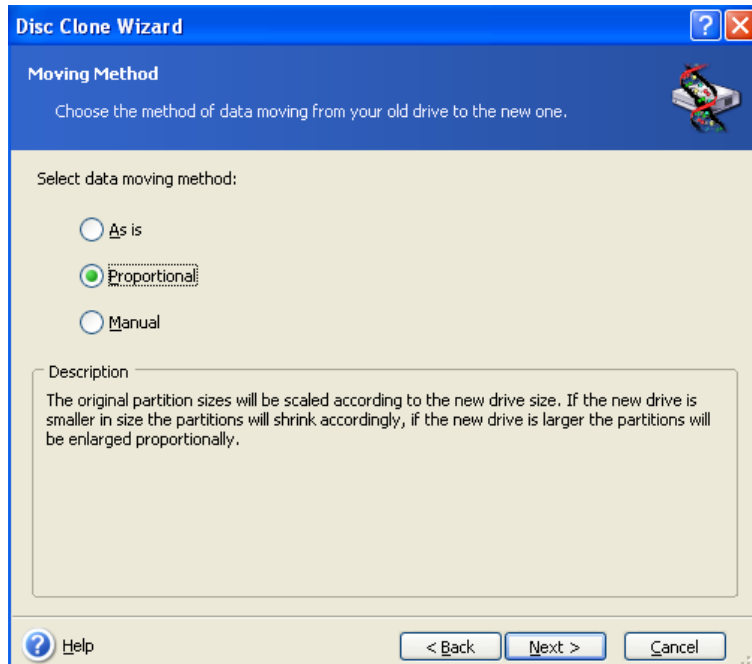
Next you will see the cloning summary.

10.3.6 Selecting partition transfer method

Maxtor MaxBlast will offer you the following data transfer methods:

- **As is**

- **Proportional** – the new disc space will be proportionally distributed among cloned partitions
- **Manual** – you will specify the new size and other parameters yourself



If you elect to transfer information "as is," a new partition will be created for every old one with the same size and type, file system and label. The unused space will become unallocated. Further, you will be able to use the unallocated space to create new partitions or to enlarge the existing partitions with special tools, such as Maxtor Disc Director Suite.

As a rule, "as is" transfers not recommended as they leave much unallocated space on the new disc. Using the "as is" method, Maxtor MaxBlast transfers unsupported and damaged file systems.

If you transfer data proportionally, each partition will be enlarged, according to the proportion of the old and new disc capacities.

FAT16 partitions are enlarged less than others, as they have a 4 GB size limit.

Depending on the selected combination, you will proceed to either the old disc partitioning window, or the disc partition layout window (see below).

10.3.7 Partitioning the old disc

If you selected **Create a new partition layout** earlier in the process, it is now time to repartition your old disc.

During this step, you will see the current disc partition layout. Initially, the disc has unallocated space only. This will change when you create new partitions.

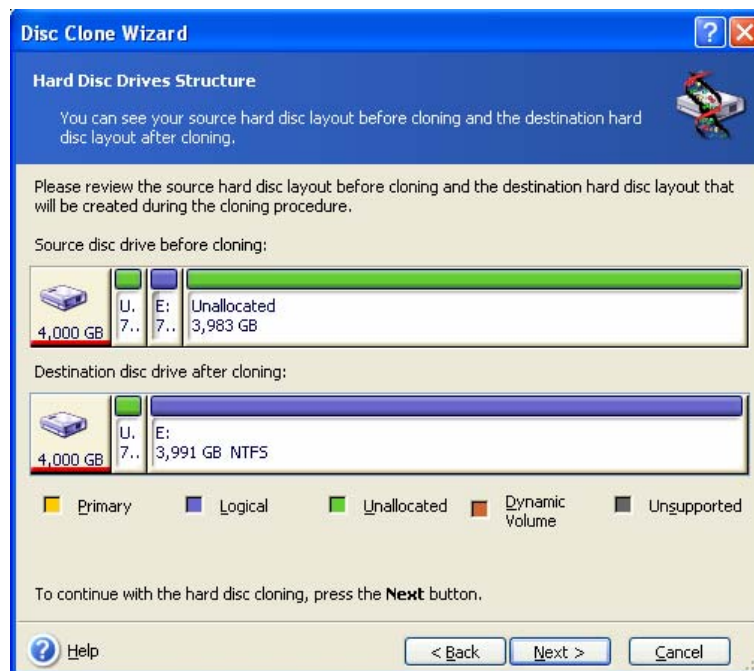
Having completed the required steps, you will add a new partition. To create another one, simply repeat those steps.

If you make a mistake, click **Back** to redo.

After you create the necessary partitions, uncheck the **Create new partition in unallocated space** box and click **Next**.

10.3.8 Old and new disc partition layouts

In the next window, you will see rectangles indicating the source hard disc, including its partitions and unallocated space, as well as the new disc layout.



Along with the hard disc number, you will see disc capacity, label, partition and file system information. Different partition types, including primary, logical and unallocated space are marked with different colors.



If you selected manual partition creation earlier, the partition layout will look different. This partitioning method is described below.

10.3.9 Cloning summary

In the next window, you will see a list of briefly described operations to be performed on the discs.

Cloning a disc containing the currently active operating system will require a reboot. In that case, after clicking **Proceed** you will be asked to confirm the reboot. Canceling the reboot will cancel the entire procedure. After the clone process finishes you will be offered an option to shut down the computer by pressing any key. This enables you to change the position of master/slave jumpers and remove one of the hard drives.

Cloning a non-system disc or a disc containing an operating system, but one that is not currently active, will proceed without reboot. After you click **Proceed**, Maxtor MaxBlast will start cloning the old disc to the new disc, indicating the progress in a special window. You can stop this procedure by clicking **Cancel**. In that case, you will have to repartition and format the new disc or repeat the cloning procedure. After the cloning operation is complete, you will see the results message.

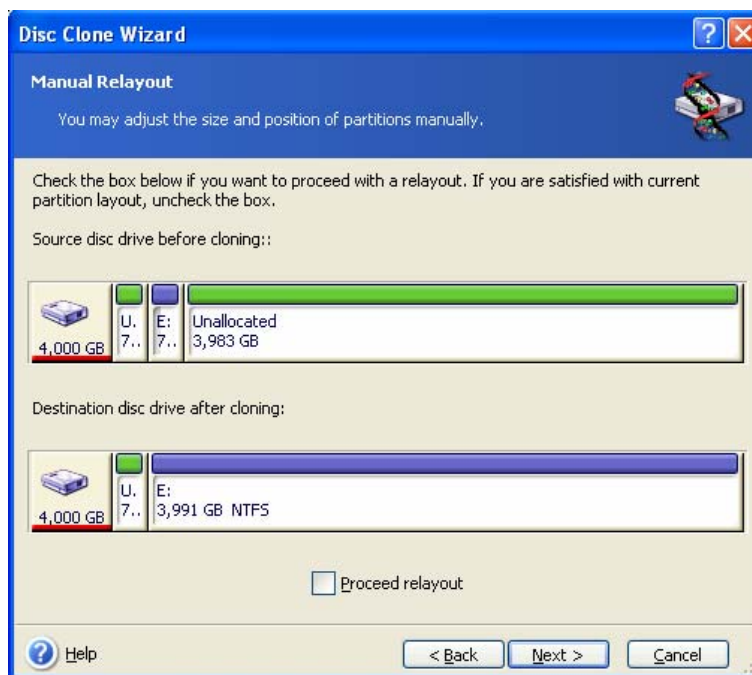
10.4 Cloning with manual partitioning

10.4.1 Old and new disc partition layouts

The manual transfer method enables you to resize partitions on the new disc. By default, the program resizes them proportionally.

In the next window, you will see rectangles indicating the source hard disc, including its partitions and unallocated space, as well as the new disc layout.

Along with the hard disc number, you will see disc capacity, label, partition and file system information. Different partition types, including primary, logical and unallocated space are marked with different colors.



To resize either partition, check the **Proceed relayout** box. If you are satisfied with the partition layout shown, uncheck this box (if checked). Clicking **Next**, you will proceed to the cloning summary window.



Be careful! Clicking **Back** in this window will reset all size and location changes that you've selected, so you will have to specify them again.

First, select a partition to resize. It will be underlined in red.

Resize and relocate it on the next step.

You can do this by entering values to **Unallocated space before**, **Partition size**, **Unallocated space after** fields, by dragging partition borders or the partition itself.

If the cursor turns to two vertical lines with left and right arrows, it is pointed at the partition border and you can drag it to enlarge or reduce the partition's size. If the cursor turns to four arrows, it is pointed at the partition, so you can move it to the left or right (if there's unallocated space near it).

Having provided the new location and size, click **Next**. You will be taken two steps back to the partition layout. You might have to perform some more resizing and relocation before you get the layout you need.

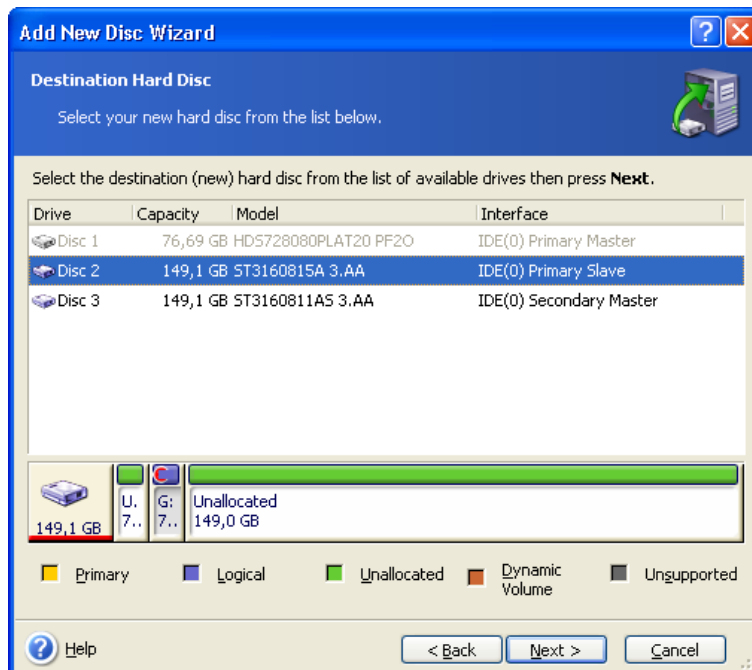
Chapter 11. Adding a new hard disc

If you don't have enough space for your data, you can either replace the old disc with a new higher-capacity one (data transfers to new discs are described in the previous chapter), or add a new disc only to store data, leaving the system on the old disc. If the computer has space for another disc, it would be easier to add a data disc drive than to clone a system one.

To add a new disc, you must first install it in your computer.

11.1 Selecting a hard disc

Select the disc that you've added to the computer.



This window might be bypassed if the program detects the new disc itself. In this case, you will immediately proceed to the new partition creation.

If there are any partitions on the new disc, they must be deleted first.

Select **Delete partitions on the destination hard disc** and click **Next** to continue.

11.2 Creating new partitions

Next you will see the current partition layout. Initially, all disc space will be unallocated. This will change after you add new partitions.

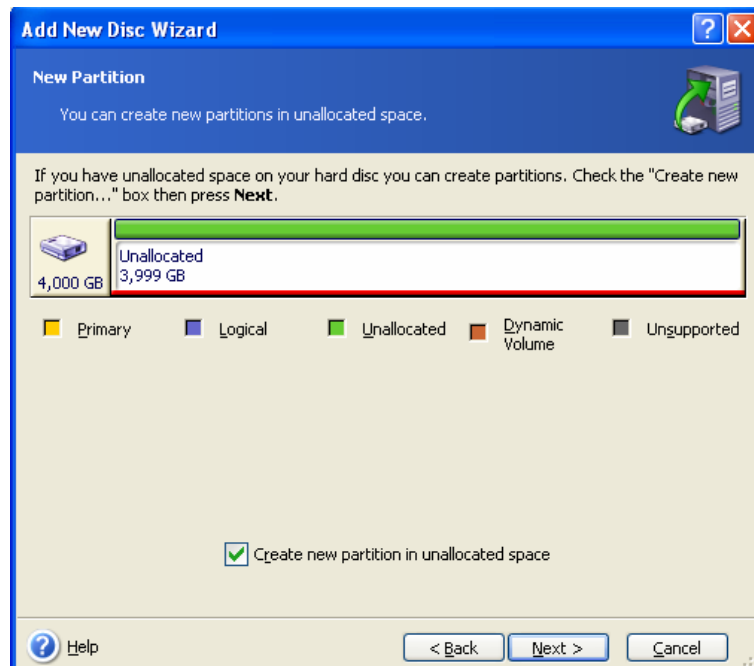
To create a partition, select **Create new partition in unallocated space** and click **Next** to perform steps required by the partition creation wizard.

You will be prompted to set the new partition location and size. You can do this by both entering values to **Unallocated space before**, **Partition size**, **Unallocated space after** fields, by dragging partition borders or the partition itself.

If the cursor turns to two vertical lines with left and right arrows, it is pointed at the partition border and you can drag it to enlarge or reduce the partition size. If the cursor turns to four arrows, it is pointed at the partition, so you can move it to the left or right (if there is

unallocated space near it). Having provided the new partition location and size, you can input a label for the new partition.

If you make a mistake at partitioning, click **Back** to redo the process.



Finally, you will be taken back to the partition layout screen. Check the resulting partitions layout and start creating another partition or move on by unchecking **Create new partition in unallocated space** and clicking **Next**.

11.3 Disc add summary

The disc add summary contains a list of operations to be performed on discs.

After you click **Proceed**, Maxtor MaxBlast will start creating new partitions, indicating the progress in a special window. You can stop this procedure by clicking **Cancel**. You will then have to repartition and format the new disc or repeat the disc add procedure.

Appendix A. Partitions and file systems

A.1 Hard disc partitions

The mechanism that allows you to install several operating systems on a single PC or to carve up a single physical disc drive into multiple “logical” disc drives is called **partitioning**.

Partitioning is performed by special applications. In MS-DOS and Windows, these are FDISK and Disk Administrator.

Partitioning programs perform the following:

- create a primary partition
- create an extended partition that can be split into several logical discs
- set an active partition (applied to a single primary partition only)



Information about partitions on a hard disc is stored in a special disc area – in the 1st sector of cylinder 0, header 0, which is called the partition table. This sector is called the master boot record, or MBR.



A physical hard disc might contain up to four partitions. This limit is forced by the partition table that is suitable for four strings only. However, this does not mean you can have only four operating systems on your PC! Applications called disc managers support far more operating systems on discs. For example, Maxtor OS Selector, a component of Acronis Disk Director Suite, enables you to install up to 100 operating systems!

A.2 File systems

An operating system gives the user the ability to work with data by supporting some type of **file system** on a partition.

All file systems are made of structures that are necessary to store and manage data. These structures are usually composed of operating system boot sectors, folders and files. File systems perform the following basic functions:

- track occupied and free disc space (and bad sectors, if any)
- support folders and file names
- track physical location of files on discs

Different operating systems use different file systems. Some operating systems are able to work with only one file system while others can use several of them. Here are some of the most widely used file systems:

A.2.1 FAT16

The FAT16 file system is widely used by DOS (DR-DOS, MS-DOS, PC-DOS, PTS-DOS and other), Windows 98/Me, and Windows NT/2000/XP operating systems and is supported by most other systems.

Main features of FAT16 are the file allocation table (FAT) and clusters. FAT is the core of the file system. To increase data safety, it is possible to have several copies of the FAT (there are usually two of them) on a single disc. A cluster is a minimum data storage unit in FAT16 file system. One cluster contains a fixed number of sectors. FAT stores information about what clusters are free, what clusters are bad, and also defines in which clusters files are stored.

The FAT16 file system has a 2GB limit that permits a maximum 65,507 clusters that are 32KB in size. (Windows NT/2000/XP support partitions up to 4GB with up to 64KB clusters). Usually the smallest cluster size is used to make the total cluster amount within the 65,507 range. The larger a partition is, the larger its clusters are.



Usually the larger the cluster size, the more disc space is wasted. A single byte of data could use up one cluster, whether the cluster size is 32KB or 64KB.

Like many other file systems, the FAT16 file system has a root folder. Unlike others, however, its root folder is stored in a special place and is limited in size (standard formatting produces a 512-item root folder).

Initially, FAT16 had limitations on file names. They could only be eight characters long, plus a dot, plus three characters of name extension. However, long-name support in Windows 95 and Windows NT bypassed this limitation. The OS/2 operating system also supports long names, but does so in a different way.

A.2.2 FAT32

The FAT32 file system was introduced in Windows 95 OSR2. It is also supported by Windows 98/Me/2000/XP. FAT32 is an evolved version of FAT16. Its main differences from FAT16 are 28-bit cluster numbers and a more flexible root, whose size is unlimited. The reasons FAT32 appeared are the support of large hard discs (over 8GB in capacity) and the impossibility of implementing any more complex file system into MS-DOS, which is still the basis for Windows 98/Me.

The maximum FAT32 disc size is 2 terabytes (1 terabyte, or TB, is equal to 1024 gigabytes, or GB).

A.2.3 NTFS

NTFS is the main file system for Windows NT/2000/XP. Its structure is closed, so no other operating system is fully supported. The main structure of NTFS is the MFT (master file table). NTFS stores a copy of the critical part of the MFT to reduce the possibility of data damage and loss. All other NTFS data structures are special files. NTFS stands for NT File System.

Like FAT, NTFS uses clusters to store files, but cluster size does not depend on partition size. NTFS is a 64-bit file system. It uses unicode to store file names. It is also a journaling (failure-protected) file system, and supports compression and encryption.

Files in folders are indexed to speed up file search.

Appendix B. Hard discs and BIOS setup

The appendices below provide you with extra information on the hard disc organization, how information is stored on discs, how discs should be installed in the computer and plugged into the motherboard, configuring discs with BIOS, partitions and file systems, and how operating systems interact with discs.

B.1 Installing hard discs in computers

B.1.1 Installing a hard disc, general scheme

To install a new IDE hard disc, you should do the following (**we will assume you have powered OFF your PC before you start!**):

1. Configure the new hard disc as **slave** by properly installing jumpers on the board of its controller. Disk drives generally have a picture on the drive that shows the correct jumper settings.
2. Open your computer and insert the new hard disc into a 3.5" or 5.25" slot with special holders. Fasten down the disc with screws.
3. Plug the power cable into the hard disc (four-threaded: two black, yellow and red; there is only one way you can plug in this cable).
4. Plug the 40- or 80-thread flat data cable into sockets on the hard disc and on the motherboard (plugging rules are described below). The disc drive will have a designation on the connector or next to it that identifies Pin 1. The cable will have one red wire on an end that is designated for Pin 1. Make sure that you place the cable in the connector correctly. Many cables also are "keyed" so that they can only go in one way.
5. Turn your computer on and enter BIOS setup by pressing the keys that are displayed on the screen while the computer is booting.
6. Configure the installed hard disc by setting the parameters **type**, **cylinder**, **heads**, **sectors** and **mode** (or **translation mode**; these parameters are written on the hard disc case) or by using the IDE autodetection BIOS utility to configure the disc automatically.
7. Set the boot sequence to A:, C:, CD-ROM or some other, depending on where your copy of Maxtor MaxBlast is located. If you have a boot diskette, set the diskette to be first; if it is on a CD, make the boot sequence start with CD-ROM.
8. Quit BIOS setup and save changes. Maxtor MaxBlast will automatically start after reboot.
9. Use Maxtor MaxBlast to configure hard discs by answering the wizard's questions.
10. After finishing the work, turn off the computer, set the jumper on the disc to the **master** position if you want to make the disc bootable (or leave it in **slave** position if the disc is installed as additional data storage).

B.1.2 Motherboard sockets, IDE cable, power cable

There are two slots on the motherboard to which the hard discs can be connected: **primary IDE** and **secondary IDE**.

Hard discs with an IDE (Integrated Drive Electronics) interface are connected to the motherboard via a 40- or 80-thread flat marked cable: one of the threads of the cable is red.

Two IDE hard discs can be connected to each of the sockets, i.e. there can be up to four hard discs of this type installed in the PC. (There are three plugs on each IDE cable: two for hard discs and one for the motherboard socket.)

As noted, IDE cable plugs are usually designed so that there is only one way to connect them to the sockets. Usually, one of the pinholes is filled on the cable plug, and one of the pins facing the filled hole is removed from the motherboard socket, so it becomes impossible to plug the cable in the wrong way.

In other cases, there is a jut on the plug on the cable, and an indentation in the socket of the hard disc and of the motherboard. This also ensures that there only one way to connect the hard disc and the motherboard.

In the past, this design of plug did not exist, so there was an empirical rule: **the IDE cable is connected to the hard disc socket so that the marked thread is the closest to the power cable**, i.e. the marked thread connected to pin #1 of the socket. A similar rule was used for connecting cables with the motherboard.

Incorrect connection of the cable with either the hard disc or the motherboard does not necessarily damage the electronics of the disc or the motherboard. The hard disc is simply not detected or initialized by BIOS.



There are some models of hard discs, especially the older ones, for which incorrect connection damaged the electronics of the drive.



We will not describe all the types of hard discs. Currently the most widespread are those with IDE or SCSI interfaces. Unlike IDE hard discs, there can be from six to 14 SCSI hard discs installed in your PC. However, you need a special SCSI controller (called a host adapter) to connect them. SCSI hard discs are not usually used in personal computers (workstations), but are found mostly in servers.

Aside from an IDE cable, a four-thread power cable must be connected to the hard discs. There is only one way to plug in this cable.

B.1.3 Installation modes, jumpers

A hard disc can be installed in a computer as **master** or as **slave**. The mode of hard disc installation is defined by the position of special connectors (called jumpers) on the hard disc.

The jumpers are either located on the electronic board of the hard disc or a special socket that provides for the connection of the hard disc and the motherboard.

There is usually a sticker on the drive that explains the markings. Typical markings are **DS**, **SP**, **CS** and **PK**.

Each jumper position corresponds to one hard disc(s) installation mode:

- **DS – master/factory default**
- **SP – slave (or no jumper required)**
- **CS – cable select for master/slave:** the purpose of the hard disc is determined by its physical position with respect to the motherboard
- **PK – jumper parking position:** the position where one can put the jumper if it is not necessary in the existing configuration

The hard disc with the jumper in **master** position is treated by the basic input/output system (BIOS) as bootable.

The jumpers on hard discs that are connected to the same cable can be in the **select for master/slave** position. In this case, BIOS will deem as «master» the disc that is connected to the IDE cable closer to the motherboard than the other one.



Unfortunately, hard disc markings were never standardized. You might well find that markings on your hard disc differ from the ones described above. Moreover, for the old types of hard discs, their purpose could be defined by two jumpers instead of one. You should study the markings carefully before installing your hard disc in the computer.

It is not enough to physically connect the hard disc to the motherboard and set the jumpers properly for the hard disc to function — hard discs have to be properly configured with the motherboard BIOS.

B.2 BIOS

When you turn on your computer, you often see a number of short text messages before you see the splash screen of your operating system. These messages are from the POST (power-on self test) program that belongs to BIOS and is executed by the processor.

BIOS, or the basic input/output system, is a program that resides in the permanent memory chip (ROM or flash BIOS) on the motherboard of your computer and is its key element. The version of BIOS that you use «knows» all the peculiarities of all the components of the motherboard: processor, memory, integrated devices. BIOS versions are provided by the manufacturers of motherboards.

Main BIOS functions are:

- POST checking of processor, memory and I/O devices
- initial configuring of all software-manageable parts of the motherboard
- initialization of operating system (OS) booting process

Among numerous components of the computer, initial configuration is necessary for the external memory subsystem that controls hard disc drives, floppy disc drives, CD-ROM drives, DVDs and other devices.

B.2.1 Setup utility

BIOS has a built-in setup utility for initial computer configuration. To enter it, you have to press a certain combination of keys (**Del**, **F1**, **Ctrl+Alt+Esc**, **Ctrl+Esc**, or some other, depending on your BIOS) during the POST sequence that starts right after you turn your computer on. Usually the message with the required combination of keys is displayed during the startup testing. Pressing this combination takes you to the menu of the setup utility that is included in your BIOS.

The menu can differ in appearance and sets of items and their names, depending on the BIOS manufacturer. The most widely known BIOS makers for PC motherboards are Award/Phoenix and AMI. Moreover, while items in the standard setup menu are mostly the same for various BIOSes, items of the extended setup heavily depend on computer and BIOS version.

Below we describe the general principles of initial hard disc configuration, and then configuration (sample) in AwardBIOS.



Large PC manufacturers like Dell and Hewlett-Packard produce motherboards themselves, and develop their own BIOS versions. You should always refer to the documentation that came with your computer for instructions on proper BIOS configuration.

B.2.2 Standard CMOS setup menu

Parameters in the standard CMOS setup menu usually define the geometry of the hard disc. The following parameters (and values) are available for each hard disc installed in your PC:

Parameter	Value	Purpose
Type	1-47, Not Installed, Auto	Type 0 or Not Installed is used when there is no hard disc installed (to uninstall it). Type 47 is reserved for user-defined parameters or for parameters detected by the IDE Auto detection utility. Auto value allows for automatic detection of IDE disc parameters during the boot sequence.
Cylinder (Cyl)	1-65535	The number of cylinders on a hard disc. For IDE discs, a logical number of cylinders is specified.
Heads (Hd)	1-16	The number of heads on a hard disc. For IDE discs, a logical number of heads is specified.
Sectors (Sec)	1-63	The number of sectors per track of a hard disc. For IDE discs, a logical number of sectors is specified.
Size (Capacity)	MBytes	The capacity of the disc in megabytes. It is calculated according to the following formula: $\text{Size} = (\text{Cyl} \times \text{Hds} \times \text{Sct} \times 512) / 1024 / 1024.$
Mode (Translation Method)	Normal/LBA/ Large/Auto	Method of translation of sector addresses.

For example, to demonstrate the main features of Maxtor MaxBlast, we used a QuantumTM FireballTM TM1700A hard disc as one of the discs in our examples. Its parameters have the following values:

Parameter	Value
Type	Auto
Cylinder (Cyl)	827
Heads (Hd)	64
Sectors (Sec)	63
Mode	Auto
CHS	1707 MB
Maximum LBA Capacity	1707 MB

In BIOS setup, you can set the Type parameter to User Type HDD (user-defined type). In this case, you also have to specify the value of the translation mode parameter, which can be Auto/Normal/LBA/Large.



Translation mode is how sector addresses are translated. This parameter appeared because in BIOS versions, there were limitations to the maximum address capacity of discs, which is 504 MB (1024 cylinders x 16 heads x 63 sectors x 512 bytes). There are two ways to bypass this limitation: (1) switch from physical to logical sector addresses (LBA), (2) use mathematics to reduce the number of addressed sectors (cylinders) and increase the number of heads; this method is called Large Disc (Large). The simplest decision is to set the value of this parameter to Auto.

If there are several hard discs connected to your motherboard, but you do not want to use some of them at the moment, you have to set the Type of these discs to Not Installed.

Parameters of hard discs can be set manually with the help of information provided by the hard disc manufacturer on its case, but it is easier to use the IDE autodetection utility that is usually included in modern BIOS versions.

The utility is sometimes a separate BIOS menu item and sometimes is included in the standard CMOS setup menu.



Please note that in «Appendix B. Hard discs and BIOS setup», we have described the general details of **physical** hard disc structure. Built-in IDE hard disc controls mask the physical disc structure. As a result, the BIOS of the motherboard «sees» **logical** cylinders, heads and sectors. We are not going to elaborate on this issue here, but knowing about this can sometimes be useful.

B.2.3 Arranging boot sequence, advanced CMOS setup menu

Aside from standard CMOS setup, BIOS menu usually has an **advanced CMOS setup** item. Here you can adjust the **boot sequence**: C:; A:; CD-ROM:.



Please note that **boot sequence** management differs for various BIOS versions, e.g. for AMI BIOS, AWARD BIOS and brand-name hardware manufacturers.

Several years ago, the operating system boot sequence was hard-coded into the BIOS. An operating system could be booted either from a diskette (drive A:), or from the hard disc C:. That was the sequence in which the BIOS queried external drives: if drive A: was ready, BIOS attempted to boot an operating system from a diskette. If the drive was not ready or there was no system area on diskette, BIOS tried to boot an operating system from hard disc C:.

At present, BIOS allows booting operating systems not only from diskettes or hard discs, but also from CD-ROMs, DVDs and other devices. If there are several hard discs installed in your computer labeled as C:, D:, E:, and F:, you can adjust the boot sequence so that an operating system is booted from, for example, disc E:. In this case, you have to set the boot sequence to look like E:, CD-ROM:, A:, C:, D:.



This does not mean that booting is done from the first disc in this list; it only means that the **first attempt** to boot an operating system is to boot it from this disc. There may be no operating system on disc E:, or it may be inactive. In this case, BIOS queries the next drive in the list. Errors can happen during booting, see B.2.5 «Hard disc initialization errors».

The BIOS numbers discs according to the order in which they are connected to IDE controllers (primary master, primary slave, secondary master, secondary slave); next go the SCSI hard discs.

This order is broken if you change the boot sequence in BIOS setup. If, for example, you specify that booting has to be done from hard disc E:, numbering

starts with the hard disc that would be the third in usual circumstances (it is usually the secondary master).

After you have installed the hard disc in your computer and have configured it in BIOS, one can say that the PC (or the motherboard) «knows» about its existence and its main parameters. However, it is still not enough for an operating system to work with the hard disc.

B.2.4 AwardBIOS

Below, we provide an example of configuring hard discs in AwardBIOS.

The **Main** AwardBIOS menu, which is responsible for configuring hard discs on motherboards for Celeron, Pentium II-III and AMD-K6/K7 processors usually looks like this:

AwardBIOS Setup Utility				
Main	Advanced	Power	Boot	Exit
System Time		[16:16:35]		Item Specific Help:
System Date		[01/10/2001]		
Legacy Diskette A		[1.44M, 3.5in]		<Enter> to go to sub-
Legacy Diskette B		[None]		menu.
Floppy 3 Mode Support		[Disabled]		
Primary Master		[Auto]		
Primary Slave		[Auto]		
Secondary Master		[Auto]		
Secondary Slave		[Auto]		
Language		[English]		
Supervisor Password		[Disabled]		
User Password		[Disabled]		
Halt On		[All but Disc/Keyboard]		
Installed Memory		[Disabled]		
F1 Help ↓ Select Item -/+ Change Values F5 Setup Defaults				
Esc Exit ←→ Select Menu Enter Select Sub-Menu F10 Save and Exit				

Place the marker on the Primary Master line and press the **Enter** key to get to the screen that looks like this:

AwardBIOS Setup Utility		
Main		
	Primary Master [Auto]	Item Specific Help:
Type	[Auto]	<Enter> to select the type of the IDE drive.
		[User Type HDD] allows you to set each entry on your own.
		Warning: Ultra DMA Mode 3/4/5 can be enabled only when BIOS detects

	Shielded 80-pin cable.
F1 Help ↓	Select Item -/+ Change Values F5 Setup Defaults
Esc Exit ←→	Select Menu Enter Select Sub-Menu F10 Save and Exit

Place the marker on the value of the Type parameter ([Auto] in this case) and press the **Enter** key to open the list of possible values of this parameter; for example:

None
Auto
User Type HDD
CD-ROM
LS-120
ZIP-100
MO
Other ATAPI Device

Use the **Up** and **Down** keys to select the User Type HDD value and press the **Enter** key to get to the following screen:

AwardBIOS Setup Utility		Item Specific Help:
Main		
Primary Master [User Type HDD]		
Type	[User Type HDD]	<Enter> to select the type of the IDE drive. [User Type HDD] allows you to set each entry on your own. Warning: Ultra DMA Mode 3/4/5 can be enabled only when BIOS detects Shielded 80-pin cable.
Translation Mode	[LBA]	
Cylinders	[.....0]	
Head	[.....0]	
Sector	[...0]	
CHS Capacity	OMB	
Maximum LBA Capacity	OMB	
Multi Sector Transfer	[Maximum]	
SMART Monitoring	[Disabled]	
PIO Mode	[4]	
Ultra DMA Mode	[5]	
F1 Help ↓		Select Item -/+ Change Values F5 Setup Defaults
Esc Exit ←→		Select Menu Enter Select Sub-Menu F10 Save and Exit

Enter the values of Translation Mode, Cylinders, Head and Sector parameters (you can find them on the case of the hard disc) to finish the initial configuration of the hard disc with BIOS.

Translation Mode parameter can have the following values:

LBA
Large
Normal
Match Partition Table
Manual

New versions of AwardBIOS menu have the **Boot** item. The screen of the **Boot** menu, which is responsible for adjusting the boot sequence, looks like this:

AwardBIOS Setup Utility		
Main	Advanced	Power
		Boot
		Exit
1. ATAPI CD-ROM	[None]	Boot Sequence:

2. Removable Device	[Legacy Floppy]	
3. IDE Hard Drive	[IBM-DTLA-307020]	<Enter> to select the device To select the boot sequence, use up or down arrow.
4. Other Boot Drive	[Disabled]	
Plug & Play O/S	[No]	Press <+> to move the device up the list, or <-> to move it down the list
Boot Virus Detection	[Enabled]	
Quick Power On Self Test	[Enabled]	
Boot up Floppy Seek	[Enabled]	
Full Screen Logo	[Enabled]	
F1 Help ↓ Select Item -/+ Change Values F5 Setup Defaults Esc Exit ←→ Select Menu Enter Select Sub-Menu F10 Save and Exit		

Place the marker on the field to the right of the 3. IDE Hard Drive item and press the **Enter** key to open the list of all hard discs connected to your computer and detected by BIOS, together with the Disabled line; for example:

Disabled
Quantum FireBALL_1700A
IBM DTLA-307020
Quantum FireBALL_1700A

This device sequence in the upper left corner of the screen means that when looking for a boot disc, the BIOS will first query the CD-ROM (1. ATAPI CD-ROM), but there is no CD-ROM in the current configuration. Next it queries the floppy disc drive (2. Removable Device). Only if none of these discs contains an operating system, does BIOS query the hard disc (3. IDE Hard Drive) that has been selected from the list.

Select an item of the list with the **Up** or **Down** keys and move the device up the list or down it with help of **+** or **-** keys. This will change the boot sequence. For example, you can select the boot sequence as the one shown below:

AwardBIOS Setup Utility				
Main	Advanced	Power	Boot	Exit
1. Removable Device		[Legacy Floppy]		Boot Sequence:
2. ATAPI CD-ROM		[None]		
3. IDE Hard Drive		[IBM-DTLA-307020]		<Enter> to select the device To select the boot sequence, use up or down arrow.
4. Other Boot Drive		[Disabled]		
Plug & Play O/S		[No]		Press <+> to move the Device up the list, or <-> to move it down the list
Boot Virus Detection		[Enabled]		
Quick Power On Self Test		[Enabled]		
Boot up Floppy Seek		[Enabled]		
Full Screen Logo		[Enabled]		

F1	Help	↓	Select Item	-/+	Change Values	F5	Setup Defaults
Esc	Exit	←→	Select Menu	Enter	Select Sub-Menu	F10	Save and Exit

After setting the specified parameters, use the **Left** or **Right** keys to select the **Exit** menu item. Reply positively to the prompt on saving the specified parameters.

For AwardBIOS for motherboards for Pentium, Pentium Pro processors (i.e the ones older than those described above) and AMD-K5/K6, the standard CMOS setup screen looks like this:

```

ROM PCI/ISA BIOS (2A69JA2A)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.

Date (mm:dd:yy) : Fri, May 15 1998
Time (hh:mm:ss) : 11: 33: 53

HARD DISCS : TYPE SIZE CYLS HEAD PRECOMP LANDZ SECTOR MODE
Primary Master : Auto 0 0 0 0 0 0 Auto
Primary Slave : Auto 0 0 0 0 0 0 Auto
Secondary Master : None 0 0 0 0 0 0 0
Secondary Slave : None 0 0 0 0 0 0 0

Drive A : 1.44 M
Drive B : None

Video : EGA/VG
Halt On: All Errors

Base Memory: 0K
Extended Memory: 0K
Other Memory: 512K
Total Memory: 512K

ESC : Quit
F1 : Help

↓→←-: Select Item
(Shift) F2 Change Color

PU/PD/+/- : Modify

```

The Type parameter can have Auto, Not Installed or User Defined values. In the latter case, you have to specify the values of other parameters manually (except MODE) according to the information on the case of the hard disc.



The purpose of the MODE and LANDZ parameters is described in the note above. The PRECOMP parameter is the so-called precompensation parameter and is important only for the older hard discs (MFM and RLL). IDE discs ignore this parameter.

In earlier BIOS versions, the boot sequence was set in the BIOS FEATURES setup section in the Boot Sequence line where you could select the most typical boot sequences, for example C:; A:;CD-ROM: or CD-ROM:; C:; A:, and other.

B.2.5 Hard disc initialization errors

Devices are usually initialized successfully, but sometimes errors can happen. Typical errors related to hard discs are reported by the following messages:

```
PRESS A KEY TO REBOOT
```

This error message is not directly related to errors during hard disc initialization. However, it appears, for example, when the boot program finds no operating system on the hard disc, or when the primary partition of the hard disc is not set as active.

```
DISC BOOT FAILURE,
INSERT SYSTEM DISC AND
PRESS ENTER
```

This message appears when the boot program finds no available boot device, be it a floppy or a hard disc, or a CD-ROM.

```
C: DRIVE ERROR  
C: DRIVE FAILURE  
ERROR ENCOUNTERED  
INITIALIZATION HARD DRIVE
```

This message appears when it is not possible to access the C: disc. If the disc is known to be functional, the reason for this error message is probably incorrect settings/connections of:

- hard disc parameters in BIOS setup
- jumpers on the controller (master/slave)
- interface cables

It is also possible that the device is out of order, or the hard disc is not formatted.