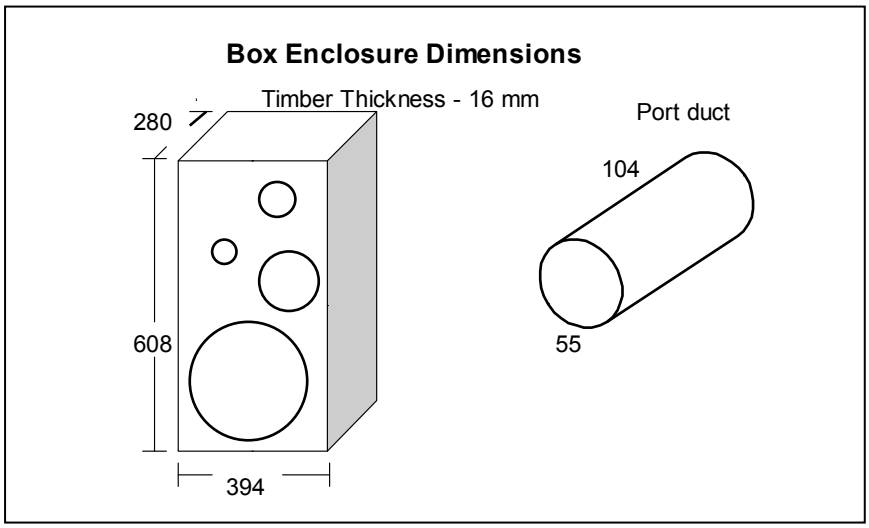
- 1 -PEERLESS SPEAKER UPGRADE PROJECT

It is amazing what people sell at garage sales for making a little extra cash, even old bomb speakers. So after much effort carrying my newly acquired bargain home raising quite a sweat, I decided to try them out. Wow! . I have never heard such disgusting sound and response. I reckon hammering a tin can sounded better, But the condition of the boxes was top notch.

Upon removal of the front covers, it's no wonder the sound was bad as the right woofer had a hole in it the size of my fist, the left was not much better. After removing all the drivers in both boxes, only one tweeter worked properly. The other drivers were basket cases. Now with only the enclosures left time to check the structural condition. No problems here fortunately. The new system would be 3-way ported as the dynamic range and bass response give the sound more natural clarity.Peerless Drivers seemed the best choice. The second step would to obtain some dimensions thus selecting a suitable port duct. The figure below shows the box enclosure and port duct dimensions.



Before drilling I had to remove the inner-bond and position the hole just off the left centre between the midrange and tweeter.The second speaker port would be located in the same location but to a right- hand orientation. This is done for ascetics and also stereo field balancing and response. The hole had to be 50mm diameter thus making the port fitting tight. Speaker ports must be tight to prevent air leaks except through the port it self which enhances bass response. The drivers used are:

Woofer 12-inch part no. 831857 * (15hz – 700 Hz)
Midrange 4-inch part no. 821615 * (750Hz – 3.8Khz)
Tweeter 1-inch part no. 811582. * (4Khz – 22Khz)
Port Duct dia.55mm x 104mm part no. PORT 12550

***Approx Frequency ranges**

front view **back view**

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The first selection of crossover net-work was a ready made unit (CODE XN150) as it seemed to have a decent power rating and acceptable crossover frequencies. The following photo shows the unit used and the wiring. Note the red markers for the positive side of the circuit.

Attentuation : 16db per octave
Power in 150w
FQL- 700 Hz
FQH - 4Khz
code : XN 150

After some time, the speaker system was finally ready for testing. I knew from personal experience that a passage of music played on the Sydney Town Hall Organ would suffice, as this instrument is capable of producing the lowest musical note from a 64 ft pipe ranging to a high note from a pipe the size of a pencil. The results were not what I expected and I found that the Sound was a little too flat and lacked decent bass for a 12-inch Peerless woofer.
Of course sound is one of the most manipulative natural forces and can be altered using a different configuration of crossover consisting of basic components. So I decided to disregard the pre-made crossover and build my own. as the photo below shows:

The photograph above consists of the components used, obviously 2 of each is required for stereo. This crossover has the following specifications :
3-way first order @ 6db per octave
X 1 - 750HZ – highest woofer frequency
X 2 – 4kHz – the lowest tweeter frequency.
The mid range frequency is approximately between 800Hz and 3.8kHz.
Over lapping Frequencies gives a smooth rollover between bass mid and highs making the sound more natural.
Coils – 0.33mH mid range (code : XLA.33)
1.8mH woofer (code : XLA1.8)
Capacitors –
4.7uF 100vw N.P tweeter (code : 4.7RY 100)
33uF 100vw N.P midrange (code : 33RY 100)

Wiring used :

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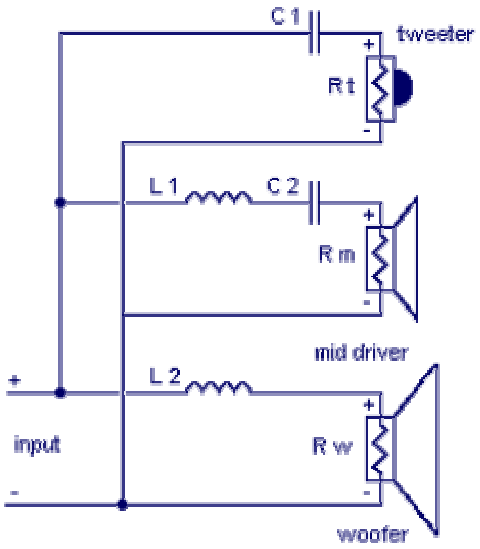
O. D - 3.5mm x 7mm /18AWG OFC
Strands - 105x0.1mm x 2
Code : AIC335 / AIC1335

The internal wiring used is the same as if wiring the amplifier to the completed system thus keeping the gauge the same. This will reduce any loss of signal quality and power.
The red markers indicate the positive side of the circuit. It is important to get the wiring orientation at each end correct otherwise the amplifiers output won't like it. And the sound phase will be affected also. The inside bottom is a good place to fasten the coils with a couple of self taper screws

The circuit used in this design is as follows :



Again after some more assembly of my own crossover as per the circuit above the system was ready for testing using my favourite passage of music from the Sydney Town Hall Organ the results were outstanding to the point of earthquake material, even for a solid brick and concrete

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rendered studio. The amplifier used for testing had the bass & treble controls set at flat (white pointer indicates 12O'clock) and the sound set at two channel stereo with no DTS (DTS – Digital Theatre Surround) or DSP (Digital Soundfield Parameter) settings active.

This is what the finished product looks like. Ok, so you ask about the white square as it looks a little odd? True. As the hole from the original 5-inch mid range speaker was bigger, I needed to make a baffle plug to fit the new 4-inch mid range using a piece of 12x 80 x 80 MDF, plenty of wood glue and some very long 70mm wood screws (8 used) to make a nice tight seal.

Equipment used for testing :
Yamaha Natural Sound Series
Amplifier :
6ch 145w Cinema amp.
Yamaha Model RXV –1000

CD Player :
Yamaha 5Disc X-changer Model : CDC675

The amplifier and CD were linked via fibre optic cables (code OPTO121) for pure digital signal and also to test the speaker integrity.

Speaker Total Dynamic range 15Hz – 22Khz. Approx.

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With the system finally finished I can now enjoy my new system as part of home theatre system knowing that the speakers will stand the test of today's HIFI, sorry, DIGITAL HIFI demands. A hearty well done Mr Peerless on a smooth well balanced product .

Presto !

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