Mirror EQ with VituixCAD

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Revision History:

Date	**Description**
Jan 19, 2022	Initial Release

Bodzio Ultimate Equalizer is not your standard software DSP solution. This software allows the user to load in a speaker frequency response, define a target “textboox” type of response, and the EQ system will generate a mirror EQ to conform the speaker response exactly to the target. Essentially the driver response is normalized to the target slope.

There are some limitations to this type of compensation, one being that EQ to perfectly flat only works completely on a single axis. Loudspeakers have complex directivity, cone breakup, diffraction, etc that may make a perfect conformance to a target slope not the best solution for overall performance.

With VituixCAD, we have the ability to provide a similar mirror EQ function, that can then be passed to APO EQ for active processing. Using in-room response or power response as a target is not yet supported, so directivity index should be very smooth in order to make a flat power response with a normalized very flat on-axis response.

VituixCAD Process

1) Connect the driver in the crossover with a “single line” in the crossover section.

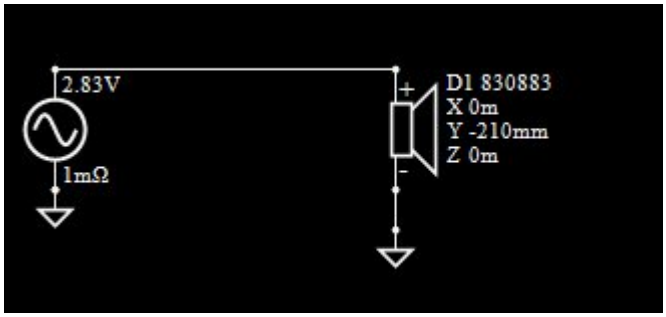

Figure 1 Single line driver connection

2) Using the Optimizer window, define the target slope and high pass or low pass function as desired. Select either “axial response” or “listening window” at the left as desired.
Some care of the target slope is necessary to avoid extreme gain requirement for the mirror filter. For example, a flat to 20kHz response for a 12” woofer will result in extreme gain requirement at high frequency. As well, target response at low frequency should be similar to driver low end roll-off as any EQ in the sub range requires many taps for a DSP system.

3) Press the “->TF” button to export the target transfer function.

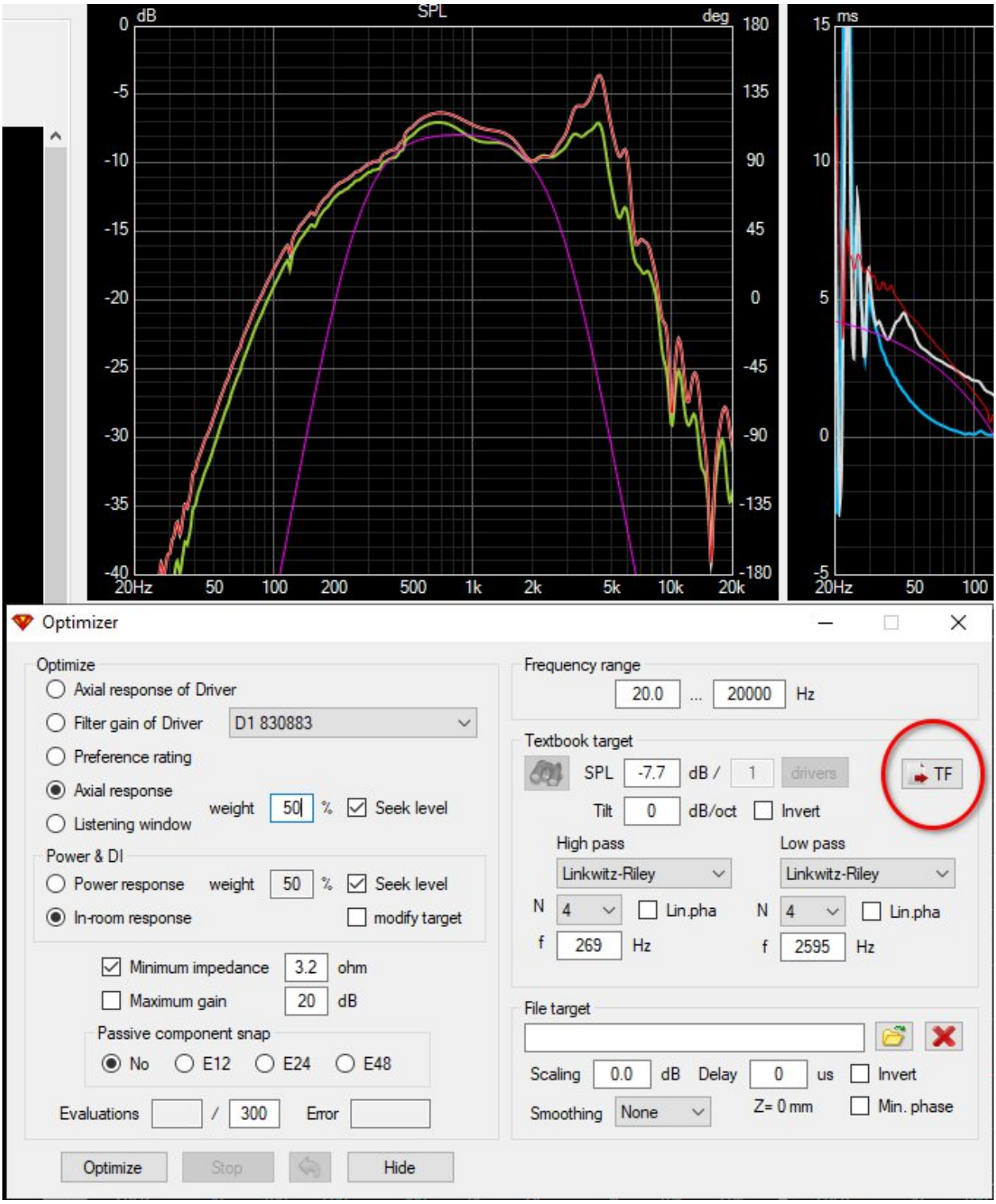

Figure 2 Target response definition

4) Repeat Steps 1 to 3 for each driver in your system.
5) Connect all drivers with active circuit blocks in the crossover schematic, each driver with it's own G(f) block. For Each G(f) block, load the previously saved transfer function file at the bottom of the window.
6) Add in any additional response shaping features such as active peak/notch as desired to shape the overall response further.

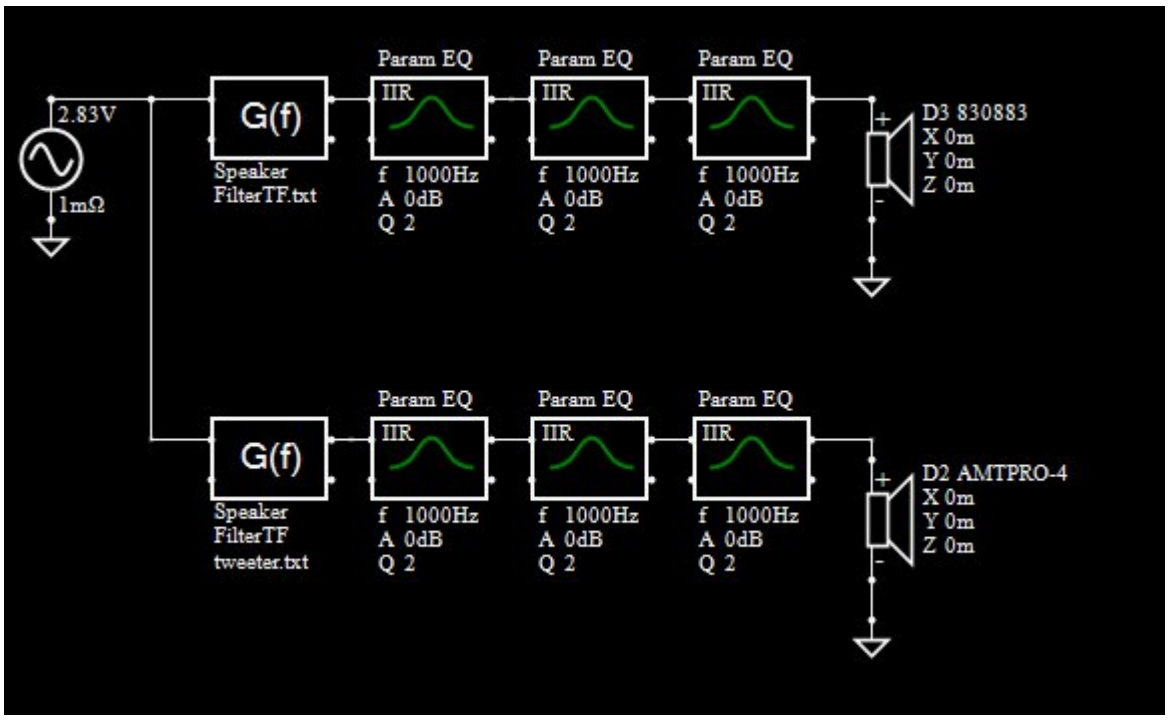

Figure 3 Filter Schematic

7) The use of the G(f) block and TF file should result in a perfectly flat on-axis response, and complex transfer function.

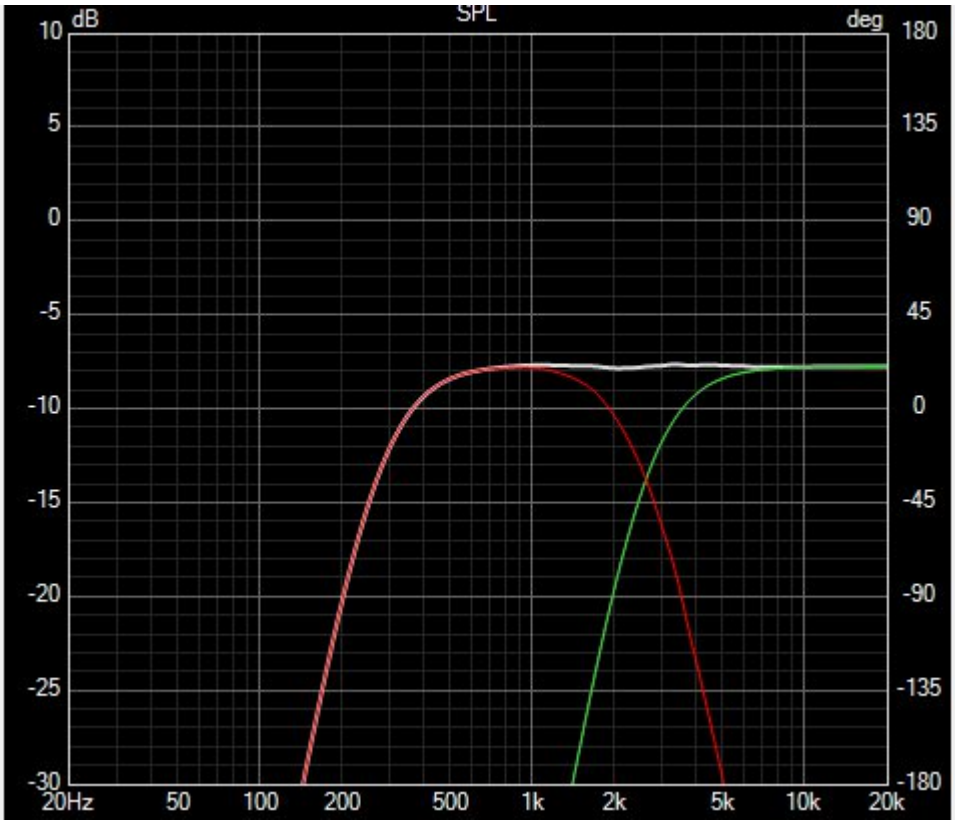

Figure 4 On-Axis Response

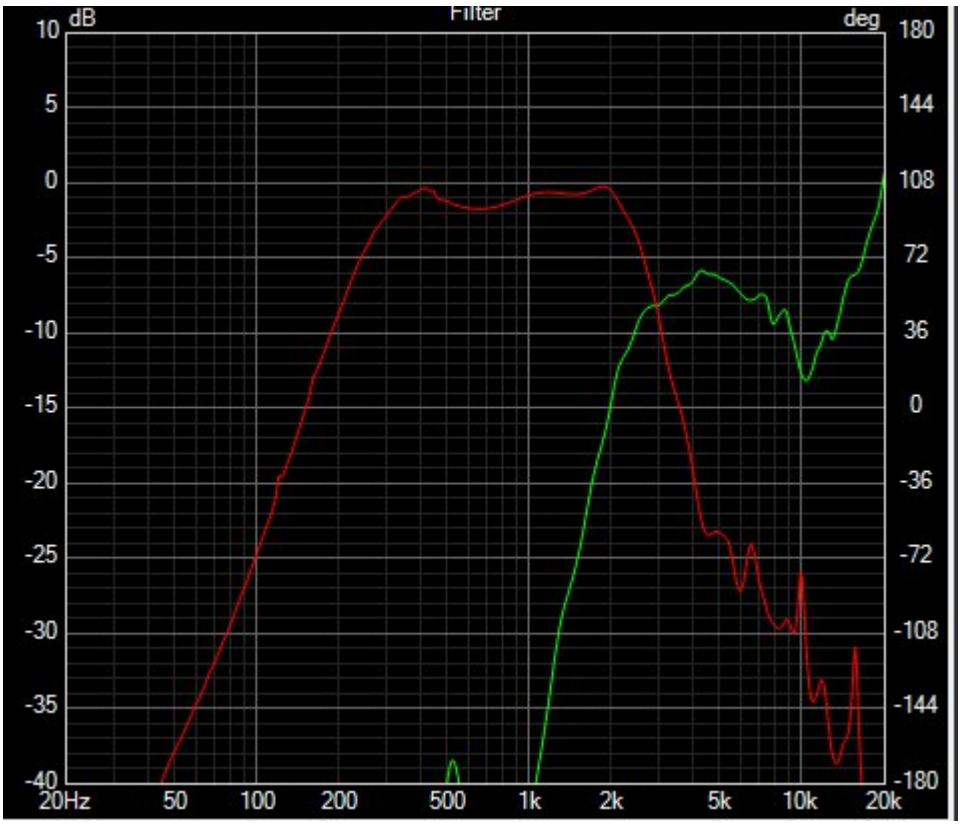

Figure 5 Transfer Function

8) Complete IR export and utilize within APO EQ for active processing. See my instruction “filter simulation with EQ APO and VituixCAD” for details on this process.