

Hornresp and MathCad MEH Model Correlation

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Introduction

Hornresp has the capability to model a three way MEH, so I entered the driver and horn geometry data for the sample problem shown in the initial presentation of this series. The geometry included coupling volumes and throats for the mid and low frequency drivers, I also needed to add a rear chamber to all three drivers for Hornresp to calculate and plot the Sound Power Level. No crossover was used for this comparison. This is not intended to be a finished design only a proof of concept that the MathCad worksheets capture the essential simulated behaviors of a MEH speaker system

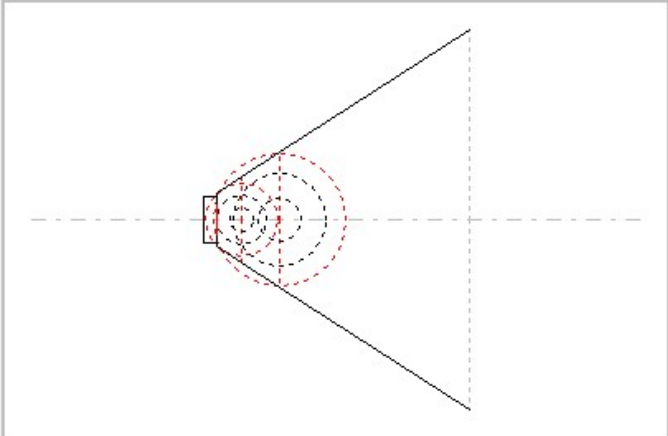
Slides 4 - 7 show the sample problem geometry and the Hornresp inputs for each driver. Then the summed and the individual Sound Power Levels are plotted on slides 8 - 11. For comparison, the corresponding MathCad Sound Power Level and SPL responses at 3 m are included on the right side of each slide. To the best of my ability using the two different programs, I have tried to use almost the same scales in each program's plotted results to make the comparisons easier to visualize.

I am not an expert at using Hornresp, if you see a fundamental error in my inputs or the execution of the MEH simulation please let me know and I will update and repost new results.

Hornresp Geometry Definition

Three-Way Multiple Entry Horn Loudspeaker Wizard ME1 record 3 ME2 record 2

Schematic Diagram System Volume 70.887 Litres



S1	68.15
S2 Manual	182.94
S3 Manual	459.30
S4	3716.10
L12 Con	4.56
L23 Con	6.85
L34 Con	34.23

Horn length is 45.64 cm

Schematic | Horn S1 - S4 | Save | Cancel

Low Frequency Driver Inputs and Schematic – ME2

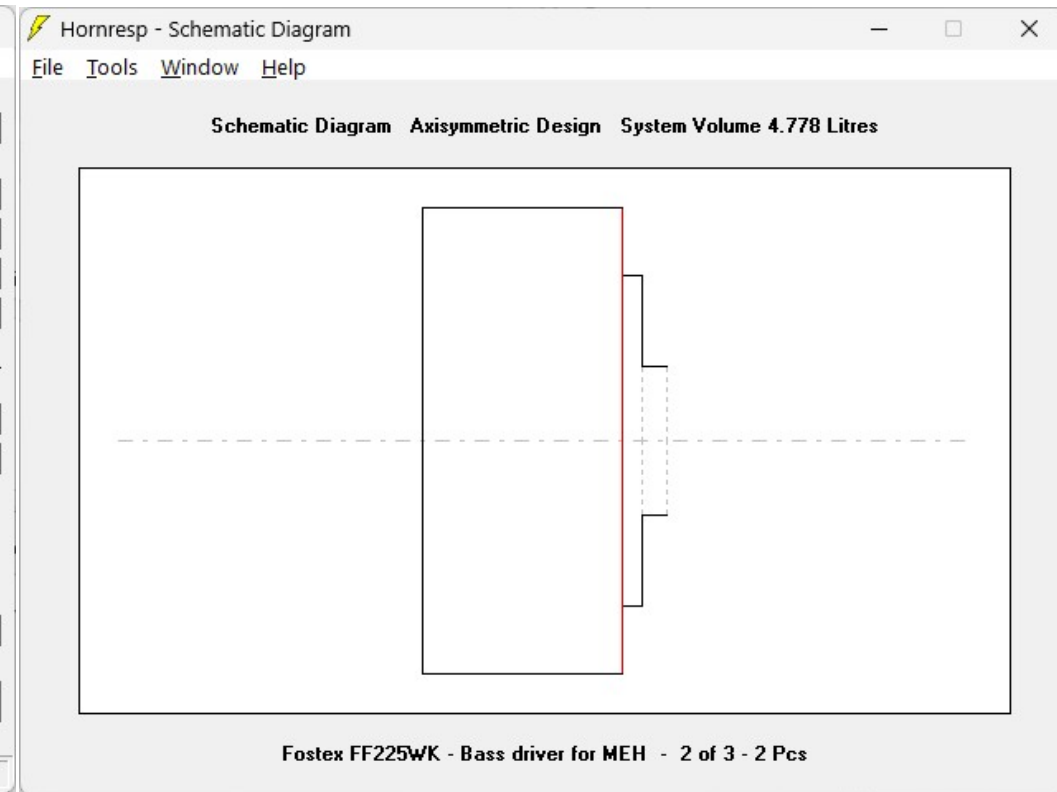
Hornresp - Input Parameters MEH

File Tools Window Help

Ang	0.0 x Pi	Eg	2.83	Rg	0.00	Cir	0.00
Ap1	44.33	Ap2	44.33	Con	1.27	F12	0.00
S2	0.00	S3	0.00	L23	0.00	F23	0.00
S3	0.00	S4	0.00	L34	0.00	F34	0.00
S4	0.00	S5	0.00	L45	0.00	F45	0.00

Sd	221.70	Cms	8.26E-04	Mmd	13.94	Re	6.00
Bl	8.01	Rms	1.90	Le	0.07	ME2	2P
Vrc	4.50	Fr	0.00	Vtc	221.67	NOTE:	
Lrc	10.16	Tal	0.00	Atc	221.70	Record activated	

Comment: Fostex FF225WK - Bass driver for MEH - 2 of 3 - 2 Pcs



Mid Frequency Driver Inputs and Schematic – ME1

Hornresp - Input Parameters MEH

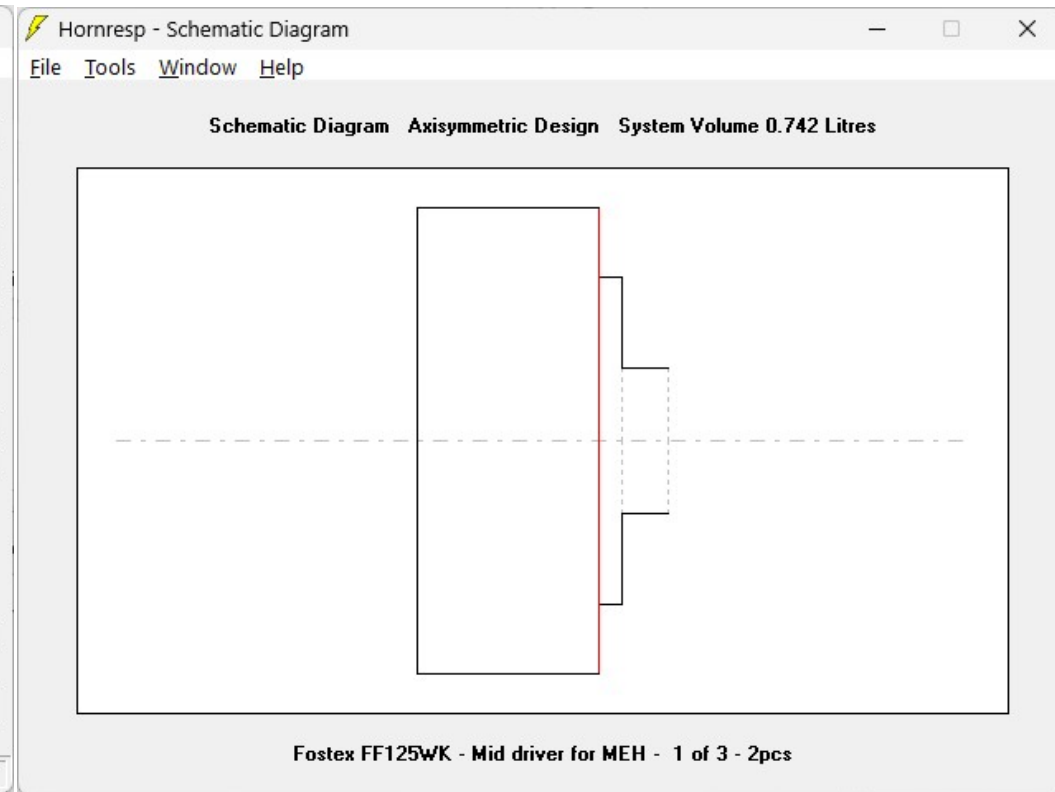
File Tools Window Help

Ang	0.0 x Pi	Eg	2.83	Rg	0.00	Cir	0.00
Ap1	13.30	Ap2	13.30	Con	1.27	F12	0.00
S2	0.00	S3	0.00	L23	0.00	F23	0.00
S3	0.00	S4	0.00	L34	0.00	F34	0.00
S4	0.00	S5	0.00	L45	0.00	F45	0.00

Sd	66.50	Cms	1.15E-03	Mmd	4.59	Re	6.70
Bl	5.49	Rms	0.41	Le	0.04	ME1	2P
Vrc	0.68	Ap	0.00	Vtc	44.54	NOTE:	
Lrc	5.08	Lpt	0.00	Atc	66.48	Record activated	

Comment: Fostex FF125WK - Mid driver for MEH - 1 of 3 - 2pcs

Previous Next Edit Add Delete Record 3 of 4 Deactivate



High Frequency Driver and Horn Inputs and Schematic – Nd

Hornresp - Input Parameters MEH

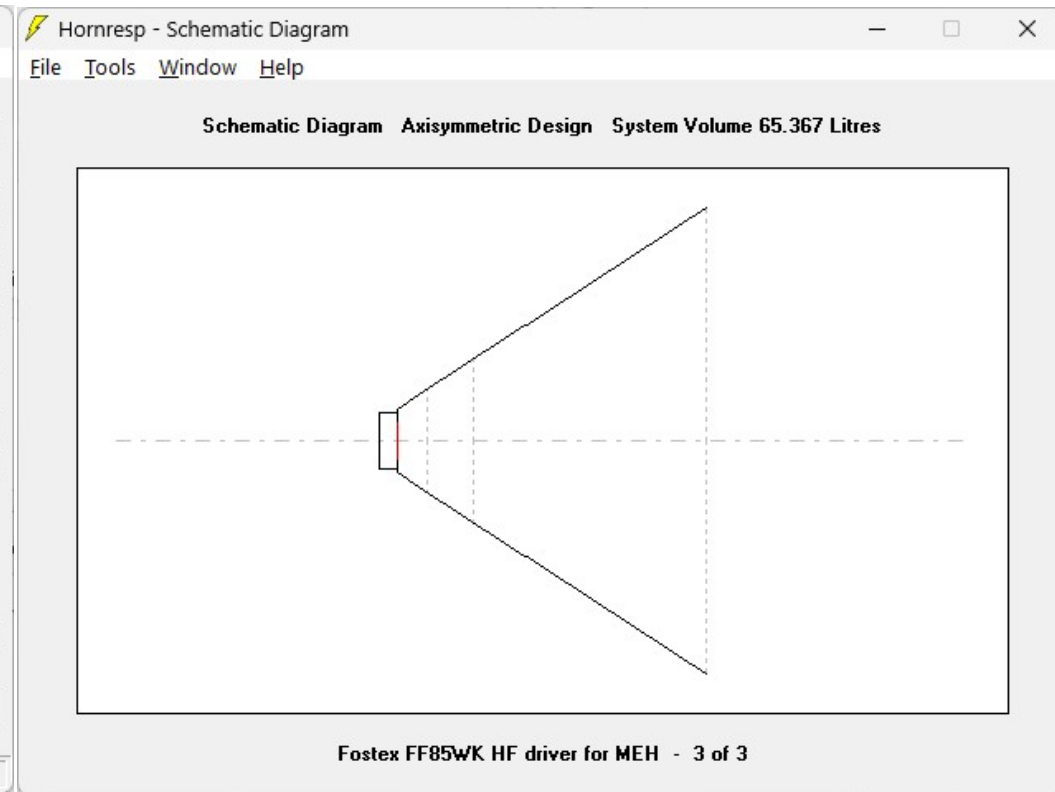
File Tools Window Help

Ang	2.0 x Pi	Eg	2.83	Rg	0.00	Fta	33.09
S1	68.15	S2	182.94	Con	4.56	F12	0.00
S2	182.94	S3	459.30	Con	6.85	F23	0.00
S3	459.30	S4	3716.10	Con	34.23	F34	0.00
S4	0.00	S5	0.00	L45	0.00	F45	0.00

Sd	28.30	Cms	9.11E-04	Mmd	2.02	Re	7.20
Bl	4.01	Rms	0.46	Le	0.03	Nd	1
Vrc	0.14	Ap1	68.15	Vtc	0.00		
Lrc	2.54	Lp	0.00	Atc	68.15		

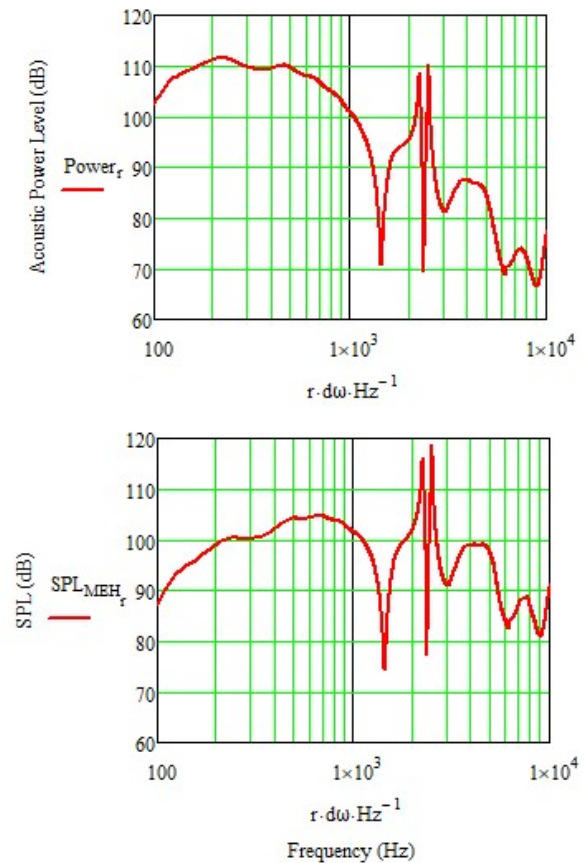
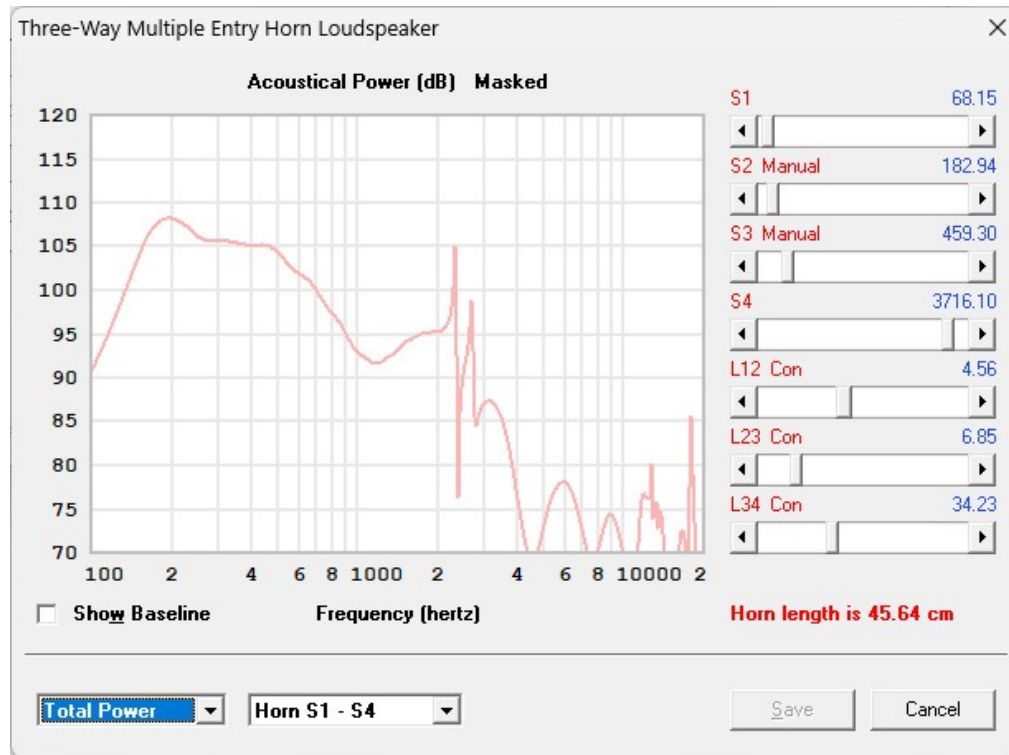
Comment: Fostex FF85WK HF driver for MEH - 3 of 3

Record number

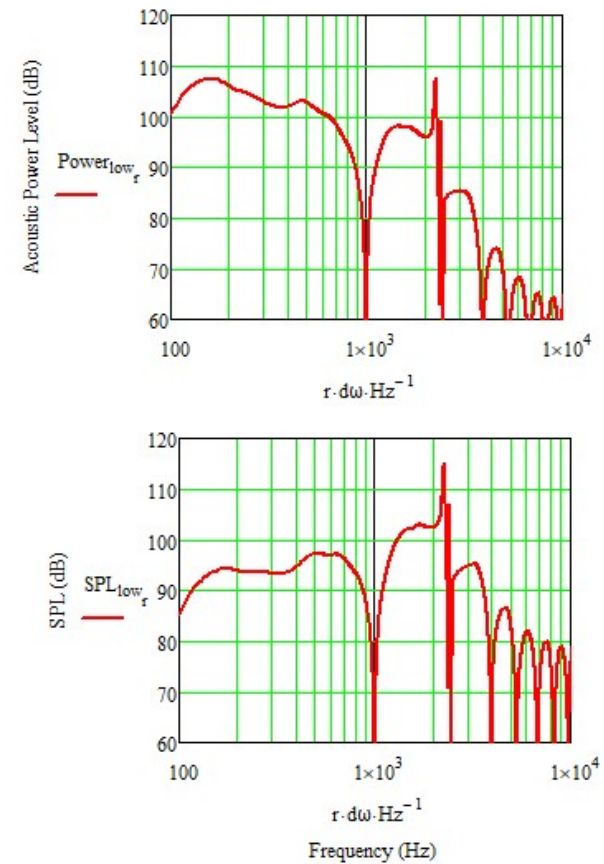
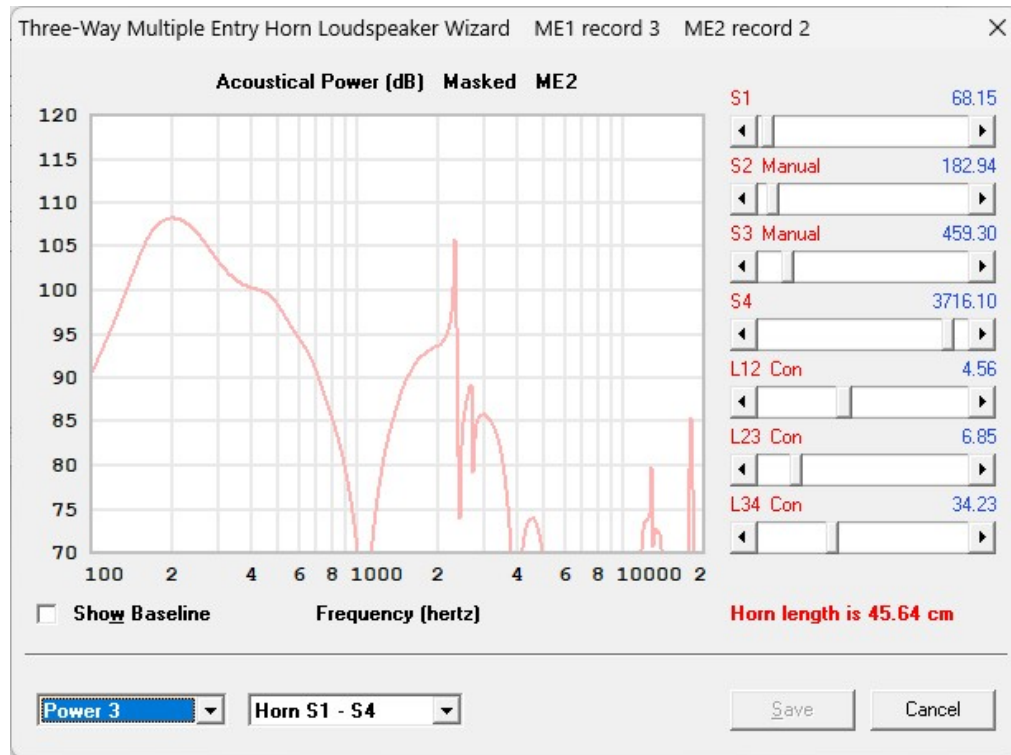


MEH and MathCad Correlation

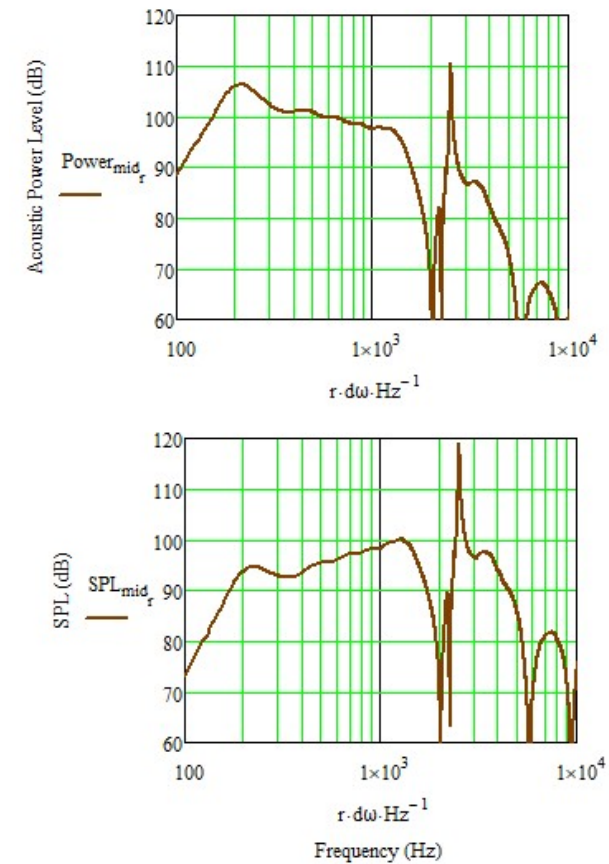
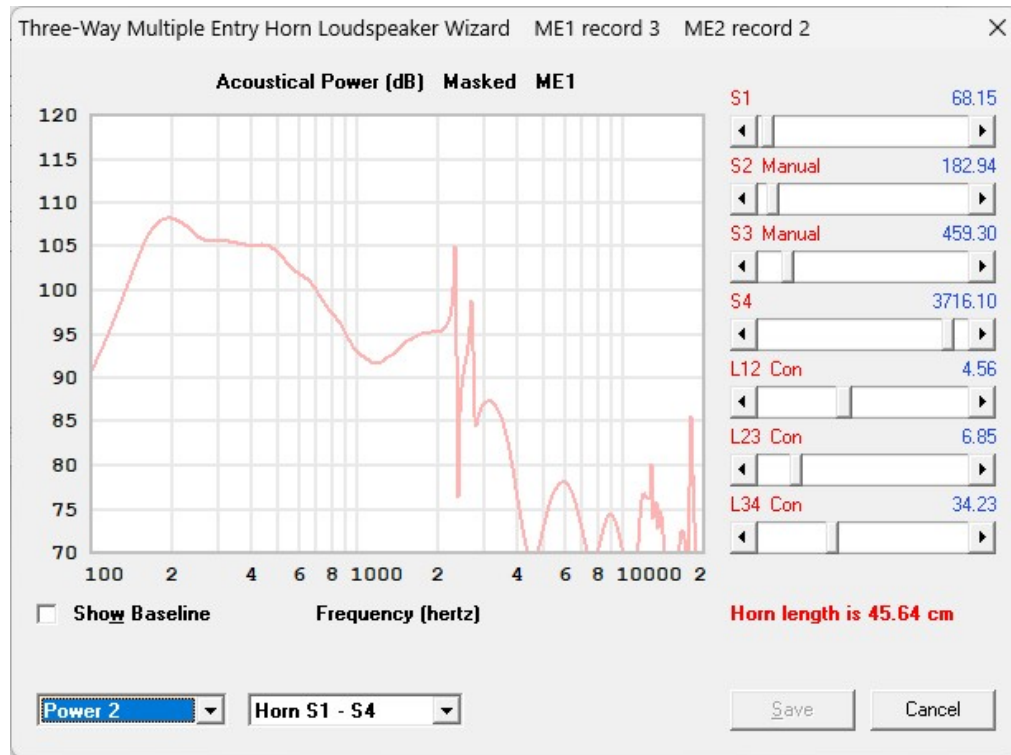
Total Sound Power Level Output



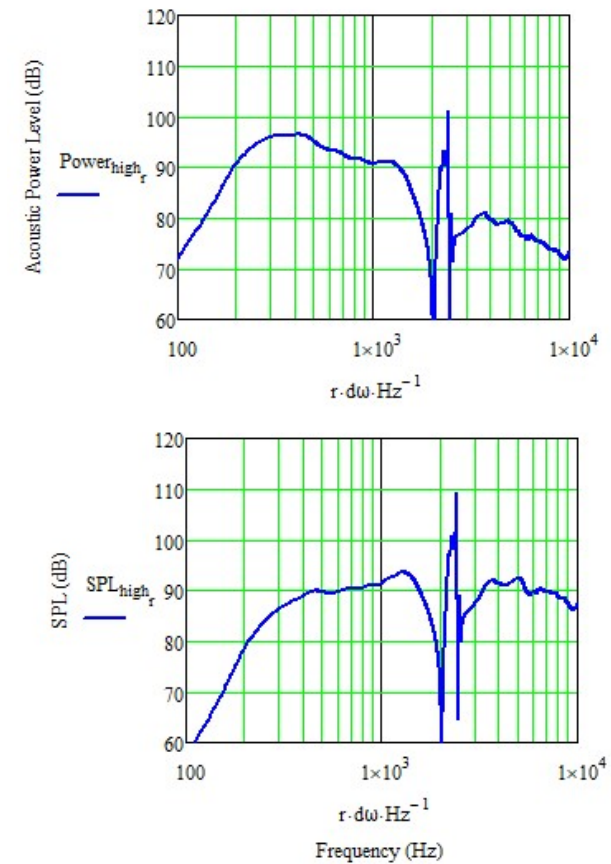
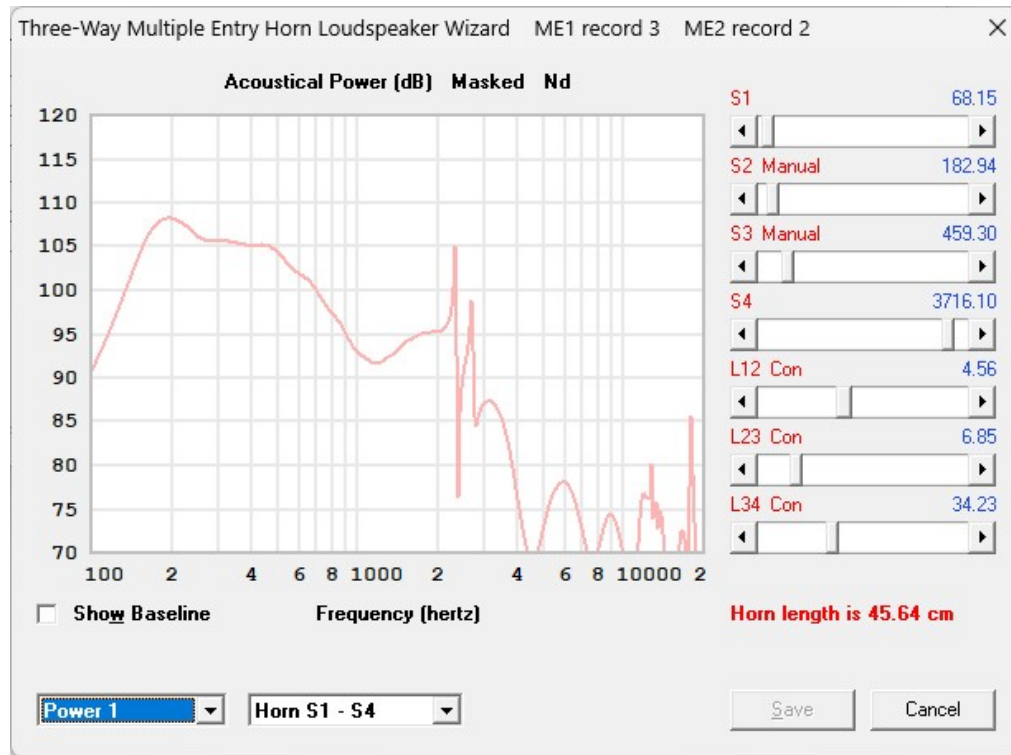
ME2 Sound Power Level Output



ME1 Sound Power Level Output



Nd Sound Power Level Output



Summary

Hornresp and MathCad represent two completely separate programming efforts that took place over 50 years apart. As a result I am sure there are many differences in the way they calculate the Sound Power Level responses. I do not know the detailed inner workings of Hornresp, so the MathCad worksheets were developed independently over the past year or two.

Comparing the Sound Power Level plots the basic shapes and behaviors are very similar; the resonant behavior of the coupling chambers and throats occur in the same frequency range and the nulls created by the offset drivers are at approximately the same frequencies. I am satisfied with these results and consider the MathCad worksheet's methods to be partially validated. The MathCad worksheets will continue to evolve as I learn more about this type of speaker, hopefully build and test a MEH speaker system, and add additional features for extending the potential modeling geometries.

More to come