

Parametric Audio Equalizer



(update: the components values are now mentioned)

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Random photo

This project is based on the parametric equalizer proposed by [Elektor](#) in the late 80s or early 90s and later published in the book "Creations électroniques" in 1993 (Publisher: Publitronic). Their design involved three stereo potentiometers per channel, which means a lot of cables from the front panel to the circuit board. It's quite tedious to build and IMHO prone to noise from within the enclosure. To solve these problems and make the unit more compact I have put everything on a single board, potentiometers included. No more cables!

A graphic equaliser has only one control per band: the gain. A parametric equaliser has 3 controls: gain, frequency and width. While a graphic equalizer requires a lot of bands to correct the sound, a parametric equaliser is more accurate and usually only one to three filters are used in series.

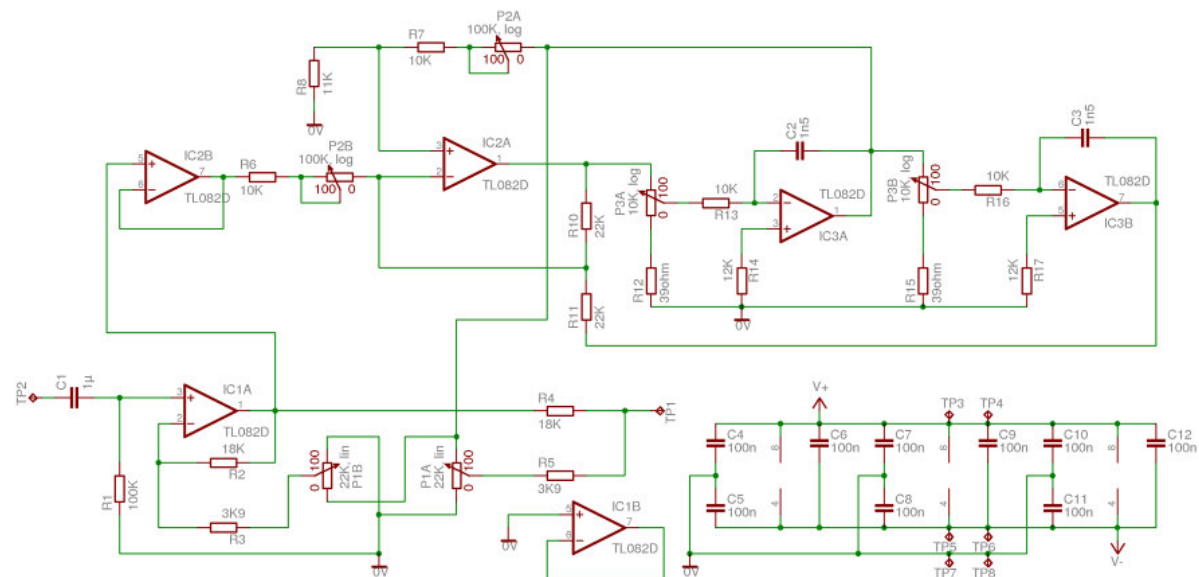
Several modifications were made to allow these improvements. First, it's an all-SMD board: easier and cheaper to build. This is necessary because clearance is limited with the front pannel. More importantly, it is important to realize that several PCBs will be stacked next to each other for the different filtering stages (usually 3, as Elektor says) and therefor we have no space to extend the PCB without spacing the potentiometers too. The only other option would be to use DIL circuits and several stacked PCBs: not very practical or cost effective...

Other modifications were necessary for the values of several components. This was prompted by the decision to use off-the-shelf ALPS stereo potentiometers. The line RK14K124 (IIRC) has a limited number of resistances available, and some filters must be re-design to accomodate another pot value. Regarding the pot's, I also opened several of them to exchange their center-detent mechanism. That way I have a center detent for the gain potentiometer and no detent for the central frequency and spectral width. The modifications are simply proportional (IIRC): changing P2 to a 10k-log requires changing R8, R9 and R10 to 2k Ω . In a similar fashion, changing P1 to a 10K-lin requires dividing R2, R3, R4 and R5 by a factor 2.2.

The project of Elektor included a Baxandall tone adjustment (bass/treble with adjustable cut frequency) but I did not implement it yet.

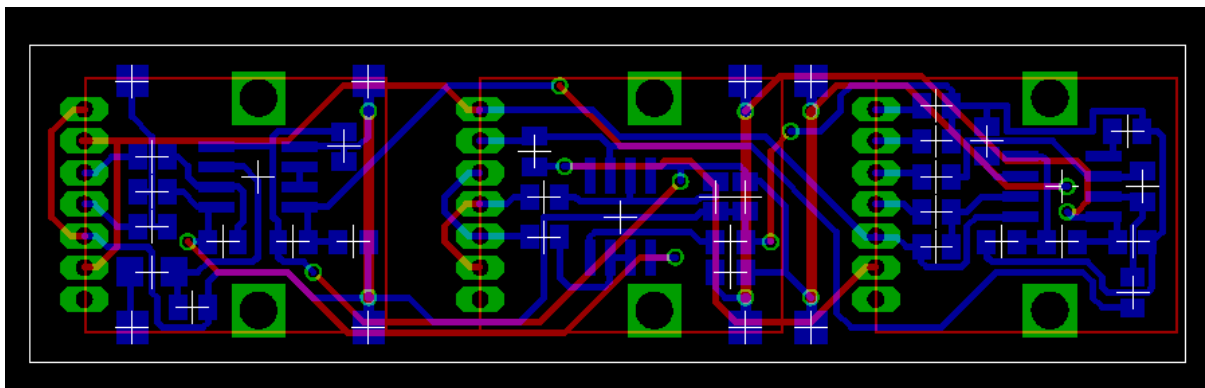
Schematic

The schematic is simply the one of Elektor. C1 should only be present in the first filter of the cascade.



PCB

As advertised before, the PCB is very compact. Care has also been taken so that the PCB interconnection is straightforward: when you place the filters next to each other the connections are aligned and very short wires suffice.



A word of caution: I have never actually built these devices because I went to Japan before I had the time to. Use at your own risk!

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