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Configuration : Extended Range Driver w/ Two Bass Drivers Mounted on an Open Baffle

**Unit and Constant Definition**

cycle := 2·π·rad

Hz := cycle·sec<sup>-1</sup>

Air Density : ρ := 1.21·kg·m<sup>-3</sup>

Speed of Sound : c := 342·m·sec<sup>-1</sup>



**Part 1 : Thiele-Small Consistent Calculation**

**Detailed User Input** (Edit This Section and Input the Parameters for the System to be Analyzed)

Power := 1·watt (Input Power, Applied Voltage Referenced to 8 ohm Driver)

Extended Range Driver Thiele / Small Parameters : Lowther PM2A

f<sub>d</sub> := 56.3·Hz V<sub>ad</sub> := 50.5·liter

R<sub>e</sub> := 6.9·Ω Q<sub>ed</sub> := 0.22

L<sub>vc</sub> := 0.0·mH Q<sub>md</sub> := 2.42

Bl := 10.18· $\frac{\text{newton}}{\text{amp}}$  Q<sub>td</sub> :=  $\left(\frac{1}{Q_{ed}} + \frac{1}{Q_{md}}\right)^{-1}$

S<sub>d</sub> := 206·cm<sup>2</sup> Q<sub>td</sub> = 0.202



Bass Driver Thiele / Small Parameters : Eminence Alpha 15" High Efficiency

f<sub>d</sub> := 38.9·Hz V<sub>ad</sub> := 276.75·liter

R<sub>e</sub> := 5.9·Ω Q<sub>ed</sub> := 1.425

L<sub>vc</sub> := 0.84·mH Q<sub>md</sub> := 7.287

Bl := 8.342· $\frac{\text{newton}}{\text{amp}}$  Q<sub>td</sub> :=  $\left(\frac{1}{Q_{ed}} + \frac{1}{Q_{md}}\right)^{-1}$

S<sub>d</sub> := 896.5·cm<sup>2</sup> Q<sub>td</sub> = 1.192



## Crossover Definition

For Even Order Crossovers :  
Type 0 = No Crossover  
Type 1 = Linkwitz-Riley  
Type 2 = Bessel  
Type 3 = BEC  
Type 4 = Butterworth

### Low Pass Filter

$$f_{LP} := 200 \cdot \text{Hz}$$

$$LP_{order} := 2$$

$$LP_{type} := 1$$

### High Pass Filter

$$f_{HP} := 200 \cdot \text{Hz}$$

$$HP_{order} := 4$$

$$HP_{type} := 1$$

(Filter Frequency)

(Filter Order : 0, 1, 2, 3, or 4)

(Filter Type : 1, 2, 3, or 4 for even order only,  
for odd order this entry is ignored)

### Crossover Phase Connection

$$LP_{phase} := 1$$

$$HP_{phase} := 1$$

(1 = in phase, -1 = out of phase)

### Low Frequency Boost

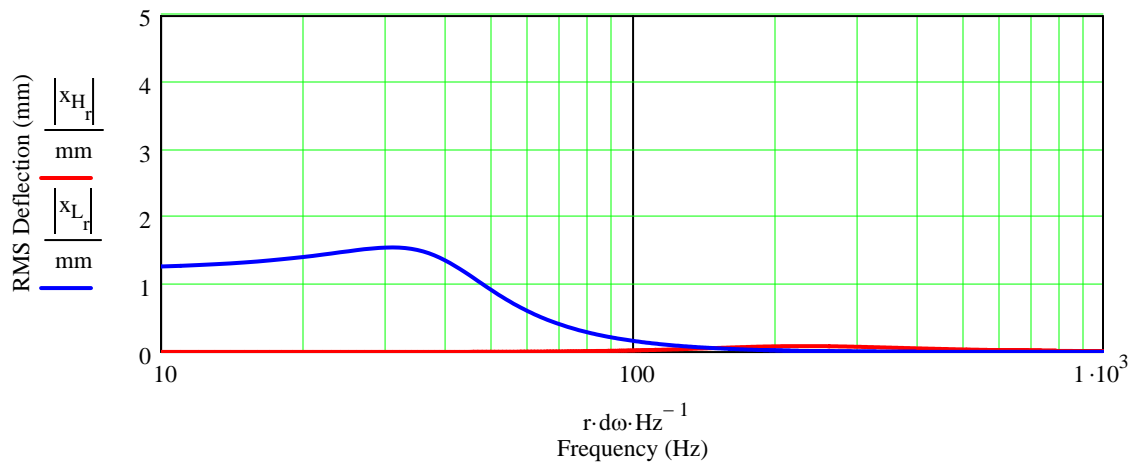
$$LP_{boost} := 2.0 \text{ dB}$$



## End of Detailed Input

## End of Part 1 Input

## Driver RMS Displacements (Red Curve - Extended Range Driver, Blue Curve - Woofers)



## **Part 2 : Detailed SPL Response Calculation**

Calculation Includes :

- Position of Drivers on the Baffle.
- Open Baffle Defraction for the Drivers.
- Floor Reflection for the Drivers.

### **Geometry**

Coordinate System :

- Origin is the lower left corner of the front baffle
- x = horizontal direction
- y = vertical direction

The variables num\_r, n\_low, and n\_high control the number of simple sources used in the calculations. Increasing each will improve accuracy at the expense of longer calculation times. Increase each variable until final plotted SPL stops changing at which point the solution has converged.

#### **Open Baffle Geometry Input**

- width := 60·in (Front Baffle Width)
- height := 48·in (Front Baffle Height)
- dist := 100·m (Front Baffle Distance from Rear Wall, to Eliminate Rear Wall use 100 m)
- num\_r := 9 (Number of Points per Quadrant of Baffle Edge)

#### **Extended Range Driver Geometry Input**

- x<sub>dc</sub> := 30·in (Driver Center x Coordinate)
- y<sub>dc</sub> := 40·in (Driver Center y Coordinate)
- n\_high := 5 (Number of Points Across Diameter)

#### **Woofers Driver Geometry Input**

- x<sub>w1</sub> := 30·in (Lower Driver Center x Coordinate)
- y<sub>w1</sub> := 10·in (Lower Driver Center y Coordinate)
- x<sub>w2</sub> := 30·in (Upper Driver Center x Coordinate)
- y<sub>w2</sub> := 26·in (Upper Driver Center y Coordinate)
- n\_low := 10 (Number of Points Across Diameter)

#### **Listening Position** (Default Location is at 1 m Distance Along the Driver's Axis)

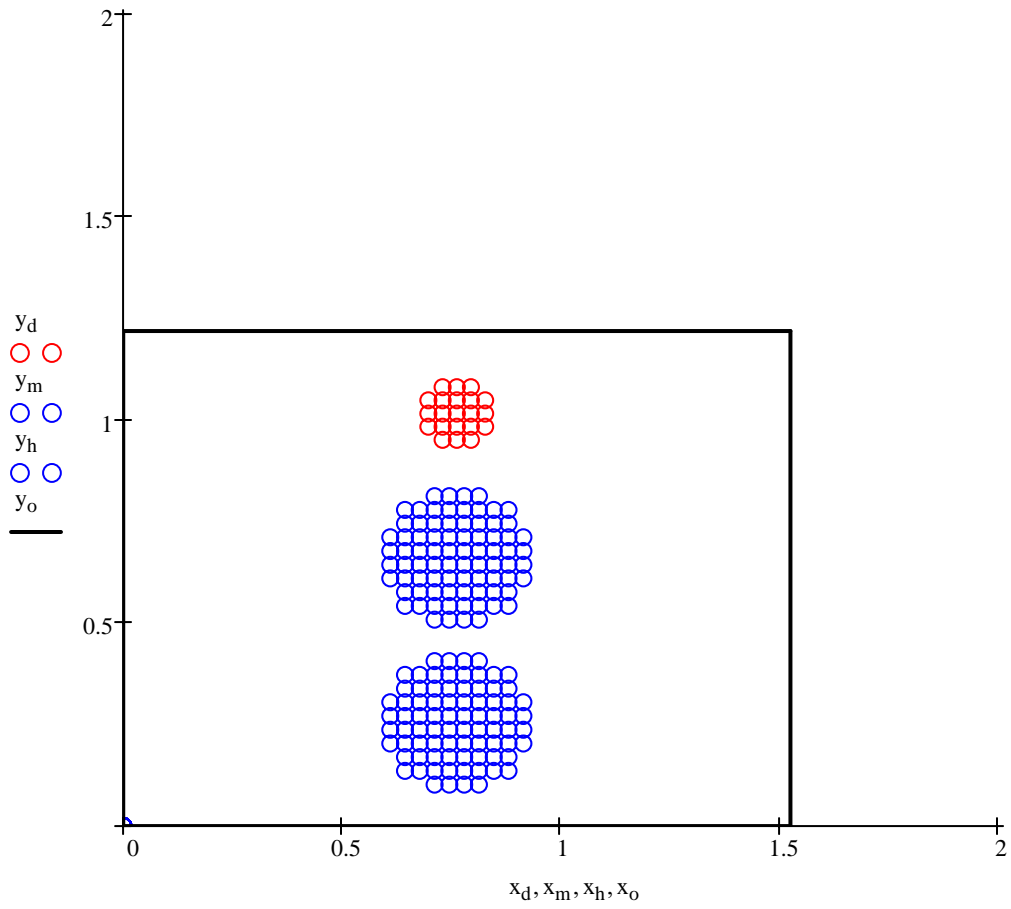
- radius := 1·m (Calculation Radius, Effective Radius is Greater if y<sub>p</sub> is Changed from Default)
- θ := 0·deg (0 deg is along the Driver's Axis, -80 deg < θ < 80 deg)
- y<sub>p</sub> := y<sub>dc</sub> (Default Height is equal to Driver Height)

#### **Floor Condition**

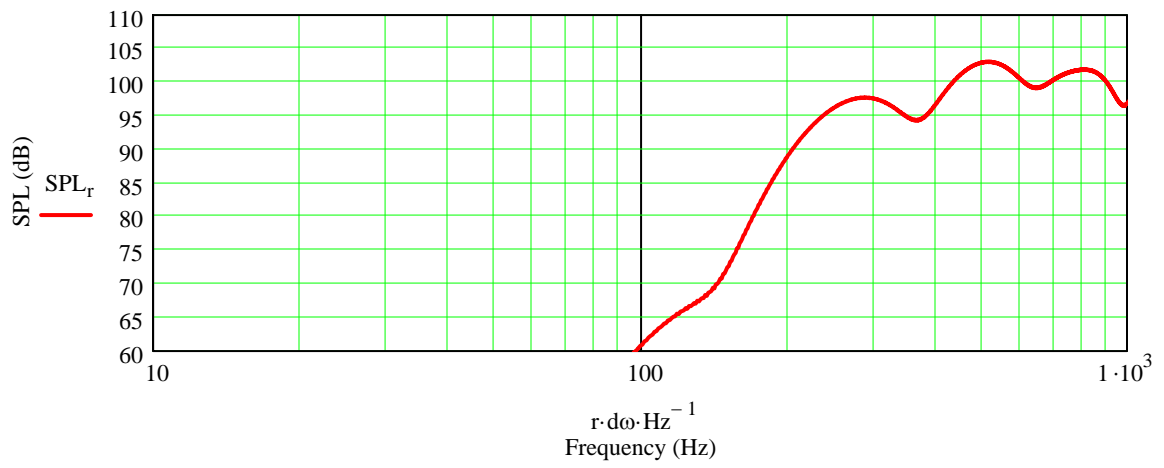
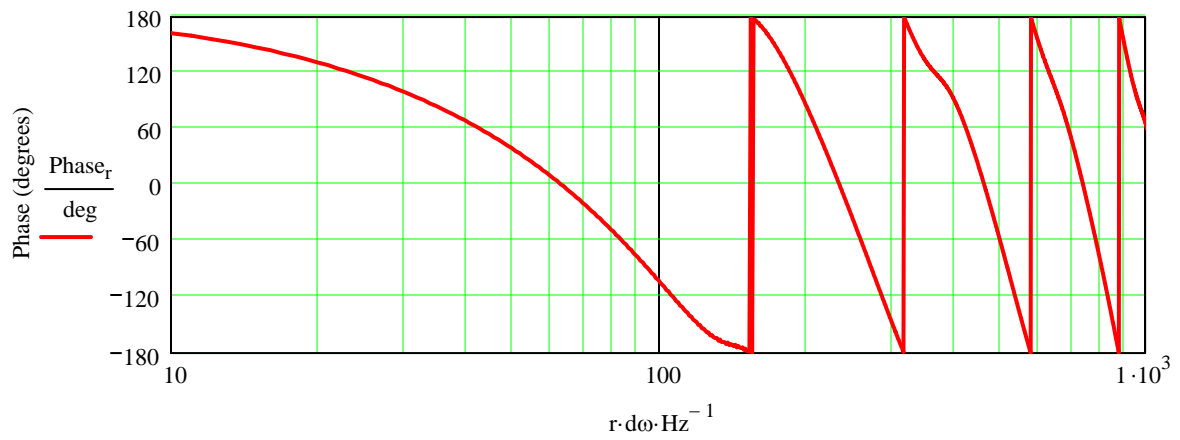
- Reflect := 1 (0 = hardwood or concrete, 1 = carpeted)



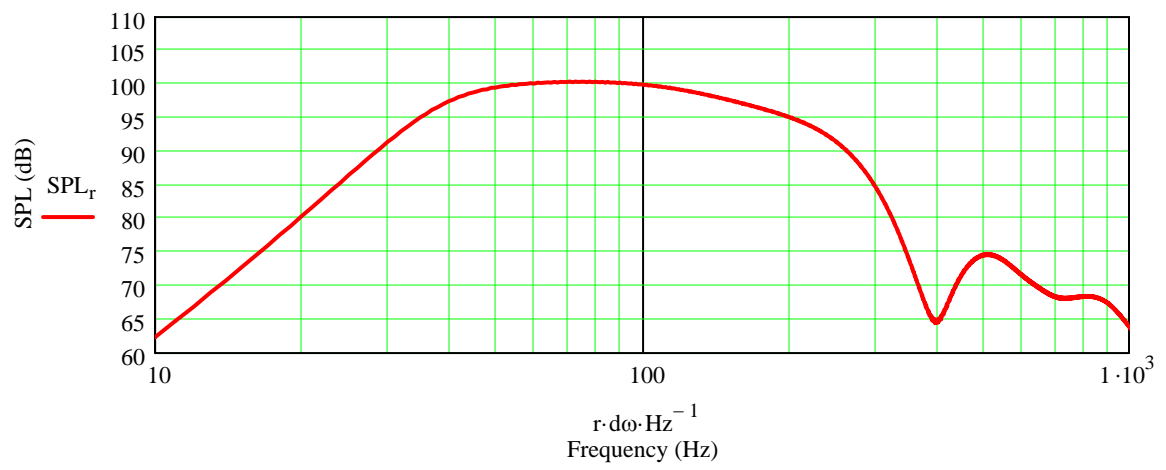
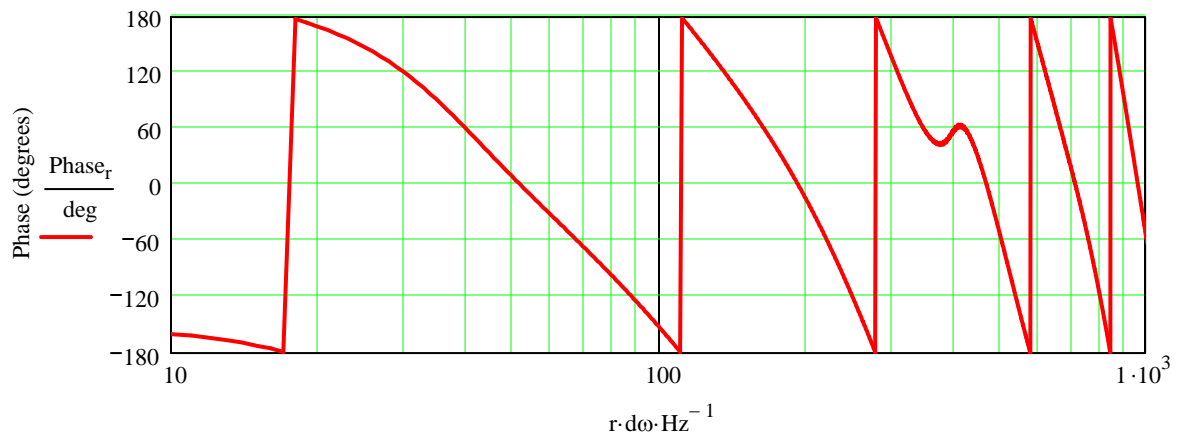
### Extended Range Driver and Two Woofers : Simple Source Pattern with Baffle Edge Outline



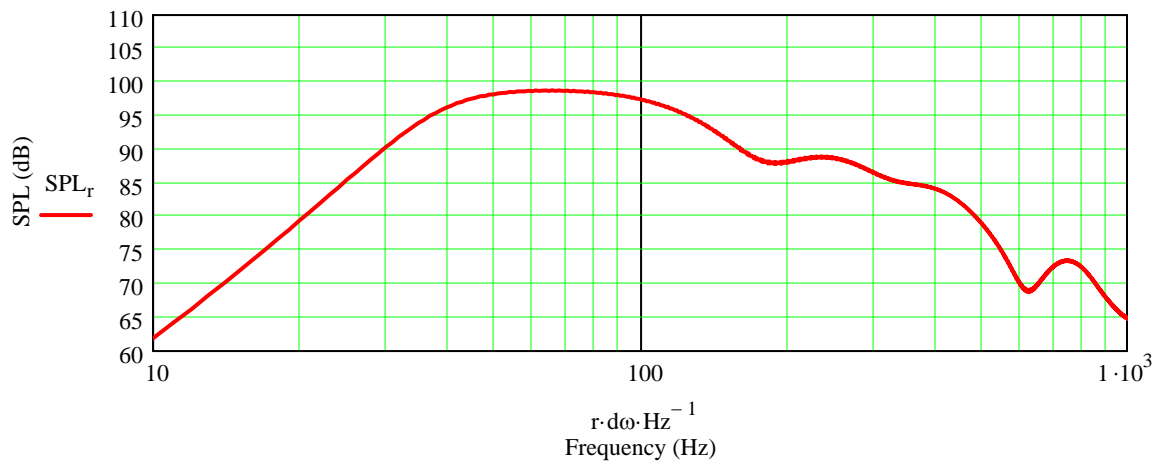
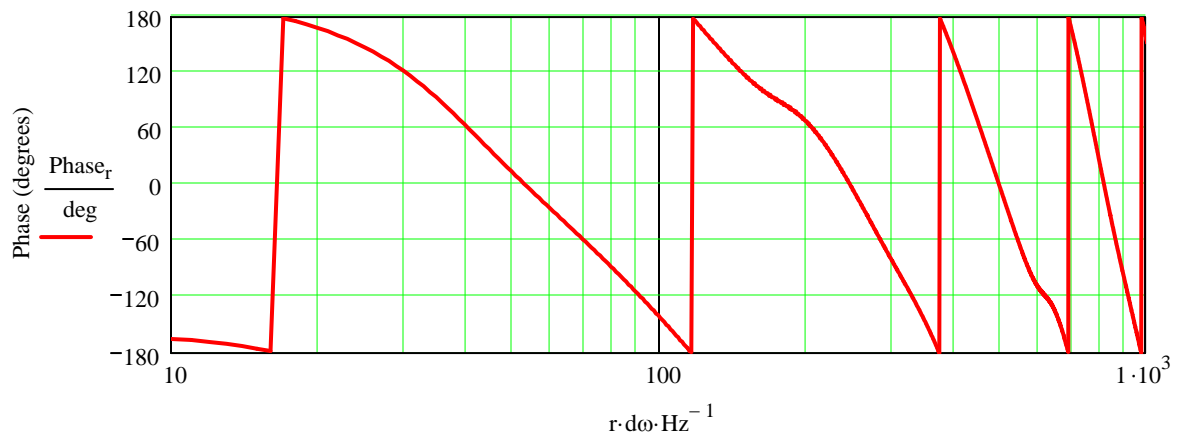
### Plotted Response for the Extended Range Driver



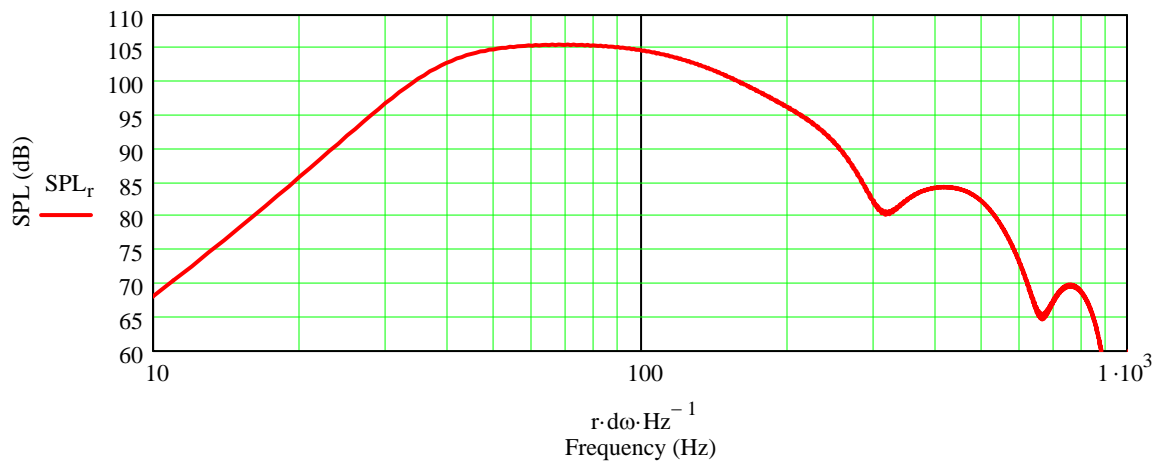
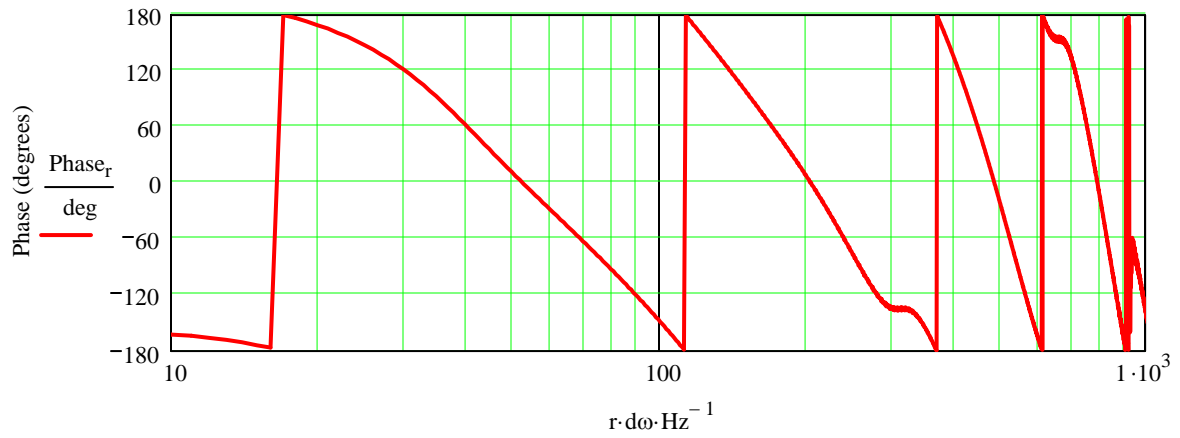
### Plotted Response for the Lower Woofer Driver



### Plotted Response for the Upper Woofer Driver



### Plotted Combined Response for the Woofer Drivers



### Plotted System Response for the Extended Range/Dual Woofer Open Baffle Design

