

NOT TABAQ ©

Tang Band Quarter Wave (not TABAQ)

A Transmission Line designed for the Tang Band 6.5" full range drivers.



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Inspired from a lot of forum threads on the internet about how good and impressive TL speakers can be with such small drivers, I decided to design my own quarter wave loudspeakers.

This is my second pair of TL speakers and my second pair of any diy speakers. I consider the first one as sounding amazingly good but being and pure beginner I would not rely on my ears.

The first pair i made was using the RS100-4 from Dayton audio and despite being more than happy with them I wanted to try and other drivers' brand that I see a lot on forums: Tang Band!

Note that my first pair was made by following old TL design method.

Please refer to: <http://www.mh-audio.nl/Loudspeaker.html#>

For this newer model however, I used (correctly?) the software Hornresp.

The Tang Band Drivers

For this build I chose to use the driver W6 2144:

Parts-express: <https://www.parts-express.com/Tang-Band-W6-2144-6-1-2-Paper-Cone-Full-Range-Driver-8-Ohm-264-959>

Tang Band W6-2144 6-1/2" Paper Cone Full Range Driver 8 Ohm



Thiele-Small Parameters

Resonant Frequency (Fs)	45Hz
DC Resistance (Re)	6.8Ω
Voice Coil Inductance (Le)	0.01mH
Mechanical Q (Qms)	1.73
Electromagnetic Q (Qes)	0.62
Total Q (Qts)	0.45
Compliance Equivalent Volume (Vas)	1.22ft³
Mechanical Compliance of Suspension (Cms)	1.24mm/N
BL Product (BL)	5.45T·m
Maximum Linear Excursion (Xmax)	3mm
Surface Area of Cone (Sd)	140cm²

As Bjorn Johannesen (bjohannesen@post.cybercity.dk) said in his TABAQ build:

« The Tang Band drivers have a relatively high Fs and very high Qts. The high Qts means the roll off is gentler than a low Qts driver, and it is therefore possible to design a quarter wave with useful output well below Fs. However, high Qts drivers can be difficult to control.

The whole idea with a quarter wave – or transmission line – is to extend the bass by the contribution from the opening. At the cabinet resonance, the output is adding to the driver output. However, there are some higher harmonics which are definitely unwanted as they are out of phase with the driver, causing uneven frequency response. These problems can be solved by different design parameters »

What more could I say?

Design in Hornresp

On parts-express and as verified by a calculator the Vented volume needed for the driver is 42.48L at a frequency (Fb) of 40Hz.

40Hz gives you a wavelength of 860cm, the quarter of that being 215cm

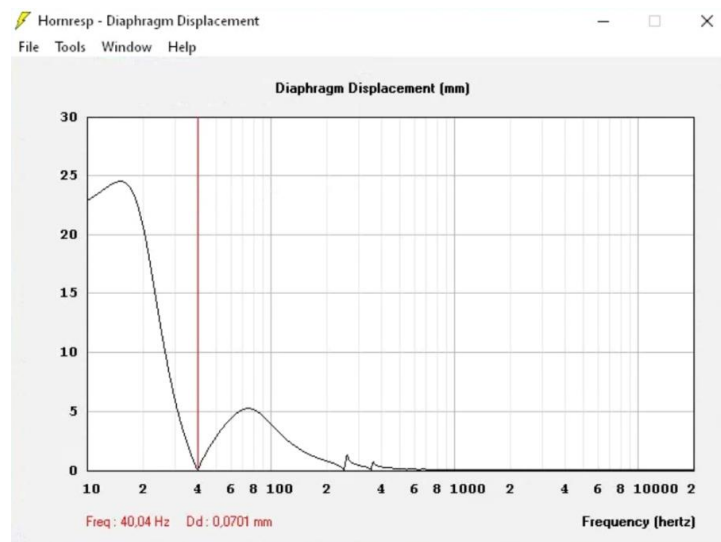
Since I divided the taper in the line in 3 segments it gives me 71.7cm

So, I entered all the parameters, chose a 1/3 driver offset and let Hornresp do the job.

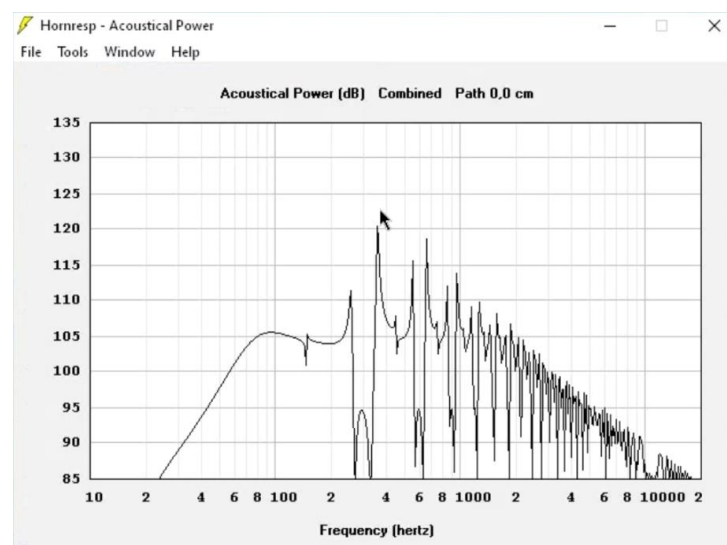
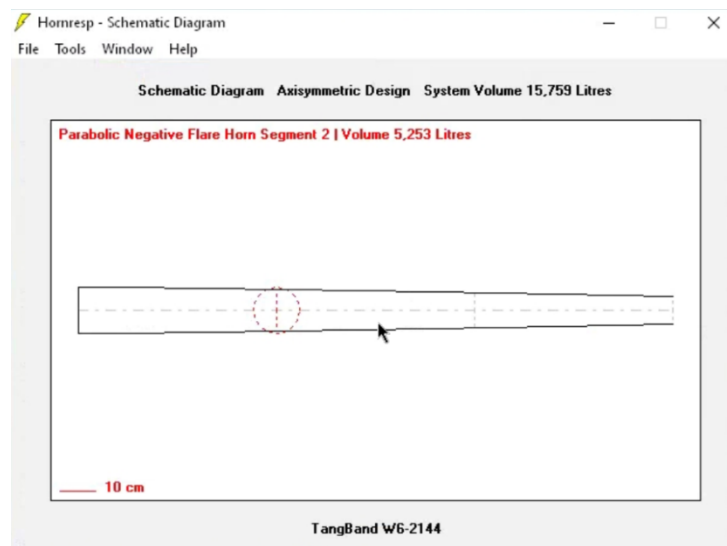
The tuning frequency was too low as I saw on the Diaphragm displacement (the cone is not moving at his tuning frequency)

So, I shortened the length of the line from 71.7 to 56cm to achieve the wanted 40Hz:

Ang	2.0 x Pi	Eg	14.28	Rg	0.00	Fta	-1.29
S1	140.00	S2	109.20	Par	56.00	F12	0.00
S2	109.20	S3	78.40	Par	56.00	F23	0.00
S3	78.40	S4	47.60	Par	56.00	F34	0.00
S4	0.00	S5	0.00	L45	0.00	F45	0.00
<hr/>							
Sd	140.00	Cms	1.24E-03	Mmd	9.13	Re	6.80
Bl	5.59	Rms	1.65	Le	0.01	OD	1
Vrc	0.00	Fr	0.00	Vtc	0.00		
Lrc	0.00	Tal	0.00	Atc	0.00		
<hr/>							
Comment: TangBand W6-2144							
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Previous Next Edit Add Delete Record 2 of 4 Calculate							



Tapered down to 34% of the line cross section area, 100% being the S_d (cone area) of the driver:



As shown on the last graph the low frequencies looks promising to me, but what about the high frequencies?

It looks kind of bad to me... should I be worried?

This is my progress so far, and I come to you to correct me if I am not following the right track.

To Build the Not TABAQ

I chose 22mm MDF because it gives a nice weight to the speaker and I can more easily have this thickness, down to 12mm thick could work just as well, I guess.

All dimensions are in mm:

