Tech Blog

How to Set up a TV-centric 3.1 Home Theater System

Configuring your TV-centric miniDSP Flex system using Device Console

You can create a compact home theater using an innovative approach to build a high fidelity 3.1 stereo system that adds depth and dynamic realism to the home movie experience. The TV-centric design uses a miniDSP Flex with Device Console to create an enjoyable and dimensional listening experience.

This tech blog will show you how to set up a TV-centric home theater using a Flex and Device Console. For a brief overview of the concept, please see our blog on Creating a 3.1 High Fidelity Stereo for Home Theater.

Diagram 1. A TV-centric audio system fits into a compact profile that easily complements any living space

Contents

1. System Interconnect Diagram

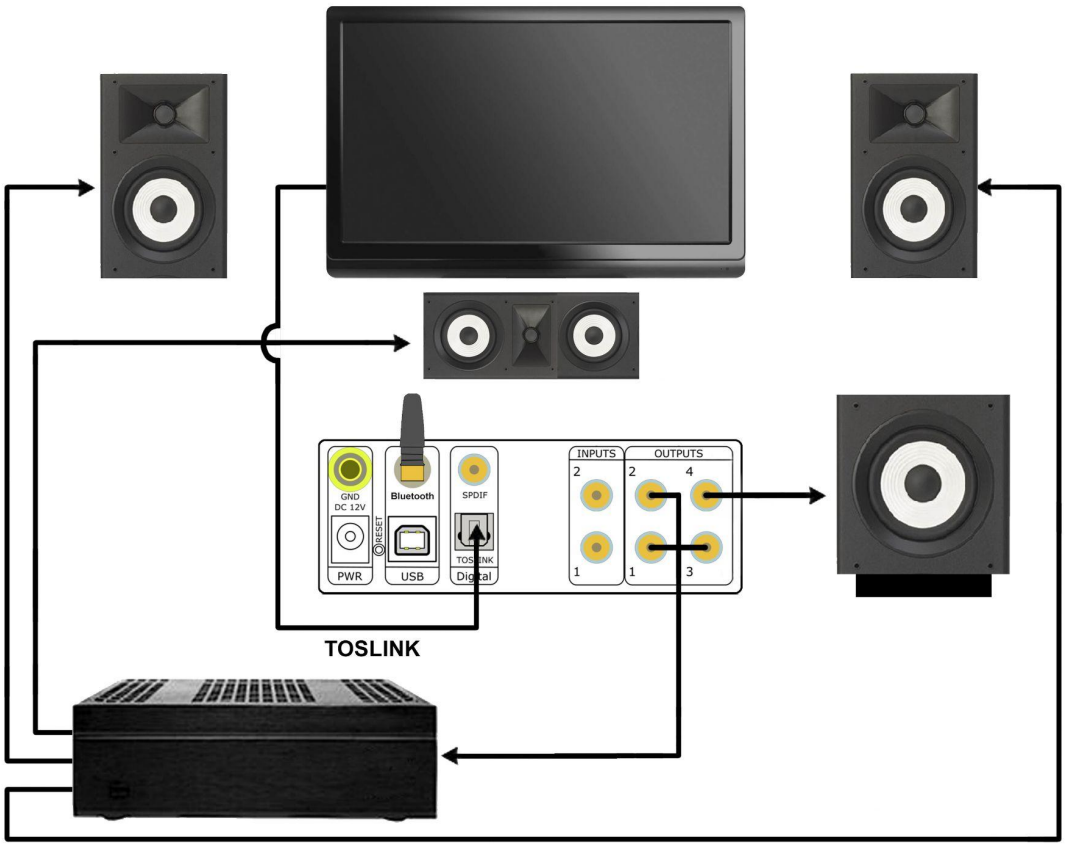

Diagram 2. miniDSP Flex-based 3.1 system with left, right, center and subwoofer channels

Referring to the diagram above, be sure to verify your connections as follows:

- TOSLINK from TV to Flex
- RCA cable from Flex to subwoofer
- RCA cables from Flex to three-channel amplifier
- Speaker wire connections from three-channel amplifier to left, right and center speakers

Once you've completed the physical setup of your TV-centric system, it's time to finalize the miniDSP Flex configuration using Device Console.

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2. System Setup Using miniDSP Device Console

miniDSP Device Console is Flex's graphic user interface for setting up your system. It provides simple control access to:

- Routing Matrix
- Crossover Frequencies
- Channel Levels
- Parametric equalization (PEQ)

In this TV-centric design, the audio will be output in PCM stereo audio over TOSLINK (fiber optic) from the TV into the miniDSP Flex. This provides a pure digital signal that is then processed into the 3.1 channels.

The routing matrix in Diagram 3 shows how the center channel and subwoofer channel have been monauralized. By combining the left and right channels into one, the resulting monauralized channel creates a simple home theater listening environment.

The channel gain is used to adjust the left, right, center and subwoofer loudness to give the most balanced listening experience. It is possible to set up to four different preset configurations, so you can have dedicated presets for movie night and high-definition audio listening.

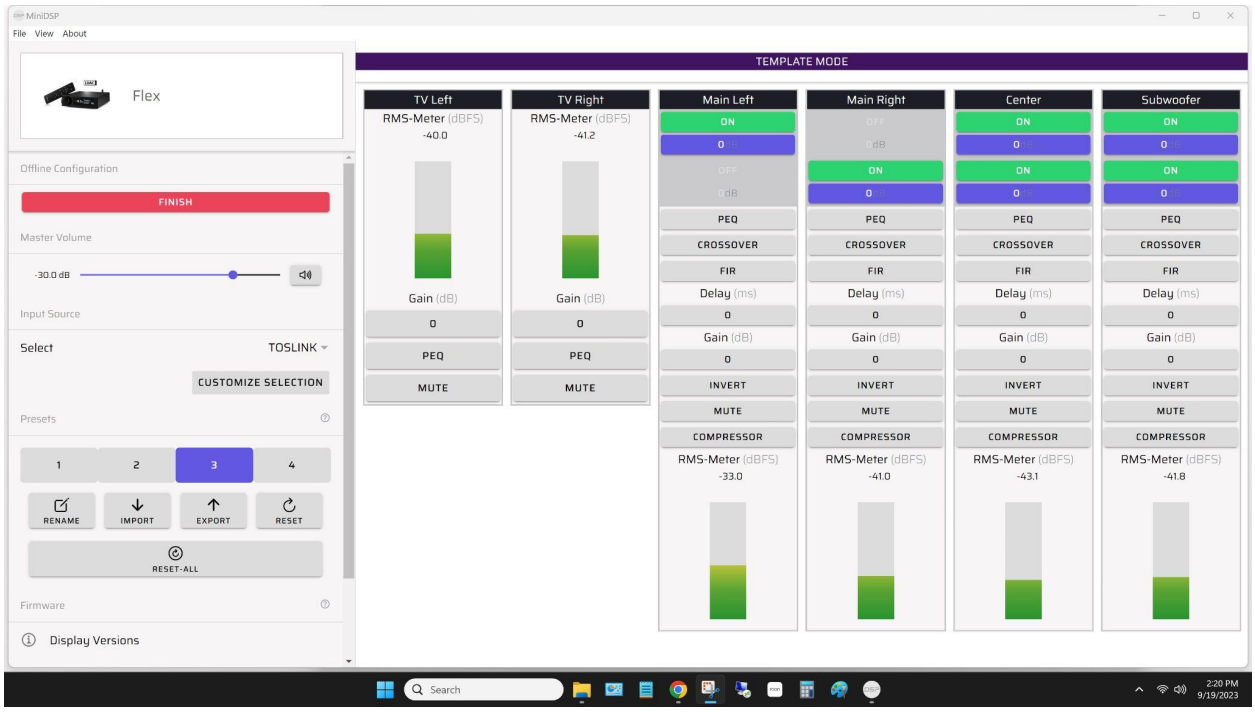

Diagram 3. Device Console's main page with routing matrix, crossovers and channel levels settings

Signal Routing

The routing matrix on the input page of Device Console will be set as follows:

- Output channels 1 and 2 for the stereo left and right
- Channel 3 for the monauralized center channel
- Channel 4 for the monauralized subwoofer

Diagram 4. Routing matrix set for 3.1 stereo for home theater audio

System Crossovers

Effective crossovers between the main and center speakers and subwoofer follow typical audio video standards.

The center channel speaker has a frequency range chosen primarily for voice. In this example, we have chosen 340 Hz to 4,000 Hz with 12dB per octave slopes. With experimentation, listening and measurement you can find the crossover frequencies that are most pleasing to you.

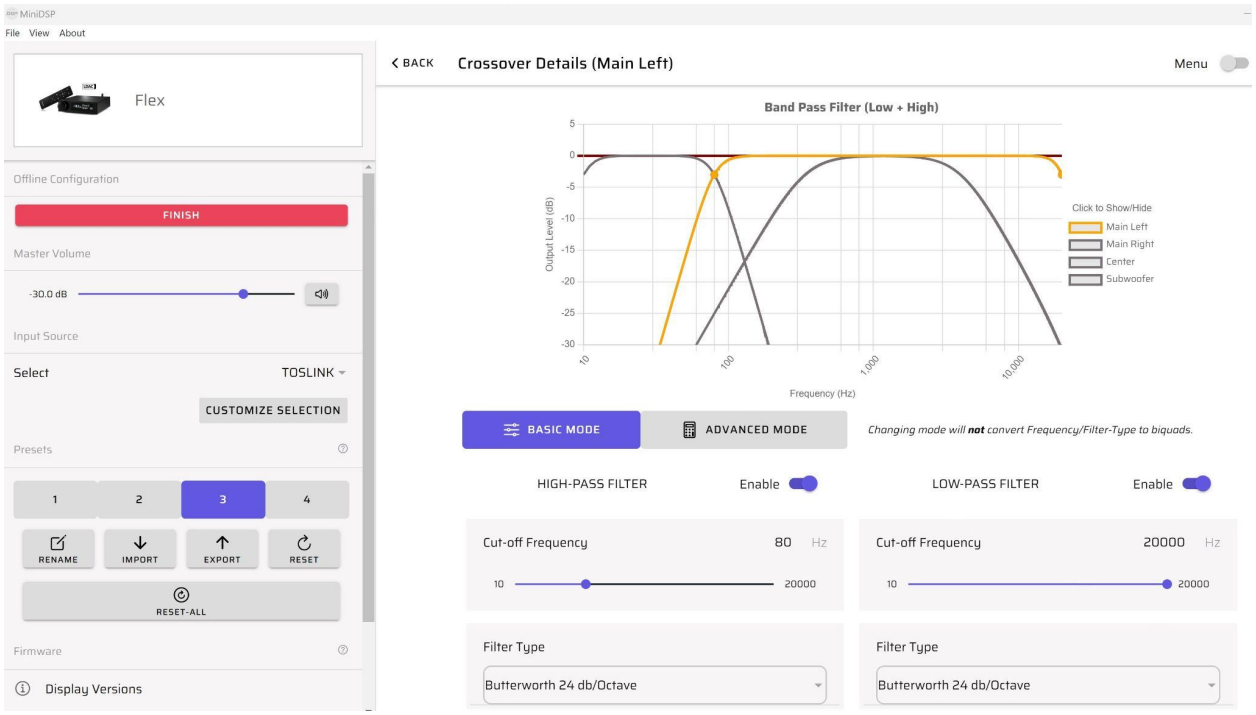

Diagram 5. Crossover setup page in miniDSP Device Console

In addition to the center channel tuned to enhance voice, you can see the crossover at 80 Hz is separating the subwoofer from the left and right main full-range speakers.

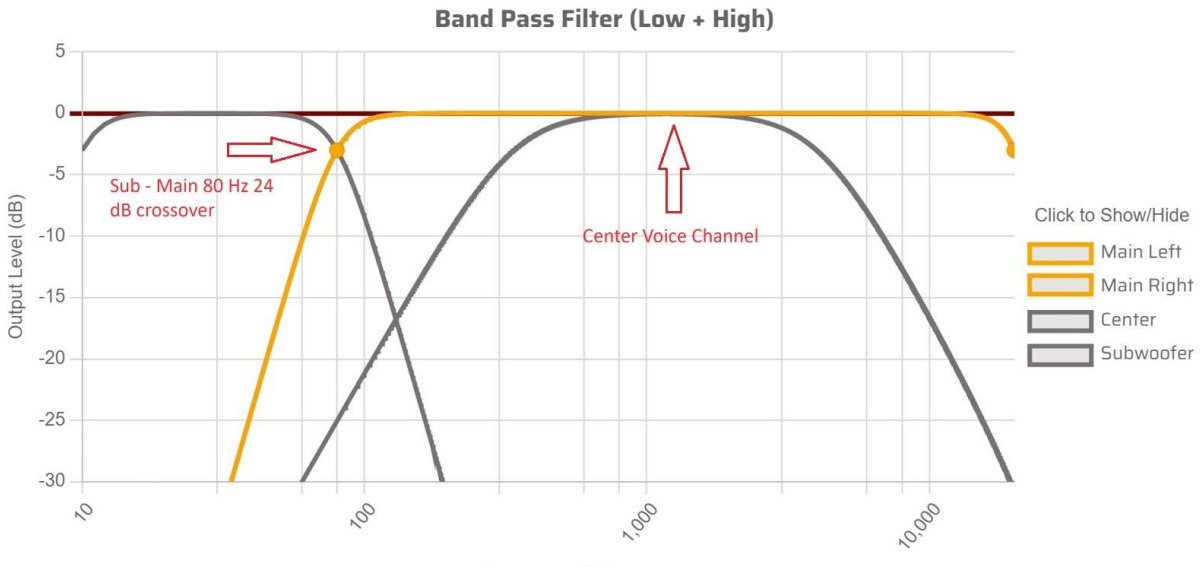

Diagram 6. Crossover configuration showing left and right mains (orange), center speaker and subwoofer.

Verifying Polarities

You can verify polarities using REW and the invert feature on the miniDSP Device Console. Simply invert any of the full-range speakers or subwoofers relative to one another to confirm polarity.

The example below shows inverting the subwoofer, which reveals a significant dip around the crossover frequency. The same thing can be done with the main and center speakers to determine if they are subtracting or adding to one another. The polarity is correct when the channel levels are additive.

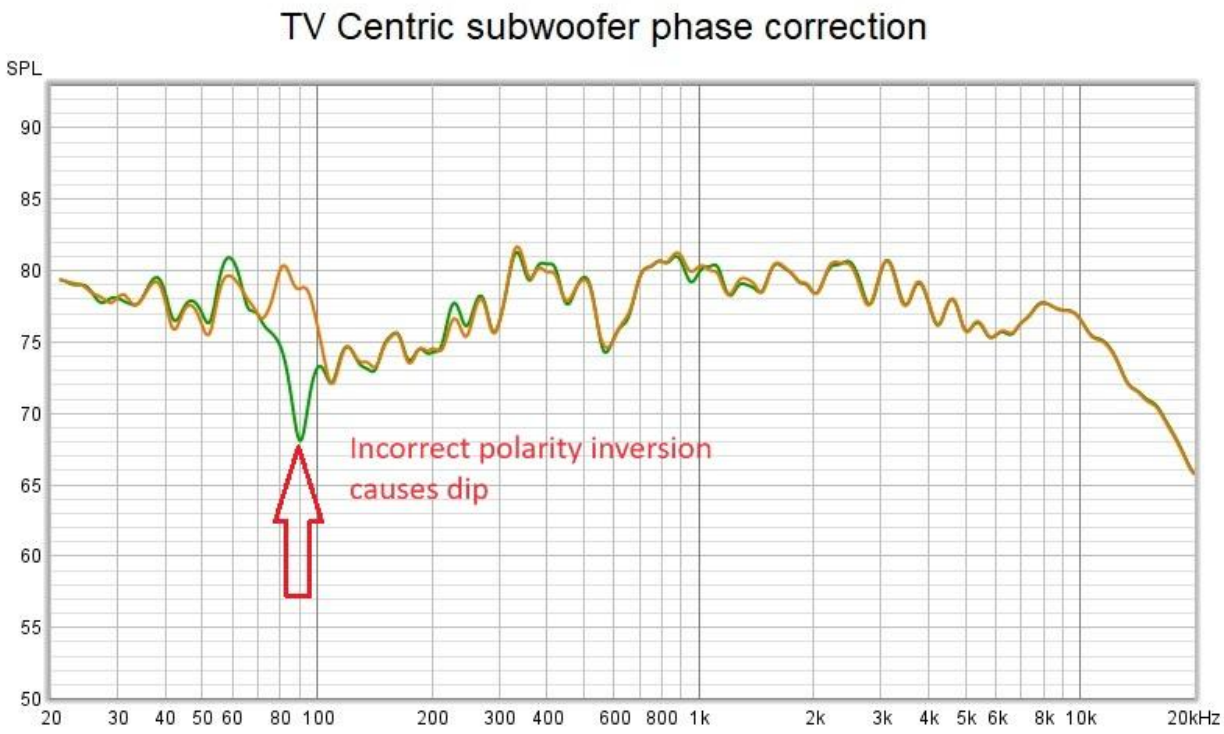

Diagram 7. Inverted versus non-inverted subwoofer showing the effect on frequency response around the crossover region

Setting Speaker Levels

The next step is to adjust the relative levels of all speakers and subwoofers using REW and a miniDSP UMIK-1. From the central listening area, adjust the levels to be close and *especially* to provide the most enjoyable listening experience. You can increase the accuracy of this measurement by moving the microphone around to several locations within your listening space and averaging the results.

In our example, we show a slightly elevated subwoofer level and a slightly elevated center channel level (for voice).

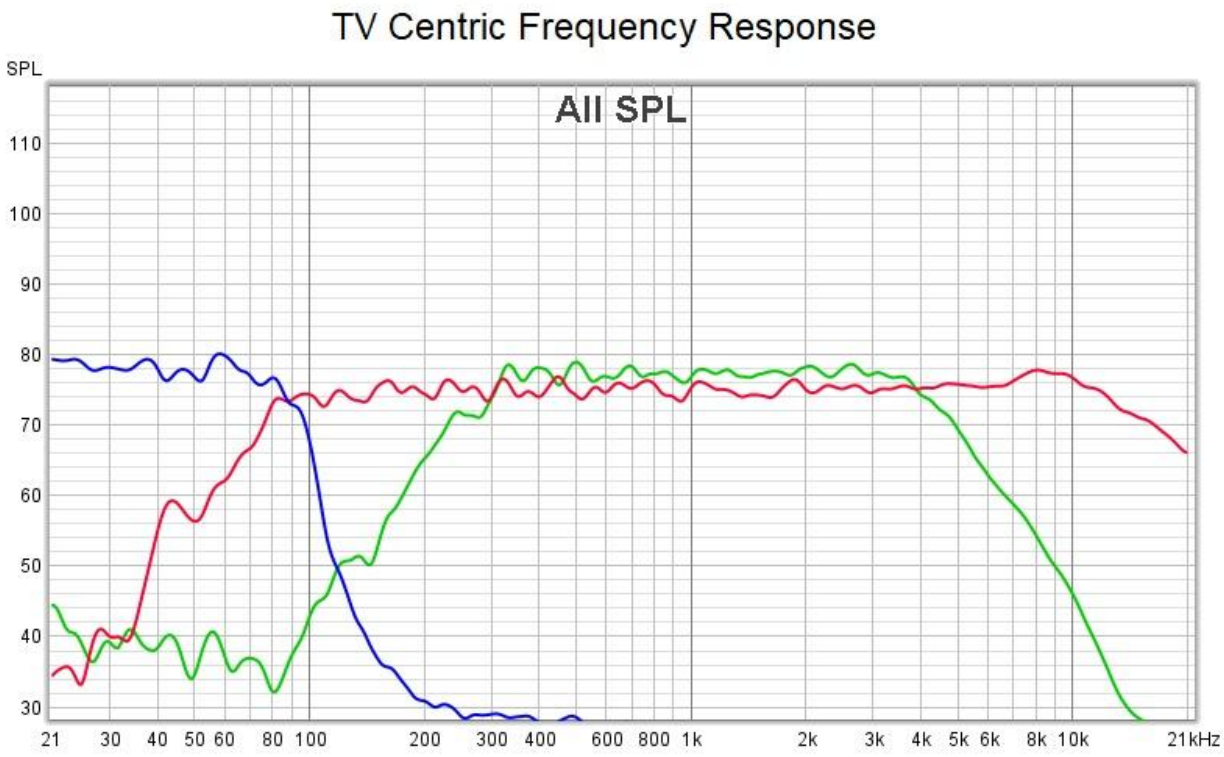

Diagram 8. Subwoofer, full-range left, right and center channel measurements after adjusting their relative level settings

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3. System Tuning Options

There are several options when it comes to room correction.

- Dirac Live solution providing state-of-the-art frequency and time domain room correction
- Basic solution with tuning to taste using the parametric equalizer in the miniDSP Flex
- Room EQ Wizard (REW) solution to create equalization correction filters, see: REW EQ Window

Before you begin your system / room correction project, complete all of the basic setup steps in the above sections. Then do some serious listening to make sure you're pleased with the preliminary results. It's key to have a proper sounding system to provide the basis for successfully completing a room correction project. Check out our tech blog Using Key Measurements to Verify Basic System Setup or see the **Additional Technical Resources** section below.

Dirac Live Solution

This is a brief outline of the Dirac Live process. Please refer to the Dirac Live User Manual for a detailed description of the procedure.

1. Create a Dirac Live account and download Dirac Live
2. Verify you have all the proper USB connections in place, with adequate room to see your computer and be able to fully move the microphone around the measuring area
3. Initiate Dirac Live from the miniDSP Device Console
4. Confirm that you are logged into your Dirac Live account
5. Perform Dirac Live level calibration
6. Select the focus listening area size
7. Perform all specified measurements
8. Proceed to Dirac Live correction waveform creation
9. Export the Dirac Live project to any miniDSP preset
10. Save your Dirac Live project

Tuning to Taste with Parametric Equalization - Basic Solution

You can tune to taste by adding parametric equalization (PEQ) curves at any time. These are applied on the Device Console output parametric equalization page and are created individually for each output channel: left, right, center and subwoofer.

The ease of adding different PEQ curves tuned to your listening preferences makes the system flexible and fun. In the example below, we show a Fletcher-Munson curve that was generated using the miniDSP Flex parametric equalizer.

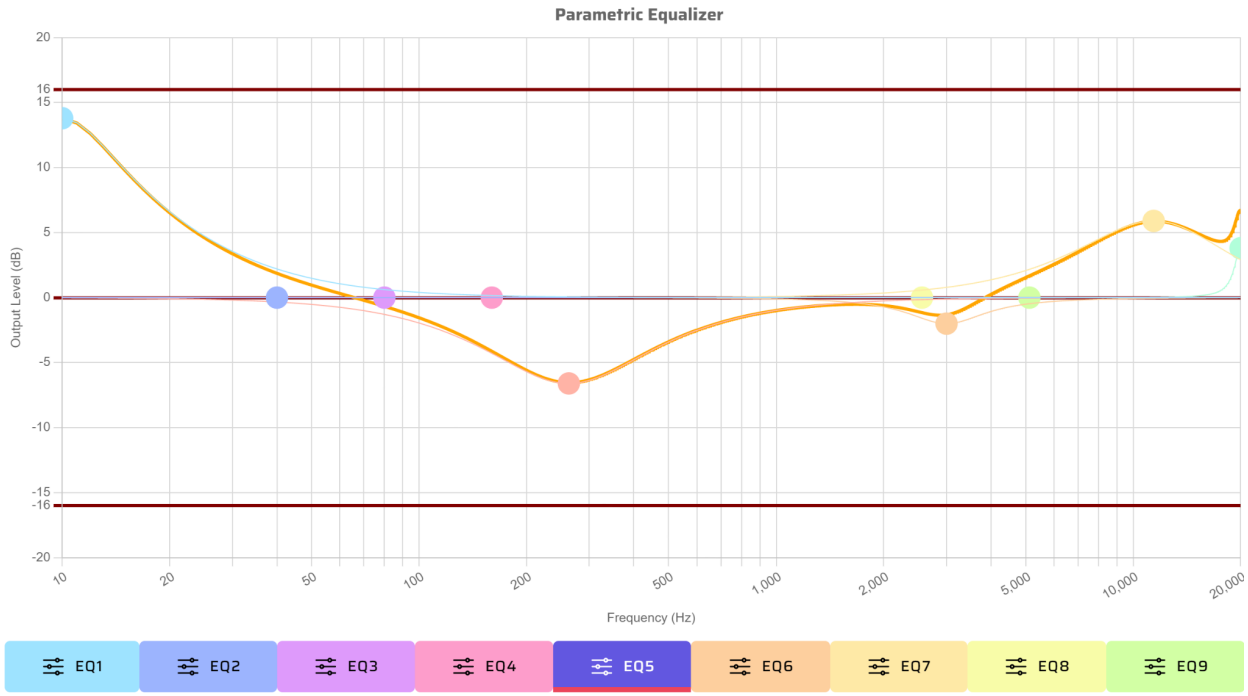

Diagram 9. Fletcher-Munson curve created with the miniDSP Flex parametric equalizer

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4. Additional Technical Resources

For more detail on the concepts mentioned in this blog, check out these resources:

1. Tech Blog: Crossover Basics using miniDSP Device Console
   Video: Crossover Basics Using MiniDSP Device Console
2. Tech Blog: Simplifying the Science of Subwoofer Integration
   Video: Simplifying the Science of Subwoofer Integration
3. Tech Blog: Using Key Measurements to Verify Basic System Setup
   Video: Using Key Measurements to Verify Basic System Setup
4. Room Correction with Dirac Live
5. Room EQ Wizard (REW) solution: Create equalization correction filters with EQ Window

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If you have questions or would like to discuss in more depth, feel free to give us a call or drop a line.