

Hardware Parametric Equalizer

Audio equalizers are important tools for adjusting the gains of different frequencies so that the sound output is more desirable. Typically, they are used to help offset unique differences in the frequency responses of speakers in order to more accurately replicate the original sound that was recorded.

A parametric equalizer provides an important additional benefit: it allows the user to actually select the size and center of the frequency band. This provides very fine control over the audio output; the user can build a filter of nearly any shape. Most parametric equalizers are implemented in software, but it should be possible to implement a hardware algorithm.

The device would contain at least the following modules:

1. The audio processor itself – it will take gain data as an input, applying an appropriate filter created by that gain curve.
2. An interface for creating “gain modifiers” which will have the following inputs
 - (a) center frequency
 - (b) band size (in terms of octaves or frequency)
 - (c) band shape

Based on all of the bands specified by the user, the system would compute an overall gain curve for the entire spectrum by smoothly merging all of the modifiers.

The resulting gain curve will be displayed on a screen as the user creates it.

3. A second interface would allow the user to trace a gain curve in the frequency domain by hand. A camera would pick up the trace and the module would analyze it and produce the appropriate filter.