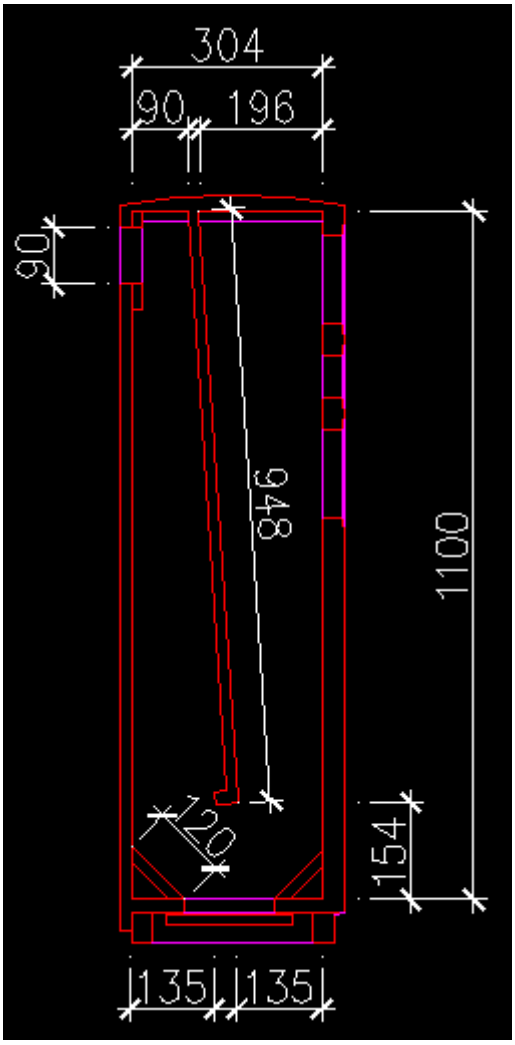
construction:building the etude transmission line speaker



Building the box

The enclosure was constructed of 18mm MDF. The front baffle is double thickness. The front baffle width is 230mm. The internal dimension of the front baffle is 194mm.The rear TL opening is 150 x 90mm.

The rear opening or vent is reinforced primarily for aesthetic reasons - from behind it gives the speaker a more solid appearance as if the entire enclosure were made from 36mm thick walls.

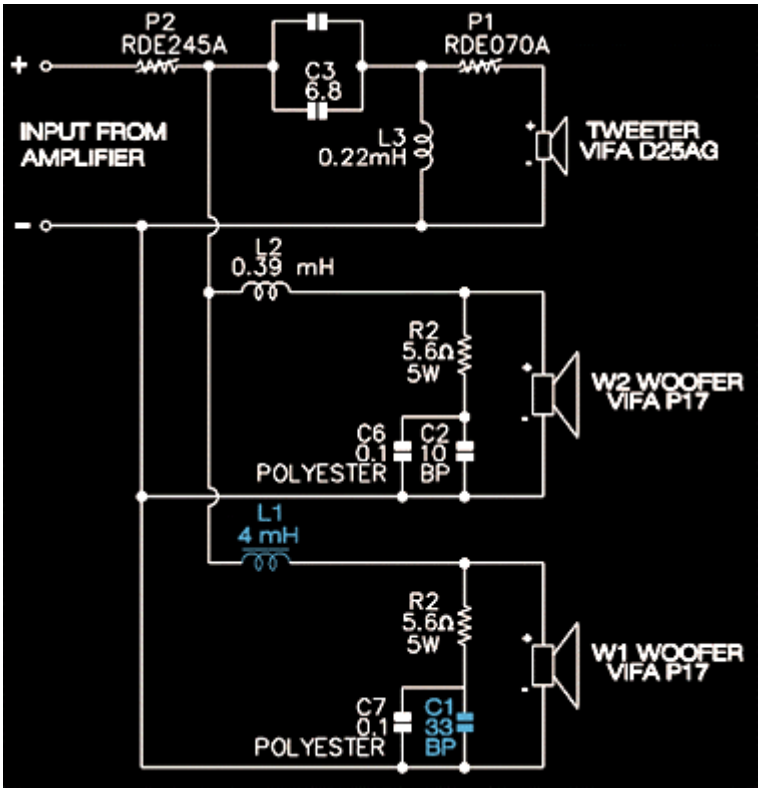
The internal baffle was reinforced at the bottom. An access panel is provided at the bottom. This allows access to the crossover which is mounted on MDF which can be mounted to the rear side of the angled internal baffle. The terminal block (not shown) is adjacent to the crossover.

The front half of the line is stuffed with acoustic damping material such as dacron or fibre fill. The base is hardwood and was needed due to the curves.

Please note: Detailed plans are NOT available. The above information when combined with the dimensioned section drawing on the left is all you need to know to build the box.

After constructing a rectangular box, I decided I wanted curves. They were achieved by adding 12mm MDF to the top and sides, then manually planing until I achieved the desired curve. This is a very time consuming process and I don't recommend it. There are better ways to get a curved box.

A single rectangular box following this design is 20 kg fully constructed. Due the the extra MDF and curves, mine weighs 33 kg.



Crossover

This is a second order Linkwitz-Riley 2.5 way crossover. Woofer 2 crosses to the tweeter while woofer 1 is rolled off above 200 Hz with a first order low pass filter, effectively providing baffle step compensation.

The tweeter uses a 0.22mH inductor and a 6.8uF capacitor to cross over at 3.5 kHz.

Woofer 2 has a second order lowpass filter at 3 kHz.

R1,R2, C1 and C2 provide impedance equalisation so that the woofer appears to the inductor as if it were a resistor. Capacitors C6 & C7 are provided to improve the power factor of the bipolar electrolytic capacitors. Overdrive protection is provided via polyswitches. The components shown coloured are those which provide the first order low pass filter to Woofer 1.

Comments on the crossover

Soon after building this speaker, I modified the crossover as I didn't initially like the idea of a 2.5 way crossover design. I modified the crossover components to woofer 1 so that they matched woofer 2. Effectively this means a 2 way crossover without baffle step compensation.

In hindsight I may have been better to leave the crossover as originally designed. I find that the tweeter could in fact use padding by 3db to achieve a subjectively more pleasant balance. A quick fix is to use the tone controls on the amp. I typically have the treble control at -4db and the bass at +6db and I find this achieves the best balance. At some stage I will probably pad the tweeter and change back to the original crossover.

Feedback

If you have any further questions, I may be contacted by email. Please also let me know if you are building this speaker as it is rewarding for me to know what others have done with this information.

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