



SonicWALL Bare Metal Recovery and Local Archiving – Workstation

User Guide



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Table of Contents

Chapter 1. Introduction.....	6
1.1 What is SonicWALL Bare Metal Recovery and Local Archiving – Workstation?	6
1.2 New in SonicWALL Bare Metal Recovery and Local Archiving – Workstation.....	6
1.3 What is a disk image	7
1.4 System requirements and supported media	7
1.4.1 Minimum system requirements	7
1.4.2 Supported operating systems.....	7
1.4.3 Supported file systems.....	8
1.4.4 Supported storage media	8
1.5 Software usage terms and conditions.....	8
1.6 Technical support.....	8
Chapter 2. SonicWALL Bare Metal Recovery and Local Archiving – Workstation installation and startup	9
2.1 Installing SonicWALL Bare Metal Recovery and Local Archiving – Workstation	9
2.2 Extracting SonicWALL Bare Metal Recovery and Local Archiving – Workstation	10
2.3 Running SonicWALL Bare Metal Recovery and Local Archiving – Workstation.....	10
2.4 Upgrading SonicWALL Bare Metal Recovery and Local Archiving – Workstation.....	10
2.5 Removing SonicWALL Bare Metal Recovery and Local Archiving – Workstation	10
Chapter 3. General information.....	11
3.1 Disk/partition images.....	11
3.2 Viewing disk and partition information	11
3.3 Backing up to tape drive	12
Chapter 4. Using SonicWALL Bare Metal Recovery and Local Archiving – Workstation.....	13
4.1 Main program window	13
4.1.1 Program menu	13
4.1.2 Status bar	14
4.1.3 Taskbar notification area icon	14
4.2 Available operations	14
Chapter 5. Creating backup archives	16
5.1 The backup procedure.....	16
5.1.1 Selecting disks/partitions to back up.....	16
5.1.2 Selecting the backup destination.....	16
5.1.3 Selecting the backup options	17
5.1.4 Providing comments.....	18
5.1.5 The operation summary and the backup process	19
5.2 Setting Backup Options.....	20
5.2.1 Compression level.....	20
5.2.2 Backup Priority.....	21
5.2.3 Archive-splitting.....	21
5.2.4 Media Components	22
5.2.5 Additional Settings.....	23
Chapter 6. Restoring a disk (partition)	25
6.1 Restore under Windows or boot from CD?.....	25
6.2 Restoring disks/partitions or files from images	25
6.2.1 Starting the Restore Data Wizard	25
6.2.2 Archive selection.....	25
6.2.3 Selecting a disk/partition to restore	26
6.2.4 Selecting a target disk/partition.....	26
6.2.5 Changing the restored partition type	27

6.2.6	Changing the restored partition file system	28
6.2.7	Changing the restored partition size and location.....	28
6.2.8	Assigning a letter to the restored partition	29
6.2.9	Restoring several disks or partitions at once.....	30
6.2.10	Setting restore options	30
6.2.11	Restoration summary and executing restoration	31
6.3	Setting restore options	32
6.3.1	Restoration priority	32
6.3.2	Additional settings	33
Chapter 7.	Creating Bootable Media	34
7.1	Creating SonicWALL rescue media	34
7.2	Creating a Win PE ISO with SonicWALL Bare Metal Recovery and Local Archiving – Workstation	36
Chapter 8.	Other operations.....	37
8.1	Validating backup archives	37
Chapter 9.	Exploring archives and mounting images	38
9.1	Exploring an archive	38
9.2	Mounting an image	39
9.3	Unmounting an image	41
Chapter 10.	Troubleshooting.....	42
10.1	Recovering SonicWALL Bare Metal Recovery and Local Archiving – Workstation	42
10.2	Frequently asked questions	42
Appendix A.	Partitions and file systems.....	44
A.1	Hard disk partitions.....	44
A.2	File systems	44
A.2.1	FAT16.....	44
A.2.2	FAT32.....	45
A.2.3	NTFS	45
A.2.4	Linux Ext2.....	45
A.2.5	Linux Ext3.....	45
A.2.6	Linux ReiserFS.....	46
Appendix B.	Hard disks and BIOS setup	47
B.1	Installing hard disks in computers	47
B.1.1	Installing a hard disk, general scheme.....	47
B.1.2	Motherboard sockets, IDE cable, power cable.....	47
B.1.3	Installation modes, jumpers.....	48
B.2	BIOS	49
B.2.1	Setup utility.....	49
B.2.2	Standard CMOS setup menu	50
B.2.3	Arranging boot sequence, advanced CMOS setup menu	51
B.2.4	AwardBIOS	52
B.2.5	Hard disk initialization errors.....	55

Chapter 1. Introduction

1.1 What is SonicWALL Bare Metal Recovery and Local Archiving – Workstation?

SonicWALL Bare Metal Recovery and Local Archiving – Workstation solves all backup problems, ensuring the safety of all information on your PC. Using it, you can back up selected files and folders, Windows applications settings, settings and messages of Microsoft e-mail clients or entire disks and partitions.

If failures occur that block access to information or affect system operation, or if you accidentally delete necessary files, you'll be able to easily restore the system and lost data.

The unique technology implemented in SonicWALL Bare Metal Recovery and Local Archiving – Workstation allows you to create exact, sector-by-sector disk backups, including all operating systems, applications and configuration files, software updates, personal settings and 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-R/RW, DVD+R/RW, magneto-optical, Iomega Zip and Jaz drives.

If you are going to install a new hard disk drive, SonicWALL Bare Metal Recovery and Local Archiving – Workstation will help you transfer information from the old one in minutes, including operating systems, applications, documents and personal settings.

Wizards and a Windows XP-style interface will make your work easier. Just answer a few simple questions and let SonicWALL Bare Metal Recovery and Local Archiving – Workstation take care of everything else! When a system problem occurs, the software will get you up and running in no time.

Minimizes downtime

SonicWALL Bare Metal Recovery and Local Archiving – Workstation enables you to restore systems in minutes, not hours or days. An entire system can be restored from an image that includes everything the system needs to run: the operating system, applications, databases, and configurations. No reinstallation or reconfiguration is required.

Eases Administration

Wizards guide users through backup and recovery tasks, ensuring the product can be implemented with minimal user training.

Supports Cutting Edge Technology

Businesses today are moving to leverage the latest technologies, dual-core 64 bit processors and 64 bit operating systems. With SonicWALL Bare Metal Recovery and Local Archiving – Workstation, you can protect these new machines, as well as legacy ones, running one solution.

1.2 New in SonicWALL Bare Metal Recovery and Local Archiving – Workstation

SonicWALL Bare Metal Recovery and Local Archiving – Workstation has the following new features:

Explore archives – easily search and recover particular files in archives just as in Windows Explorer

Backup to DVD media

One-click backup – launch the backup wizard by right-clicking on a disk and selecting **Backup** in the context menu.

1.3 What is a disk image

A disk (partition) image is a file that contains a copy of all information stored on a disk. Image stores all the server data including operating system, databases, all programs, data, and settings.

By backing up your information regularly you will completely protect yourself from data losses in case of system failures and even server malfunctions.

To restore your system after a failure it would be enough to restore information from a previously created image.

By default SonicWALL Bare Metal Recovery and Local Archiving – Workstation image files have “.tib” extension and can contain images of several partitions or disks.

An image file, containing a large partition image or several disks images, might have considerable size. In this case it can be split into several files that together make an original image. A single image can also be split for burning to removable media.



SonicWALL Bare Metal Recovery and Local Archiving – Workstation stores only those hard disk parts that contain data (for supported partition types). This reduces image size and speeds up image creation and restoration.



A partition image includes all files and folders independently of their attributes (including hidden and system files), boot record, FAT, and Root.



A disk image includes images of all disk partitions as well as the zero track with Master Boot Record (MBR).

1.4 System requirements and supported media

1.4.1 Minimum system requirements

SonicWALL Bare Metal Recovery and Local Archiving – Workstation requires the following hardware:

- Pentium processor or higher
- 128 MB RAM
- FDD or CD-RW drive for bootable media creation
- Mouse (recommended).

1.4.2 Supported operating systems

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

-
- Windows® Vista

SonicWALL Bare Metal Recovery and Local Archiving – Workstation also enables creating a bootable diskette or CD-R/W that can back-up and restore a disk/partition on a computer running any PC-based operating system including Linux®.

1.4.3 Supported file systems

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

If a file system is not supported nor is corrupted, SonicWALL Bare Metal Recovery and Local Archiving – Workstation can copy data using a sector-by-sector approach.

1.4.4 Supported storage media

- Hard disk drives
- Networked storage devices
- 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 disks, ZIP®, Jaz® and other removable media

* - 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.

1.5 Software usage terms and conditions

The conditions for SonicWALL Bare Metal Recovery and Local Archiving – Workstation software usage are described in the «License Agreement» (page 3 of this manual). The unique registration number is a confirmation of your legal purchase and usage of SonicWALL Bare Metal Recovery and Local Archiving – Workstation on your system.

Under current legislation, the «License Agreement» is considered a contract between you and SonicWALL Inc. The contract is a legal document and its violation may result in legal action.

Illegal use and/or distribution of this software will be prosecuted.

1.6 Technical support

Users of legally purchased copies of SonicWALL Bare Metal Recovery and Local Archiving – Workstation are entitled to free e-mail technical support from SonicWALL. If you have installation or working problems that you can't solve by yourself using this manual and the readme.txt file, e-mail the technical support team.

When e-mailing technical support, you must provide the number of your SonicWALL Bare Metal Recovery and Local Archiving – Workstation copy bundled with the program. This number is made up of five sets of five characters separated by hyphens; there is a total of 25 letters and numbers.

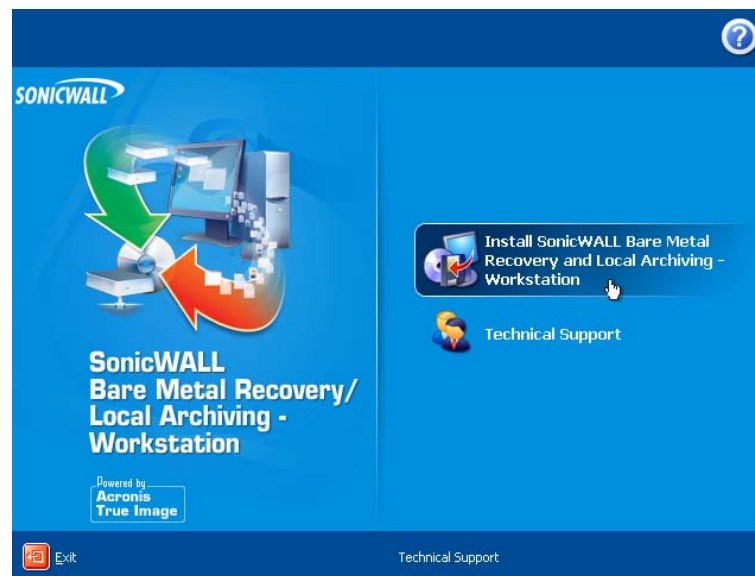
For more information visit <http://www.sonicwall.com/support/contact.html>

Chapter 2. SonicWALL Bare Metal Recovery and Local Archiving – Workstation installation and startup

2.1 Installing SonicWALL Bare Metal Recovery and Local Archiving – Workstation

To install SonicWALL Bare Metal Recovery and Local Archiving – Workstation:

- Run the SonicWALL Bare Metal Recovery and Local Archiving – Workstation setup file
- In the Install Menu, select the program to install: SonicWALL Bare Metal Recovery and Local Archiving – Workstation
- Follow the install wizard instructions on the screen.



Typical, Custom and **Complete** installation is available. Having pressed **Custom**, you can choose to install **Bart PE plug-in**, besides **SonicWALL Bare Metal Recovery and Local Archiving – Workstation** and **SonicWALL Media Builder**.

The widely used **Bart PE** utility provides a Windows-like operating environment invoked via removable bootable media. 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 SonicWALL Bare Metal Recovery and Local Archiving – Workstation into a Bart PE plug-in tab. The plug-in files will be placed into the component installation folder along with other program files.

With **SonicWALL Media Builder** you can create bootable rescue disks (see details in [Chapter 7. Creating Bootable Media](#)). Installing the **SonicWALL Media Builder** will allow you to create bootable media or its ISO image at any time from the main program window or running **SonicWALL Media Builder** on its own.



When installed, SonicWALL Bare Metal Recovery and Local Archiving – Workstation creates a new device in the Device Manager list (**Control Panel -> System -> Hardware -> Device Manager -> SonicWALL Devices -> SonicWALL TrueImage Backup Archive**)

Explorer). Do not disable or uninstall this device, as it is necessary for connecting image archives as virtual disks (see [Chapter 9. Exploring archives and mounting images](#)).

2.2 Extracting SonicWALL Bare Metal Recovery and Local Archiving – Workstation

When installing SonicWALL Bare Metal Recovery and Local Archiving – Workstation, 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 SonicWALL Bare Metal Recovery and Local Archiving – Workstation 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 SonicWALL Bare Metal Recovery and Local Archiving – Workstation

You can run SonicWALL Bare Metal Recovery and Local Archiving – Workstation in Windows by selecting **Start -> Programs -> SonicWALL -> SonicWALL Bare Metal Recovery and Local Archiving – Workstation -> SonicWALL Bare Metal Recovery and Local Archiving – Workstation** or clicking on the appropriate shortcut on the desktop.

If your disk data is totally corrupted and you cannot boot, load the standalone SonicWALL Bare Metal Recovery and Local Archiving – Workstation version from the bootable media you created using SonicWALL Media Builder. Then you will be able to restore the disk from its previously created image.

2.4 Upgrading SonicWALL Bare Metal Recovery and Local Archiving – Workstation

If you already have SonicWALL Bare Metal Recovery and Local Archiving – Workstation installed, the new version will simply update it; there is no need to remove the old version and reinstall the software.

Please keep in mind that the backups created by the later program version may be incompatible with the previous program versions. So, if you roll back SonicWALL Bare Metal Recovery and Local Archiving – Workstation to the older version, most probably you will have to re-create the archives using the older version. For the same reason, we highly recommend that you create a new bootable media after each SonicWALL Bare Metal Recovery and Local Archiving – Workstation upgrade.

2.5 Removing SonicWALL Bare Metal Recovery and Local Archiving – Workstation

Select **Start -> Settings -> Control panel -> Add or remove programs -> < SonicWALL Bare Metal Recovery and Local Archiving – Workstation > -> 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 Disk/partition images

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

Backing up disks and partitions is performed in a different way: SonicWALL Bare Metal Recovery and Local Archiving – Workstation stores a sector-by-sector snapshot of the disk, 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 disk image,” and the resulting backup archive is often called a disk/partition image.



SonicWALL Bare Metal Recovery and Local Archiving – Workstation stores only those hard disk parts 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.



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 disk with master boot record (MBR).



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

By default, files in all SonicWALL Bare Metal Recovery and Local Archiving – Workstation archives have a “.tib” extension.

It is important to note that you can restore files and folders from disk/partition images. To do so, mount the image as a virtual disk (see [Chapter 9. Exploring archives and mounting images](#)).



Be careful! Disk letters in standalone SonicWALL Bare Metal Recovery and Local Archiving – Workstation might sometimes differ from the way Windows identifies drives. For example, the D: drive identified in the standalone SonicWALL Bare Metal Recovery and Local Archiving – Workstation might correspond to the E: drive in Windows.

3.2 Viewing disk and partition information

You can change the way of data representation 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 disk properties window.

This window contains two panels. The left panel contains the properties tree and the right describes the selected property in detail. The disk 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.

3.3 Backing up to tape drive

The current version of SonicWALL Bare Metal Recovery and Local Archiving – Workstation supports SCSI tape drives. It can store images on and restore them from tape, store large images to multiple tapes.

If you have a SCSI tape drive connected to your server, the list of devices available for image storage and restoration will be extended with a name corresponding to the drive type.

Images are created on and restored from tapes in the same way as from other devices, with the following exceptions.

If you are to use data tapes previously used by other programs, their contents will be cleared.

A new full image can be stored on an empty tape only. If you use tapes that already contain data, their contents will be cleared and overwritten.

You don't have to provide a filename to store an image on or restore it from a tape.

You might experience short pauses that are required to rewind the tape.

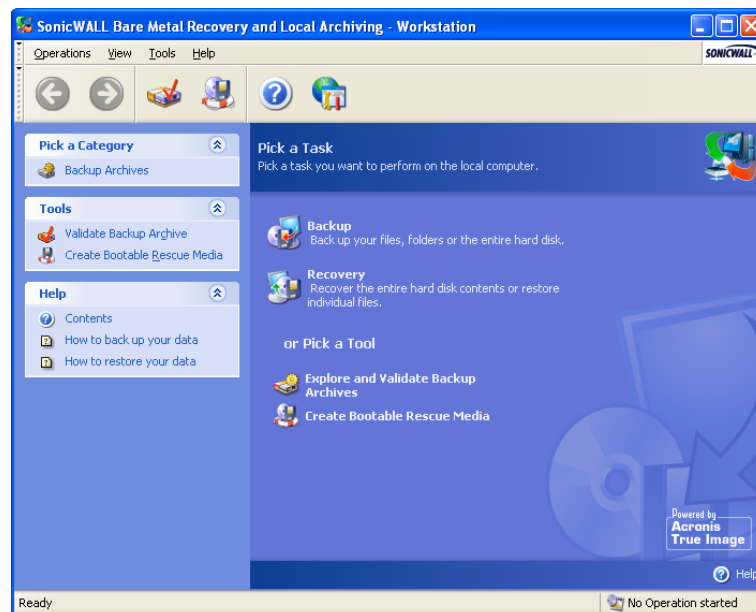


Low-quality or old tape, as well as dirt on the magnetic head, might lead to pauses that can last up to several minutes long.

Chapter 4. Using SonicWALL Bare Metal Recovery and Local Archiving – Workstation

4.1 Main program window

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



Main program window

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 the necessary operation or tool by clicking its icon in the main area or by selecting the same item from the **Operations** or **Tools** menu.

The main window contains operation icons divided into two groups.

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

- **Backup** – create a backup archive
- **Recovery** – restore data from a previously created archive

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

- **Explore and Validate Backup Archives** – explore file-level archives, mount disk/partition images as virtual drives, run the archive integrity checking procedure
- **Create Bootable Rescue Media** – run the bootable media creation procedure

4.1.1 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 Archives** – runs the archive integrity checking procedure
- **Validate Backup Archive** – run the archive integrity checking procedure
- **Create Bootable Rescue Media** – run the bootable media creation procedure
- **Options** – open a window for editing default backup/restore options, setting text appearance (fonts).

The **Help** menu is used to invoke help and obtain information about SonicWALL Bare Metal Recovery and Local Archiving – Workstation.

4.1.2 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.

4.1.3 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. It is present for background execution of scheduled tasks as well.

4.2 Available operations

You can perform the following operations on the computer.

- Backup and restore data, including system disks/partitions

Click **Backup** or **Recovery**, and then follow the Wizard's instructions. See details in [Chapter 5. Creating backup archives](#) and [Chapter 6. Restoring a disk \(partition\)](#).

- **Set up backup/restore options**, such as backup process priority or compression level.

Select **Tools** -> **Options** -> **Default backup options** or **Default restoration options** and make settings. See details in [5.2 Setting Backup Options](#) and [6.3 Setting Restore Options](#).

- Explore and validate backup archives wherever they reside, be it local, network or removable media

Click **Explore and Validate Backup Archive**, and then follow the Wizard's instructions. See details in [8.1 Validating backup archives](#) and [9.1 Exploring an archive](#).

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

Click **Mount image**, then follow the Wizard's instructions. See details in [9.2 Mounting an Image](#).

- Unmount previously mounted partition images

Click **Unmount image**, then follow the Wizard's instructions. See details in [9.3 Unmounting an Image](#).

-
- Create bootable rescue media or its ISO image

See [Chapter 7. Creating Bootable Media.](#)

Chapter 5. Creating backup archives

To be able to restore the lost data or roll back your system to a predetermined state, you should first create a data or entire-system backup file.

Backing up the entire system disk (creating a disk image) takes more disk space but 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.

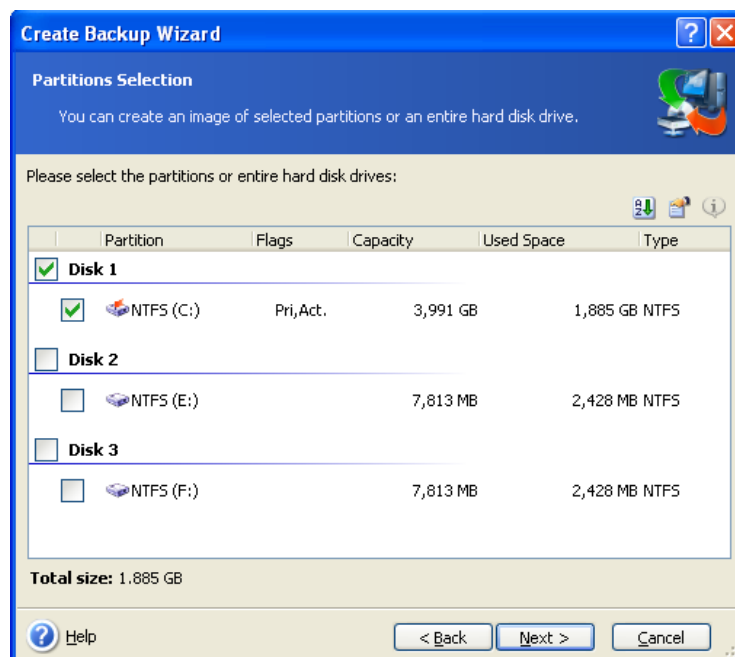
5.1 The backup procedure

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

Invoke the **Create Backup Wizard** by clicking on the backup operation icon in the main program window.

5.1.1 Selecting disks/partitions to back up

In the **Partitions Selection** window you will see the hard disk layout of your server. Flag a partition to select it. Flag a whole disk to select all its partitions. You can select one or more hard disks or any combination of partitions and hard disks.

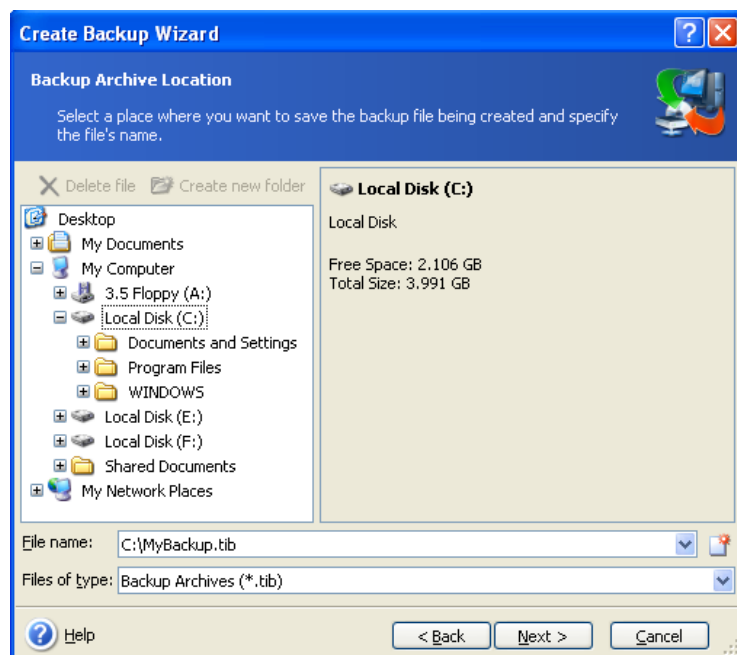


Disk and partition layout

Having selected partitions and/or disks, click **Next**. Note that this button is disabled as far as no partitions or disks are selected.

5.1.2 Selecting the backup destination

Select the destination place for the backup on the hard disk, the network, CD-R/RW, DVD-recordable, or removable media, such as FireWire (IEEE-1394) or USB (1.0, 1.1 and 2.0) device.



Backup archive location selection

Select the image location in the disk tree. In the **File name** field, enter image file name.

If there's already an image file with that name, SonicWALL Bare Metal Recovery and Local Archiving – Workstation will ask if you want to overwrite it. Overwriting the backup means that you discard the entire old archive and start creating a new one.



You can store several partitions and/or disks images in a single file.

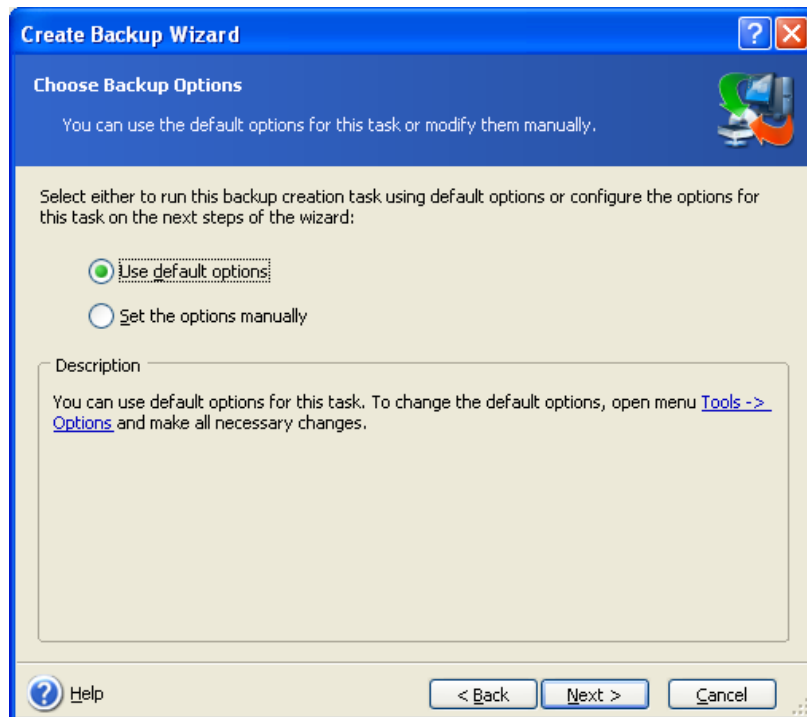


The program can generate a unique filename. Just click **Generate file name for a new file** button at the right.

Remember, 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 disk will protect your data if the primary disk is damaged. Data saved to a network disk or removable media will survive even if all your local hard disks are down.

5.1.3 Selecting the backup options

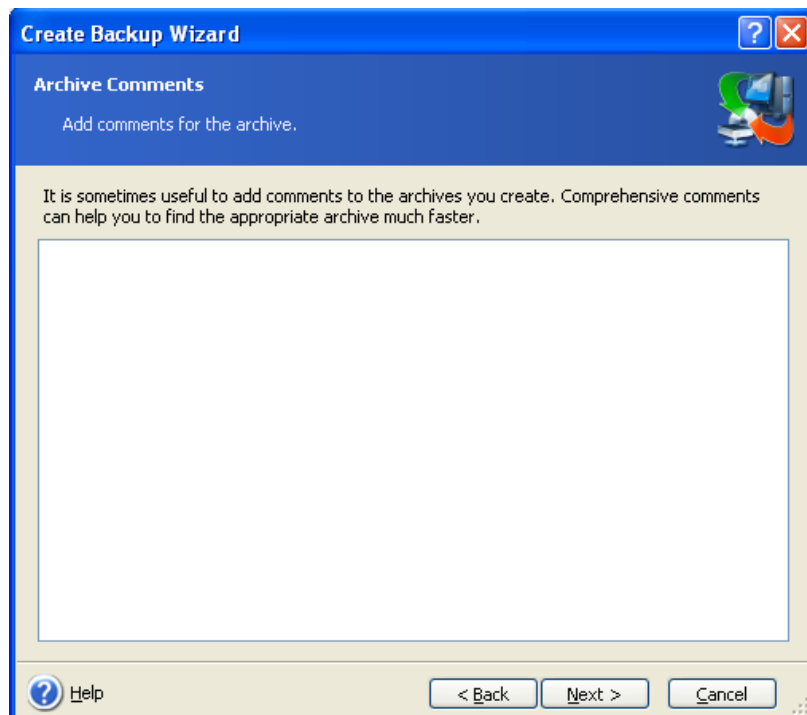
Select the backup options (that is, backup file splitting, compression level etc.). You may **Use default options** or **Set the options manually**. If the latter is the case, the settings will be applied only to the current backup task. Alternatively, you can edit the default options from the current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



Choosing Backup Options

5.1.4 Providing comments

On the **Archive Comments** wizard page, you'll be able to provide an archive file with comments about the server and its user, the hard disk, partition data, image creation time, and any peculiarities and conditions.



Archive comments

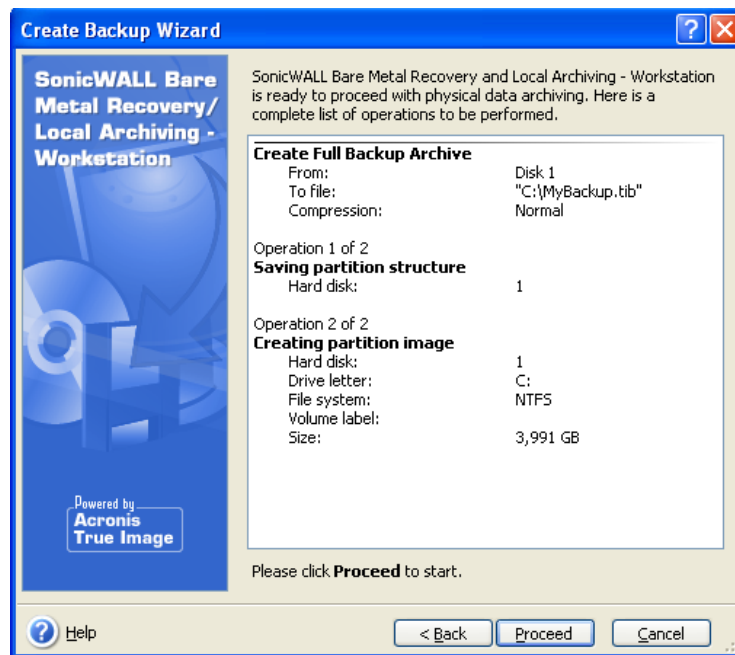
The more details you provide in the comments, the better. If you don't provide comments, you might mistake images and restore the wrong system partition, for example.

However, you can choose not to make any notes. 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 The operation summary and the 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**.



Backup creation script

All operations of a partition (disk) image creation in an archive file are delayed in SonicWALL Bare Metal Recovery and Local Archiving – Workstation. A partition (disk) image creation script is created first; then it is executed.

After you click **Proceed**, SonicWALL Bare Metal Recovery and Local Archiving – Workstation will start creating an image, indicating the progress in the special window. You can stop this procedure by clicking **Cancel**.

You can also close the progress window by clicking **Hide**. The 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 image is ready. If you prepare some more image creation operations, they'll be queued after the current one.

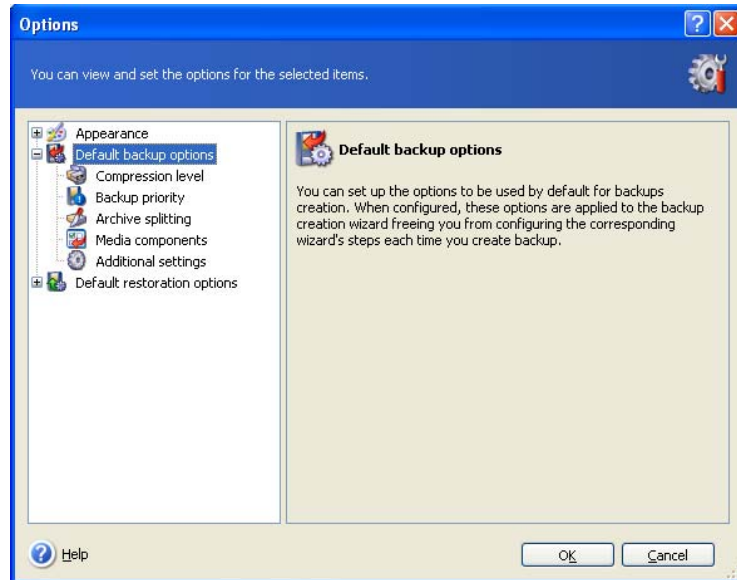


If you burn the image to several removable media, be sure to number them, since you will have to insert them in order during the restoration.

5.2 Setting Backup Options

To view or edit the default backup options, select **Tools -> Options -> Default 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.



Setting Backup Options

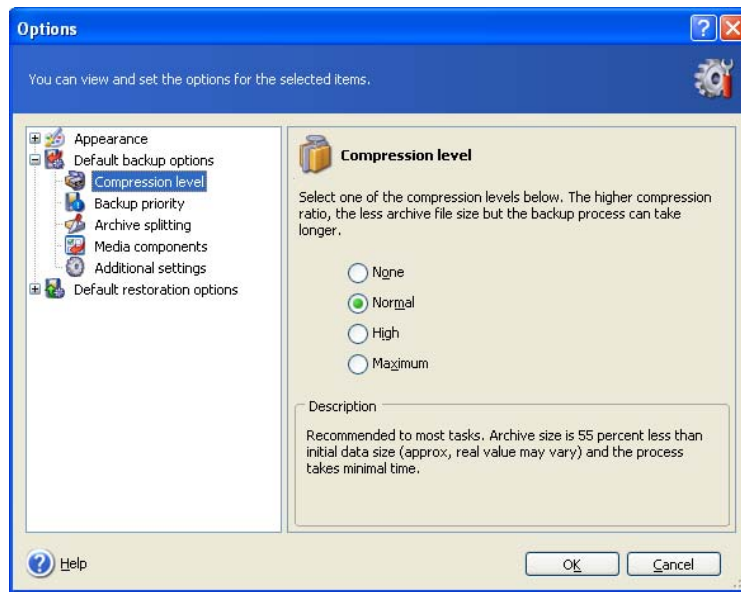
5.2.1 Compression level

The default setting – **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 disks required.

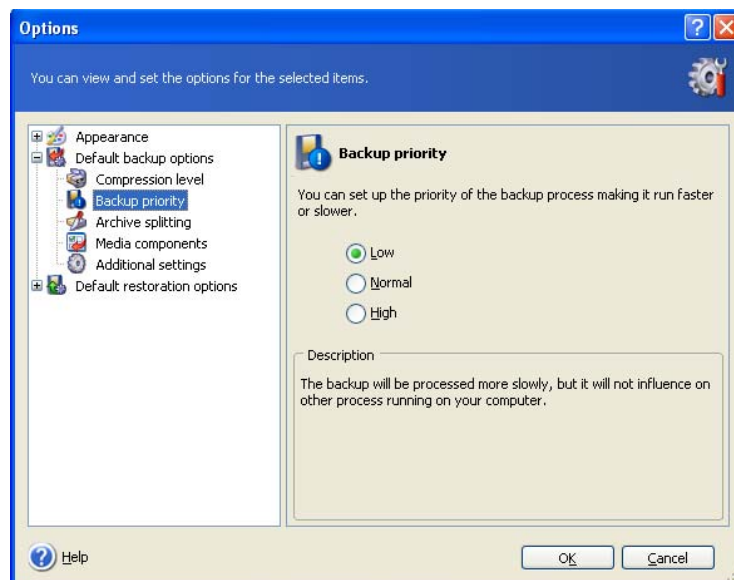


Setting Compression level

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 due to taking resources from the other currently running processes. The effect will depend on total CPU usage and other factors.



Setting Backup Priority

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.

The preset is **Automatic**. With this setting, SonicWALL Bare Metal Recovery and Local Archiving – Workstation will act as follows.

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

If the storage disk has enough space, but its file system does not allow the estimated file size, SonicWALL Bare Metal Recovery and Local Archiving – Workstation will automatically split the backup into several files.



FAT16 and FAT32 file systems have a 4 GB file size limit. At the same time, the existing hard drive's capacity may reach as much as 2 TB. Therefore, an archive file might easily exceed this limit, if you are going to back up the entire disk.

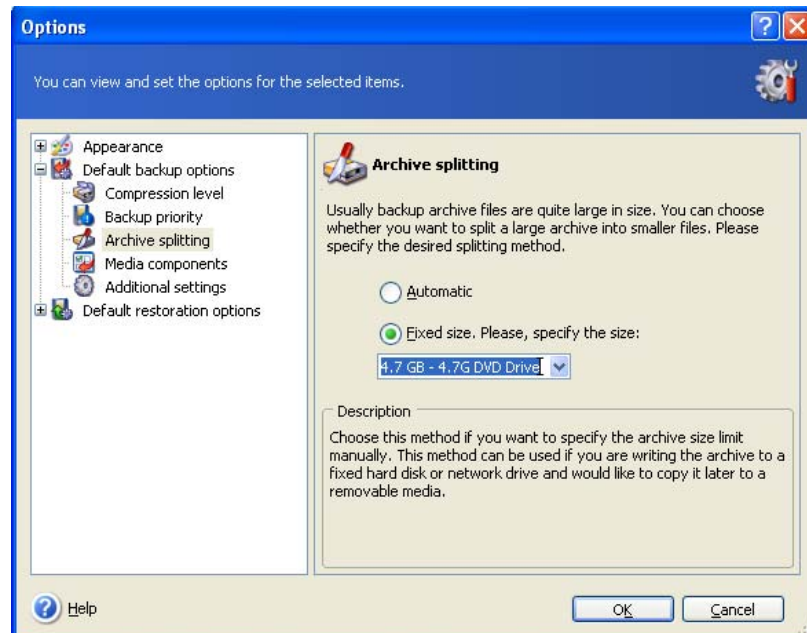
If you do not have enough space to store the image on your hard disk, the program will warn you and wait for your decision as to how you plan to fix the problem. You can try to free some additional space and continue or click **Back** and select another disk.

When backing up to a diskette, CD-R/RW or DVD±R/RW: SonicWALL Bare Metal Recovery and Local Archiving – Workstation will ask you to insert a new disk when the previous one is full.

Alternatively, 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 disk 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 disk.



Setting Archive Splitting

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 disk.

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

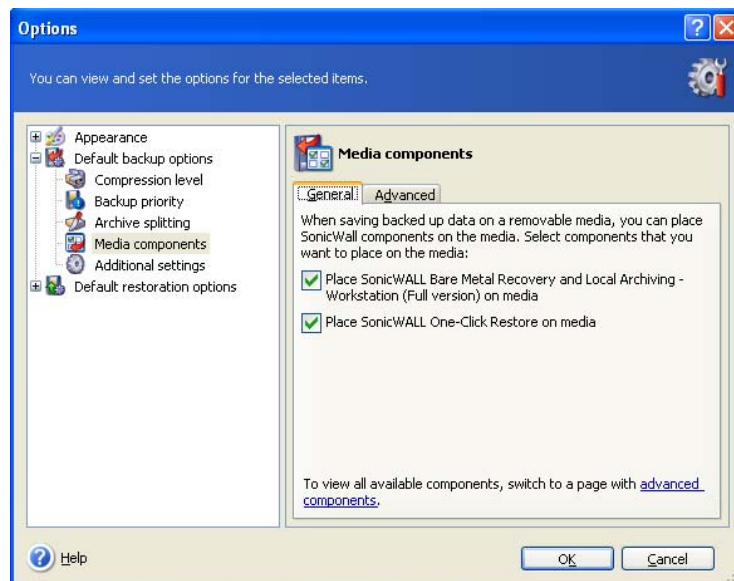
The **SonicWALL One-Click Restore** is a minimal addition to your rescue media, allowing one-click disk recovery from an image archive, stored on this media. This means that at boot from the media and clicking “restore” all the data contained in the image will be silently restored.



Because one-click approach does not imply user selections, like selecting partitions to restore, SonicWALL One-Click Restore always restores the entire disk. Therefore, if your disk consists of several partitions and you are planning to use SonicWALL One-Click Restore, all the partitions must be included into the image. Any partitions which are missing from the image will be lost.

If you want more functionality during restoration, write a standalone version of **SonicWALL Bare Metal Recovery and Local Archiving – Workstation** to the rescue disk.

Under **Advanced** tab you can select full, safe or both SonicWALL Bare Metal Recovery and Local Archiving – Workstation 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 SonicWALL products, such as SonicWALL Disk Director Suite, installed on your computer, the bootable versions of these programs’ components will be offered as **Advanced** as well.



Setting Media Components

5.2.5 Additional Settings

Validate backup archive upon operation completion

The preset is **disabled**.

You can choose to check the backup data integrity. Verification will be performed immediately after the archive is created.

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. Therefore, you should disable the prompt when scheduling a backup to removable media. Then, if the removable media is available (for example, CD-R/RW inserted) the task can run unattended.

Chapter 6. Restoring a disk (partition)

6.1 Restore under Windows or boot from CD?

As mentioned above (see [2.3 Running SonicWALL Bare Metal Recovery and Local Archiving – Workstation](#)), SonicWALL Bare Metal Recovery and Local Archiving – Workstation can be run in several ways. However, disk restoration is always performed just one way.

We recommend that you first try to restore data running SonicWALL Bare Metal Recovery and Local Archiving – Workstation under Windows, because this method provides more functionality. Boot from the bootable media only if Windows does not load.

The boot disk (e.g. a CD) from which you loaded the program does not keep you from using other CDs with images. SonicWALL Bare Metal Recovery and Local Archiving – Workstation is loaded entirely into RAM, so you can remove the bootable CD to insert an image disk.

To restore a partition (disk) from an image, SonicWALL Bare Metal Recovery and Local Archiving – Workstation must obtain **exclusive access** to this partition (disk). This means no other applications can access it at that time. If you receive a message stating that the partition (disk) can not be blocked, close applications that use this partition (disk) and start over. If you can not determine which applications use the partition (disk), close them all.



Be careful! Disk letters in standalone SonicWALL Bare Metal Recovery and Local Archiving – Workstation might sometimes differ from the way Windows identifies drives. For example, the D: drive identified in the standalone SonicWALL Bare Metal Recovery and Local Archiving – Workstation might correspond to the E: drive in Windows.

6.2 Restoring disks/partitions or files from images

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

6.2.1 Starting the Restore Data Wizard

Invoke the **Restore Data Wizard** by clicking on the Recovery operation icon in the main program window. Click **Next**.

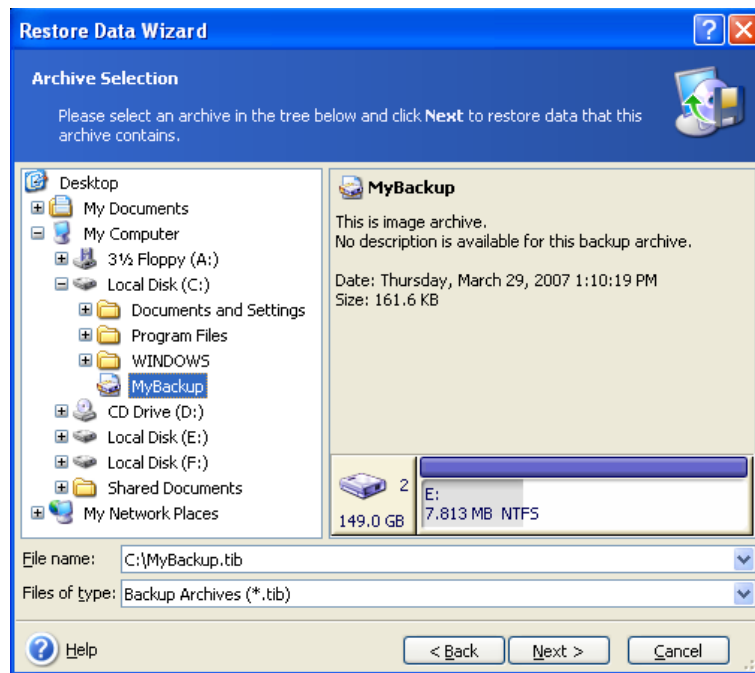
6.2.2 Archive selection

Find and select the file, containing an image of the required partition. If the image is stored on removable media, connect this media, or insert the image CD/DVD (if the image was splitted to several CDs/DVDs, insert the last one). The **File Name** field will reflect its name and the **Next** will become available.

If you added a comment to the archive, it will be displayed to the right of the drives tree. The comment is displayed in the right part of the window.



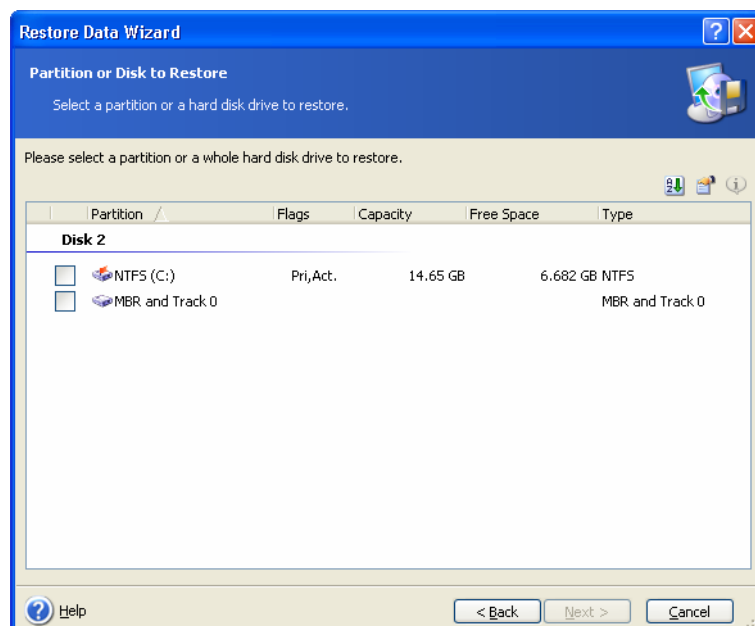
If the archive is located on removable media, e.g. CD, first insert the last CD and then insert disks in reverse order when Restore Data Wizard prompts.



Archive selection for restoration

6.2.3 Selecting a disk/partition to restore

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



Disks and partitions 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. Restore MBR if it is critical to your system boot.

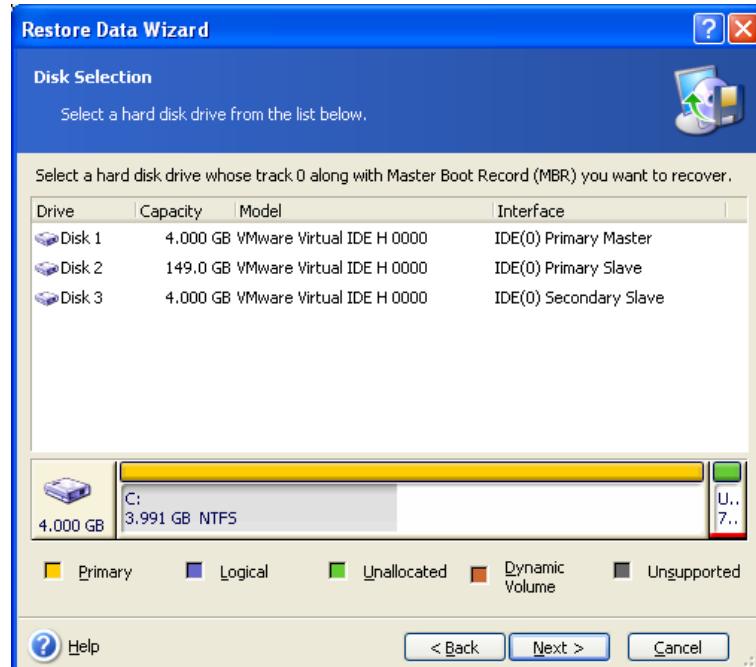
6.2.4 Selecting a target disk/partition

Select a target disk or partition where you want to restore the selected image. You can restore data to their initial location, to another disk/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.

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



Selecting a target disk/partition

6.2.5 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 disk.

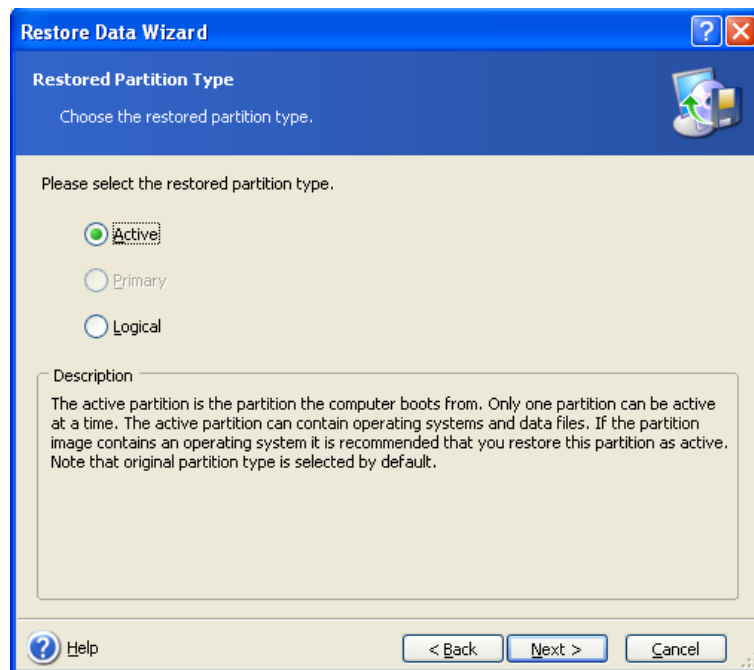
If you are restoring a system partition to the new (or the same) disk and want to load an operating system from it, you will select **Active**.

If you restore a system partition to another hard disk with its own partitions and OS, most probably 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 server from booting.



Selecting a restored partition type

6.2.6 Changing the restored partition file system

Though seldom required, you can change the partition file system during its restoration. SonicWALL Bare Metal Recovery and Local Archiving – Workstation 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.



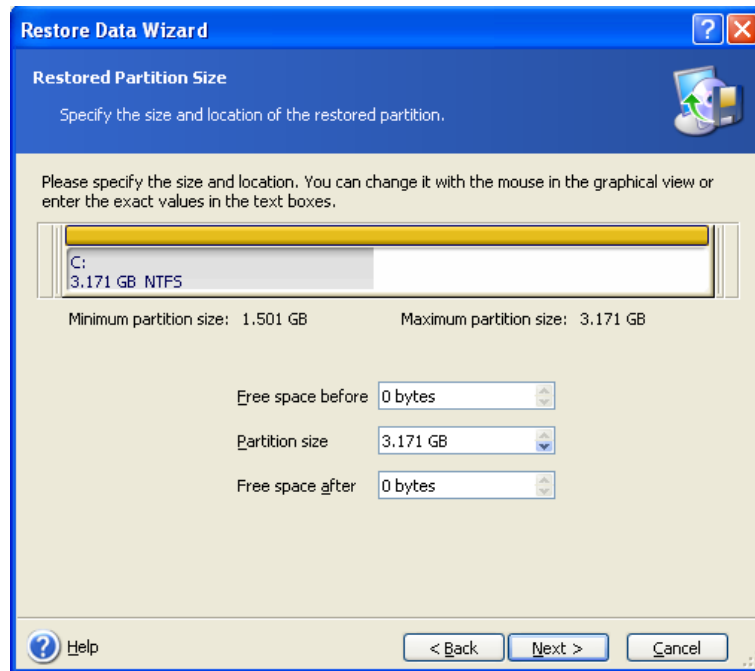
Let us imagine you are to restore a partition from an old, low-capacity FAT16 disk to a newer disk. FAT16 would not be effective and might even be impossible to set on the high-capacity hard disk. That's because FAT16 supports partitions up to 4 GB, so you will not be able to restore a 4 GB FAT16 partition 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 FAT32 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.

6.2.7 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 disk space between partitions being restored. In this case, you will have to restore the partition to be reduced first.

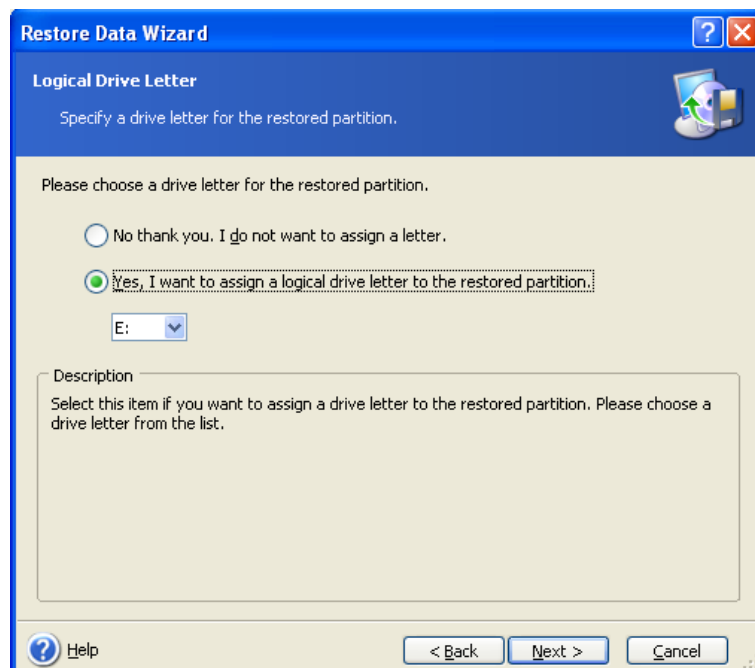


Changing the restored partition size

6.2.8 Assigning a letter to the restored partition

SonicWALL Bare Metal Recovery and Local Archiving – Workstation 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.

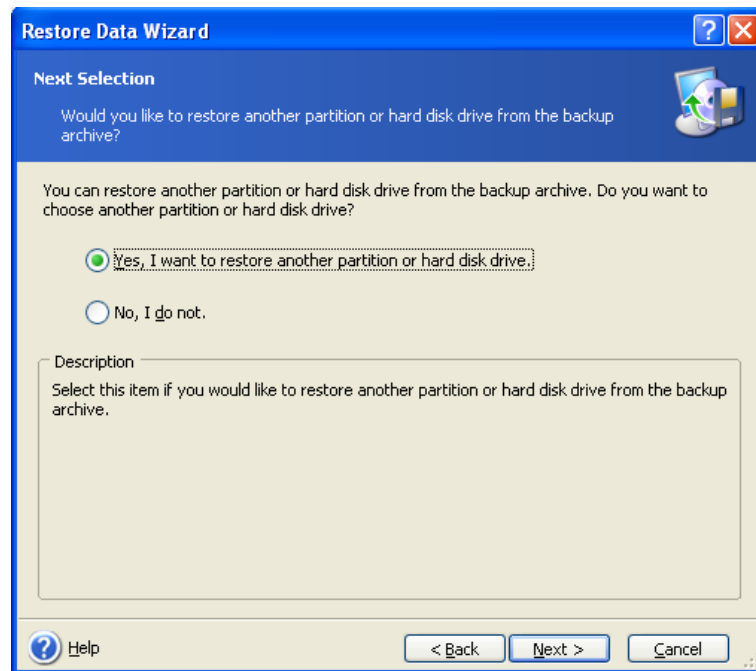


Assigning a letter to the restored partition

6.2.9 Restoring several disks or partitions at once

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

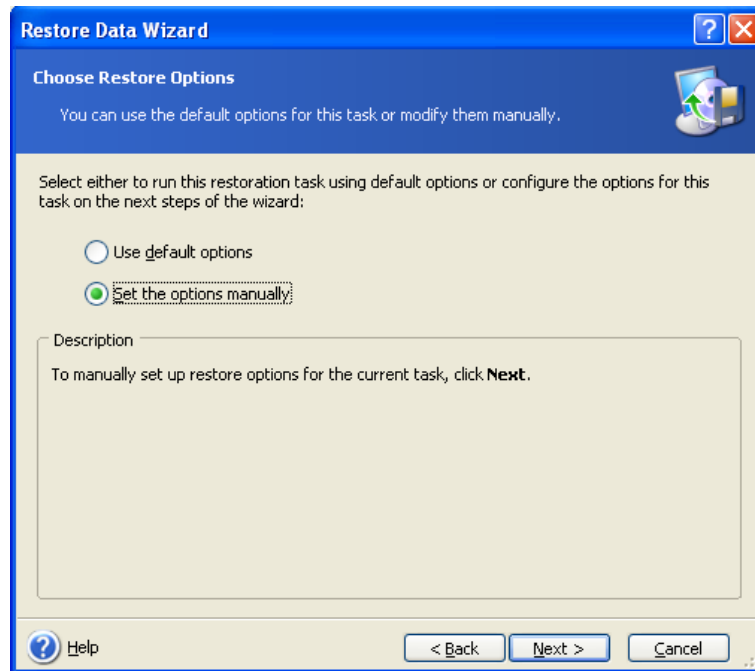
If you want to restore another disk (partition), select **Yes, I want to restore another partition or hard disk drive**. Then you will return to the partition selection window ([6.2.3](#)) again and will have to repeat the above steps. Otherwise, don't set this switch.



Restoring several disks or partitions at once

6.2.10 Setting restore options

Select the options for the restoration process (that is, pre/post restoration commands, restoration process priority etc.). You may **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. Alternatively, 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.



Choosing restore options

6.2.11 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 disk(s). Clicking **Proceed** will launch the task execution.

The task will appear on the **Active tasks** pane of the main window. The task progress will be shown in a special window.

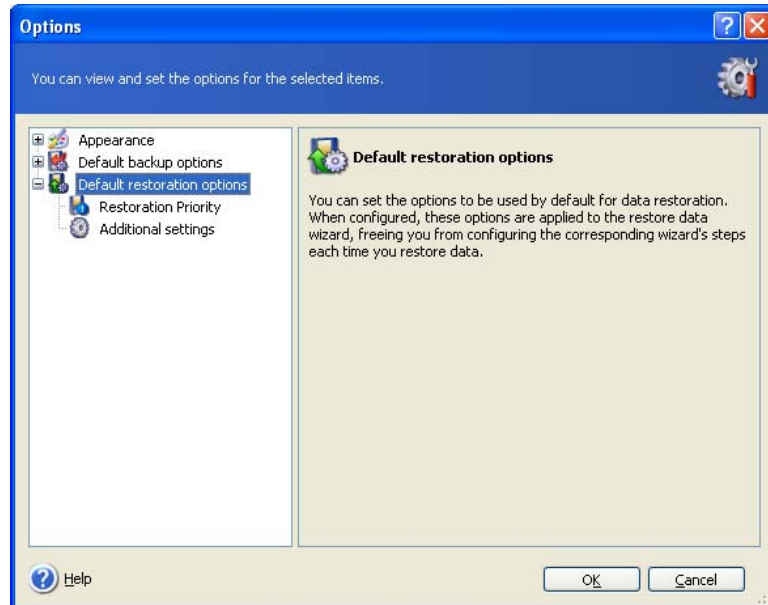
You can stop the procedure by clicking **Cancel**. However, it is critical to note that the target partition will be deleted and its space unallocated – the same result you will get if the restoration is unsuccessful. To recover the “lost” partition, you will have to restore it from the image again.



6.3 Setting restore options

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

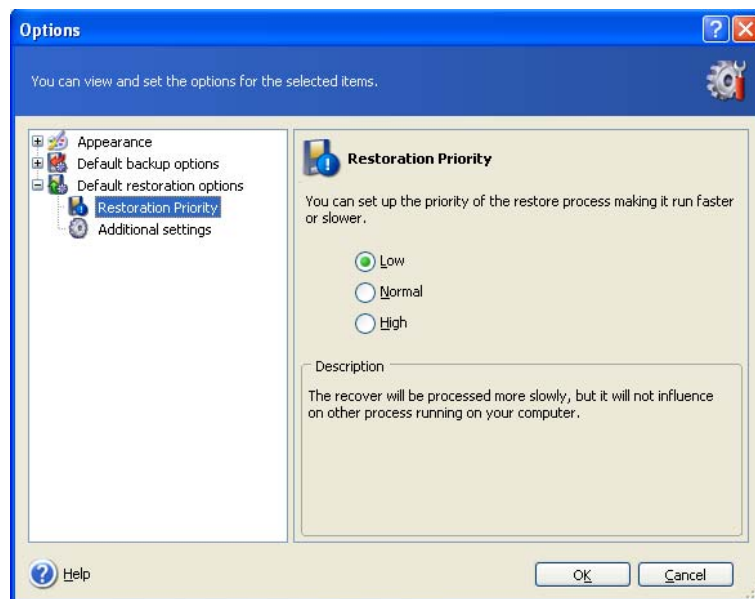
You can edit the default (or set the temporary) restore options while creating a restore task as well.



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. Increasing of restoration priority may speed up the restore process due to taking resources from the other currently running processes. The effect will depend on total CPU usage and other factors.



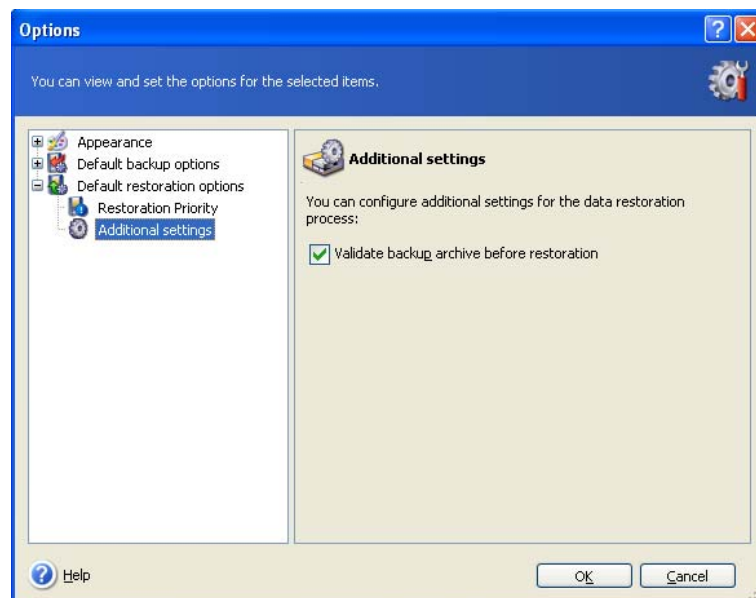
Setting restoration priority

6.3.2 Additional settings

1. Before data is restored from the archive, SonicWALL Bare Metal Recovery and Local Archiving – Workstation can check its integrity. If you suspect that the archive might have been corrupted, select **Validate backup archive before restoration**.
2. Having restored a disk/partition from an image, SonicWALL Bare Metal Recovery and Local Archiving – Workstation 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 disk/partitions under Windows 2000/XP and for FAT16/32 and NTFS file systems.



Chapter 7. Creating Bootable Media

7.1 Creating SonicWALL rescue media

You can run SonicWALL Bare Metal Recovery and Local Archiving – Workstation on a crashed computer that cannot boot. You can even back up disks 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 SonicWALL Bare Metal Recovery and Local Archiving – Workstation version.

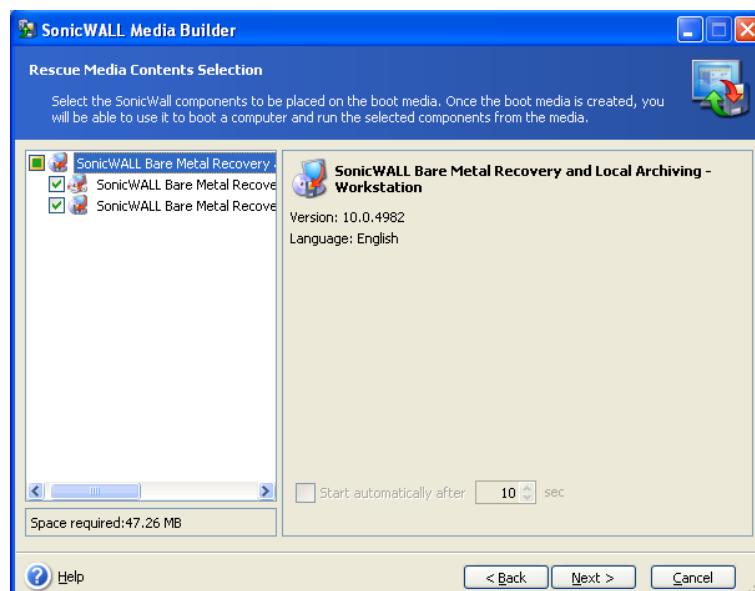
If you purchased SonicWALL Bare Metal Recovery and Local Archiving – Workstation on the Web, you can create bootable media using the SonicWALL Media Builder. For this, you will need a blank CD-R/RW or several formatted diskettes (the wizard will tell you the exact number), or any other media your computer can boot from, such as a Zip drive.

SonicWALL Bare Metal Recovery and Local Archiving – Workstation also provides the ability to create an ISO image of a bootable disk on the hard disk.



If you have chosen not to install the SonicWALL Media Builder during SonicWALL Bare Metal Recovery and Local Archiving – Workstation installation, you will not be able to use this feature.

1. Click **Create Bootable Rescue Media** on the toolbar or the sidebar, or select **Create Bootable Rescue Media** from the **Tools** menu. You can also run the SonicWALL Media Builder without loading SonicWALL Bare Metal Recovery and Local Archiving – Workstation by selecting **Programs -> SonicWALL -> SonicWALL Bare Metal Recovery and Local Archiving – Workstation -> Bootable Rescue Media Builder** from the **Start** menu.
2. Select which components of SonicWALL programs you want to place on the bootable media.



Rescue Media Contents Selection

SonicWALL Bare Metal Recovery and Local Archiving – Workstation offers the following components:

- **SonicWALL Bare Metal Recovery and Local Archiving – Workstation full version**

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

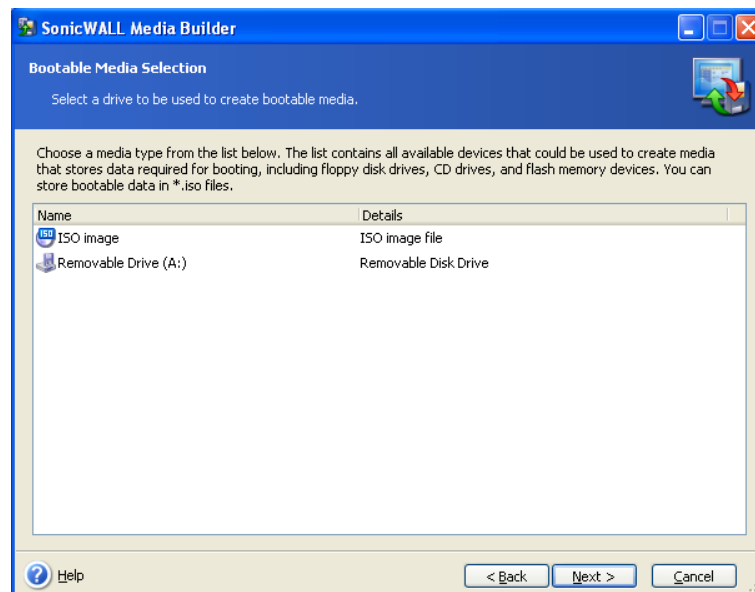
- **SonicWALL Bare Metal Recovery and Local Archiving – Workstation safe version**

Does not include USB, PC Card, or SCSI drivers. Recommended for use in case of problems with running Full version.

3. Select the type of bootable media (CD-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 disk ISO image or save bootable data on the RIS server.



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, SonicWALL Bare Metal Recovery and Local Archiving – Workstation). To write another component, start Bootable Media Builder once again.



Bootable Media Selection

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

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

After you create a boot disk, identify it and keep it in a safe place.

Please keep in mind that the backups created by the later program version may be incompatible with the previous program versions. By this reason, we highly recommend that you create a new bootable media after each SonicWALL Bare Metal Recovery and Local Archiving – Workstation upgrade.

7.2 Creating a Win PE ISO with SonicWALL Bare Metal Recovery and Local Archiving – Workstation

Windows Preinstallation Environment (Win PE) is a minimal Windows system based on the Windows XP Professional and the Windows Server 2003 kernels. Win PE is commonly used by OEMs and corporations for deployment, test, diagnostic and system repair purposes. Using SonicWALL Bare Metal Recovery and Local Archiving – Workstation in Windows Preinstallation Environment allows a combination of SonicWALL Bare Metal Recovery and Local Archiving – Workstation and Win PE facilities and provides more functionality than using only bootable media.

To add the SonicWALL Bare Metal Recovery and Local Archiving – Workstation plug-in to your Win PE distribution:

1. Make sure that **Bart PE plug-in** is installed on the computer (the default path is \Program Files\SonicWALL\SonicWALLBareMetalRecoveryandLocalArchiving\BartPE). If not, run SonicWALL Bare Metal Recovery and Local Archiving – Workstation setup file, choose **Modify** and install the Bart PE plug-in.

SonicWALL Win PE ISO Builder locates the SonicWALL Bart PE plug-in using the registry key **HKEY_LOCAL_MACHINE\SOFTWARE\SonicWALL\SonicWALLBareMetalRecoveryandLocalArchiving\Settings\BartPE**, created at the time of installation. If you moved the Bart PE plug-in to another folder after installation, change the key accordingly. If the above key is missing, the builder does not work.

2. Insert your Win PE distribution CD into the media drive of the computer. If you have a distribution copy on the hard disk, copy the path to it. The distribution files must be unpacked and allocated in a separate folder.
3. Select Programs -> SonicWALL ->SonicWALL Bare Metal Recovery and Local Archiving – Workstation -> SonicWALL Win PE ISO Builder.
4. Specify a source folder for building Win PE ISO, i.e. the media drive with Win PE distribution or a folder with the distribution copy.
5. Locate a folder where you want to create Win PE ISO and provide the name for the ISO file.
6. Check your settings in the summary screen and click **Proceed**.
7. Use any third-party tool that will burn ISO images to CD or DVD.



Media based on Win PE 2.0 and including SonicWALL Bare Metal Recovery and Local Archiving – Workstation requires at least 768MB RAM to work.

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**, select **Validate Backup Archive** in the main window or in the **Tools** group or click **Validate Backup Archive** on the toolbar.
2. Click **Next**.
3. Select the archive to validate.



Selecting archive to validate

4. Click **Next**.
5. Clicking **Proceed** will launch the validation procedure. After the validation is complete, you will see the results window. You can cancel checking by clicking **Cancel**.

Chapter 9. Exploring archives and mounting images

SonicWALL Bare Metal Recovery and Local Archiving – Workstation offers two kinds of archive contents management: mounting and exploring for images. Both operations are performed via the **Backup Archives** category.

Exploring images lets you view their contents and copy the selected files to the hard disk.

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

- a new disk 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 disk or partition
- SonicWALL Bare Metal Recovery and Local Archiving – Workstation mounts the image only in read-only mode.

The following is a brief summary of the Explore vs Mount operation:

	Explore	Mount
Archive type	Disk or partition image	Partition image
Assigning a letter	No	Yes
Archive modification	No	No
Files extraction	Yes	Yes

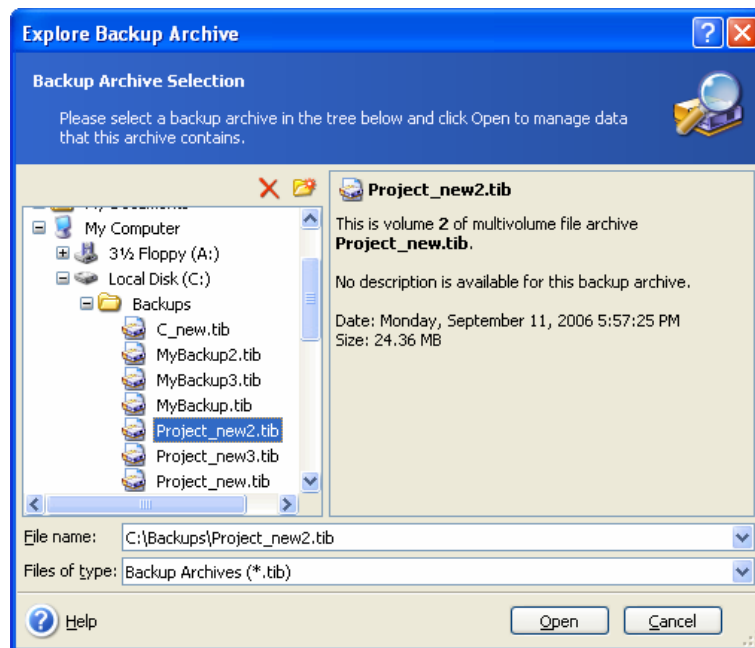


The current version of SonicWALL Bare Metal Recovery and Local Archiving – Workstation can mount or explore an image archive only if all its volumes reside in the same directory. If your archive spans several CD-R/RW discs and you wish to mount the image, you should copy all volumes to a hard disk drive 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. If the archive was protected with a password, SonicWALL Bare Metal Recovery and Local Archiving – Workstation will ask for it. Further steps will not be enabled until you enter the correct password.

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 disk folder.

9.2 Mounting an image

1. Invoke the **Mount Image Wizard** by clicking on the **Mount Image** operation icon in the main program window.

2. Click **Next**.

3. Select the archive from the drives tree.



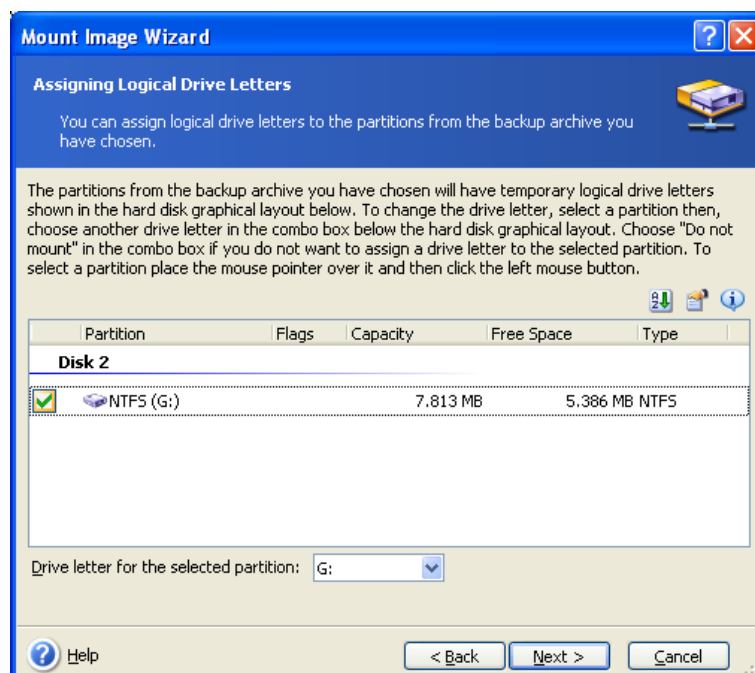
Selecting an image to mount

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, SonicWALL Bare Metal Recovery and Local Archiving – Workstation will ask for it. Neither the partitions layout, nor the **Next** button will be enabled until you enter the correct password.

4. Click **Next**.

5. Select a partition to mount as a virtual disk. (Note that you cannot mount the entire disk.)

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



6. Click **Next**.

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

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

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 disk after all necessary operations are finished, as keeping up virtual disks takes considerable system resources. If you do not, the virtual disk will disappear after your server is turned off.

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

Chapter 10. Troubleshooting

10.1 Recovering SonicWALL Bare Metal Recovery and Local Archiving – Workstation

If SonicWALL Bare Metal Recovery and Local Archiving – Workstation ceases running or produces errors, its files might be corrupted. To fix it, you will have to recover the program. To do this, run SonicWALL Bare Metal Recovery and Local Archiving – Workstation installer again. It will detect SonicWALL Bare Metal Recovery and Local Archiving – Workstation on your server and will ask you if you want to recover (update) or remove it.

Click **Recover** and click **Proceed**.

10.2 Frequently asked questions

What storage devices does SonicWALL Bare Metal Recovery and Local Archiving – Workstation support for keeping backups?

Backups can be created on both hard disks, and other storage devices supported by Windows 2000, XP, Vista.

What is the purpose of specifying image file size?

The server hard disk is the fastest and most effective storage device. It can write a disk (partition) image considerably faster than any other device, such as a CD-R/RW or DVD±R/RW. Having specified image volume size (for example, 600–650Mb for CD-R/RW), you can quickly create image files on your hard disk that you can burn to appropriate media afterwards. This allows you to do the entire task much more quickly.

What devices can a system partition be restored from, if SonicWALL Bare Metal Recovery and Local Archiving – Workstation is loaded from its bootable diskette of CD?

SonicWALL Bare Metal Recovery and Local Archiving – Workstation supports any connected hard disks, network locations as well as CD-R/RW, DVD+R/RW, DVD-RW and a wide variety of FireWire (IEEE-1394) and USB (1.0, 1.1, 2.0) devices.

Can Easy CD Creator 4.x–5.0 impede SonicWALL Bare Metal Recovery and Local Archiving – Workstation ?

Easy CD Creator 4.x and 5.0 automatically installs an old version of Take Two® backup utility that is no longer supported by its manufacturer, Roxio. If SonicWALL Bare Metal Recovery and Local Archiving – Workstation detects this utility, it shows you the following message in the beginning of image creation:

"Can't create the image of the logical disk, as it's already used by a running application. Please close all other applications and try again."

We recommend that you update your Easy CD Creator to Version 5.1 or newer and/or completely remove Take Two®.

For more information, visit

http://www.roxio.com/en/support/roxio_support/taketwo.html

I created an image on CD-R/RW disks, but when I try to browse it, SonicWALL Bare Metal Recovery and Local Archiving – Workstation tells me it can't connect this image as a virtual disk.

The current version of SonicWALL Bare Metal Recovery and Local Archiving – Workstation can connect images only if their files are located in the same place. If your image is located on several CD-R/RW or hard disks, you will have to copy all its files to a single folder on your hard disk.

I received the "Can't create image of disk D:, because it's already used by applications or contains bad sectors" error message, where D: stands for my logical disk, when I tried to create an image under Windows.

Your logical disk might contain bad sectors. We recommend you to run a complete disk surface test. Type "chkdsk /R D:" in the command line and reboot if needed.

Appendix A. Partitions and file systems

A.1 Hard disk partitions

The mechanism that allows you to install several operating systems on a single PC or to carve up a single physical disk drive into multiple “logical” disk 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 disks
- set an active partition (applied to a single primary partition only)



Information about partitions on a hard disk is stored in a special disk 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 disk 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 disk managers support far more operating systems on disks. For example, SonicWALL 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 disk space (and bad sectors, if any)
- support folders and file names
- track physical location of files on disks

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 disk. 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 disk 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 bypasses 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 disks (over 8GB in capacity) and the impossibility to implement any more complex file system into MS-DOS, which is still the base for Windows 98/Me.

The maximum FAT32 disk 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.

A.2.4 Linux Ext2

Ext2 is one of the main file systems for the Linux operating system. Ext2 is a 32-bit system. Its maximum size is 16TB. The main data structure that describes a file is an i-node. A place to store the table of all i-nodes has to be allocated in advance (during formatting).

A.2.5 Linux Ext3

Officially introduced with its version 7.2 of the Linux operating system, Ext3 is the Red Hat Linux journaling file system. It is forward and backward compatible with Linux ext2. It has multiple journaling modes and broad cross-platform compatibility in both 32- and 64-bit architectures.

A.2.6 Linux ReiserFS

ReiserFS was officially introduced to Linux in 2001. ReiserFS overcomes many Ext2 disadvantages. It is a 64-bit journaling file system that dynamically allocates space for data substructures.

Appendix B. Hard disks and BIOS setup

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

B.1 Installing hard disks in computers

B.1.1 Installing a hard disk, general scheme

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

1. Configure the new hard disk 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 disk into a 3.5" or 5.25" slot with special holders. Fasten down the disk with screws.
3. Plug the power cable into the hard disk (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 disk and on the motherboard (plugging rules are described below). The disk 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 disk by setting the parameters **type, cylinder, heads, sectors** and **mode** (or **translation mode**; these parameters are written on the hard disk case) or by using the IDE autodetection BIOS utility to configure the disk automatically.
7. Set the boot sequence to A:, C:, CD-ROM or some other, depending on where your copy of SonicWALL Bare Metal Recovery and Local Archiving – Workstation 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. SonicWALL Bare Metal Recovery and Local Archiving – Workstation will automatically start after reboot.
9. Use SonicWALL Bare Metal Recovery and Local Archiving – Workstation to configure hard disks by answering the wizard's questions.
10. After finishing the work, turn off the computer, set the jumper on the disk to the **master** position if you want to make the disk bootable (or leave it in **slave** position if the disk 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 disks can be connected: **primary IDE** and **secondary IDE**.

Hard disks 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 disks can be connected to each of the sockets, i.e. there can be up to four hard disks of this type installed in the PC. (There are three plugs on each IDE cable: two for hard disks 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 not possible 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 disk and of the motherboard. This also ensures that there only one way to connect the hard disk 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 disk 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 disk or the motherboard does not necessarily damage the electronics of the disk or the motherboard. The hard disk is simply not detected or initialized by BIOS.



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



We will not describe all the types of hard disks. Currently the most widespread are those with IDE or SCSI interfaces. Unlike IDE hard disks, there can be from six to 14 SCSI hard disks installed in your PC. However, you need a special SCSI controller (called a host adapter) to connect them. SCSI hard disks 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 disks. There is only one way to plug in this cable.

B.1.3 Installation modes, jumpers

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

The jumpers are either located on the electronic board of the hard disk or a special socket that provides for the connection of the hard disk 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 disk(s) installation mode:

- **DS – master/factory default**
- **SP – slave (or no jumper required)**
- **CS – cable select for master/slave:** the purpose of the hard disk 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 disk with the jumper in **master** position is treated by the basic input/output system (BIOS) as bootable.

The jumpers on hard disks 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 disk that is connected to the IDE cable closer to the motherboard than the other one.



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

It is not enough to physically connect the hard disk to the motherboard and set the jumpers properly for the hard disk to function — hard disks 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 disk drives, floppy disk 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 disk 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 disk. The following parameters (and values) are available for each hard disk 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 disk 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 disk parameters during the boot sequence.
Cylinder (Cyl)	1-65535	The number of cylinders on a hard disk. For IDE disks, a logical number of cylinders is specified.
Heads (Hd)	1-16	The number of heads on a hard disk. For IDE disks, a logical number of heads is specified.
Sectors (Sec)	1-63	The number of sectors per track of a hard disk. For IDE disks, a logical number of sectors is specified.
Size (Capacity)	MBytes	The capacity of the disk in megabytes. It is calculated according to the following formula: $Size = (Cyl \times Hds \times Sct \times 512) / 1024 / 1024$.
Mode (Translation Method)	Normal/LBA/ Large/Auto	Method of translation of sector addresses.

For example, to demonstrate the main features of SonicWALL Bare Metal Recovery and Local Archiving – Workstation, we used a Quantum™ Fireball™ TM1700A hard disk as one of the disks 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 disks, 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 Disk (Large). The simplest decision is to set the value of this parameter to Auto.

If there are several hard disks 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 disks to Not Installed.

Parameters of hard disks can be set manually with the help of information provided by the hard disk 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 0, «Appendix B. Hard disks and BIOS setup», we have described the general details of **physical** hard disk structure. Built-in IDE hard disk controls mask the physical disk 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 disk 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 disk C:.

At present, BIOS allows booting operating systems not only from diskettes or hard disks, but also from CD-ROMs, DVDs and other devices. If there are several hard disks 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, disk 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 disk in this list; it only means that the **first attempt** to boot an operating system is to boot it from this disk. There may be no operating system on disk E:, or it can be inactive. In this case, BIOS queries the next drive in the list. Errors can happen during booting, see B.2.5 «Hard disk initialization errors».

The BIOS numbers disks 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 disks.

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 disk E:, numbering

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

After you have installed the hard disk 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 disk.

B.2.4 AwardBIOS

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

The **Main** AwardBIOS menu, which is responsible for configuring hard disks 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 Disk/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.
Translation Mode	[LBA]	[User Type HDD] allows you to set each entry on your own.
Cylinders	[.....0]	Warning: Ultra DMA Mode 3/4/5 can be enabled only when BIOS detects Shielded 80-pin cable.
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 disk) to finish the initial configuration of the hard disk 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 disks 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 disk, 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 disk drive (2. Removable Device). Only if none of these disks contains an operating system, does BIOS query the hard disk (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 DISKS : 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 disk.



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 disks (MFM and RLL). IDE disks 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 disk initialization errors

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

```
PRESS A KEY TO REBOOT
```

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

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

This message appears when the boot program finds no available boot device, be that a floppy or a hard disk, 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: disk. If the disk is known to be functional, the reason for this error message is probably incorrect settings/connections of:

- hard disk 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 disk is not formatted.