Aperivox

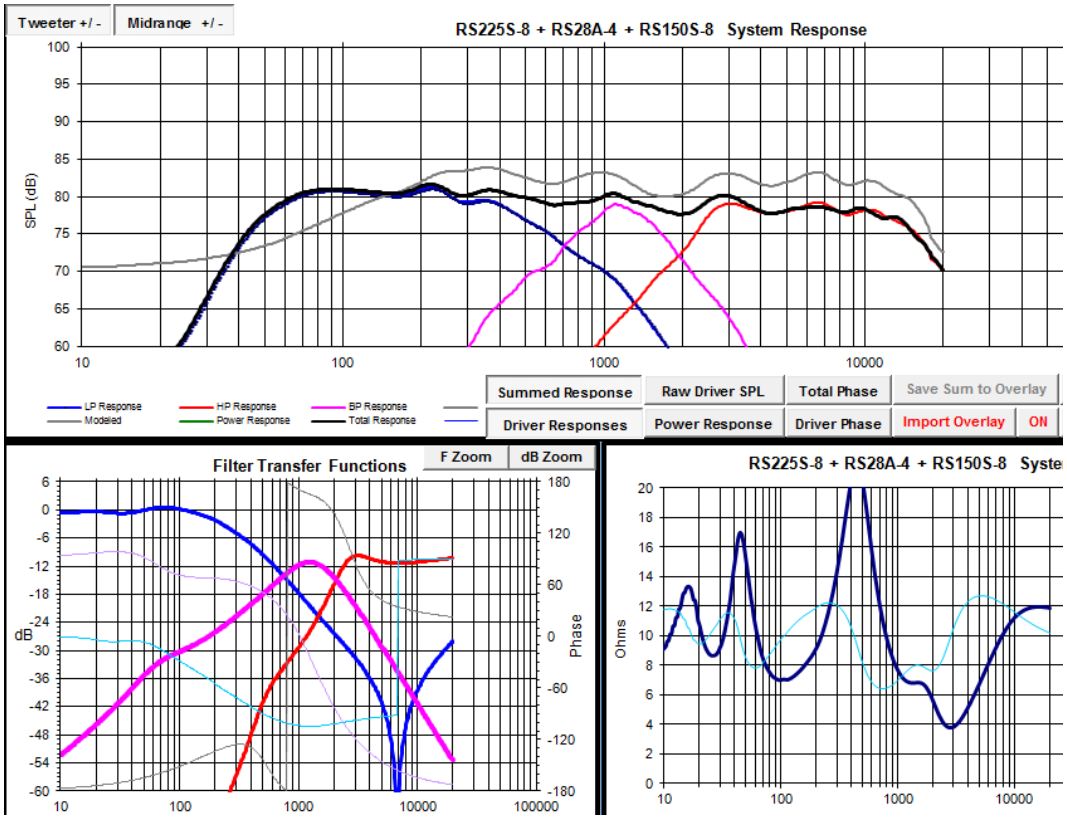
Designed June 2014 by John Hollander

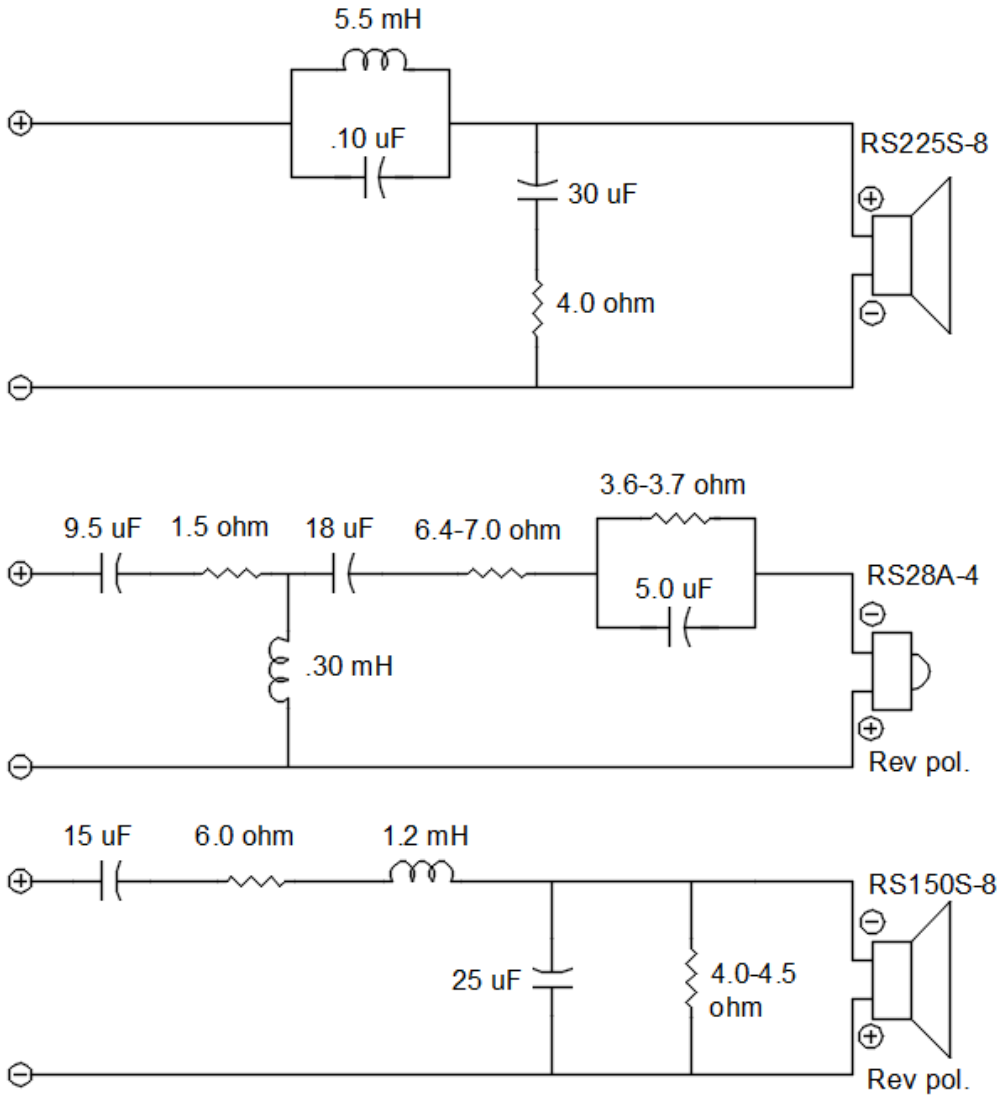
The purpose of the project was to remake a pair of home theater main speakers. The mid-range was planned to be open back in a narrow baffle. This necessitated the MTW arrangement and the tapered top portion of the baffle. The drivers are the RS225S-8, RS150S-8, and the RS28A-4. The tweeter is still available.

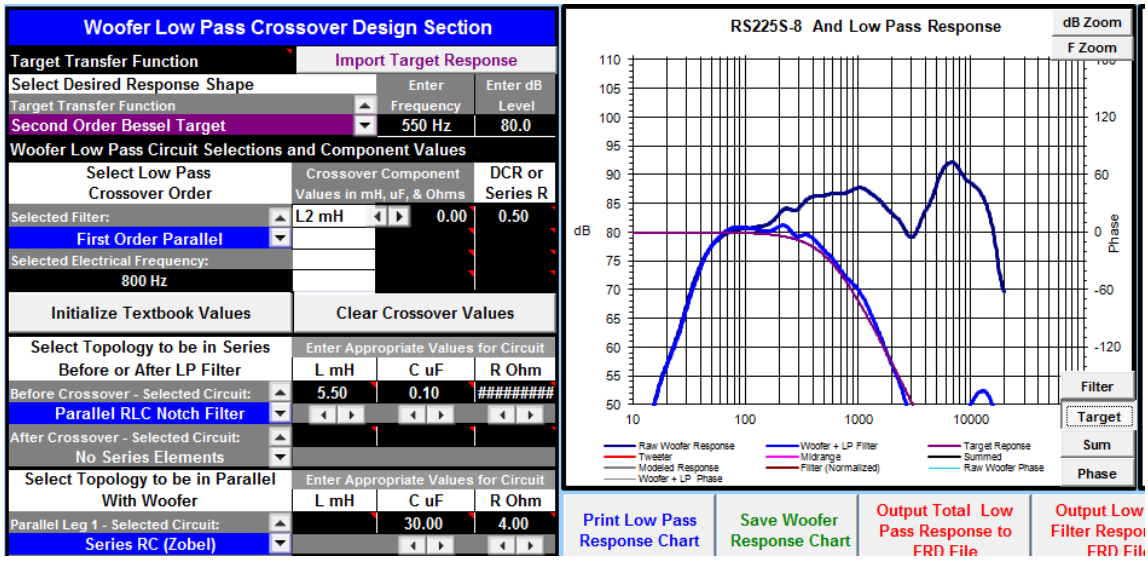
The woofer section is designed and damped as a MLTL. The box volume is about 49 liters, with an f3 in the mid 30s

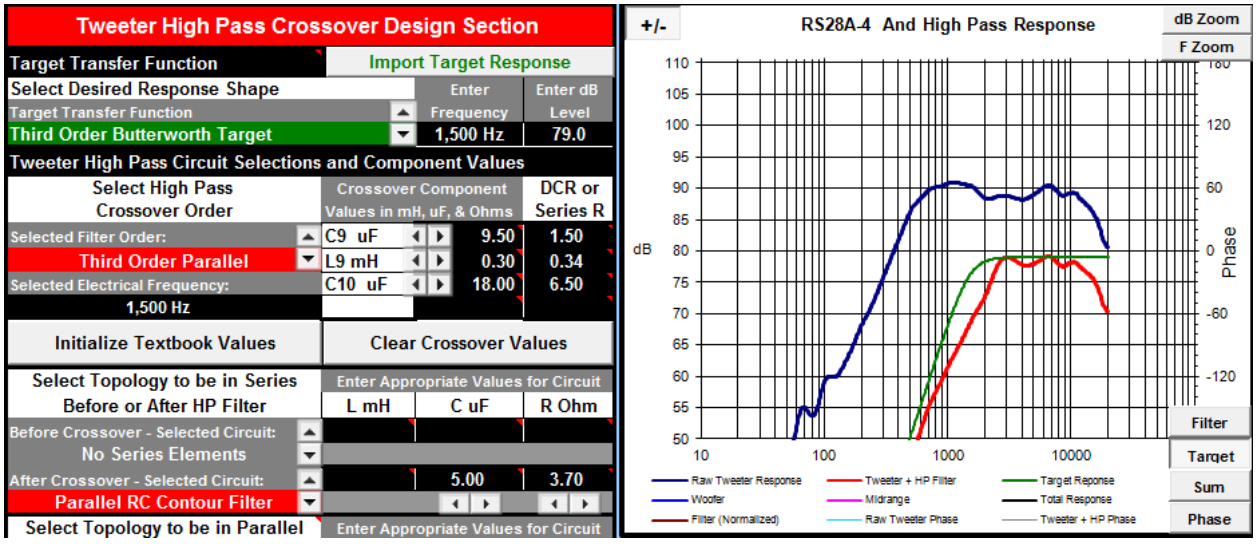
The crossover points were dictated by the dipole null and roll off of the midrange. The tweeter to mid crossover is at 1,900 Hz, 3rd order Butterworth shape. The mid to woofer is about 700 Hz, second order Bessel shape

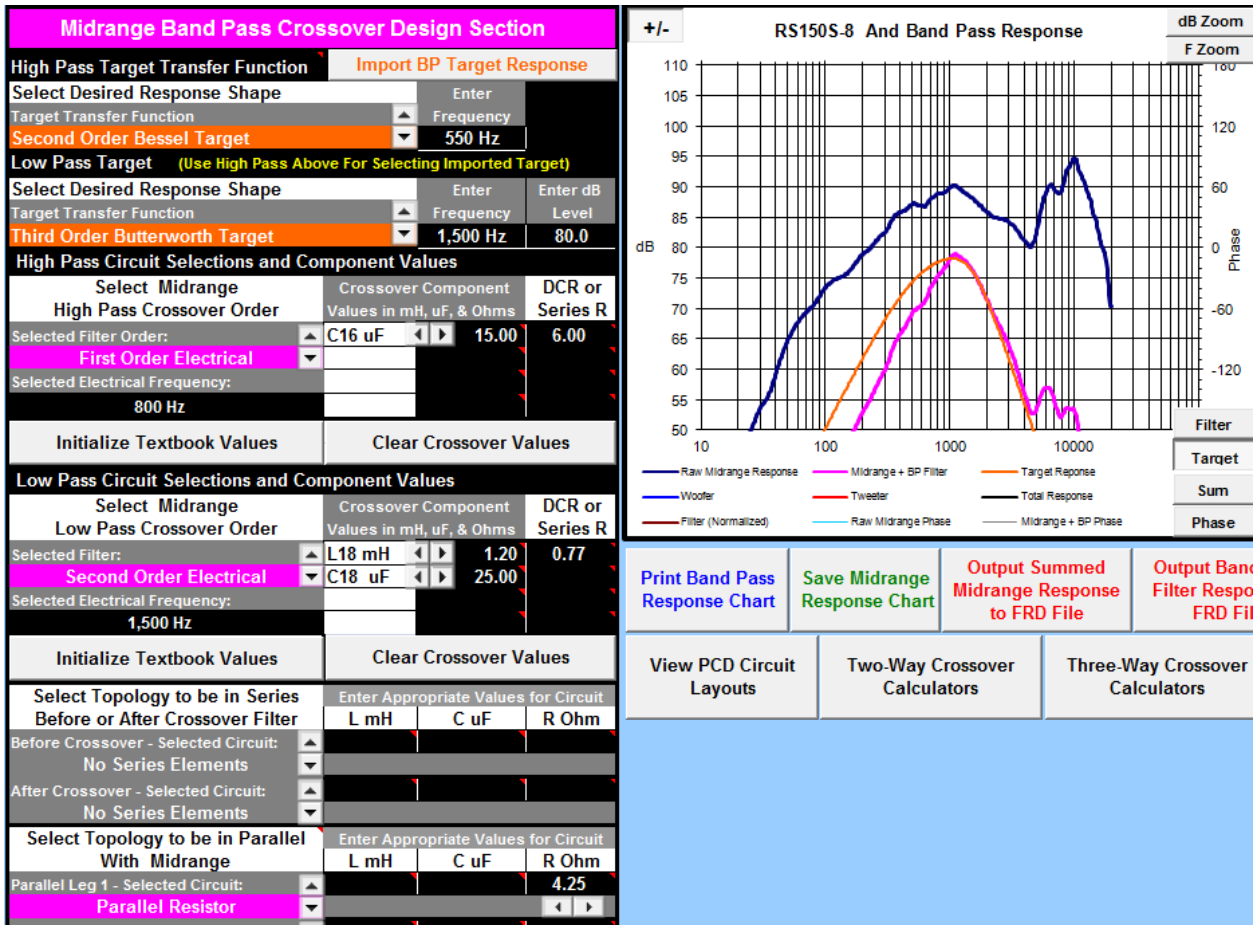
This graph is measured over modeled. Note that the simulation is tilted down toward the high frequencies, but the measured response is flat. This is due to the open baffle rear wave. Driver responses are not accurate below 80Hz due to the test enclosure. Actual measurement was gated at 350 Hz

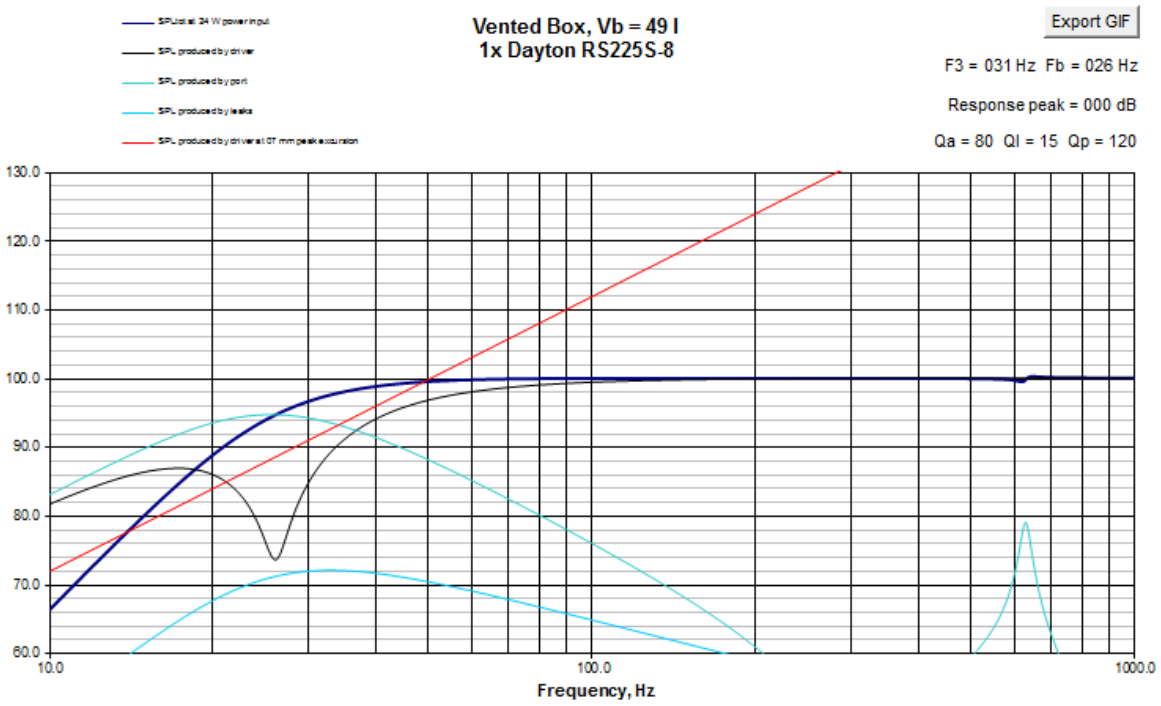


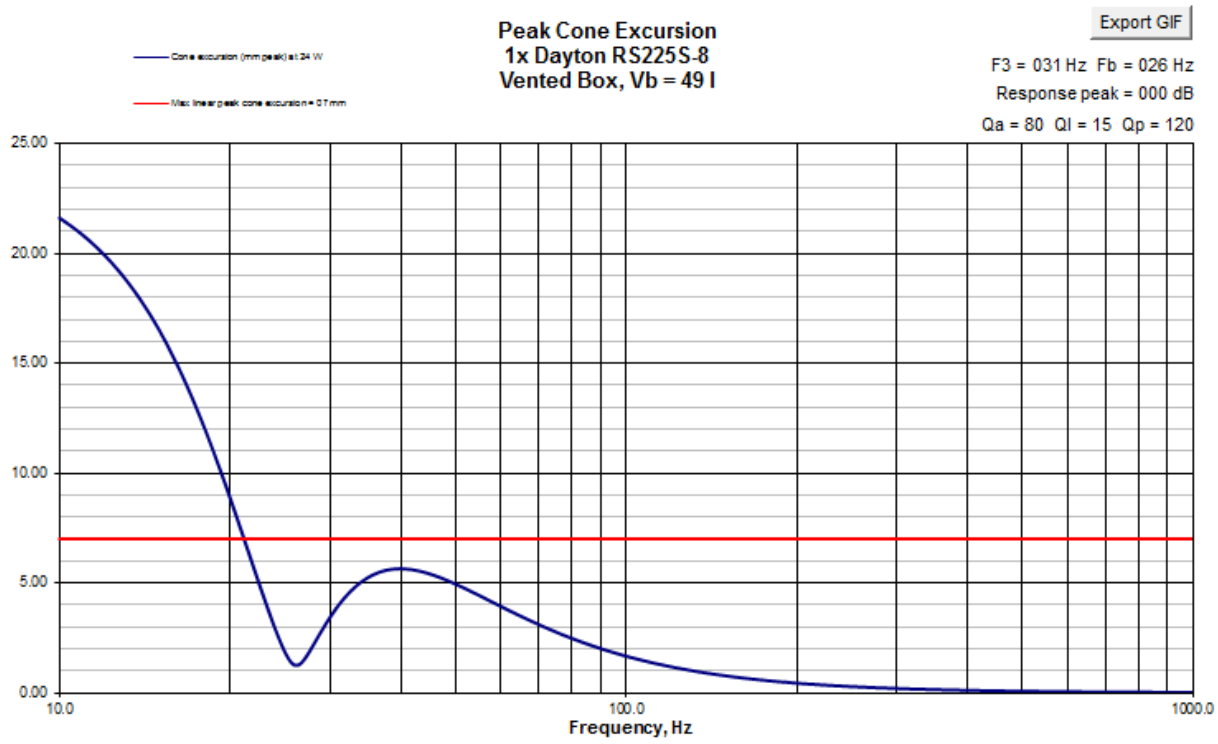

5.5 mH
.10 uF
30 uF
4.0 ohm
RS225S-8
3.6-3.7 ohm
9.5 uF
1.5 ohm
18 uF
6.4-7.0 ohm
5.0 uF
RS28A-4
.30 mH
Rev pol.
15 uF
6.0 ohm
1.2 mH
RS150S-8
25 uF
4.0-4.5 ohm
Rev pol.

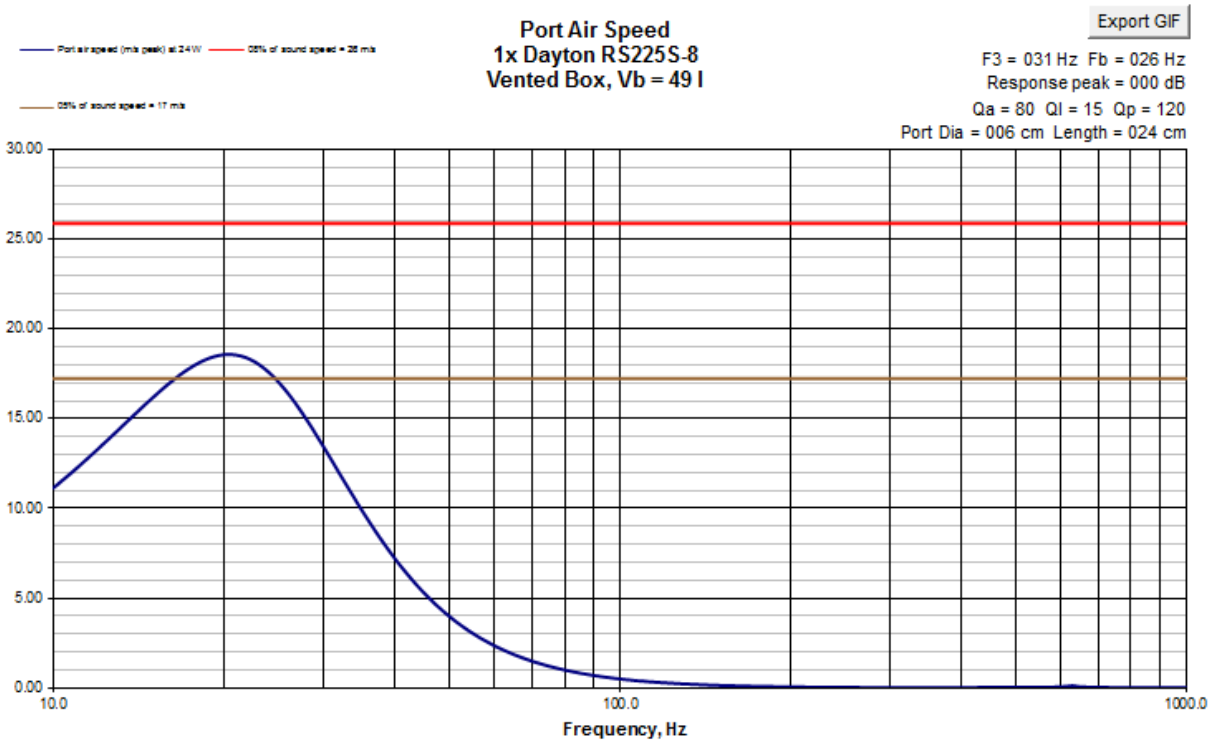

Woofer Low Pass Crossover Design Section
Target Transfer Function
Import Target Response
Select Desired Response Shape
Enter Frequency
Enter dB Level
Target Transfer Function
Second Order Bessel Target
550 Hz
80.0
Woofer Low Pass Circuit Selections and Component Values
Select Low Pass Crossover Order
Crossover Component Values in mH, uF, & Ohms
DCR or Series R
Selected Filter:
L2 mH
0.00
0.50
First Order Parallel
Selected Electrical Frequency:
800 Hz
Initialize Textbook Values
Clear Crossover Values
Select Topology to be in Series Before or After LP Filter
Enter Appropriate Values for Circuit
L mH
C uF
R Ohm
Before Crossover - Selected Circuit:
5.50
0.10
##########
Parallel RLC Notch Filter
After Crossover - Selected Circuit:
No Series Elements
Select Topology to be in Parallel With Woofer
Enter Appropriate Values for Circuit
L mH
C uF
R Ohm
Parallel Leg 1 - Selected Circuit:
30.00
4.00
Series RC (Zobel)
RS225S-8 And Low Pass Response
dB Zoom
F Zoom
dB
Phase
Filter
Target
Sum
Phase
Raw Woofer Response
Tweeter
Modeled Response
Woofer + LP Phase
Woofer + LP Filter
Midrange
Filter (Normalized)
Target Reponse
Summed
Raw Woofer Phase
Print Low Pass Response Chart
Save Woofer Response Chart
Output Total Low Pass Response to FRD File
Output Low Filter Respo FRD Fil

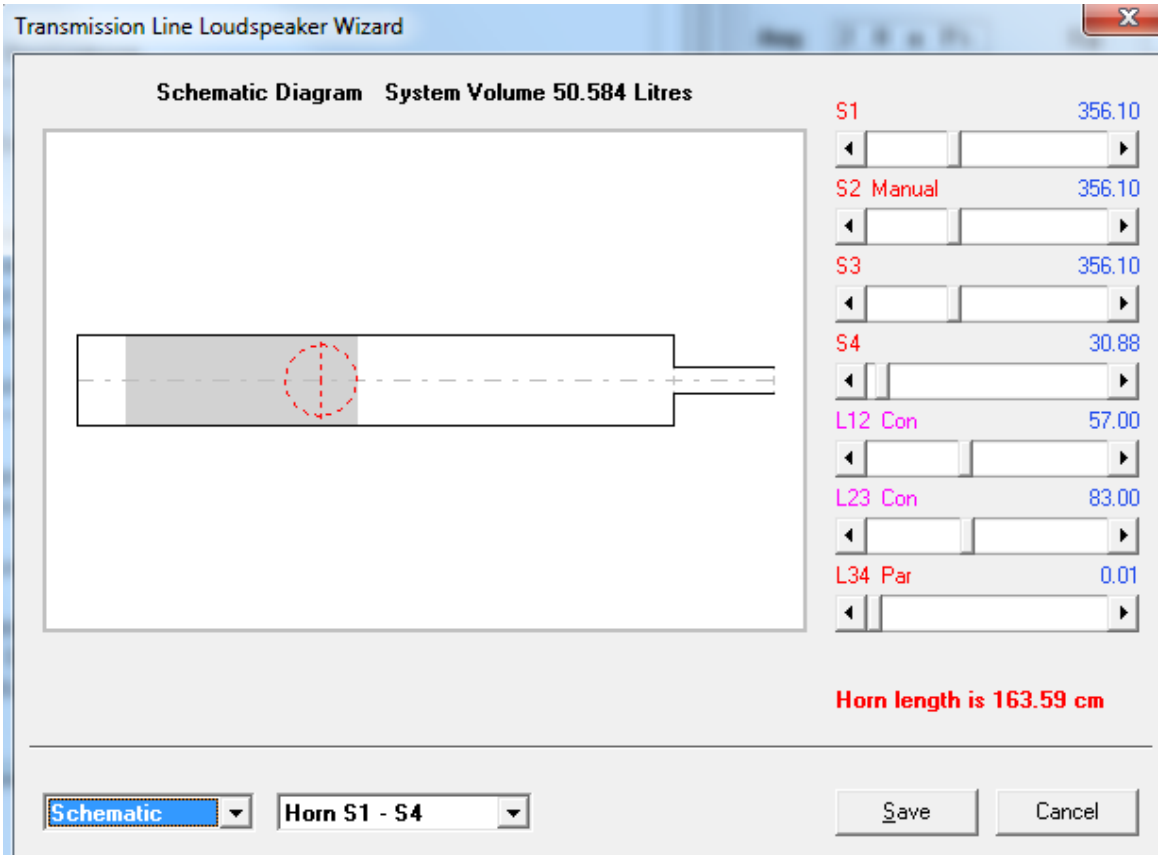

Tweeter High Pass Crossover Design Section
Target Transfer Function
Import Target Response
Select Desired Response Shape
Enter Frequency
Enter dB Level
Target Transfer Function
Third Order Butterworth Target
1,500 Hz
79.0
Tweeter High Pass Circuit Selections and Component Values
Select High Pass Crossover Order
Crossover Component Values in mH, uF, & Ohms
DCR or Series R
Selected Filter Order:
Third Order Parallel
C9 uF
9.50
1.50
L9 mH
0.30
0.34
Selected Electrical Frequency:
1,500 Hz
C10 uF
18.00
6.50
Initialize Textbook Values
Clear Crossover Values
Select Topology to be in Series Before or After HP Filter
Enter Appropriate Values for Circuit
L mH
C uF
R Ohm
Before Crossover - Selected Circuit:
No Series Elements
After Crossover - Selected Circuit:
5.00
3.70
Parallel RC Contour Filter
Select Topology to be in Parallel
Enter Appropriate Values for Circuit
+/-
RS28A-4 And High Pass Response
dB Zoom
F Zoom
dB
Phase
Filter
Target
Sum
Phase
Raw Tweeter Response
Tweeter + HP Filter
Target Reponse
Woofer
Midrange
Total Response
Filter (Normalized)
Raw Tweeter Phase
Tweeter + HP Phase

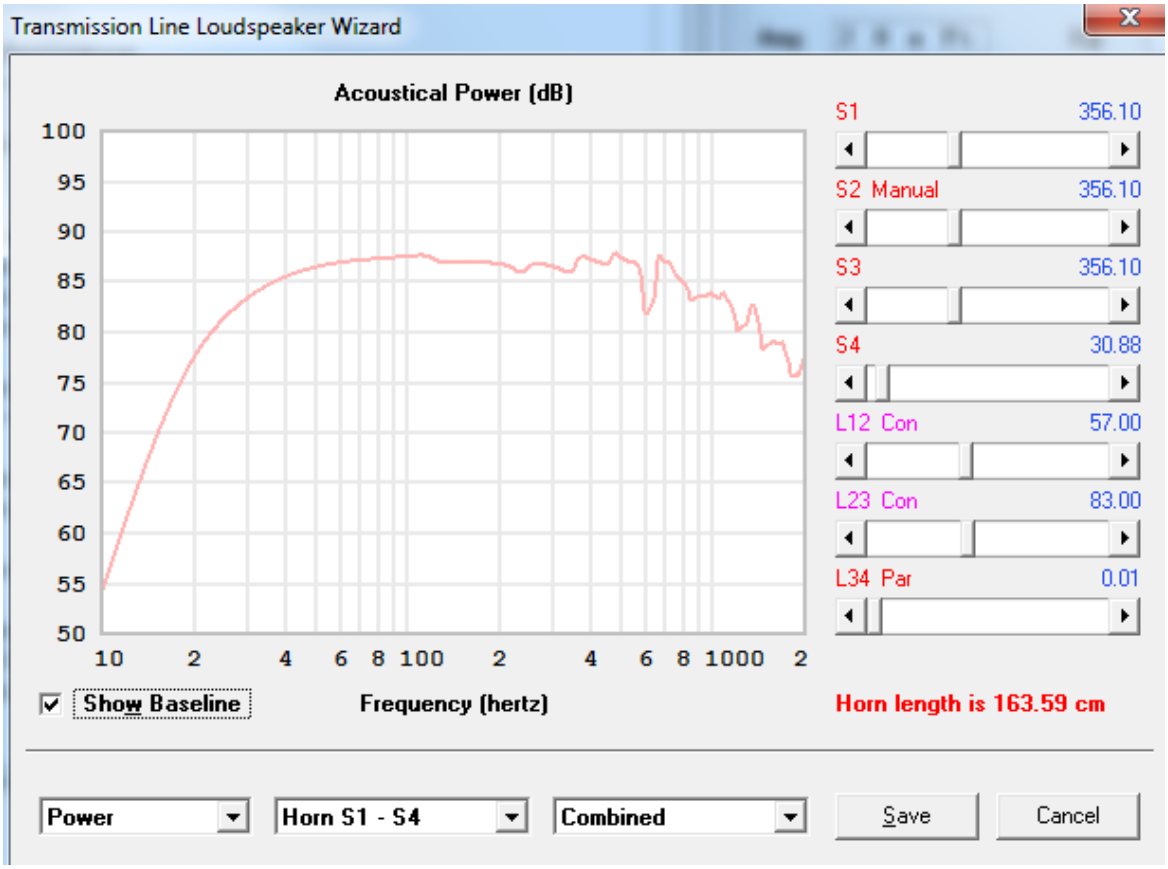

Midrange Band Pass Crossover Design Section
High Pass Target Transfer Function
Import BP Target Response
Select Desired Response Shape
Enter Frequency
Target Transfer Function
Second Order Bessel Target
550 Hz
Low Pass Target
(Use High Pass Above For Selecting Imported Target)
Select Desired Response Shape
Enter Frequency
Enter dB Level
Target Transfer Function
Third Order Butterworth Target
1,500 Hz
80.0
High Pass Circuit Selections and Component Values
Select Midrange High Pass Crossover Order
Crossover Component Values in mH, uF, & Ohms
DCR or Series R
Selected Filter Order:
First Order Electrical
C16 uF
15.00
6.00
Selected Electrical Frequency:
800 Hz
Initialize Textbook Values
Clear Crossover Values
Low Pass Circuit Selections and Component Values
Select Midrange Low Pass Crossover Order
Crossover Component Values in mH, uF, & Ohms
DCR or Series R
Selected Filter:
Second Order Electrical
L18 mH
1.20
0.77
C18 uF
25.00
Selected Electrical Frequency:
1,500 Hz
Initialize Textbook Values
Clear Crossover Values
Select Topology to be in Series Before or After Crossover Filter
Enter Appropriate Values for Circuit
L mH
C uF
R Ohm
Before Crossover - Selected Circuit:
No Series Elements
After Crossover - Selected Circuit:
No Series Elements
Select Topology to be in Parallel With Midrange
Enter Appropriate Values for Circuit
L mH
C uF
R Ohm
Parallel Leg 1 - Selected Circuit:
4.25
Parallel Resistor
+/-
RS150S-8 And Band Pass Response
dB Zoom
F Zoom
dB
Phase
Filter
Target
Sum
Phase
Raw Midrange Response
Midrange + BP Filter
Target Reponse
Woofer
Tweeter
Total Response
Filter (Normalized)
Raw Midrange Phase
Midrange + BP Phase
Print Band Pass Response Chart
Save Midrange Response Chart
Output Summed Midrange Response to FRD File
Output Band Filter Respo FRD Fil
View PCD Circuit Layouts
Two-Way Crossover Calculators
Three-Way Crossover Calculators

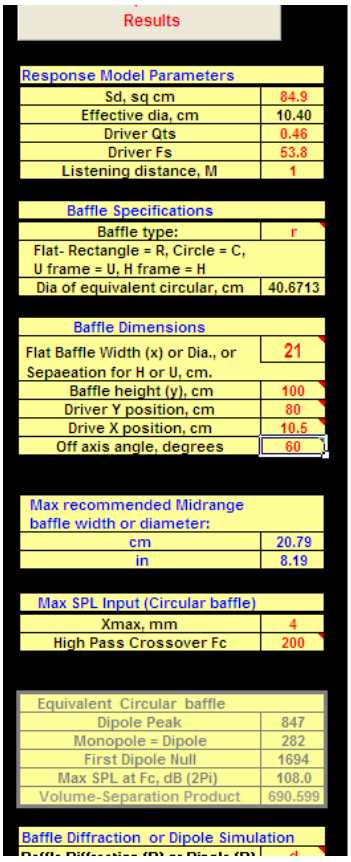

Vented Box, Vb = 49 l
1x Dayton RS225S-8
Export GIF
F3 = 031 Hz Fb = 026 Hz
Response peak = 000 dB
Qa = 80 Ql = 15 Qp = 120
SPL produced by driver
SPL produced by port
SPL produced by leaks
SPL produced by driver at 07 mm peak excursion
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
10.0
100.0
1000.0
Frequency, Hz


Peak Cone Excursion
1x Dayton RS225S-8
Vented Box, Vb = 49 l
Export GIF
F3 = 031 Hz Fb = 026 Hz
Response peak = 000 dB
Qa = 80 Ql = 15 Qp = 120
Max linear peak cone excursion = 07 mm
25.00
20.00
15.00
10.00
5.00
0.00
10.0
100.0
1000.0
Frequency, Hz


Port Air Speed
1x Dayton RS225S-8
Vented Box, Vb = 49 l
Export GIF
F3 = 031 Hz Fb = 026 Hz
Response peak = 000 dB
Qa = 80 Ql = 15 Qp = 120
Port Dia = 006 cm Length = 024 cm
30.00
25.00
20.00
15.00
10.00
5.00
0.00
10.0
100.0
1000.0
Frequency, Hz


Transmission Line Loudspeaker Wizard
Schematic Diagram System Volume 50.584 Litres
S1 356.10
S2 Manual 356.10
S3 356.10
S4 30.88
L12 Con 57.00
L23 Con 83.00
L34 Par 0.01
Horn length is 163.59 cm
Schematic
Horn S1 - S4
Save
Cancel





Results

Response Model Parameters	
Sd, sq cm	84.9
Effective dia, cm	10.40
Driver Qts	0.46
Driver Fs	53.8
Listening distance, M	1

Baffle Specifications	
Baffle type:	r
Flat- Rectangle = R, Circle = C, U frame = U, H frame = H	
Dia of equivalent circular, cm	40.6713

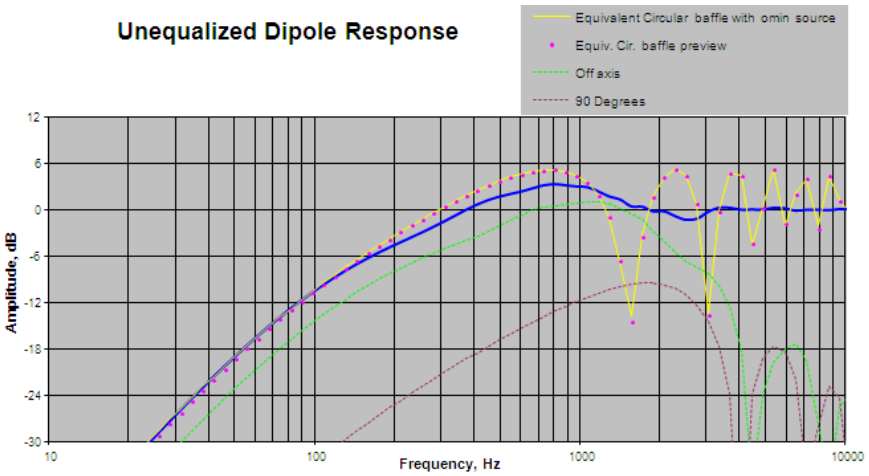
Baffle Dimensions	
Flat Baffle Width (x) or Dia., or Sepaeation for H or U, cm.	21
Baffle height (y), cm	100
Driver Y position, cm	80
Drive X position, cm	10.5
Off axis angle, degrees	60

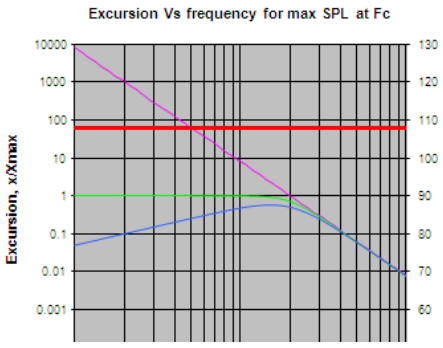
Max recommended Midrange baffle width or diameter:	
cm	20.79
in	8.19

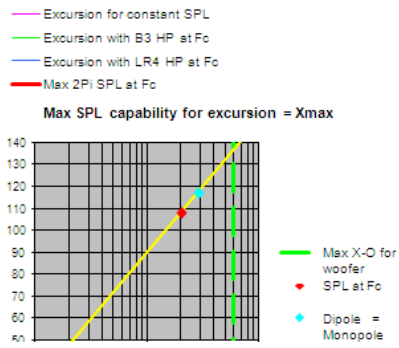
Max SPL Input (Circular baffle)	
Xmax, mm	4
High Pass Crossover Fc	200

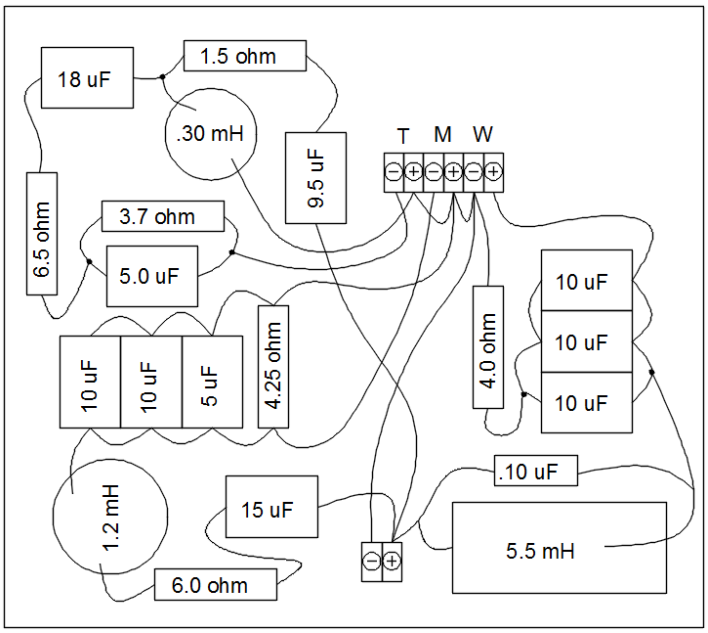
Equivalent Circular baffle	
Dipole Peak	847
Monopole = Dipole	282
First Dipole Null	1694
Max SPL at Fc, dB (2Pi)	108.0
Volume-Separation Product	690.599

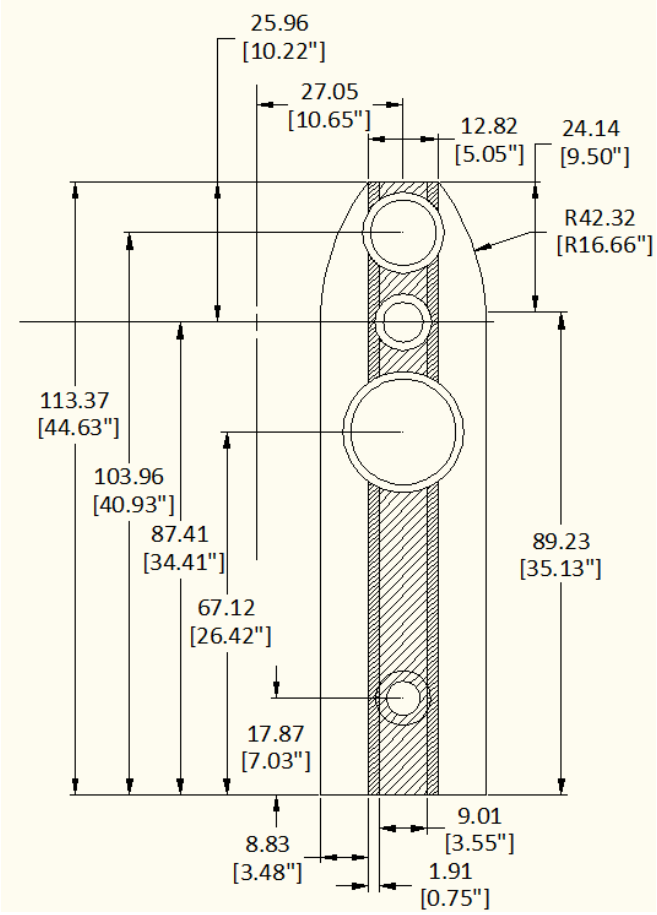
Baffle Diffraction or Dipole Simulation











Baffle is 1.5 inches thick