

AUDIO ANALOGUE

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HIGH-END AUDIO ELECTRONICS
HANDCRAFTED IN ITALY

USB DAC *Application Note*

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The aim of this document is to give some advices about the use of the Audio Analogue products having a USBDAC inside. At the end of the document a brief glossary reporting some of the most common words used speaking about this kind of technology. It is not pretending to be a exhaustive and complete one but we hope is useful for who has never approached this matter. It's our intent to update this document for what we can...

The USBDAC function is to connect the PC or MAC to the Hi Fi system so that any sound produced by the PC/MAC will be played by the Hi Fi system. The PC/MAC Hi Fi system connection is performed via a USB connection USB REV1.1 or USBREV2.0 compatible. The USB cable which physically implements the connection must be shorter than 3 meters. Anyway you can increase the connection length as much as you like adding along the connection devices called "active Hubs". There are many USB active Hubs available on the market. If you are going to buy a one please be sure it is a USB REV2.0 compatible. To increase the USB connection length via the active hubs doesn't decrease the audio chain performances because the digital levels are re-generated by the active hubs. Therefore, from the audio reproduction point of view, there is no loss in quality in the chain: "PC/MAC → USB cable → Hub attivo → cable → USBDAC". Of course is important that the USB cables between the active USB hubs aren't longer than 3meters and that the active hubs are correctly linked and working. The opportunity to increase the connection length is very important when a PC/MAC in an other room is used instead of a laptop. Moreover remind that, for the best listening experience, is better that the PC/MAC is placed in a room different from where the Hi Fi System is. That's because of the noise produced by the PC/MAC inner fan.

Once the connection PC/MAC → USBDAC is performed, and the first initialization done (by which the PC/MAC load the proper driver software), the PC/MAC sees the USBDAC and what connected to its analog outputs as its audio board. Therefore any sound produced by the PC/MAC, even the "system" sounds, is played by the Hi Fi system.

The next step is to use a player, that's say a software which can read different audio formats and reproduce them. In such way all the audio files present into the PC/MAC and all the audio files which can be downloaded from the web can be reproduced by the PC/MAC and so will be played on the Hi Fi system. Usually both the PC and the MAC have already a player inside, and such software is run any time a audio or video file is clicked. The players by default inside the PC and MAC, perfectly work with the Audio Analogue USBDACs, anyway there are many others players, many of which are free. Some players are particularly interesting because they guarantee a transparent crossing in the digital data flux. In fact, normally, the players perform some kind of digital elaboration between the data reading and the data sending to the audio board. For the PC (Personal Computer with a Windows operative system) the behaviour of the player in passing the data is controlled by softwares named "drivers".

Below, a list of free players is reported, some of which are dedicated to the Mac OsX¹ and some others to the Microsoft Windows Os².

At the reported web links is possible to download the software and to have information about its use and installation.

- **foobar2000** (freeware audio player for Windows): <http://www.foobar2000.org/>
- **VLC** (open source audio player for Windows and Mac): <http://www.videolan.org/vlc/>
- **SongBird** (open source audio player for Windows and Mac): <http://getsongbird.com/>
- **Audion** (free audio player and many more for Mac): <https://www.panic.com/audion/index.html>
- **Play** (open source audio player for Mac): <http://sbooth.org/Play/>

Listening to music using a USB DAC

We point out the player: "Foobar2000". It is a PC player which is very interesting because can use the drivers "ASIO". Using such drivers is possible to pass the data directly to the audio board with no other digital elaborations. To use "Foobar2000" with the ASIO drivers is required to properly set the player. Below the correct procedure is reported.

First of all is necessary to have the ASIO drivers and install them. Then the Foobar2000 player will be installed (if not already on the PC) and then, by a proper "support" ("foo_out_asio.dll" to be copied into the Foobar folder) the player will be able to use the ASIO drivers. In the last step we will have to set the Foobar to use the new ASIO drivers instead of its default ones.

These are the details:

- 1) Installing the ASIO drivers: you can download the ASIO drivers at the link: <http://www.asio4all.com>. Look for the English revision of ASIO4ALL_2_9 and run it clicking it. The file will be downloaded and it will install itself. Different behaviours are possible according to the used browser.
- 2) Installing Foobar2000: Foobar2000 is a freeware software, is possible to download its last revision at the link: <http://www.foobar2000.org/download>. Click on the icon "download" of "Latest stable version. The file will be downloaded and installed. Different behaviours are possible according to the used browser.
- 3) Installing the ASIO drivers support: you can download the last revision for the Foobar2000 player at the link: http://www.foobar2000.org/components/view/foo_out_asio clicking on "download". Once downloaded the zip file, decompress it and then copy the file "foo_out_asio.dll" into the folder "\Components" inside the Foobar2000 main folder.

For example: for a standard installation of Foobar2000 which install Foobar2000 in "C:\Programmi", the folder will be in "C:\Programmi\Foobar2000\Components: or in "C:\Programs Files\Foobar2000\Components". The folder "\Components" will be, anyway, in the path selected when the Foobar has been installed (at point 2).

Once the ASIO drivers have been installed, Foobar has been installed and once copied the file "foo_out_asio.dll" into the folder "\Components", the player must be set to use the ASIO drivers (which are now available).

1. Run Foobar2000 clicking the software icon:  the software will open as below.

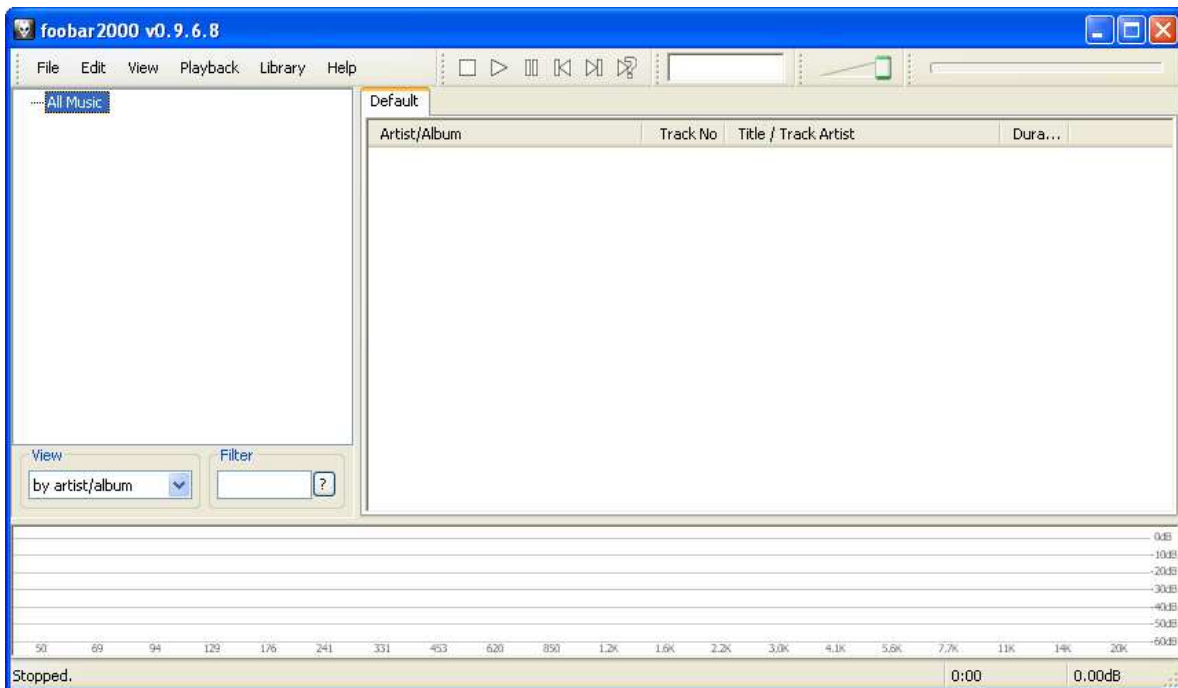


Fig. 1: Foobar2000 main screen

- Open the “File” menu and click on “Preferences”:

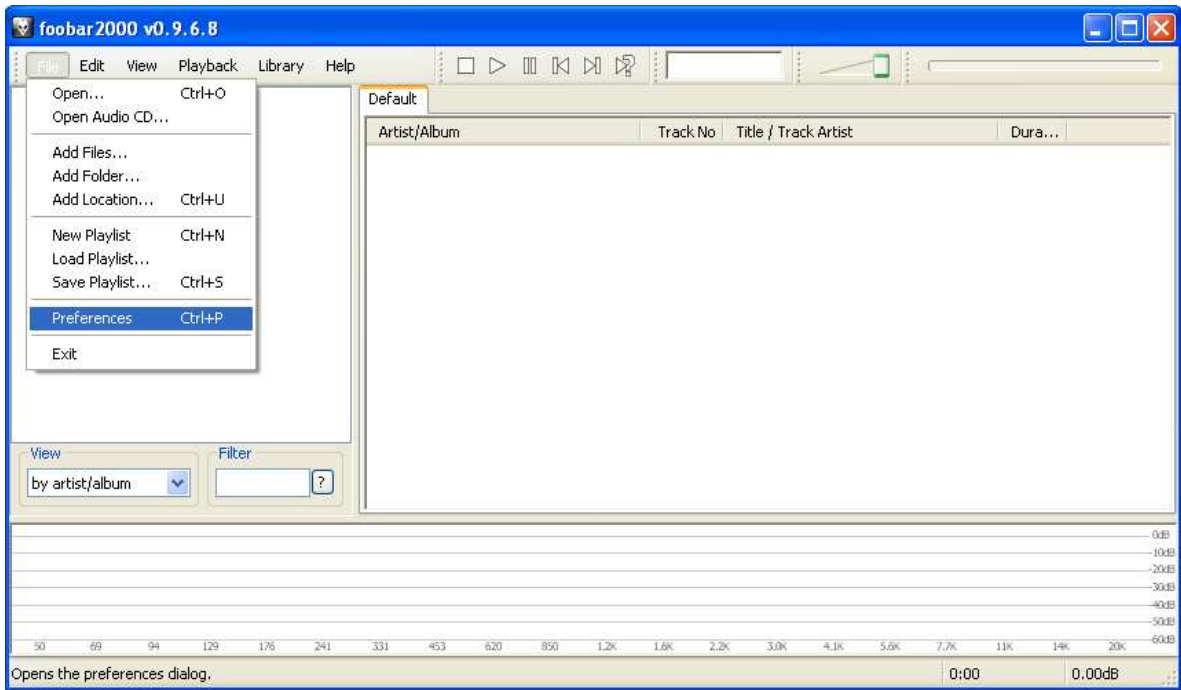


Fig. 2: File Menù → Preferences

- Into the “Preferences” window, open the “Playback” menu (3.a) and the “Output” menu (3.b). Then open the menu at the “Output Device:” (3.c) voce. Then select the voice: “ASIO : ASIO4ALL v2” (3.d). Then click on “Close” (3.e) at the bottom right in the page to come back to the main screen of Foobar2000.

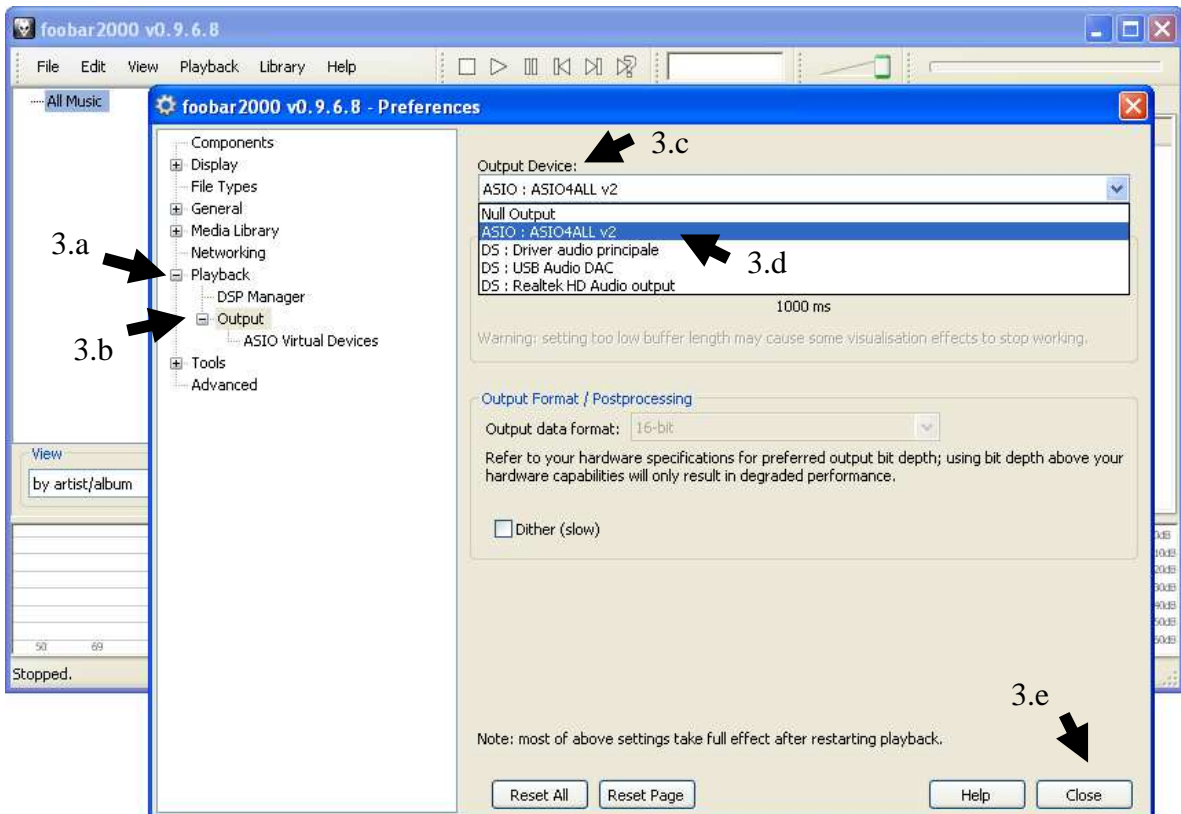


Fig. 3: Finestra Preferences

4. Now Foobar2000 is ready and set to reproduce audio using the ASIO drivers. The commands: Play/Pause, Stop, Next e Prev track available in Foobar2000 (HID) can be sent to the PC, for the Audio Analogue products supporting such functions, using the switches on the front board and the switches on the remote.

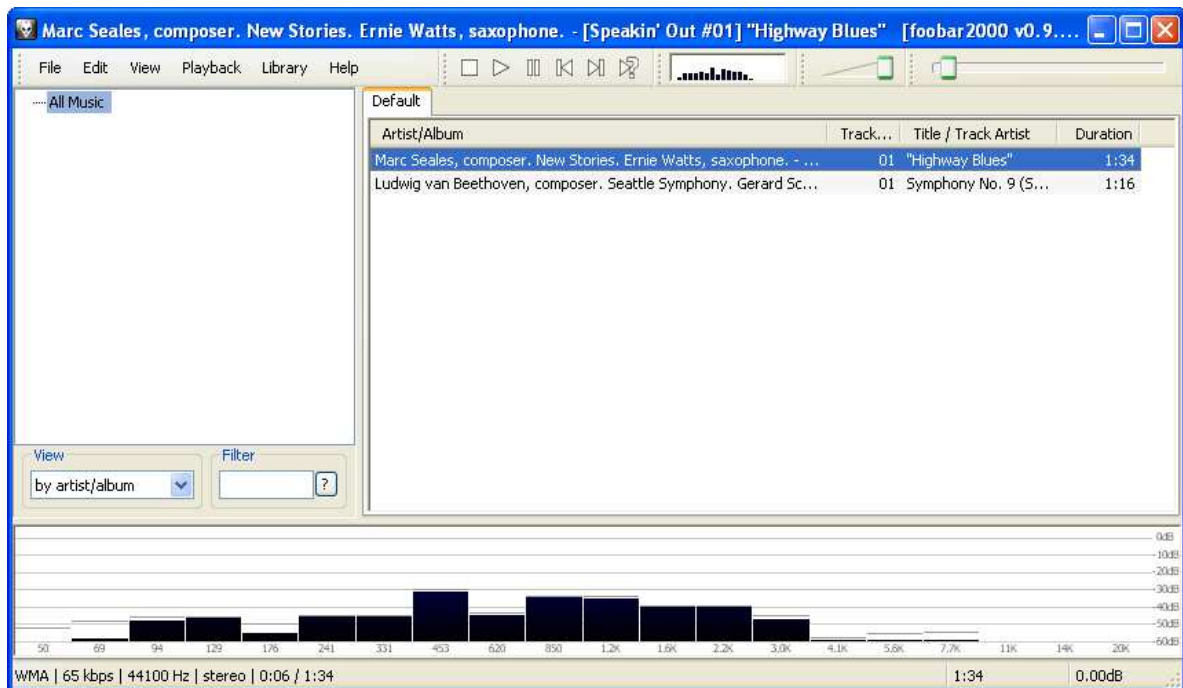


Fig. 4: Schermata Principale di Foobar2000 in riproduzione

Listening to Web Radios or Music on Demand using the USBDAC

The USBDAC not only let you reproduce the audio files on your PC/MAC but also let you play with the Hi Fi system the many audio files on web. There are in fact many websites which offer a free, unlimited and legal access to music. Below a list of some of the most known website offering such service on free is reported (there are also many others which offers the same service with fee).

- <http://www.deezer.com/>: French music on demand website, in 5 languages: French, English, German, Italian. It's a free website.
- <http://www.izaria.us/>: is a web radio where listening to music on streaming and downloading music in a free and legal way.
- <http://www.allmusic.fm/>: it's music on demand website where listening to music on streaming and downloading music in a free and legal way.
- <http://www.tunewiki.com/>: free music website.

Note. To access such web services, after the USBDAC mode is selected on the Audio Analogue product, run your web browser on the PC/MAC (Internet Explorer⁴, Mozilla Firefox⁵, Safari⁶, Google Chrome⁷ ...) and connect to the links above.

The most important un-free music website is by far the Apple iTunes Store⁸.

iTunes is an Apple application which started as a multimedia player mainly pointed to the music reproduction and audio arrangement. iTunes is a freeware player which can be downloaded at the link: <http://www.apple.com/itunes/how-to/>. iTunes is at the moment the second player for diffusion in the word being Windows Media Audio, the player by Windows, the first presently.

The "war" between the players caused iTunes to support, by default, the audio formats: MP3, AIFF, WAV, AAC and ALE, but not the WMA format which is the Windows Media Audio one. iTunes can anyway reproduce WMA files by a conversion in type which is possible when, as for all the others player, the proper Plug-In is installed. iTunes has largely increased its diffusion in these years because it's the tool to load and arrange music playlist on the iPod. The great iPod success has caused Windows Media Audio to

make itself compatible with iTunes. In fact now Windows Media Audio can convert its file audio from a WMA format to the AAC one which is the most used in iTunes.

On the 28 April of 2003 Apple Inc. has published on web its iTunes Store which is a on line shop where buying music as a whole CD or as single track and also many other audio/video files. iTunes Store has imposed itself as the most important on line music shop with more than 70% of the whole on line music purchases performed on iTunes Store. For selling music on its music-web-shop, Apple has reached agreements with the main record producers such as: BMG Music, EMI, Sony Music, Universal and Warner Bros. Moreover agreements are every day reached with the smaller record producers. iTunes let you download a single track at a price of less than a dollar and require the payment via a credit card on encrypt and absolutely safe web pages.

With iTunes you can create your playlist, which can be then transferred to the iPod. The protection system on the music downloaded from the iTunes Store is the: Apple Fair Play, a Digital Right Management integrated based on iTunes Store, such protection System let you burn a unlimited number of copies of the downloaded music while the music can be played by a 5 maximum number of computer .

Glossary

AAC: is a compressed audio format (Advanced Audio Coding) from MPEG and has been included into MPEG-4. At the same compression is characterized by better performances than the older MP3. Is the most used audio format for iTunes. It is a "lossy" compression algorithm.

AIFF: (Audio Interchange File Format) is an audio standard used to save audio recordings on a PC. Is not a compressed format. The AIFF has been designed by Apple Computer developing the "Interchange File Format " by Electronics Art. The AIFF is commonly used in the Apple MACs, that's why is known also as Apple Interchange File Format (AIF).

ALE: Apple Lossless Encoder (known also as Apple Lossless, ALE, or Apple Lossless Audio Codec, ALAC) is a audio Codec by Apple Computer developed for a lossless compression.

APE: is a audio lossless compressed format by Monkey's Audio. By this algorithm the original file is compressed till the 60% with no lost of the information. At the moment is probably the best lossless codec for its balance in speed and compression.

ASIO: the ASIO drivers are Windows audio drivers. They were at first realized by the Steinberg Media Technologies GmbH to facilitate the editing and recording of audio files on a PC. The audiophiles have started using such drivers because they bypass the Windows mixer and guarantee a exact bit to bit transfer (in a transparent mode with no digital elaboration) to the audio board. A free revision of the ASIO drivers has been developed by Michael Tippach ASIO4ALL (<http://www.asio4all.com/>), and is supported by the Audio Analogue USBDACs.

Bitrate: (transfer speed) in informatics and telecommunications "bitrate" means how many data can be passed through a specific connection in a time unit. The Bit rate is the amount of binary information (bits) which pass in a second. Such value varies for the compressed audio file such as for the MP3. The general rule is that the more the bitrate is the more the amount of original information included and the more the quality of the compressed audio. It is usually accepted that a fair good quality for a MP3 file is obtained with a 128Kbit/second bit rate. Such quality is anyway poor compared to a CD.

CODEC: is a program or a hardware device which codifies and/or de-codifies a digital signal, such as a audio or video one. Usually the performed operations change the original file format and involve compression/decompression. Therefore a Codec is a program or a device which perform operation on digital signals such as the compression/decompression algorithms. For example, to play a MP3 (or FLAC or APE) file, a player must have the proper decompression program that's say the proper codec.

Compression: is a technique to reduce the amount of bits required to represent a information. We can distinguish two different compression types: lossy (with a information loss) and lossless (with no information loss). The lossy compressions reach a very high compression (a high reduction in the number of bits required to represent the information compared to the original) but at the expense of a loss of the original information. The lossless compressions can instead reach a smaller compression but the compressed file when decompressed is indiscernible from the original file. The compression is usually performed to reduce the memory required to store the file or to transmit the file in a shorter time. Any compression/de-compression is performed by a dedicated algorithm. In audio there are many compression algorithms both lossless such as: FLAC, APE, ALE and loosy such as MP3, WMA (windows Media Audio), Vorbis, AAC, MPC.

FLAC: (Free Lossless Audio Codec) is a lossless Open Source Coded audio, that's say the data compression is done with no loss of the original information. The compression is not very high. The recording company Deutsche Grammophon, specialized in Classical music, has adopted the FLAC as format to sell downloadable tracks on its web site.

FREEWARE: a software which is given for free.

Media Player (Player): is a software to reproduce multimedia files (audio and video). Usually the Media Player can manage different audio and video formats, but there are also players specialized just for audio or video. The Media Player uses Codecs to obtain the proper content from the different formats. There are many Media Player both free and on charge. The operative systems have usually their own Media Player already installed.

MP3: (*Motion Picture Expert Group-1/2 Audio Layer 3*, also known as *MPEG-1 Audio Layer 3*) it's an audio compression algorithm, lossy type. Can drastically decrease the amount of required data to save the information. However the overall audio quality it's quite acceptable.

MPC: (Musepack) it's a open source audio compression algorithm, lossy type. It's quite similar to the MP3 but its quality, comparing the MPC with the MP3 at the same bitrate, is better. It is also known as: **MPEGplus, MPEG+ or MP+.**

Music on demand: the music contents are as first compressed and saved on a server as files. A user can then ask the server to send him the audio/video contents. Is not required to download the whole file on the PC before reproducing it. In fact, the received data, are de-compressed and reproduced some seconds after they have been received.

Music on Streaming: "Streaming" means a audio/video data flux transmitted from a source to one or more destinations trough a telematic network. These data are reproduced little by little as they arrive.

Open Source: it is said of a software for which the rights owners let everybody using the software and encourage software independent programmers to study and modify it. This is obtained by proper use licences.

Playlist: it's a function, usually available for Media Players, by which is possible to create a song collection which can then be reproduced as a sequence.

Plug-in: (also said: **addin** or **add-in**, **addon** or **add-on**), it's a program working to increase the functions of an other one. For example, a plugin for a audio software allows it to de-code audio formats not originally supported or present in the main program of the player.

Vorbis: is a audio open source compression algorithm, lossy type. Can be considered the MP3, AAC antagonist. For the same audio quality can reach an higher compression than the MP3 format. Both MP3 and Vorbis have been designed via very deep psycho-acoustics studies.

WAV: (or **WAVE**), stand for *WAVEform audio format* . It's a audio format developed by Microsoft and IBM for IBM PC and compatible computers. Is not a compressed file. The WAV is a proprietary audio format which can be reproduced by almost any audio player.

WMA: (Windows Media Audio) it's a audio standard developed by Microsoft. The WMA extension files are Advanced Systems Format (.ASF) which audio is compressed via the Codec WMA. It's a proprietary format which can be reproduced and burned on a CD-ROM only by a Windows Media Player software player compatible with Windows operative system.

¹⁾ Mac OS X it's a trademark of *Apple Inc.*

²⁾ Microsoft Windows it's a trademark of *Microsoft Corporation.*

³⁾ ASIO it's a trademark of *Steinberg Media Technologies GmbH.*

⁴⁾ Internet Explorer it's a trademark of *Microsoft Corporation.*

⁵⁾ Mozilla Firefox it's a trademark of *Mozilla Fondation.*

⁶⁾ Safari it's a trademark of *Apple Inc.*

⁷⁾ Google Chrome it's a trademark of *Google Inc..*

⁸⁾ iTunes Store it's a trademark of *Apple Inc.*

⁹⁾ Apple it's a trademark of *Apple Inc.*

¹⁰⁾ iTunes it's a trademark of *Apple Inc.*

¹¹⁾ Windows Media Player it's a trademark of *Microsoft Corporation.*

¹²⁾ Windows Media Audio it's a trademark of *Microsoft Corporation.*

¹³⁾ iPod it's a trademark of *Apple Inc.*

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