JBL 2245 H and Quarter Wave (Transmission Line) Designs

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Given the T/S parameters, I have used the software from Marin J. King to design subs speakers for this driver. Please note, I have not built any of these cabinets, and the design is made purely by simulation. However, from my experience building speakers based on Martin J. King's software, I am very confident with the estimate results. For your personal taste and listening room, you can experiment with the stuffing.

All numbers are internal values and you should be able to design the enclosure from this information. The line can be folded, and the length is measured in the middle of the line and in the middle of the corners.

Cross section area is a factor of the drivers Sd, which is the easiest way to use the software.

Driver T/S

Fs: 20 Hz

Vas: 821 liter

Re: 5.8 Ohm

Qes: 0.27

Qms: 2.2

Qts: 0.24

L: 1.4 mH

BL: 21

Sd: 1300 cm^2

General about the designs

I found tapered line was not the way to go with this driver. Both designs are mass loaded in some way. This reduce the size of the cabinet, compared to a straight line

MathCAD models are divided into section from driver to closed end and sections from the driver to the open end. Note that in all designs, the last part of the pipe is unstuffed.

DESIGN 1 – Reduced cross section area with “small” opening

The last section is the opening, and the length is set to 0.75 in = the thickness of the cabinet.

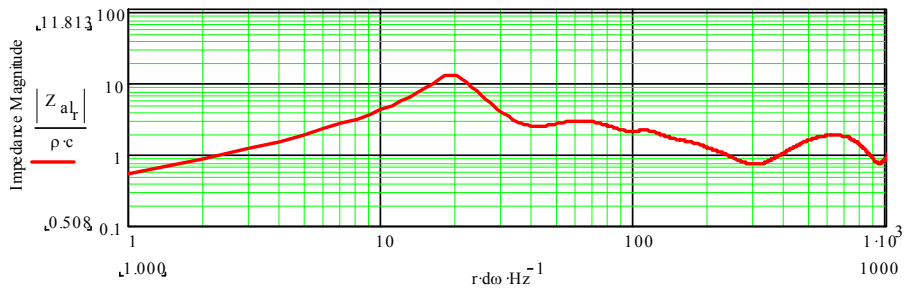
Total stuffing: 20.465 lb

Closed End of Transmission Line (Driver ---> Closed End)

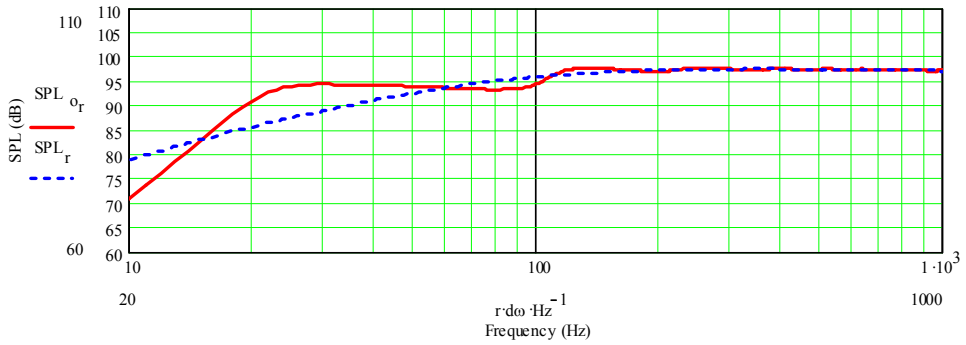
Section Length	Initial Area	Final Area	Stuffing Density
$L_{c_0} := 10 \cdot in$	$S_{c_{0,0}} := 3 \cdot S_d$	$S_{c_{0,1}} := 3 \cdot S_d$	$D_{c_0} := 0.9 \cdot lb \cdot ft^{-3}$

Section Length	Initial Area	Final Area	Stuffing Density
$L_{o_0} := 55 \cdot in$	$S_{o_{0,0}} := 3 \cdot S_d$	$S_{o_{0,1}} := 3 \cdot S_d$	$D_{o_0} := 0.9 \cdot lb \cdot ft^{-3}$
$L_{o_1} := 55 \cdot in$	$S_{o_{1,0}} := 2 \cdot S_d$	$S_{o_{1,1}} := 2 \cdot S_d$	$D_{o_1} := 0.0 \cdot lb \cdot ft^{-3}$
$L_{o_2} := 0.75 \cdot in$	$S_{o_{2,0}} := 0.5 \cdot S_d$	$S_{o_{2,1}} := 0.5 \cdot S_d$	$D_{o_2} := 0.0 \cdot lb \cdot ft^{-3}$

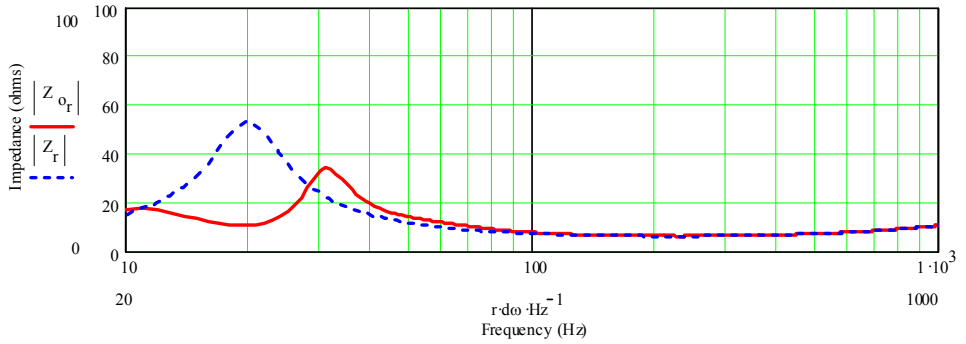
This design could be 2 Sonotubes, 65” and 55”, with different sizes, and with a “small” opening: 0.5 Sd = 650cm^2



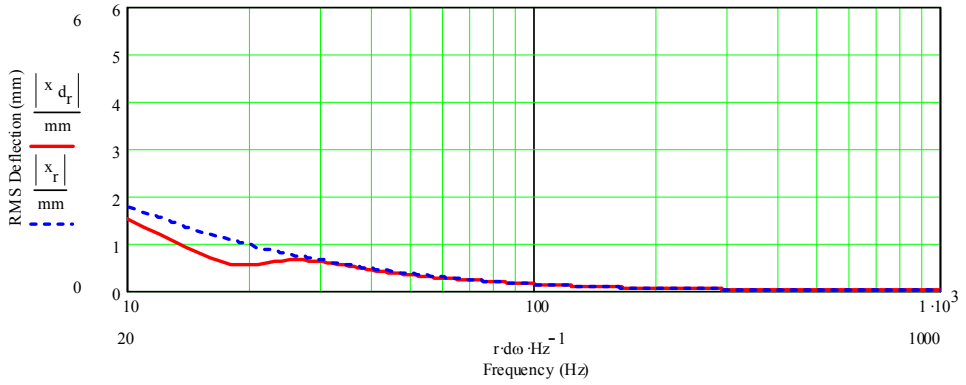
Tuning of the cabinet is just below 20Hz



Summed output from driver and opening. Dotted blue line is the same driver in an IB.



Impedance.



Displacement of the driver

DESIGN 2 – Coupling chamber and reduced cross section area

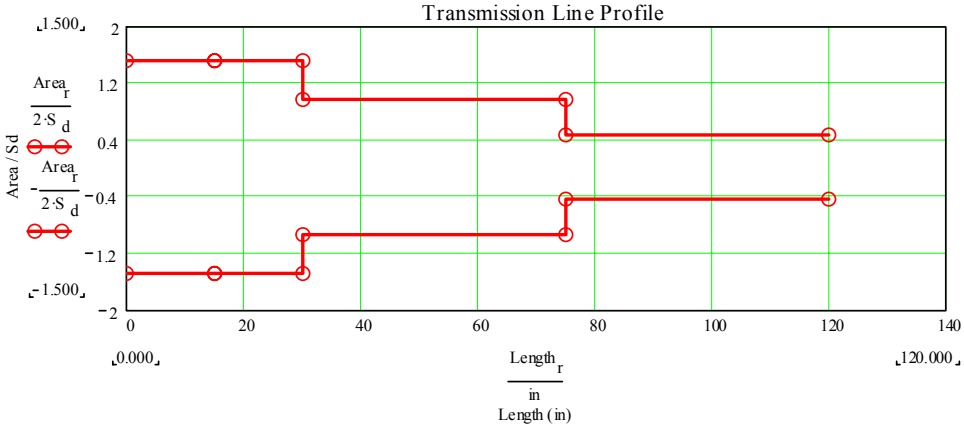
This construction is similar to my HideAway TL Sub from AudioXpress July 2006, but in this particular case, the cross section area of the line is bigger. In my HideAway, the pipe was much smaller, to make the line fit under my coach.

Section Length	Initial Area	Final Area	Stuffing Density
$L_{c_0} := 15 \cdot in$	$S_{c_{0,0}} := 3 \cdot S_d$	$S_{c_{0,1}} := 3 \cdot S_d$	$D_{c_0} := 0.3 \cdot lb \cdot ft^{-3}$

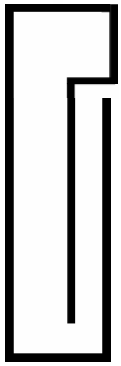
Open End of Transmission Line (Driver ---> Open End)

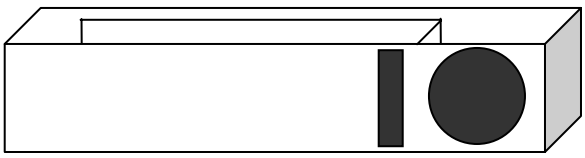
Section Length	Initial Area	Final Area	Stuffing Density
$L_{o_0} := 15 \cdot in$	$S_{o_{0,0}} := 3 \cdot S_d$	$S_{o_{0,1}} := 3 \cdot S_d$	$D_{o_0} := 0.3 \cdot lb \cdot ft^{-3}$
$L_{o_1} := 45 \cdot in$	$S_{o_{1,0}} := 1.9 \cdot S_d$	$S_{o_{1,1}} := 1.9 \cdot S_d$	$D_{o_1} := 0.3 \cdot lb \cdot ft^{-3}$
$L_{o_2} := 45 \cdot in$	$S_{o_{2,0}} := 0.9 \cdot S_d$	$S_{o_{2,1}} := 0.9 \cdot S_d$	$D_{o_2} := 0.0 \cdot lb \cdot ft^{-3}$

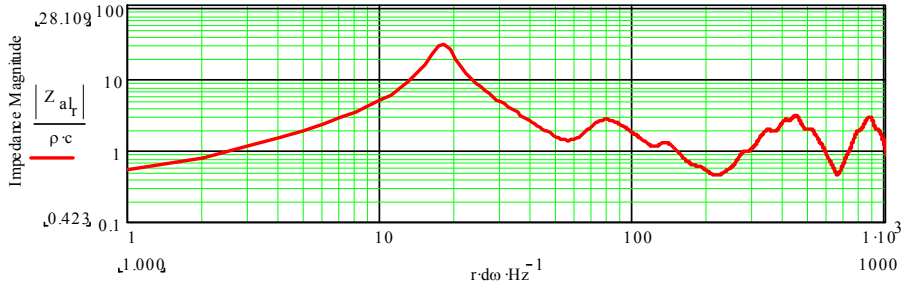
Total stuffing totally is: 6.139 lb



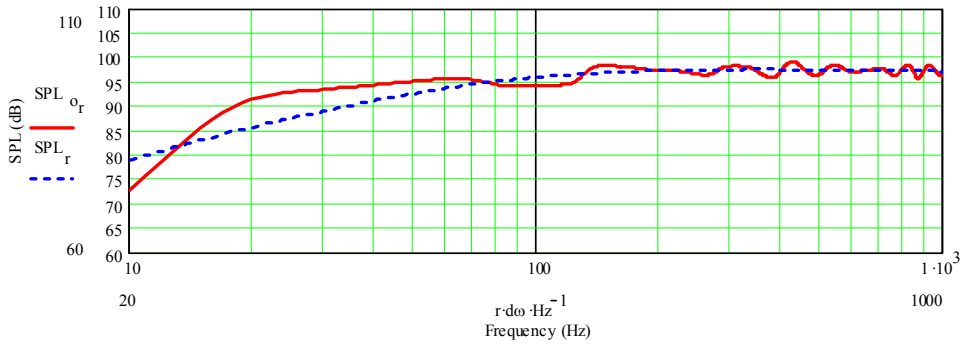
This design can be a folded pipe, which reduces the length and places the opening close to the driver.



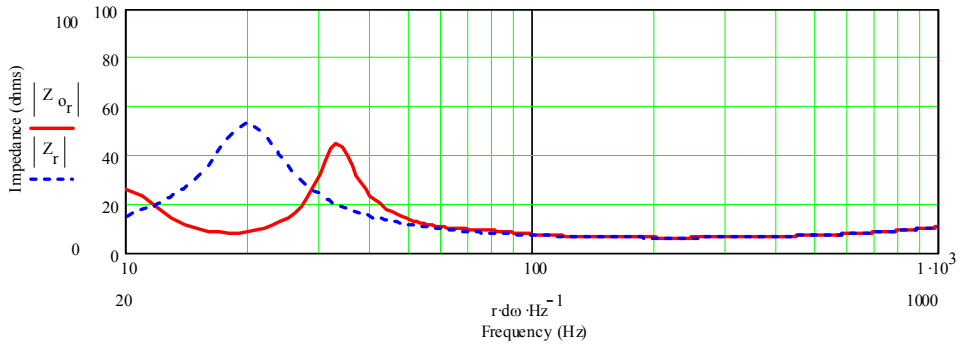




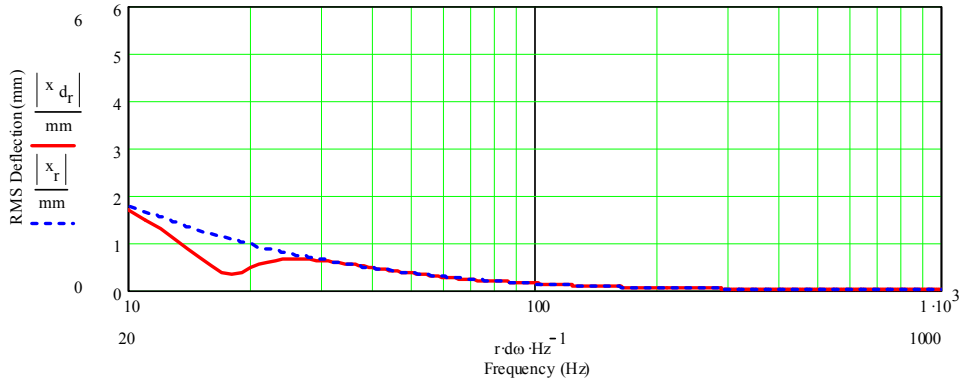
The tuning frequency of the cabinet is about 18Hz.



Summed SPL from the driver and the opening. Note the very gentle roll off. A straight SPL down to 20 Hz in the simulation is not what you want, because this might cause elevated response due to room gain.



Impedance.



Displacement. Note that the movement of the cone is very well damped