G’day

I have a pair of JBL speakers configured (physically) like a 4333 which (now) have a 2234 woofer, 2420 mid with horn and lense, and slots. They had 3110 crossovers which I wanted to upgrade.

I looked at the original 4333 crossover circuit, and saw that it used a tapped iron cored inductor. Solid information on this inductor was scant, and I wasn’t willing to risk spending many hundreds of dollars building crossovers that didn’t have complete and accurate component values. There is an ‘equivalent’ 4333 crossover circuit floating around, but then I came across Nelson Pass’ crossover design available here. His notes were articulate and he seemed to be on the same quest I was – To maintain the JBL legacy sound – just better. So I decided to build Nelsons crossovers.

The results were great and I’m impressed.

Anyway – enough ranting – In case it’s useful to someone, I’ve documented what I did below.

The circuit –

Nelsons circuit is below and I used this except for a change to the Tweeter circuit

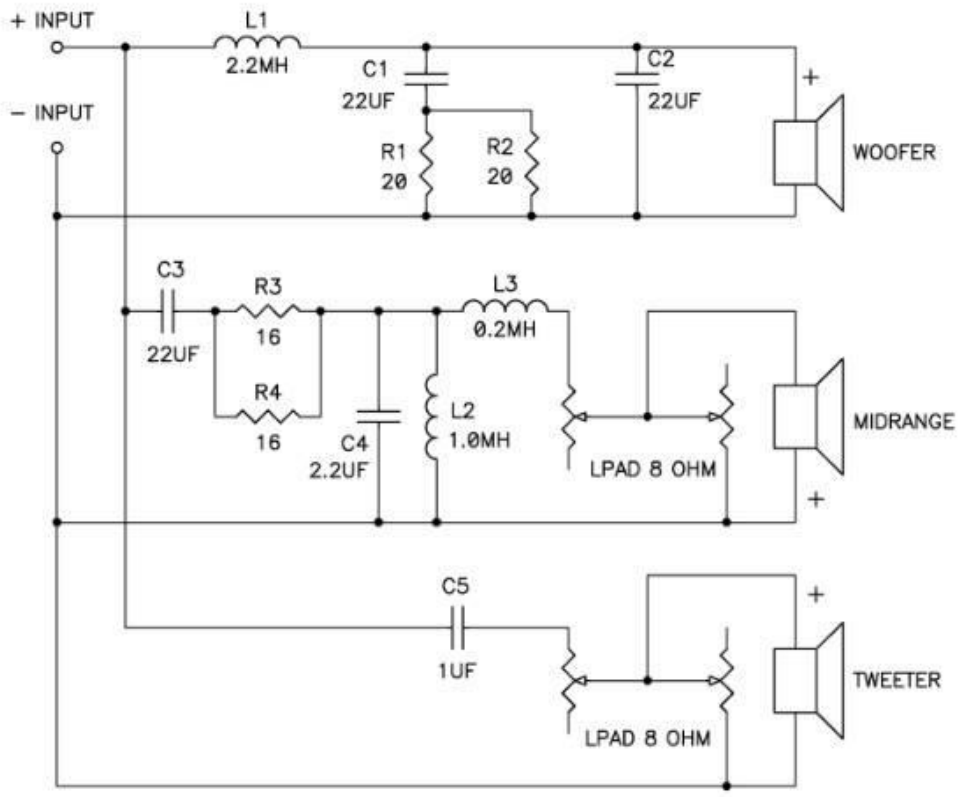


Figure 1: Nelson Pass improved L300 circuit

.

With the tweeter, I wasn't happy with 6db per octave, so right after the 1uf cap, I added a 1.5uf Cap, and between the two, I added a 1.8 Mh inductor.

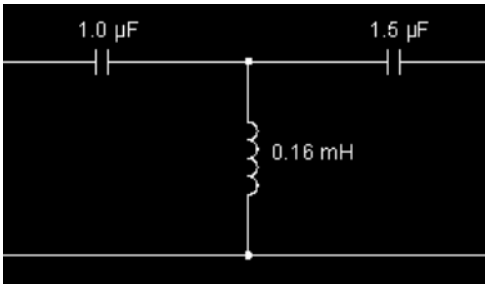


Figure 2: Modified tweeter circuit

The first thing I did, was sourced components – quality capacitors & inductors aren't cheap! I decided to use the best components I could afford for any application that was in series with (passed) the audio, and if I had to use 'lesser' components, to use them where they were parallel to the signal. Not crap components mind you – Just not $70 per cap. This meant the following needed to be highest quality;

- L1
- C3
- R3 & 4
- L3
- C5 (& the 1.5 uf Cap after C5 not in the above circuit)

…for these I used MCap Supreme capacitors, and copper foil inductors. R 3 & 4 were specified as 10W 16 Ohm, so I used single 20W 8 Ohm, non inductive Resistors for these instead. All other resistors were standard 10 W 5% type.

The parts list;

- 6 X 22uf Capacitors
- 2 X 2.2uf Capacitors
- 2 X 1.5uf Capacitors
- 2 X 1uf Capacitors
- 4 X 20 Ohm Resistors
- 4 X 16 Ohm Resistors
- 2 X 2.2mh Inductor
- 2 X .2mh Inductor
- 2 X 1mh Inductor
- 2 X 0.2mh Inductor
- 4 X 8 Ohm L-pads

…along with 300 X 300MM 5MM formica boards to mount everything, connectors etc.

The build

Ok, here's how I went about it – I was lucky enough to have the help of my daughter who soldered, and loaded the boards – Thanks hon ☺

Once I got all the components together, I covered the formica boards in masking tape so I could mark locations etc. I then placed the components on the boards inline with the circuit diagram, and traced around them with a marker.

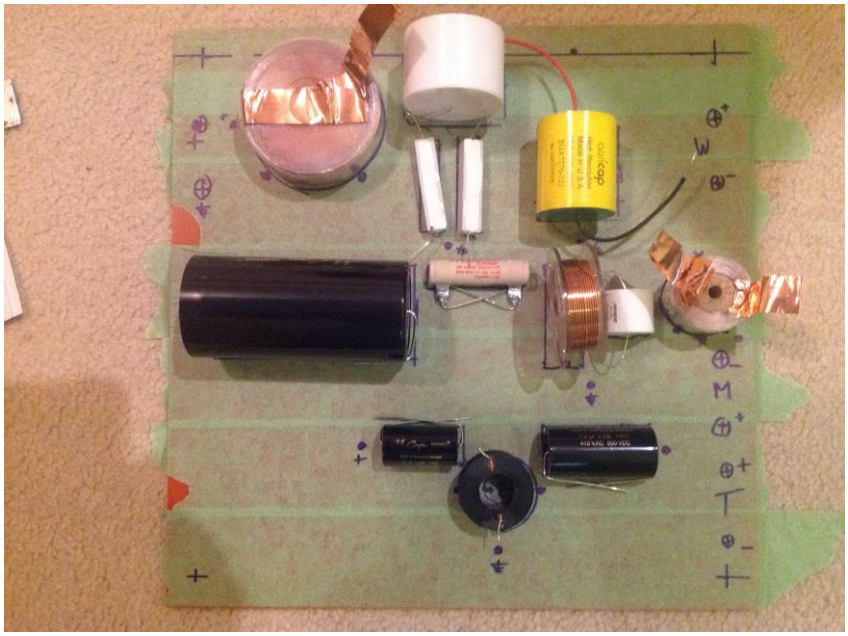


Figure 3: Placing the components

I also marked locations for driver and input connections, along with holes for mounting, wires, and cable ties which were to be used to hold the components.

Here's the board with locations of components and holes marked.

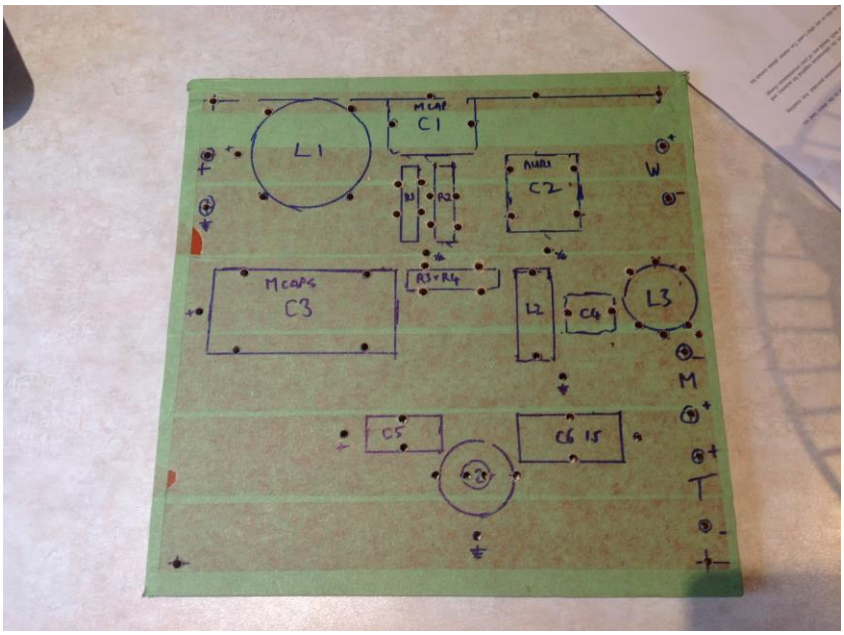


Figure 4: Component locations marked

Next job is drilling the holes – I checked and double checked that things were right as mistakes made at this stage could mean shopping for new boards.

Once the holes were drilled, I removed the masking tape, and marked the location of components.

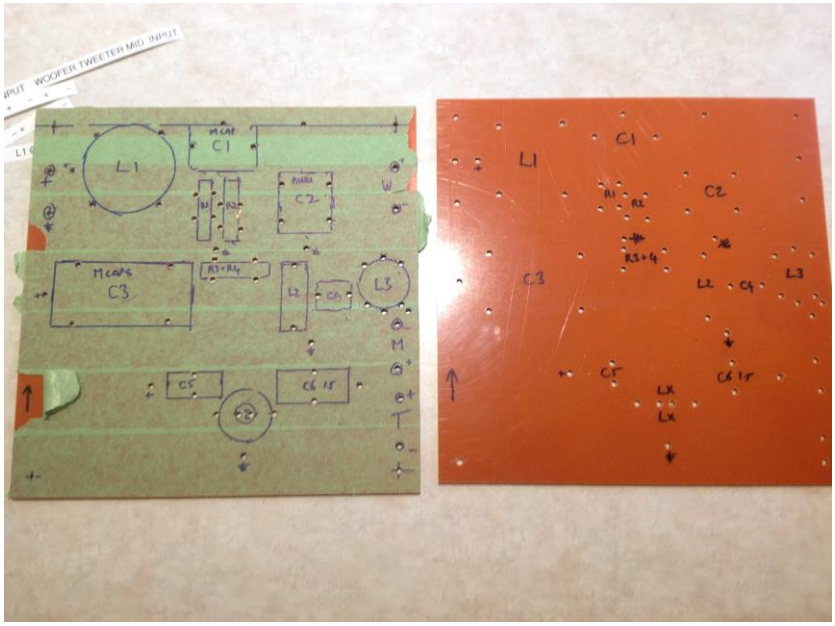


Figure 5: Drilled board with component locations marked

Time to load the components.

Note that I glued and cable tied the components to the formica board so they'd be protected from vibration.

Only an idiot loads a boards components, without inserting the wires into their respective holes – I am that idiot. You shouldn't be.

I then inserted wires as appropriate, and soldered wires to the inductors and fed them through the boards.

Figure 6: Glued and cable tied components loaded

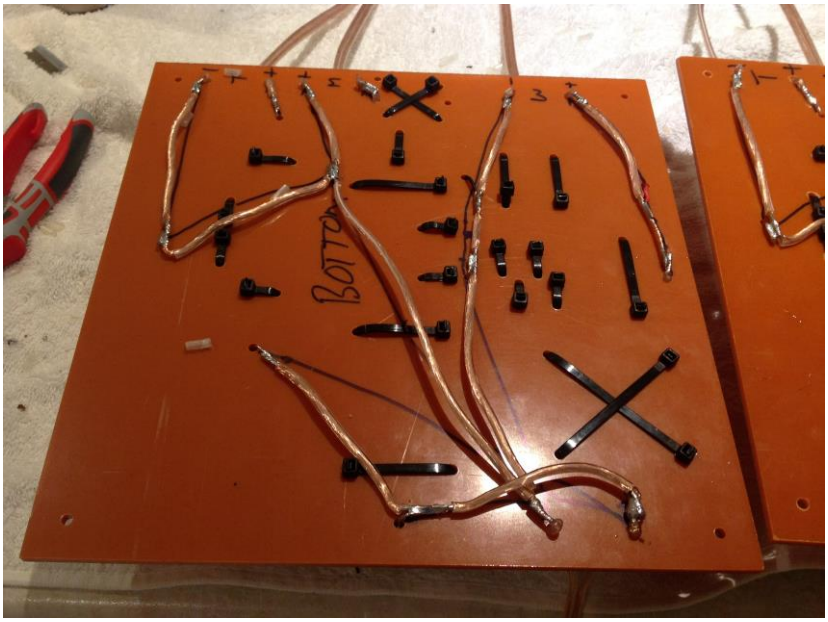
Here's the underside of the board with the wires in place.

Figure 7: Underside of board before wiring

Now I marked where the wires should connect each component, and we started soldering…

Figure 8: Wire positions marked - Start soldering

Here's one of the boards wired up.



I used hot glue to secure the wires, and did the same with each component.

I paid particular attention to ensuring the inductor foil was glues so it couldn't vibrate when in use.

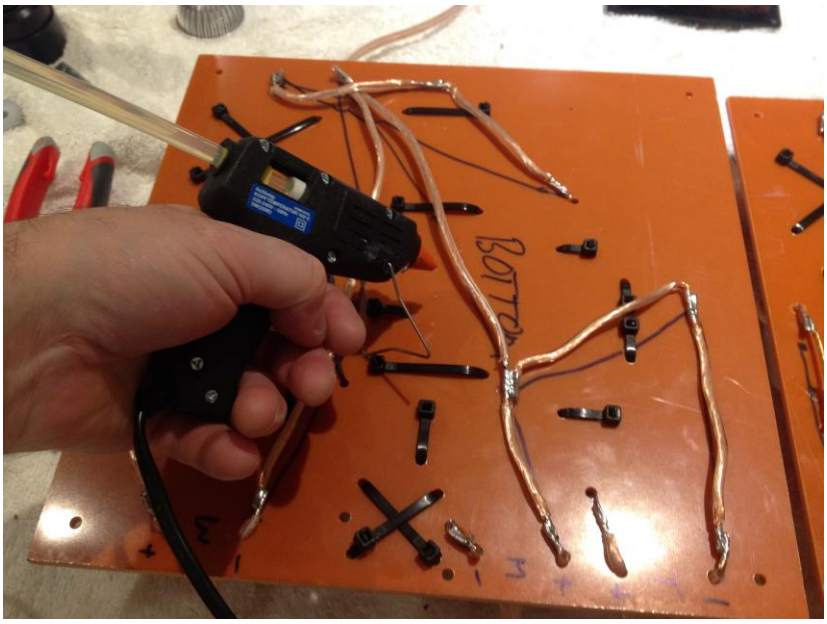


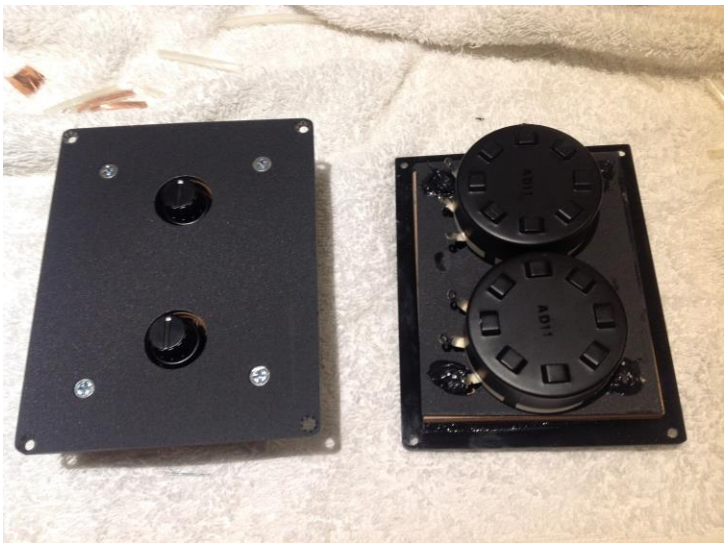
Figure 9: Use hot glue to secure wires and components

The hot glue looks a little untidy n my opinion, but it sure does the job.

Ok – Now I have two boards with components loaded, connected, and secured. Also note the

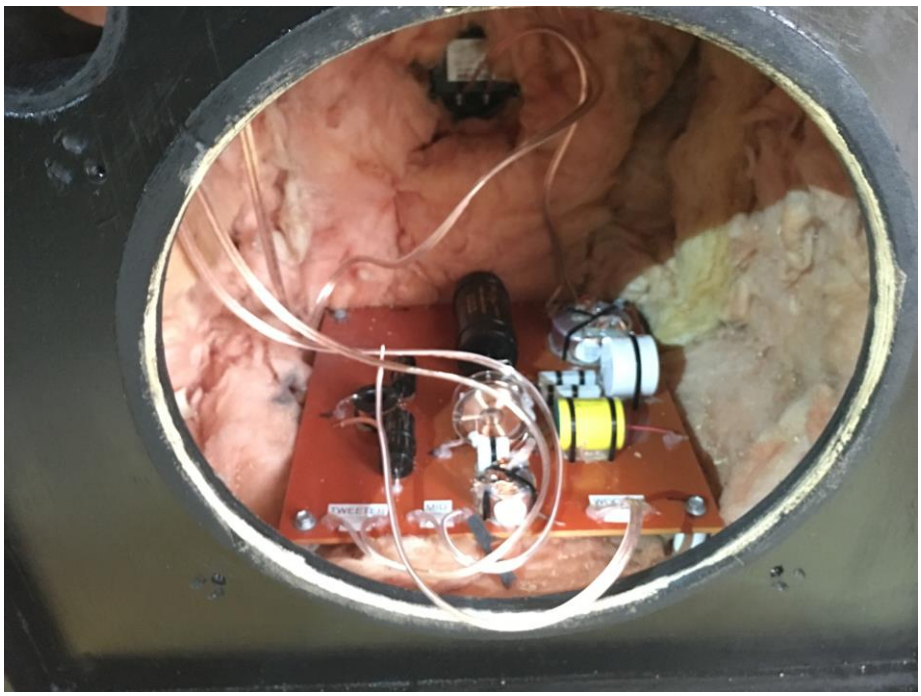
glue used to hold the components on the board. I used an industrial glue however anything that can take a little heat and vibration should be adequate.

Next I turned my attention to the L-Pads – I used 100 watt L-Pads for all, though that's overkill. I wanted to replace the existing 3110 crossovers with a plate that had the lpads mounted. This way, if I ever wanted to take the speakers back to stock, it was achievable. In the end, I decided to use acrylic sheet for the face and back, with MDF in between, monting the L-Pads to the back plate. This gave the knobs a sunken appearance which looks much better than just mounting the L-Pads to the face. I was a bit slack with photos of this part of the build.



I cut the face plates, then the back plate and MDF. I then screwed and glued them together with epoxy.

All that was left to do now was wire the L-pads to the crossovers, then install into the boxes.



I made spacers from plastic conduit to keep the crossovers off the bottom of the boxes, and screwed them in.

Thanks to Nelson Pass for his circuit and excellent writeup – I'm sure it took him a long time to do all the hard work that arrived at his design. Without that, I would have taken a different path and may not have been as pleased with the end result.

Pauly. 2nd November, 2015