

Ultimate Equalizer V5 – MME for Windows7 and Windows10

Background

The Ultimate Equalizer DSP software package is intended to facilitate the following functions:

1. Loudspeaker driver SPL/Phase equalization in Minimum-Phase acoustic mode.
2. Loudspeaker driver SPL/Phase equalization in Linear-Phase acoustic mode. In this mode, the loudspeaker will correctly reproduce square wave.
3. Room Mode equalization – typically below Schroeder Frequency
4. DSP Crossover implementation of various types and slopes
5. Time delay to align drivers' acoustic centres
6. MLS measurement system, and more...

This is rather comprehensive list of the available DSP functions. However, **the most important feature of the program is to allow you to experiment with Linear-Phase loudspeaker design.**

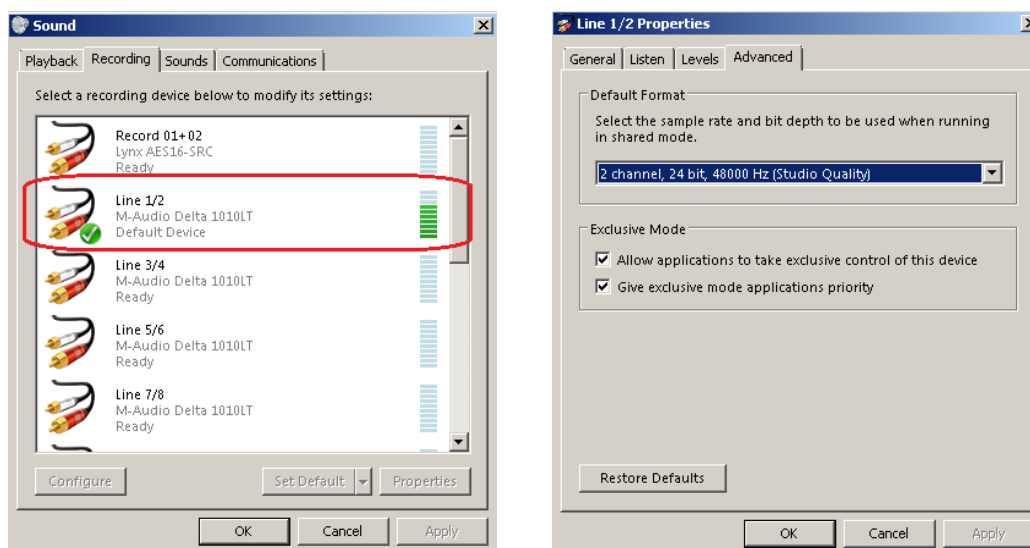
The UE5 is a simplified version of the flagship DSP software UE10. The program is based on MME/WDM audio interface available in Windows7 and Windows10 operating systems. It is intended to be used with quality PCI and PCIe sound cards allocated as described in the next paragraph.

Sound Cards and Operating Systems

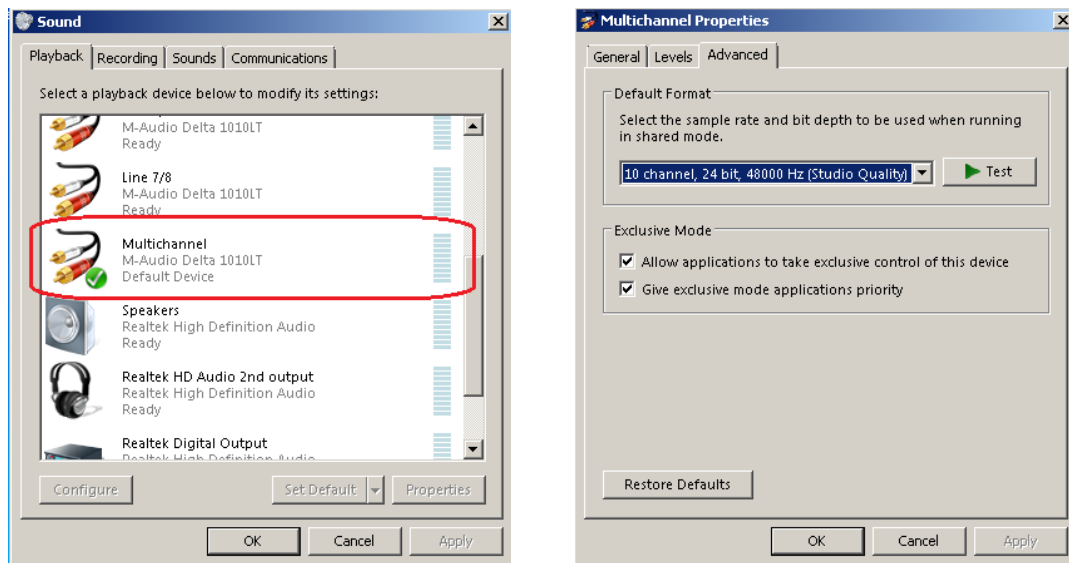
Windows 7

Recommended sound cards for Windows 7 operating system are Delta1010LT and Delta410. These sound cards and their drivers are still available on the internet. For example the latest driver for Delta1010LT sound card is Version 6.0.8.

Using this card, you will be able to implement up to 2 x 4-way stereo systems on Windows 7 PCs. Example of Input (Recording) settings in Windows 7 Sound Manager:



Example of Output (Playback) settings in Windows 7 Sound Manager:

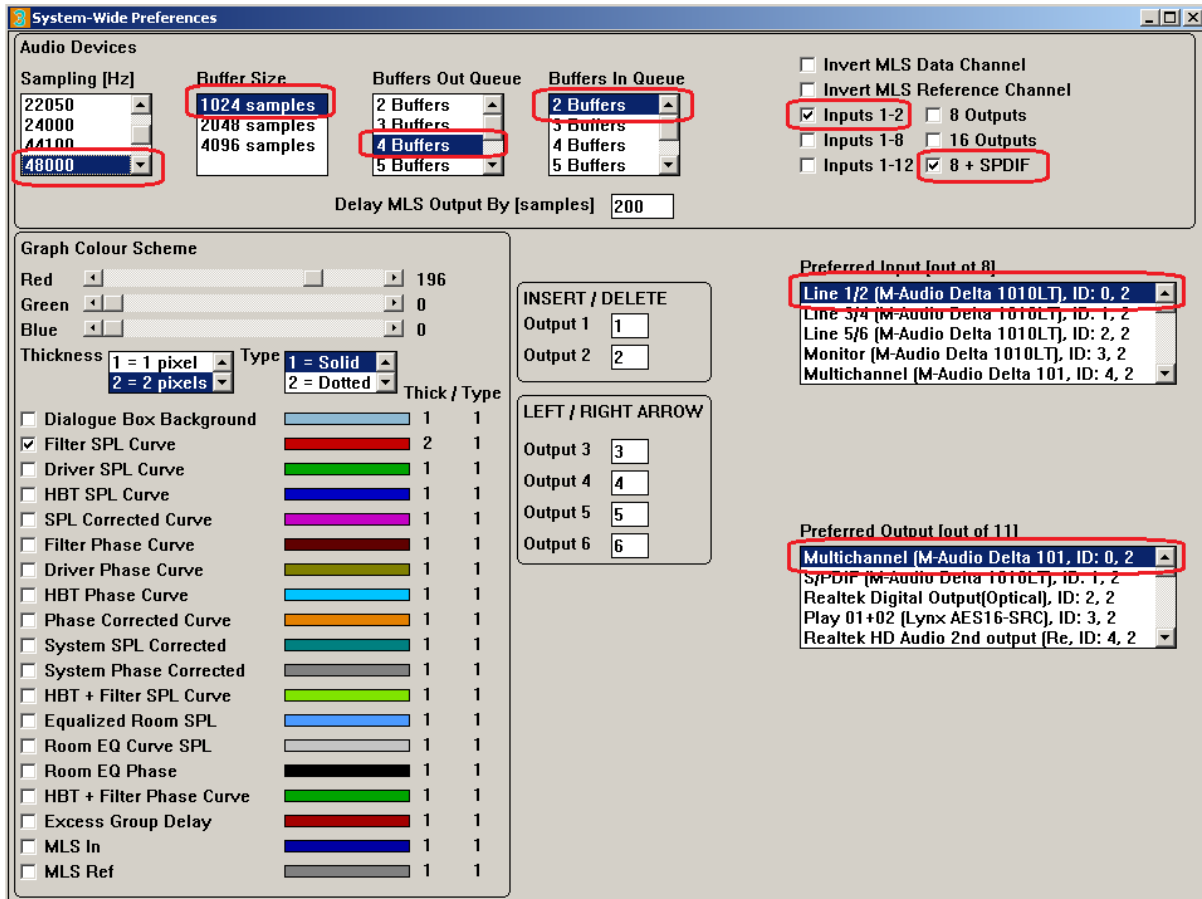


Example of Delta1010LT settings in Delta Control Panel:



The above example is given for 48kHz sampling rate setting. Obviously, when attempting to play standard music CD wave files, the settings should be changed to 44.1kHz.

Example of UE5 Preferences Screen settings, that correspond to the selections above for 2in/8out configuration, are shown below.



Please note, that Delta1010LT shows as a 10-channel Playback audio device in Windows Sound Manager, therefore UE5 Preferences are set to “8 + SPDIF” for Outputs. SPDIF outputs are not used in this version of UE5.

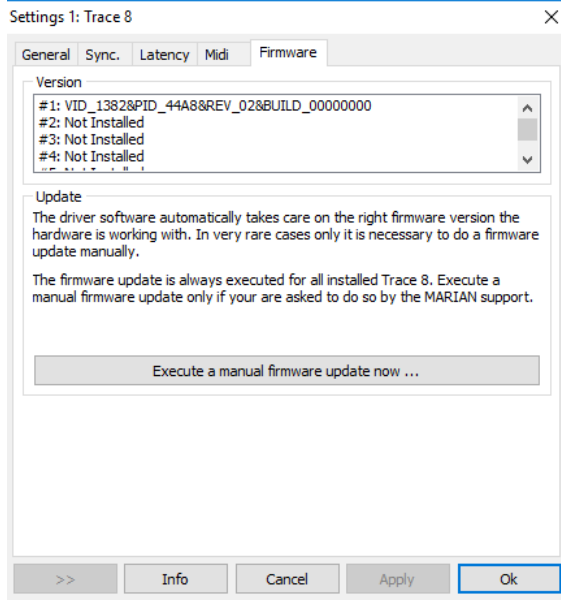
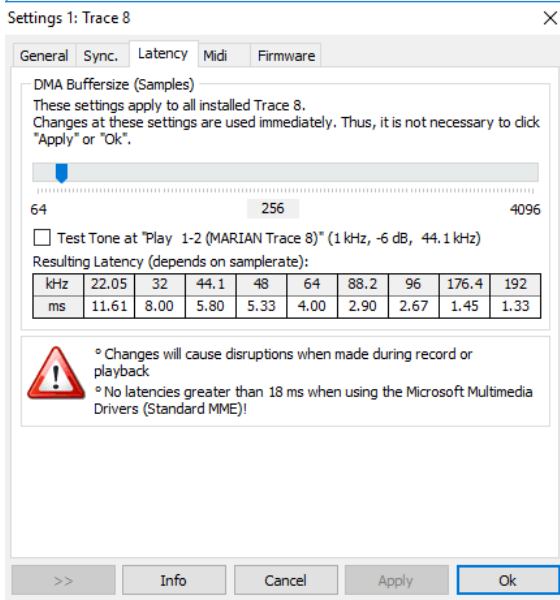
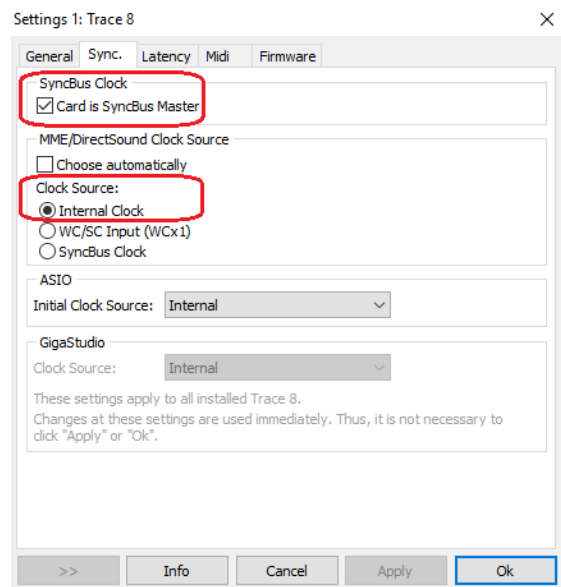
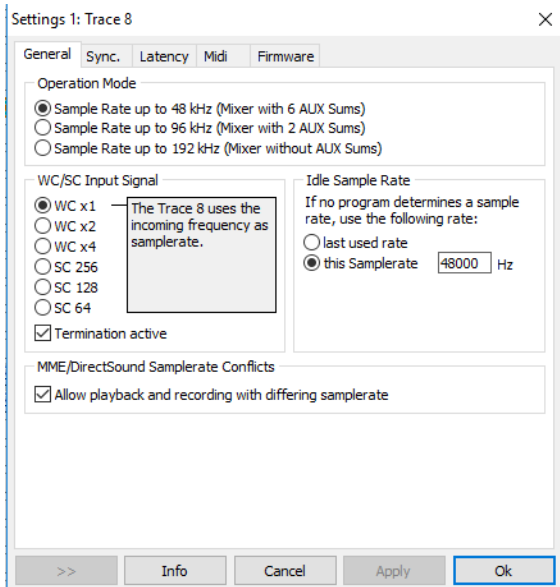
Windows 10

There are two sound cards recommended for Windows 10 operating system: Trace8 and TraceOut16, both available from a German company Marian GmbH. Again, these sound cards are still available on the internet and come with drivers for Windows 10. Using these cards, you will be able to implement up to 2 x 8way stereo systems (2in/16out) on Windows 10 PCs

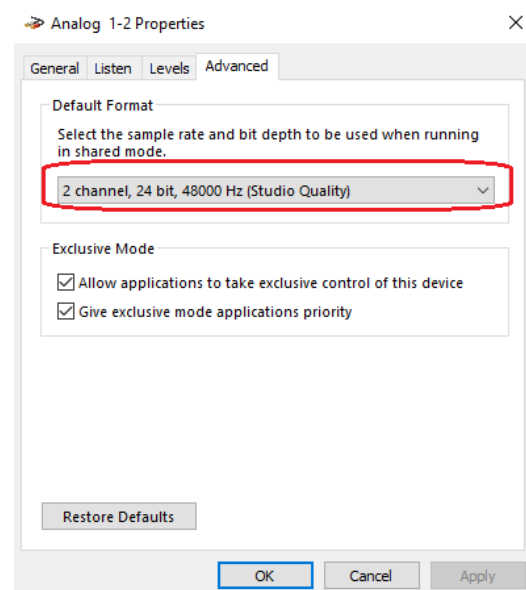
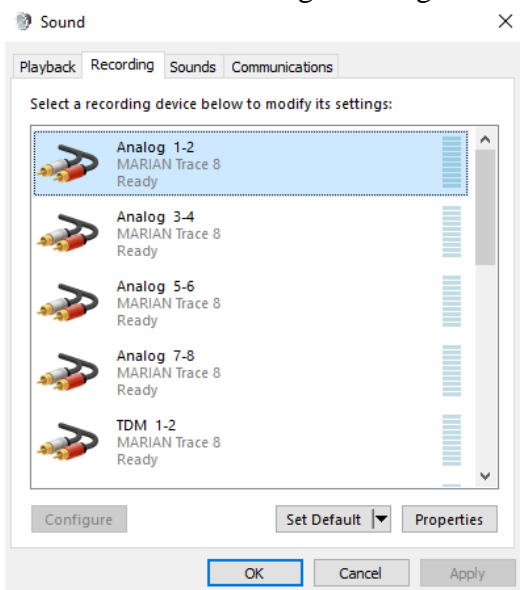
It is worth mentioning, that another card from Marian – Seraph8 will be soon incorporated into the recommended suite of cards for UE5. It is then expected to allow implementation of 8in/16out DSP systems, when used with TraceOut16 card.

Shown below are settings for Trace8 sound card.

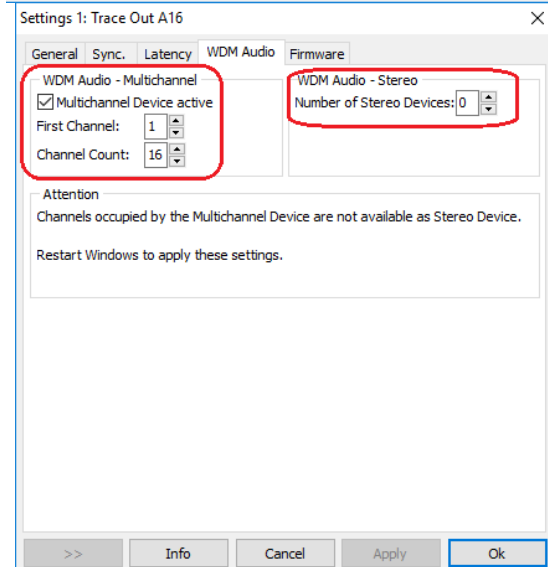
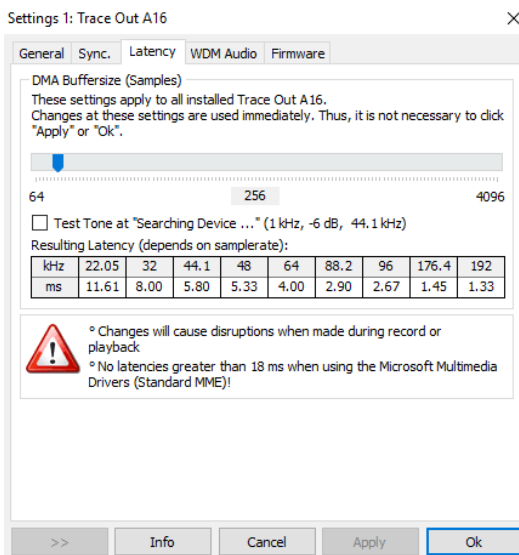
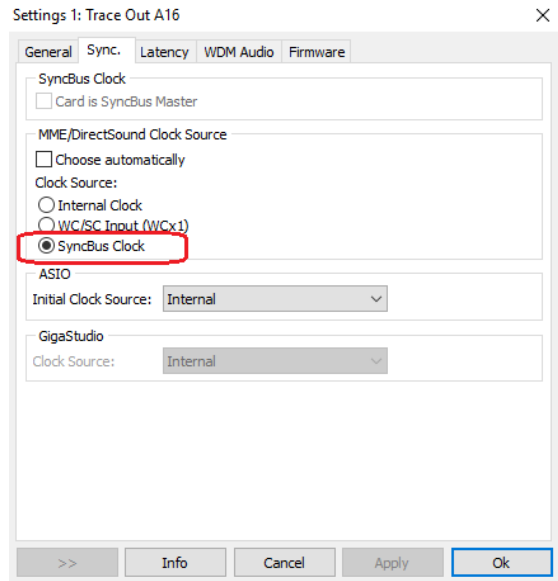
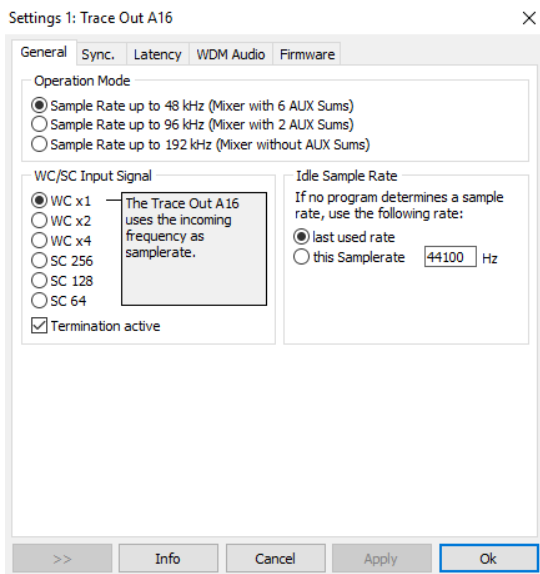
Please note, that Trace8 is the “Synch Master” card and the TraceOut16 is locked to the Master card.



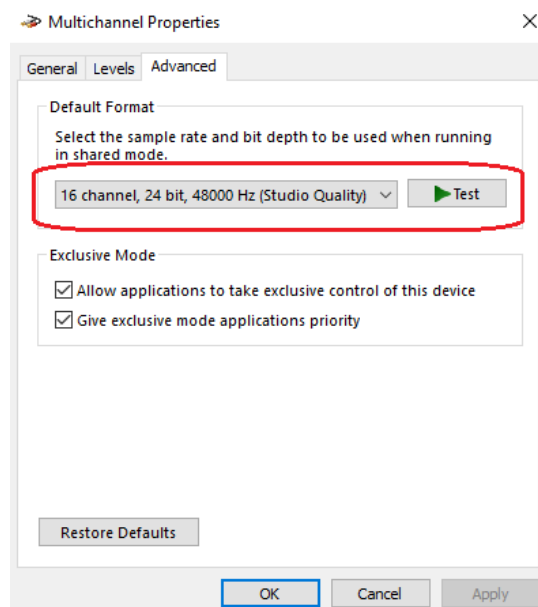
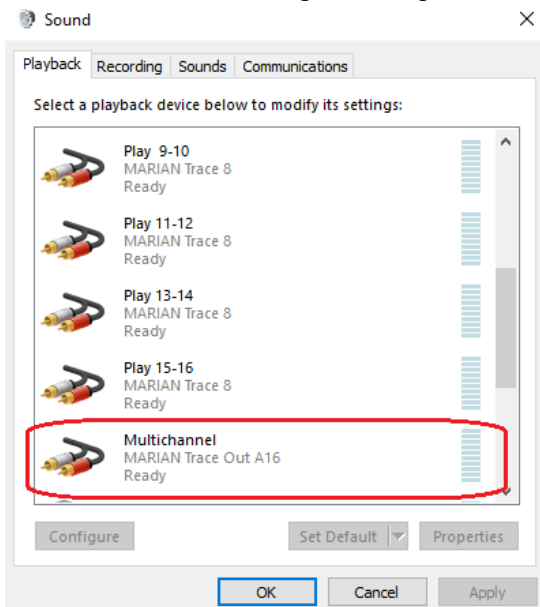
Windows Sound Manager settings for Trace8 are shown below:



Now, TraceOut16 settings at Marian card driver are:



Windows Sound Manager settings for Trace8 are shown below:



The driver for TraceOut16 Version 4.01 is available from Marian:

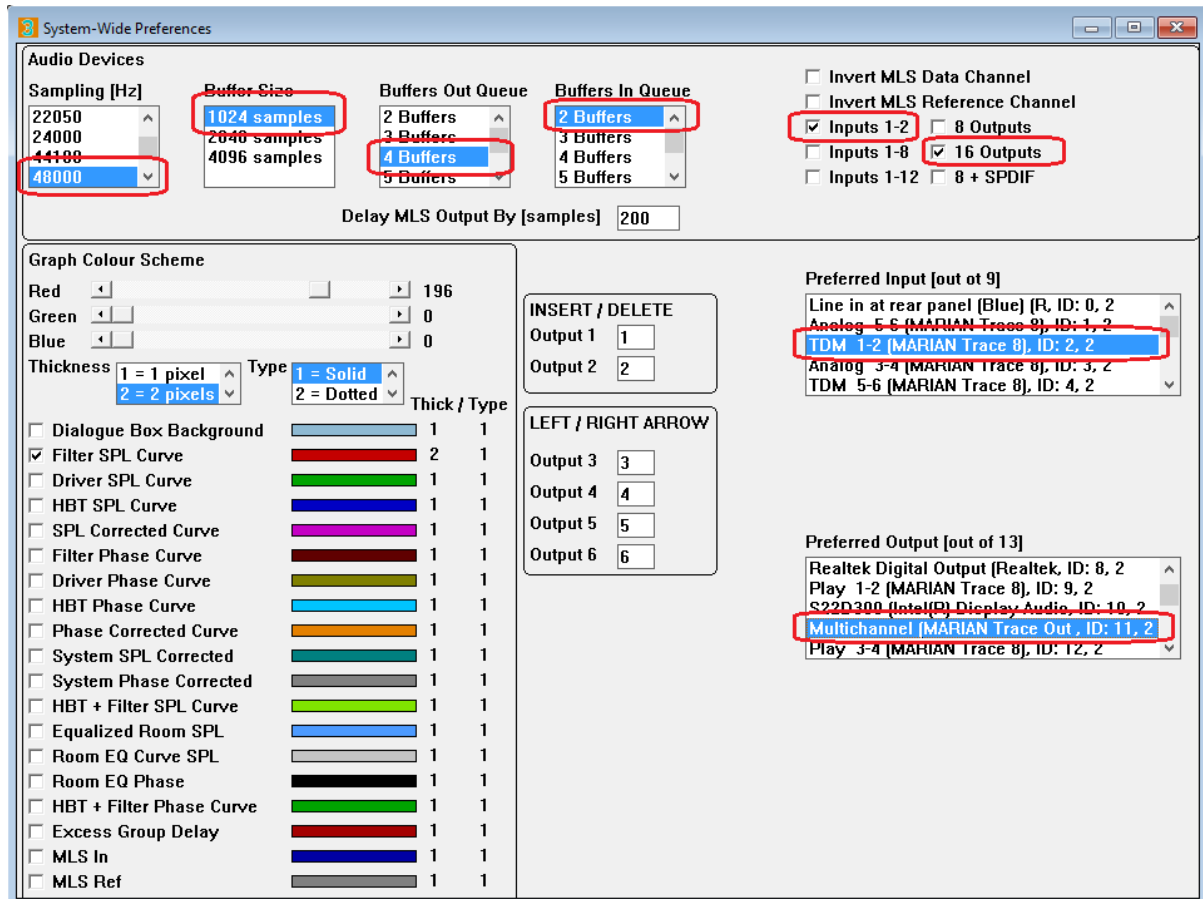
<https://www.marian.de/en/downloads>

https://www.marian.de/files/trace_out/readme.htm

IMPORTANT: Marian sound cards are interconnected via TDM SynchBus cable.

<https://www.marian.de/en/shop>

Example of UE5 Preferences Screen settings, that correspond to the selections above for both cards and 2in/16out configuration, are shown below.



The above example is given for 48kHz sampling rate setting. Obviously, when attempting to play standard music CD wave files, the settings should be changed to 44.1kHz.

Using Motherboard Audio

A typical PC comes with motherboard audio available as 2in/8out configuration. While the Input side (Recording – in Windows Sound manager) can be reliably used for capturing external signals into UE5, the Output (Playback) may be a different story. This is because Windows uses Realtek audio system, which often comes as pre-configured 2/4/8 way system, with channel parameters modified to suit given configuration, like 7.1 surround sound system. In short, the two main output channels may have flat frequency response and standard voltage levels, but surround channels may have imposed some limitations. This is why external sound cards are recommended for proper multichannel operation.

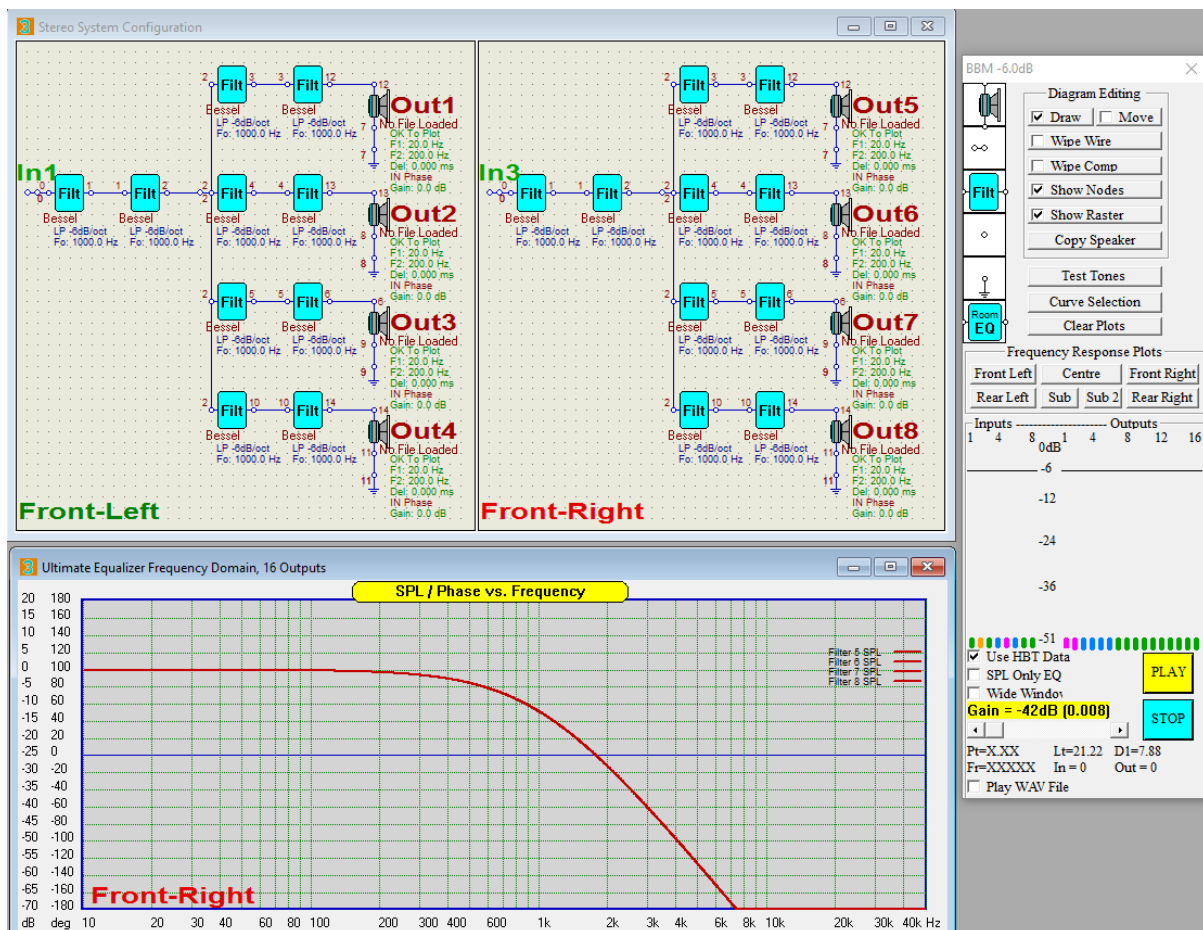
System Examples

Since the UE5 described in this document is a descendant of the Ultimate Equalizer family, it is strongly recommended for you to become familiar with the manuals of the UE family available from <https://www.bodziosoftware.com.au/>

UE5 comes with an MLS measurement system, Diffraction Simulator and File Editor to allow for free-standing operation for creating fully edited driver files, including measurements and Room EQ. All these operations are described in UE manuals and will not be repeated here.

1. 2in / 8out Stereo System

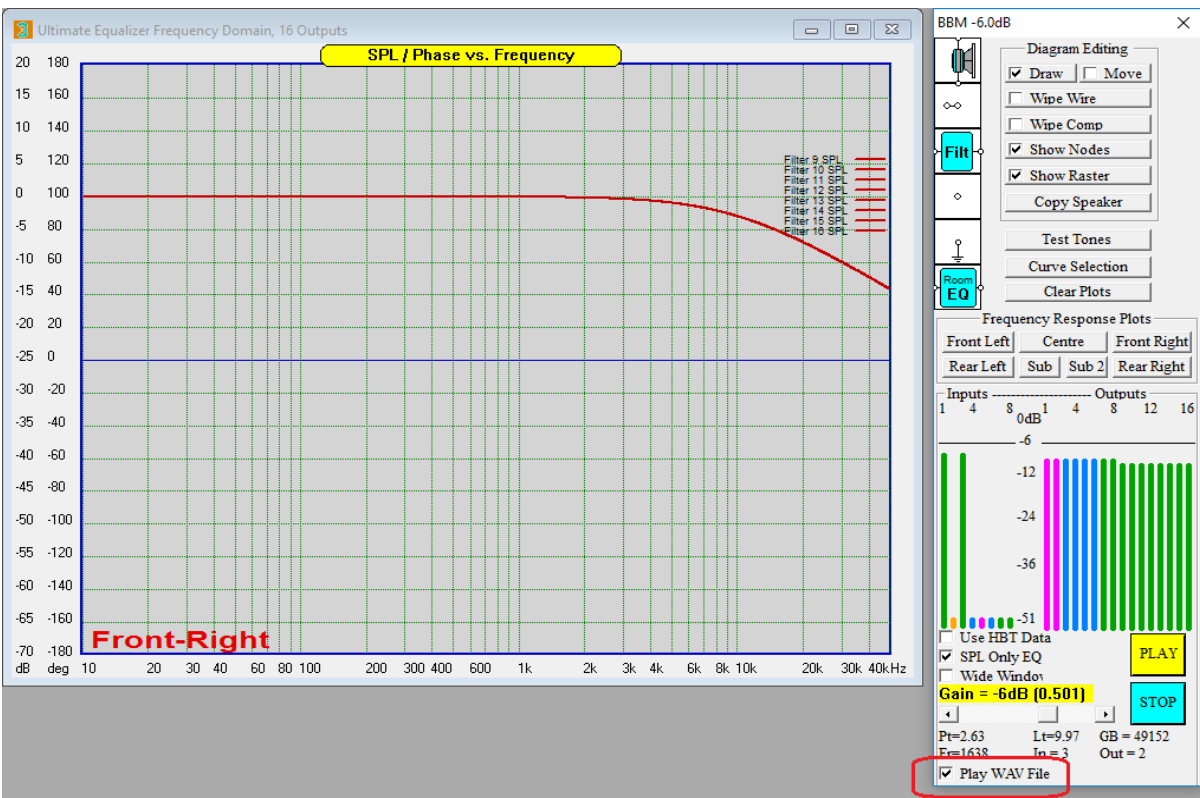
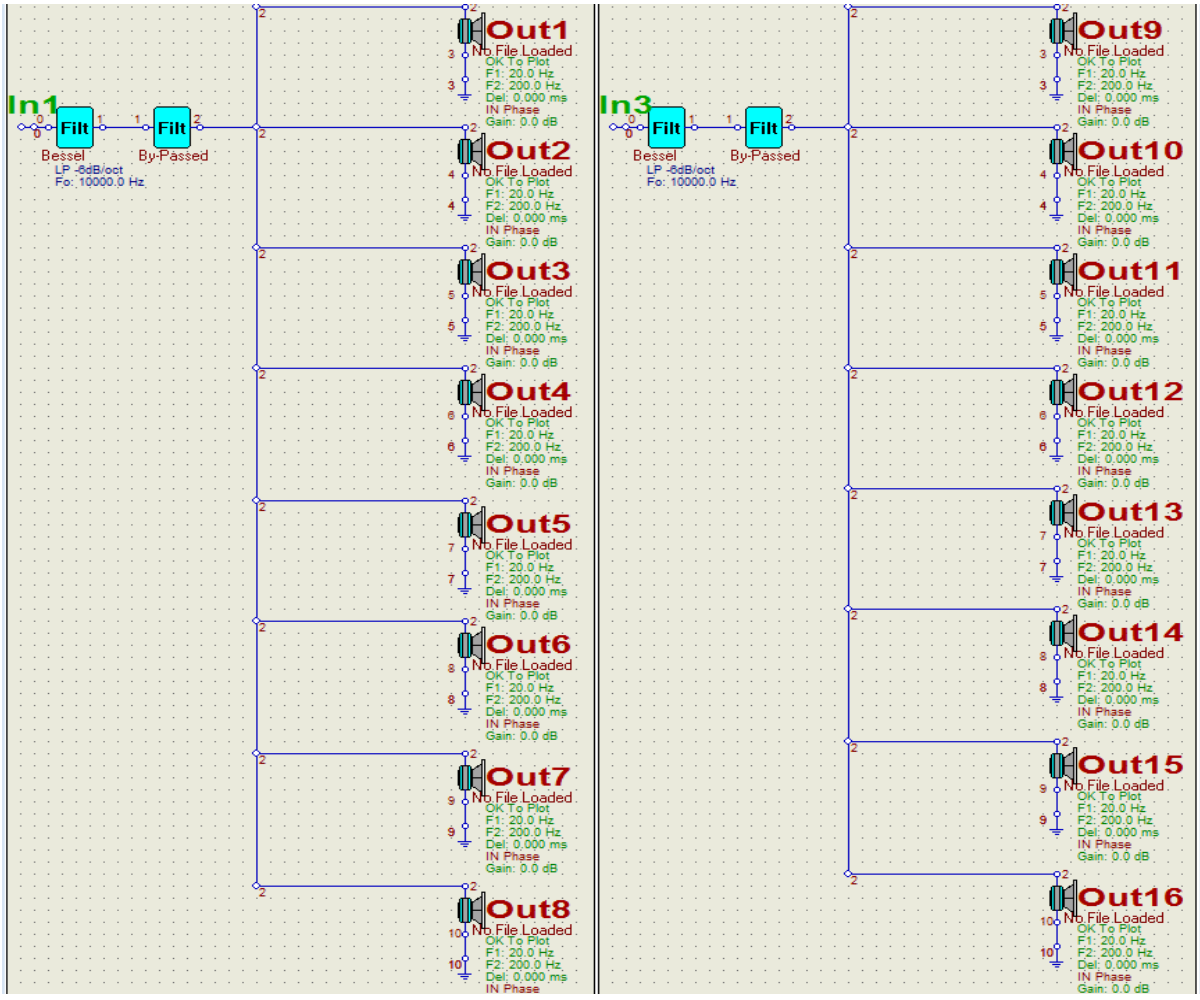
Shown below is an example of a 2x4way stereo system, with Bessel filtering block. This configuration could be used with Delta1010LT sound card using Win7.



Only the "Front Left" and "Front Right" buttons are operational for plotting transfer functions. Please note inputs are allocated as **In1 and In3**.

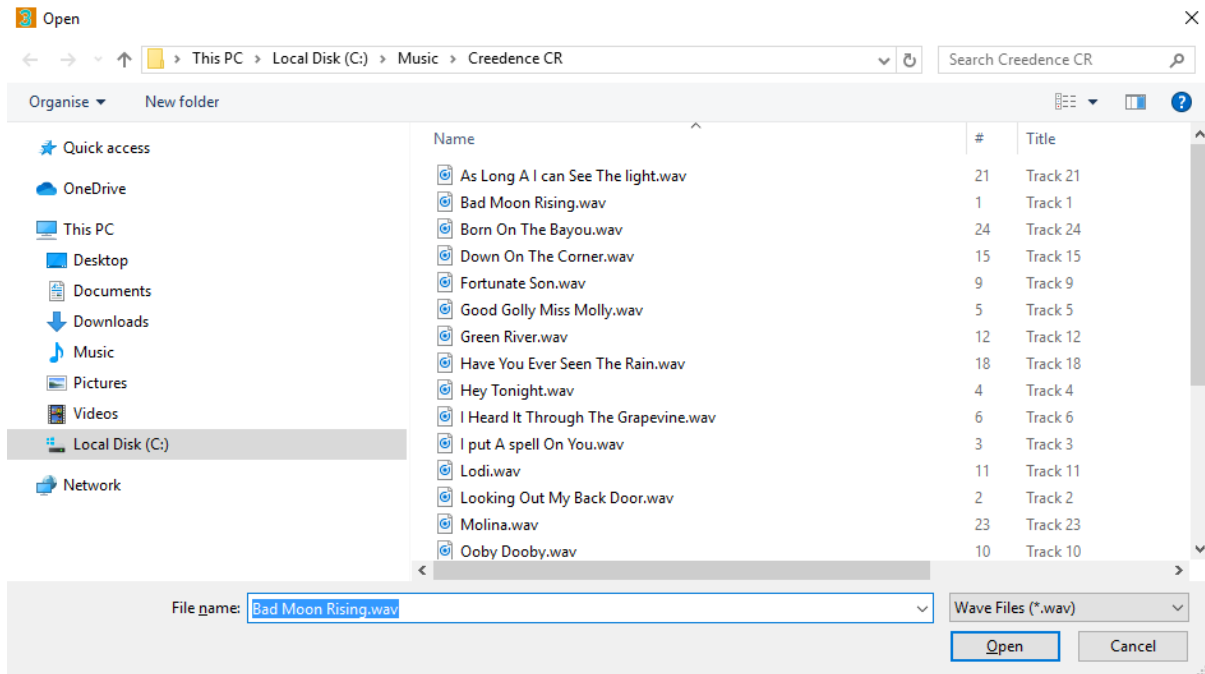
2. 2in / 16out Stereo System

Shown below is an example of a 2x8way stereo system, with most filtering blocks removed. This is just an example of system used to test 16-channel sound card. This configuration could be used with Trace8 + TraceOut16 sound cards using Win10. Please note inputs are allocated as **In1 and In3**.



Playback of CD – WAV files

If you check the “Play WAV File” checkbox and then press “PLAY” button, the following selection box will be opened.



Please select the song you wish to hear and press “Open” button.

The program will now automatically calculate transfer functions for the Front-Left and Front-Right channels and will commence playback.

Concluding Remarks

Loudspeaker design can be an exciting activity, at least at the beginning. If your enthusiasm fades somehow, because the design process and the final products become a little predictable, then perhaps the approach offered by UE5 would inject some life back into your hobby.

The outcome will be a DSP equalized loudspeaker system with acoustically linear phase. Only such system can reproduce square waves. Add to it the intelligent room EQ, and the final product will outperform previous designs. The DSP will process up to 16 channels with 8192 – 32768 coefficients in each channel, offering **outstanding low-frequency resolution**.

All the above can be accomplished by investing in a second-hand Win7 or Win10 computer and a sound card or two.