


Horn Length Reduction Study

Model a series of exponential horns with a flare rate of 38.68 Hz, and then change the throat size by applying more driver area, and reduce the horn length at the same time.

Determine if the acoustic horn length can be reduced by this technique.

Throat with Single Driver

 Hornresp - Input Parameters

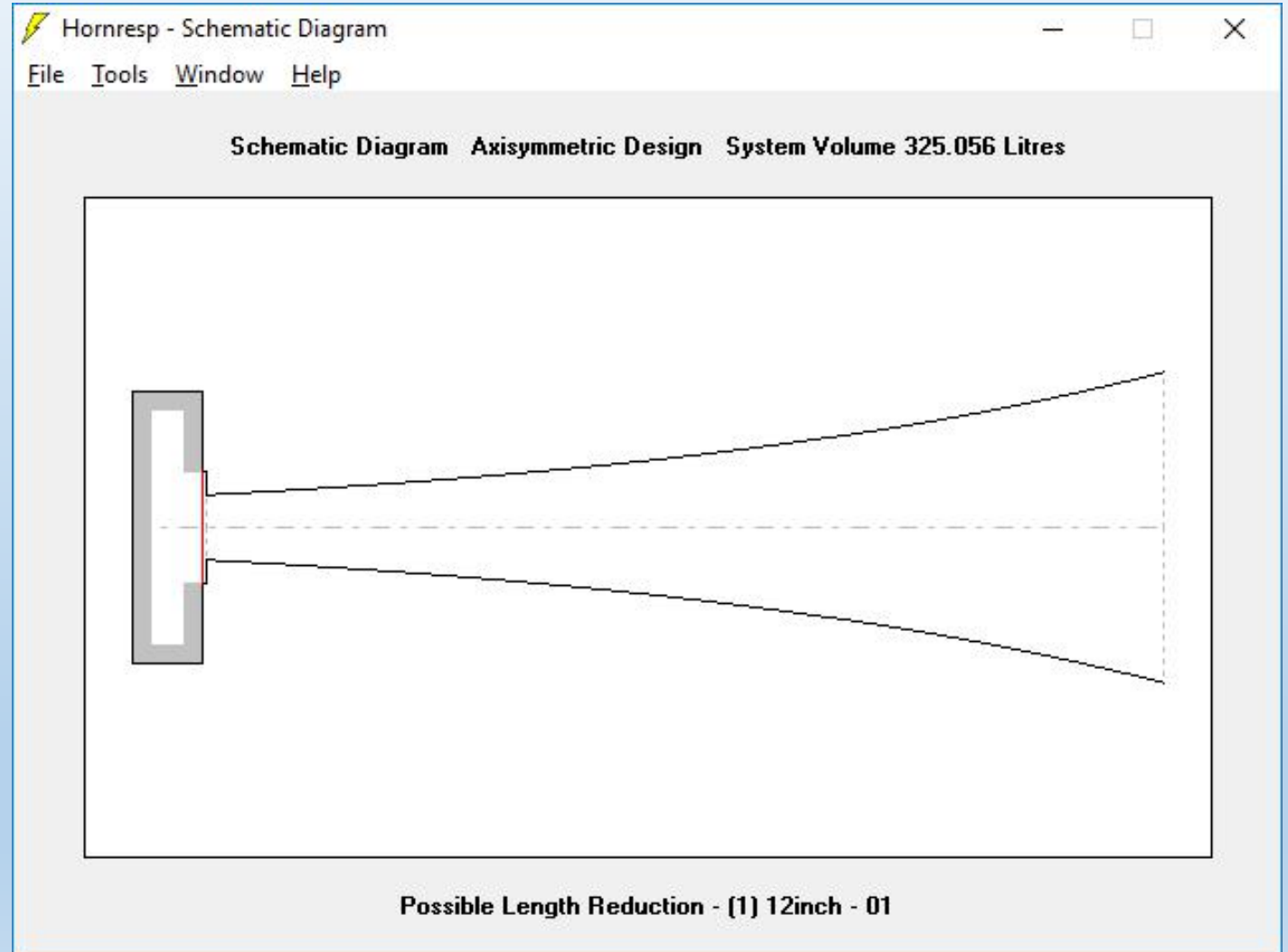
File Tools Window Help

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S2	<input type="text" value="0.00"/>	S3	<input type="text" value="0.00"/>	L23	<input type="text" value="0.00"/>	AT	<input type="text" value="3.04"/>
S3	<input type="text" value="0.00"/>	S4	<input type="text" value="0.00"/>	L34	<input type="text" value="0.00"/>	F34	<input type="text" value="0.00"/>
S4	<input type="text" value="0.00"/>	S5	<input type="text" value="0.00"/>	L45	<input type="text" value="0.00"/>	F45	<input type="text" value="0.00"/>

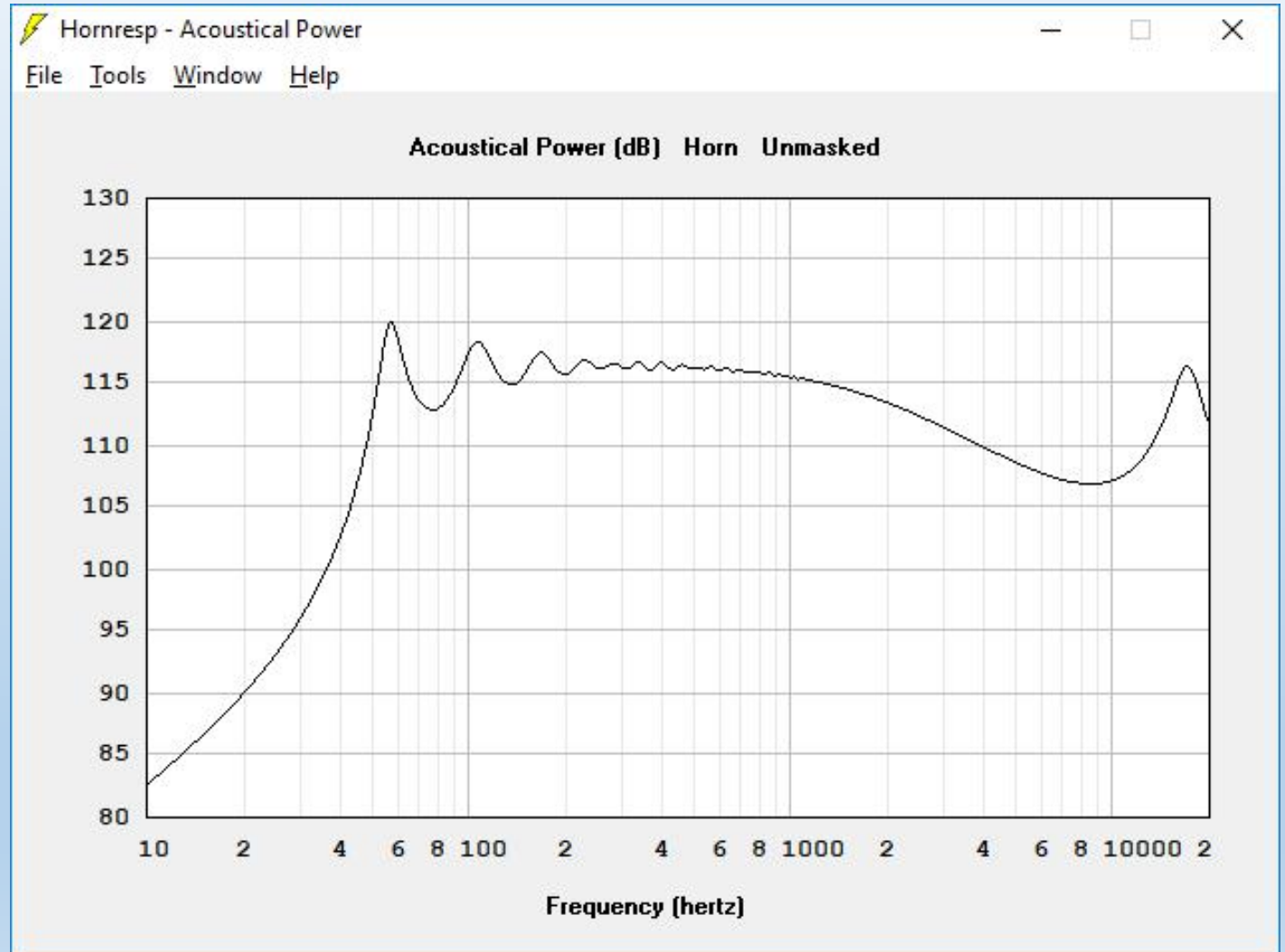
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Bl	<input type="text" value="18.00"/>	Rms	<input type="text" value="4.00"/>	Le	<input type="text" value="1.00"/>	Nd	<input type="text" value="1"/>
Vrc	<input type="text" value="50.00"/>	Fr	<input type="text" value="40000.00"/>	Vtc	<input type="text" value="530.00"/>		
Lrc	<input type="text" value="16.00"/>	Tal	<input type="text" value="4.00"/>	Atc	<input type="text" value="530.00"/>		

Comment


Throat with Single Driver Shape



Throat with Single Driver SPL



Throat with Dual Drivers

 Hornresp - Input Parameters

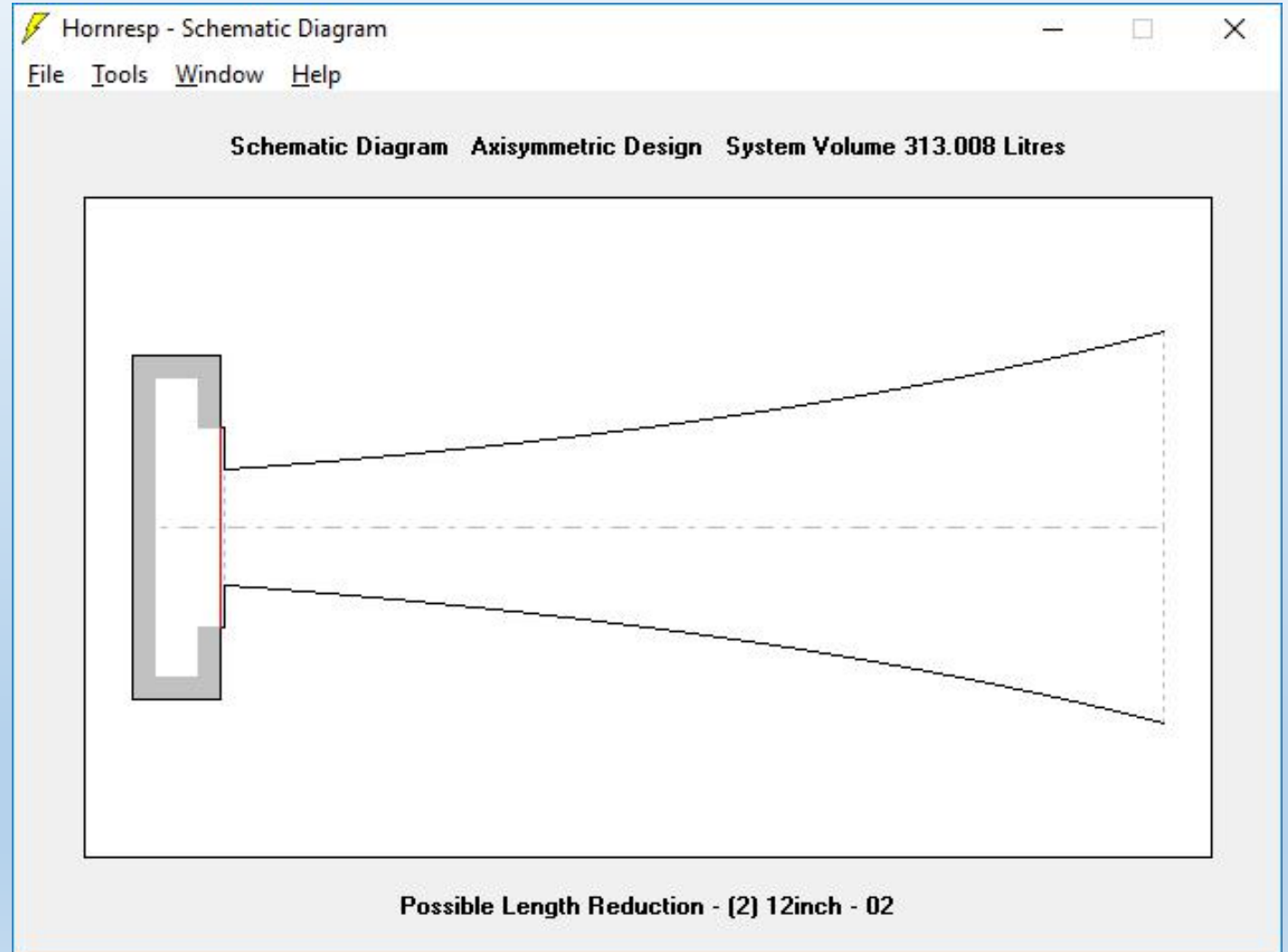
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S2	<input type="text" value="0.00"/>	S3	<input type="text" value="0.00"/>	L23	<input type="text" value="0.00"/>	AT	<input type="text" value="4.29"/>
S3	<input type="text" value="0.00"/>	S4	<input type="text" value="0.00"/>	L34	<input type="text" value="0.00"/>	F34	<input type="text" value="0.00"/>
S4	<input type="text" value="0.00"/>	S5	<input type="text" value="0.00"/>	L45	<input type="text" value="0.00"/>	F45	<input type="text" value="0.00"/>

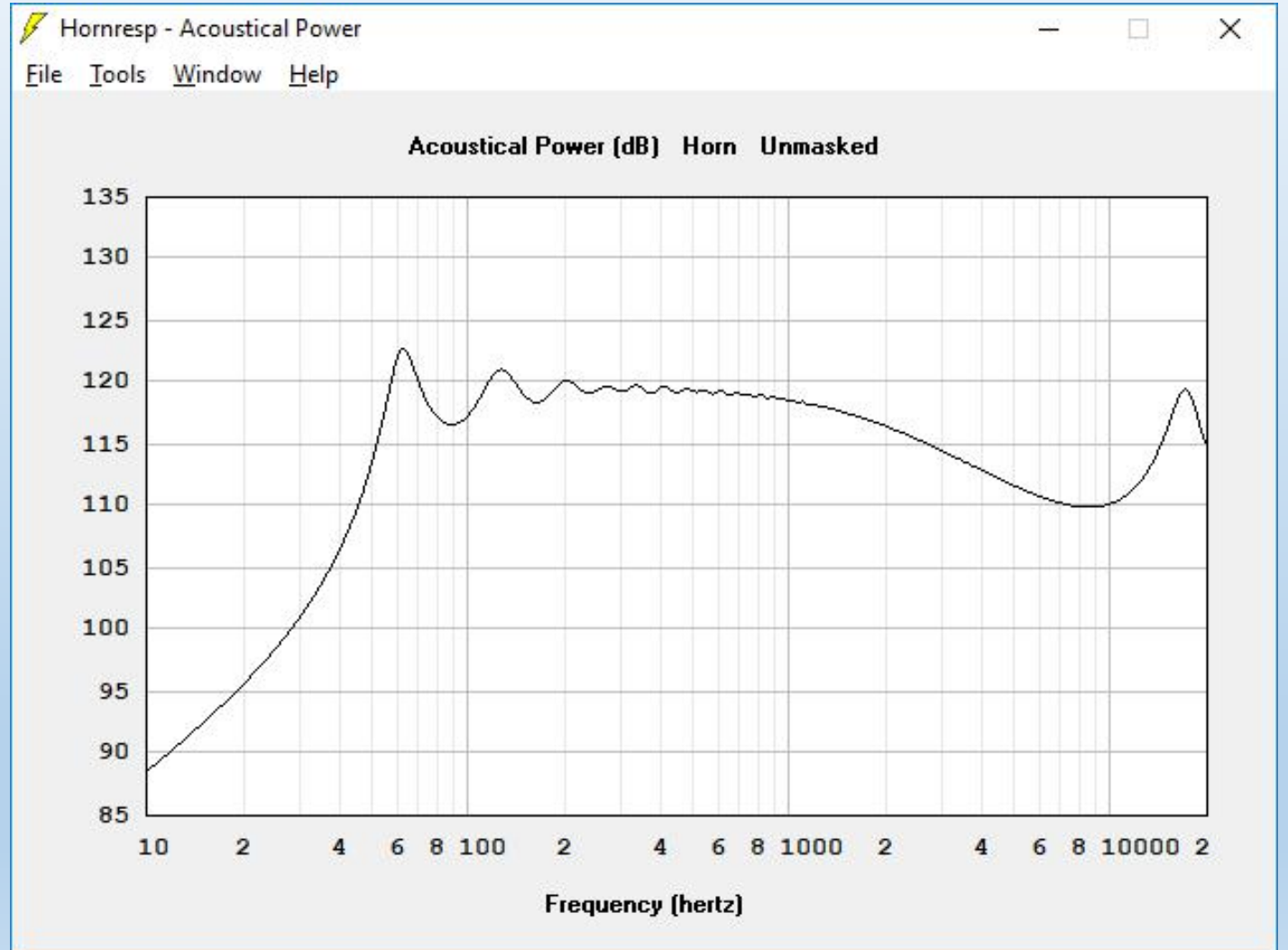
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Vrc	<input type="text" value="50.00"/>	Fr	<input type="text" value="40000.00"/>	Vtc	<input type="text" value="1060.00"/>		
Lrc	<input type="text" value="16.00"/>	Tal	<input type="text" value="4.00"/>	Atc	<input type="text" value="1060.00"/>		

Comment


Throat with Dual Drivers Shape



Throat with Dual Drivers SPL



Throat with Quad Drivers

 **Hornresp - Input Parameters** — □ ✕

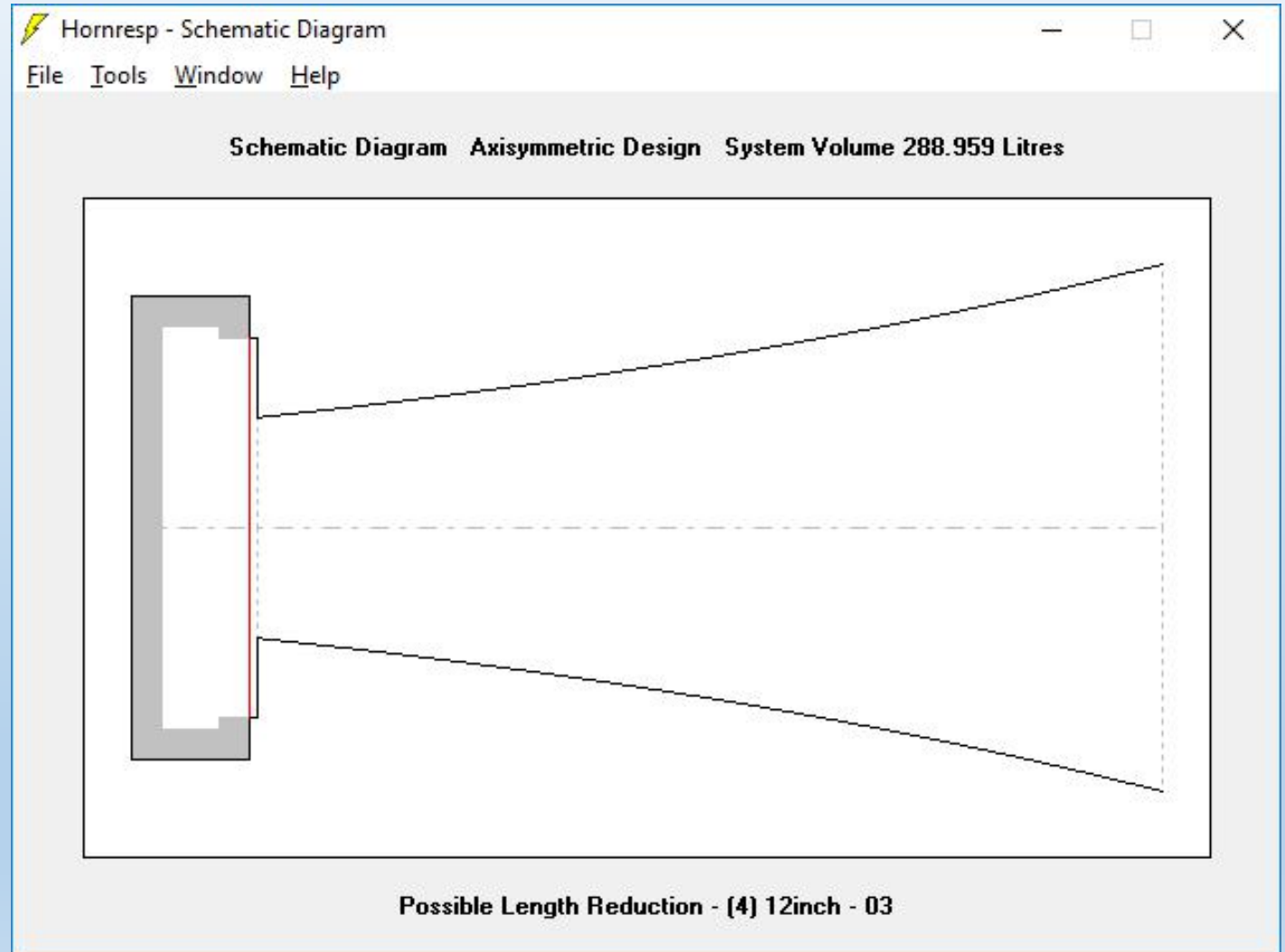
File Tools Window Help

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S3	<input type="text" value="0.00"/>	S4	<input type="text" value="0.00"/>	L34	<input type="text" value="0.00"/>	F34	<input type="text" value="0.00"/>
S4	<input type="text" value="0.00"/>	S5	<input type="text" value="0.00"/>	L45	<input type="text" value="0.00"/>	F45	<input type="text" value="0.00"/>

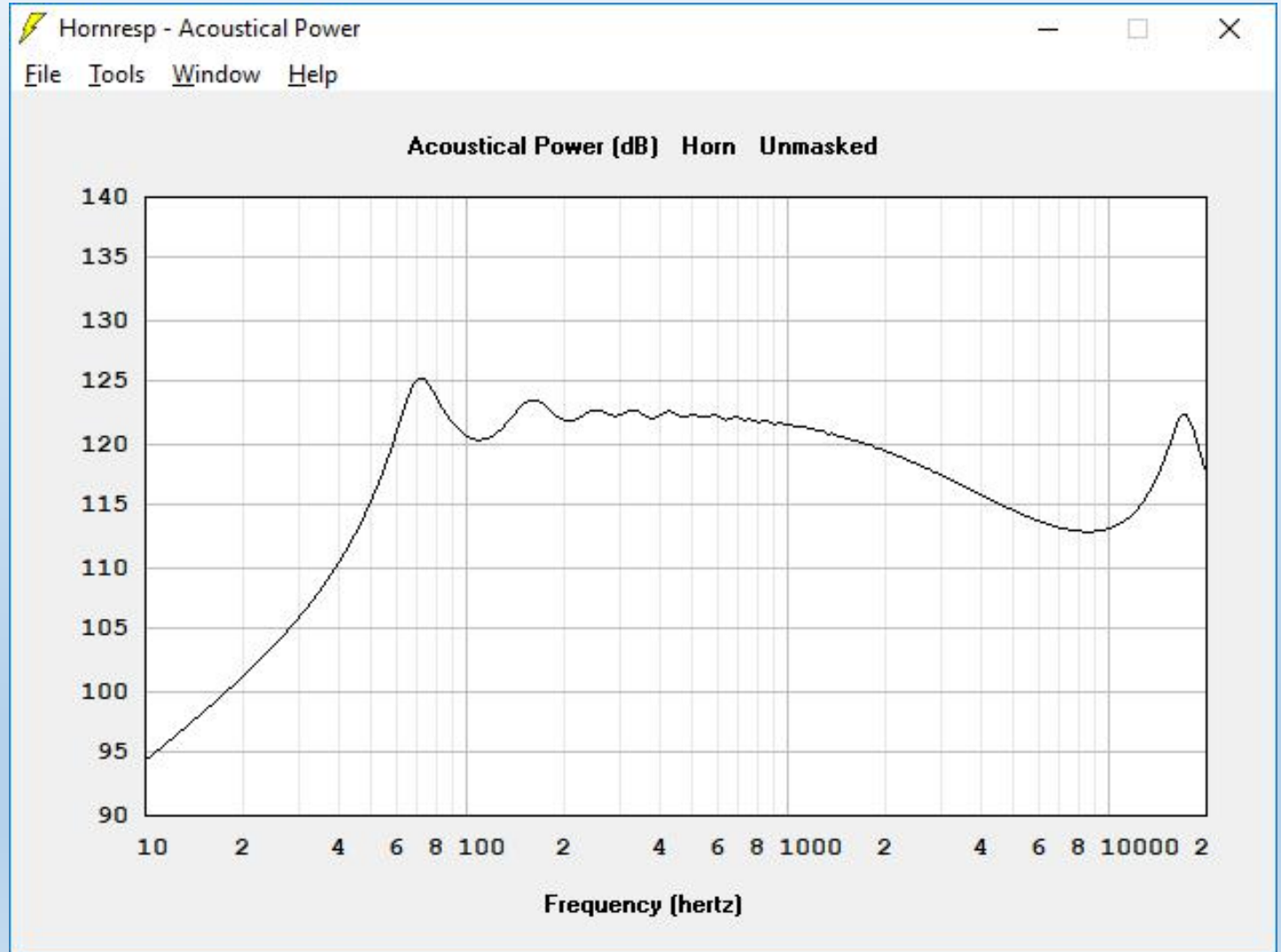
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Vrc	<input type="text" value="50.00"/>	Fr	<input type="text" value="40000.00"/>	Vtc	<input type="text" value="2120.00"/>		
Lrc	<input type="text" value="16.00"/>	Tal	<input type="text" value="4.00"/>	Atc	<input type="text" value="2120.00"/>		

Comment


Throat with Quad Drivers Shape



Throat with Quad Drivers SPL



Throat with Six Drivers

 **Hornresp - Input Parameters** — □ ✕

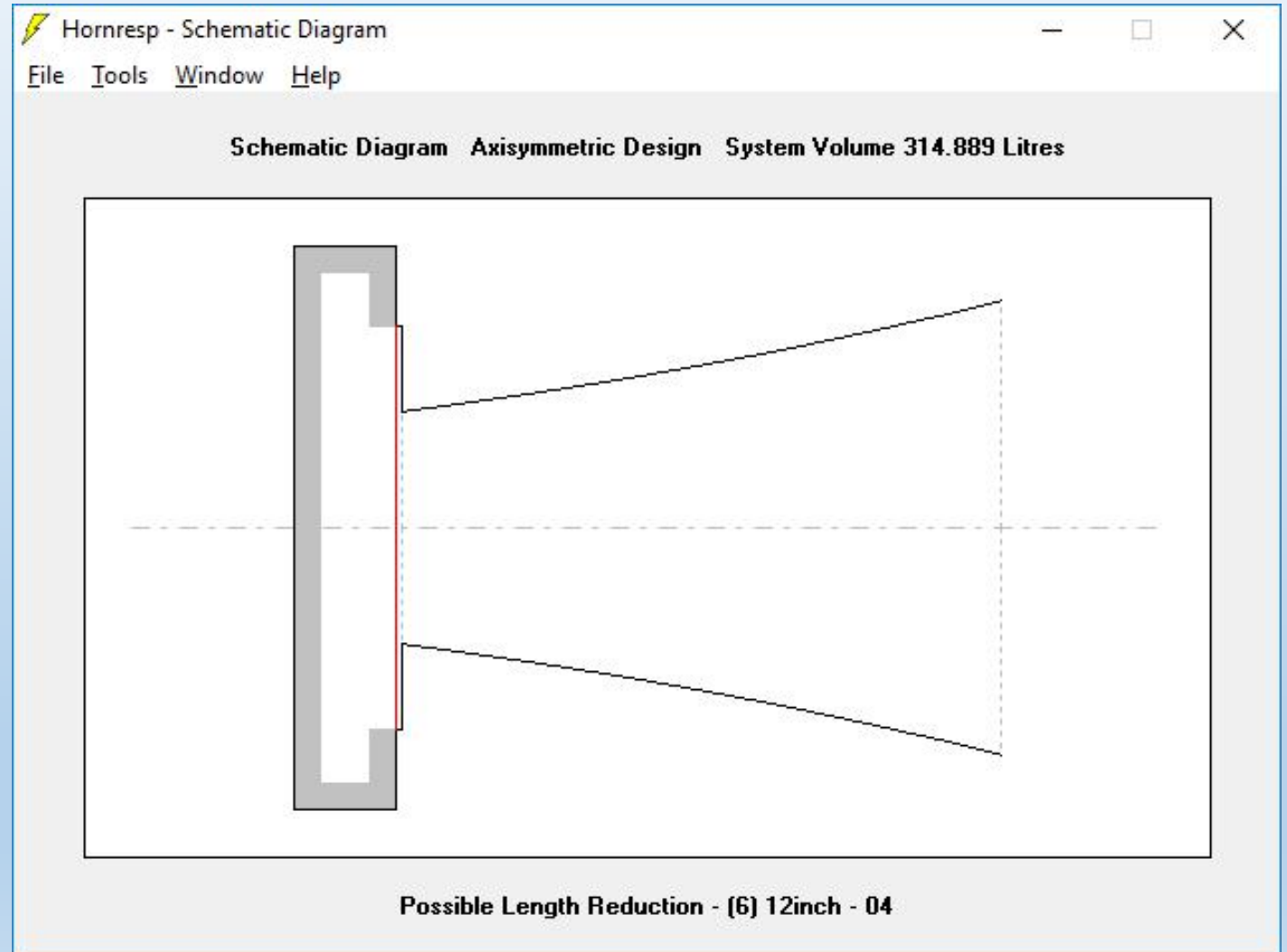
File Tools Window Help

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S3	<input type="text" value="0.00"/>	S4	<input type="text" value="0.00"/>	L34	<input type="text" value="0.00"/>	F34	<input type="text" value="0.00"/>
S4	<input type="text" value="0.00"/>	S5	<input type="text" value="0.00"/>	L45	<input type="text" value="0.00"/>	F45	<input type="text" value="0.00"/>

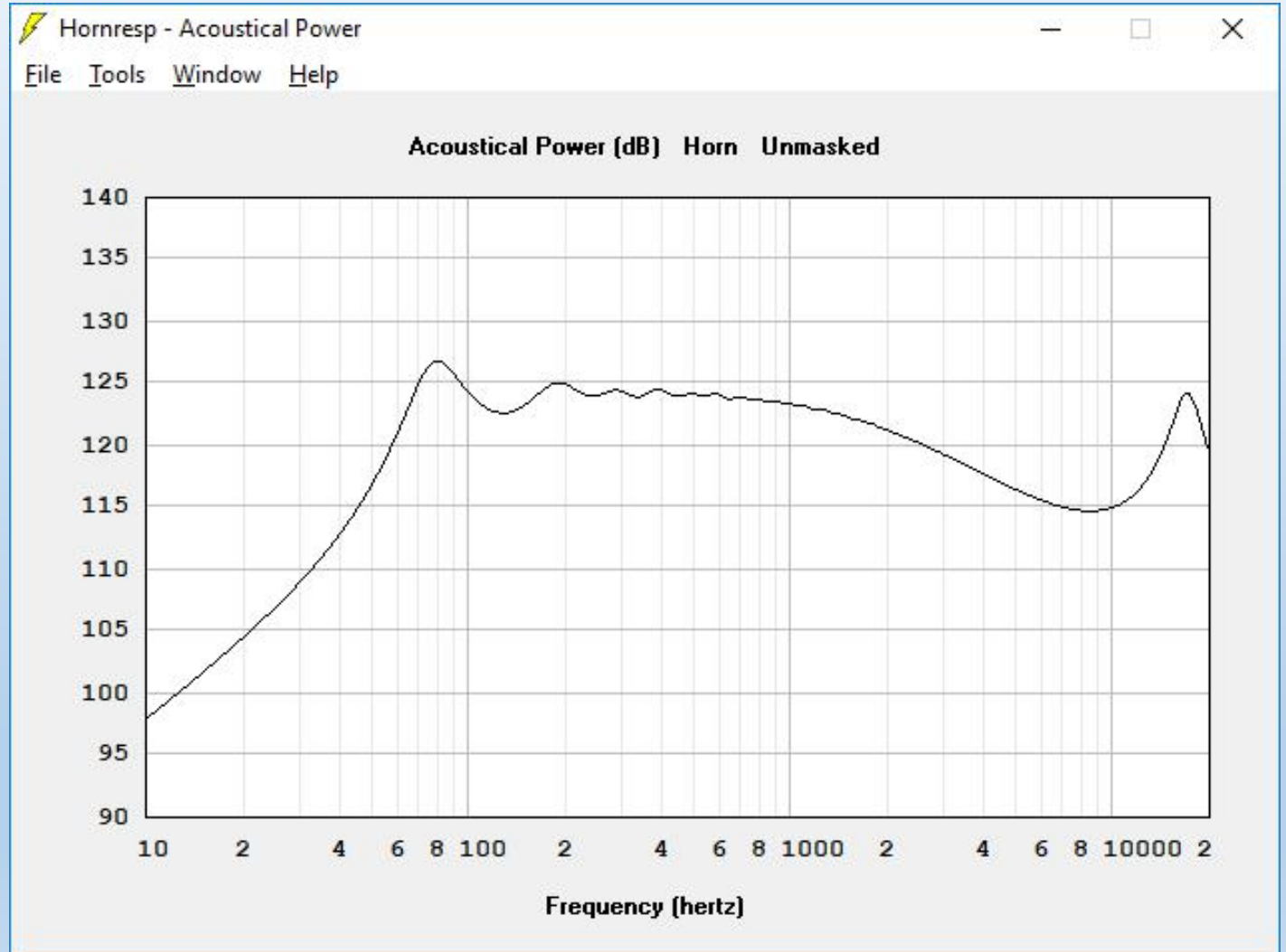
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Vrc	<input type="text" value="100.00"/>	Fr	<input type="text" value="40000.00"/>	Vtc	<input type="text" value="3180.00"/>		
Lrc	<input type="text" value="16.00"/>	Tal	<input type="text" value="4.00"/>	Atc	<input type="text" value="3180.00"/>		

Comment


Throat with Six Drivers Shape



Throat with Six Drivers SPL



Throat with Eight Drivers

 **Hornresp - Input Parameters** — □ ✕

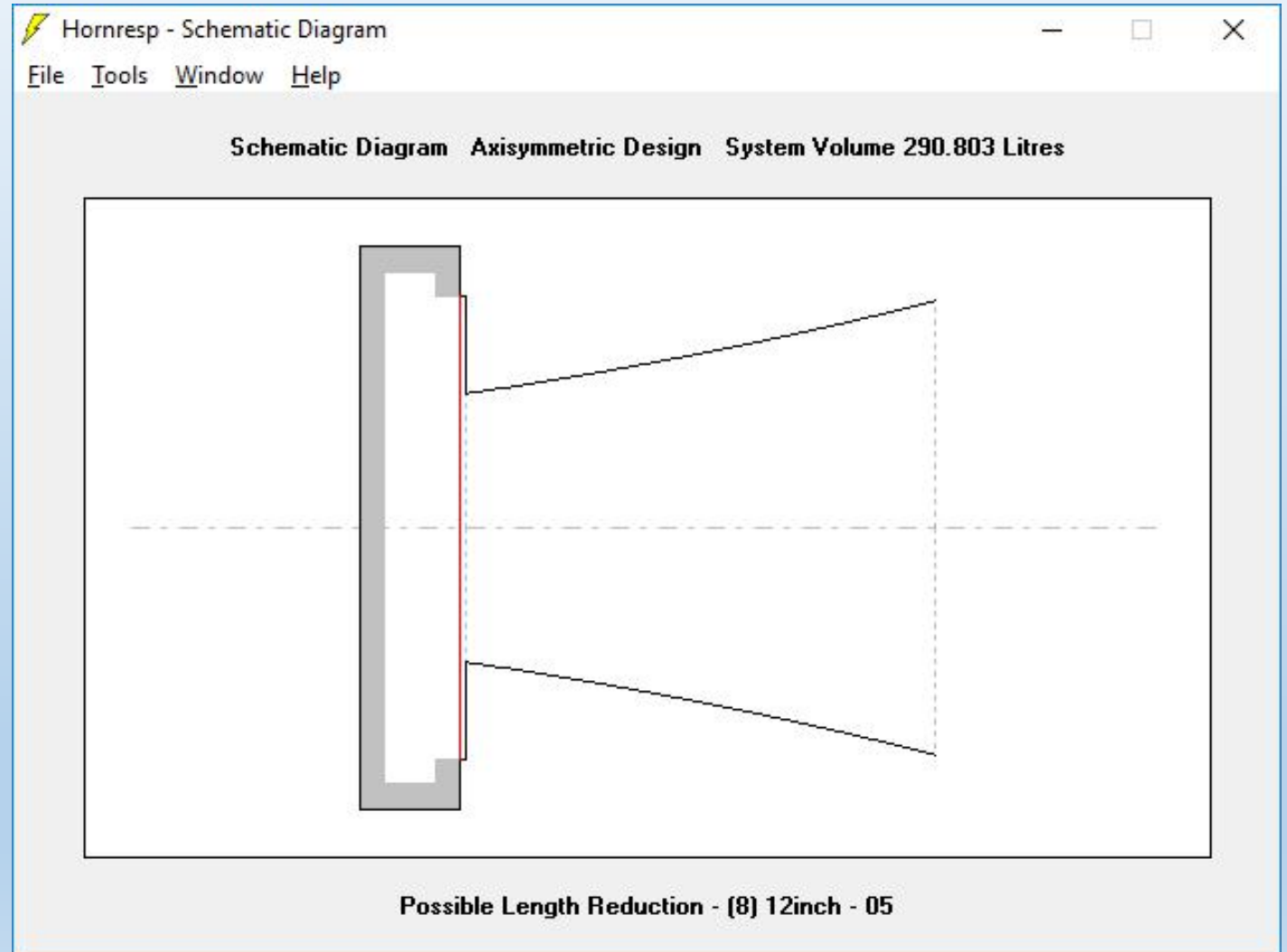
File Tools Window Help

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S3	<input type="text" value="0.00"/>	S4	<input type="text" value="0.00"/>	L34	<input type="text" value="0.00"/>	F34	<input type="text" value="0.00"/>
S4	<input type="text" value="0.00"/>	S5	<input type="text" value="0.00"/>	L45	<input type="text" value="0.00"/>	F45	<input type="text" value="0.00"/>

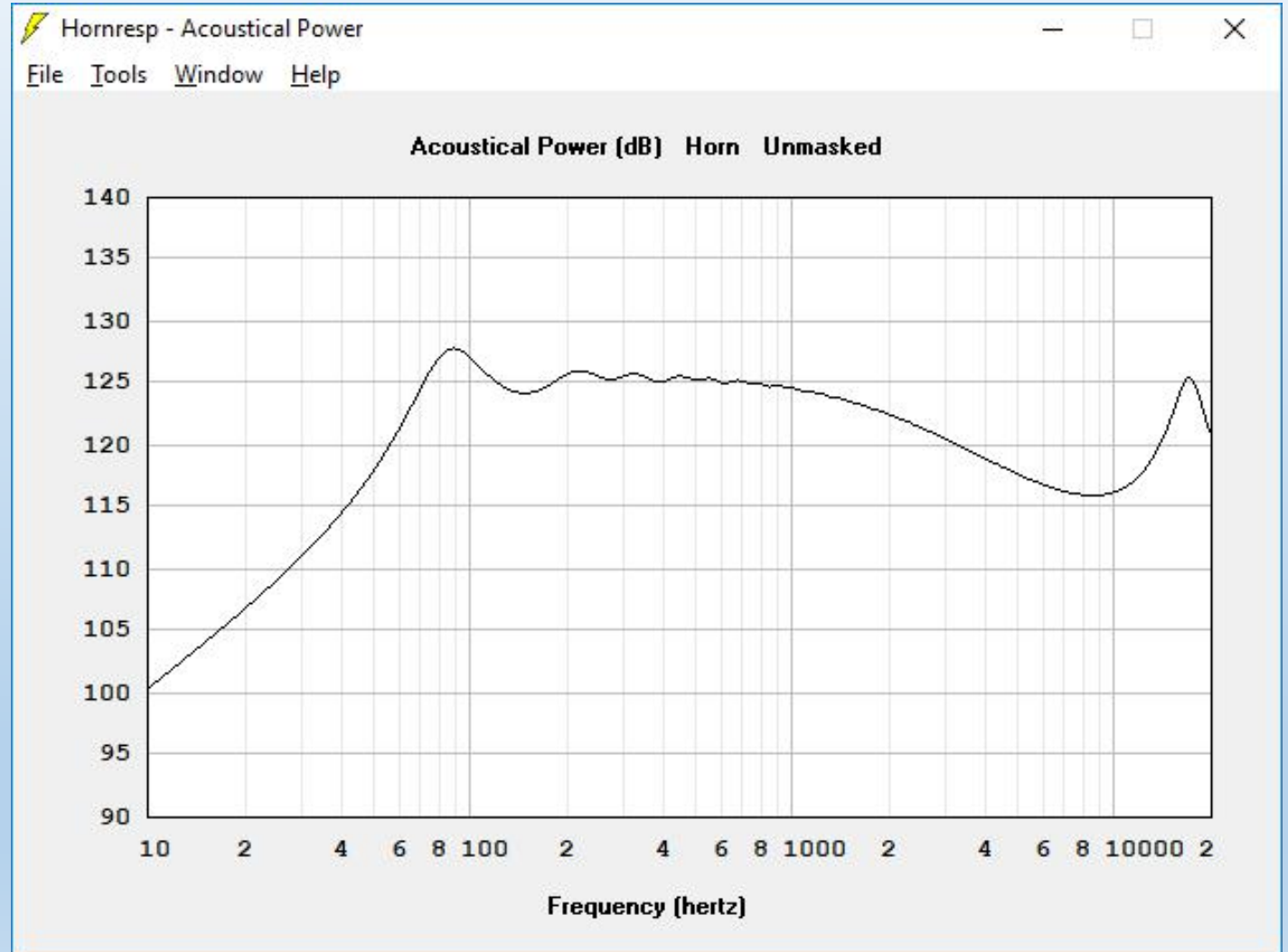
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Vrc	<input type="text" value="100.00"/>	Fr	<input type="text" value="40000.00"/>	Vtc	<input type="text" value="4240.00"/>		
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Comment

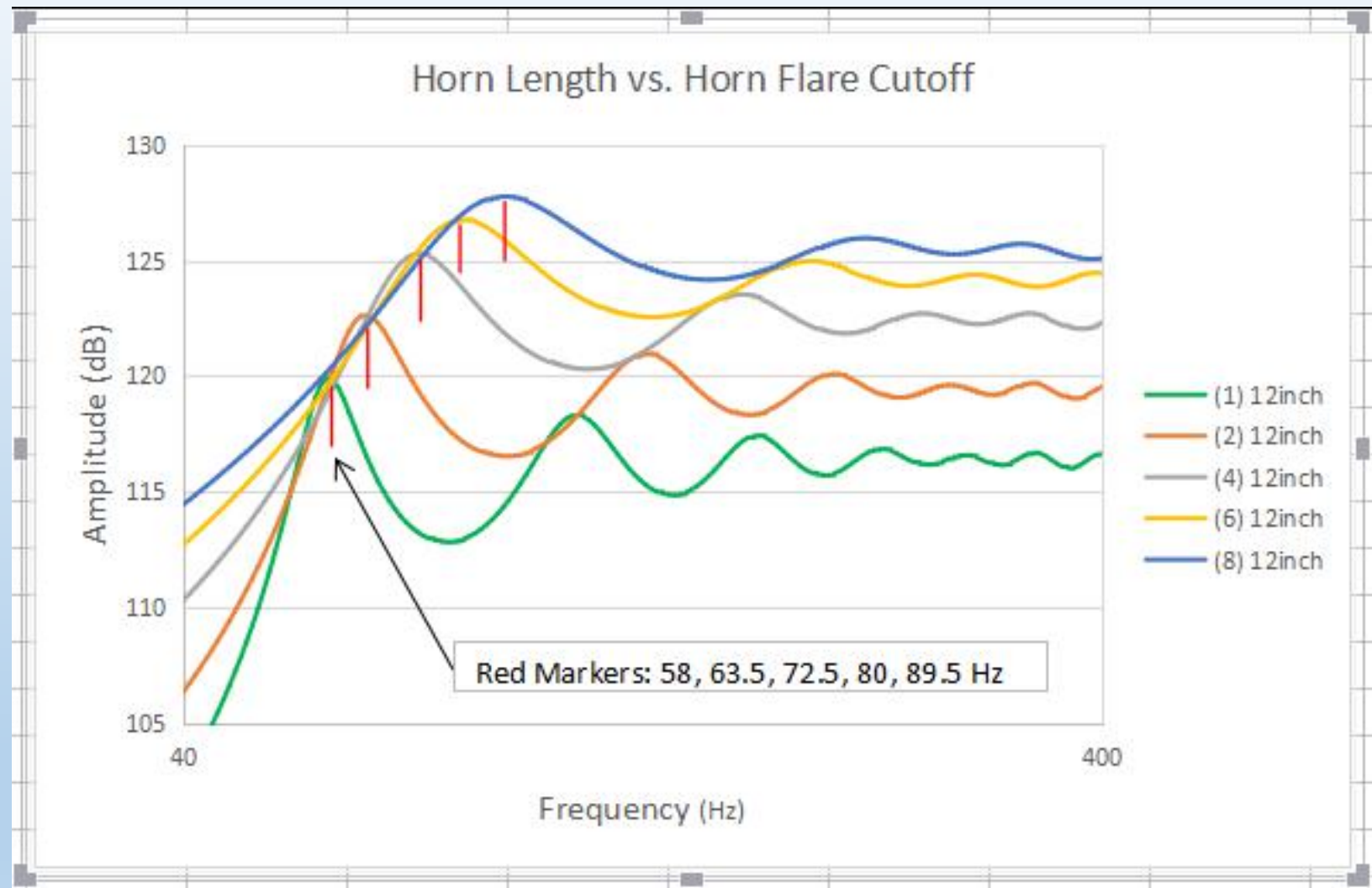
Throat with Eight Drivers Shape



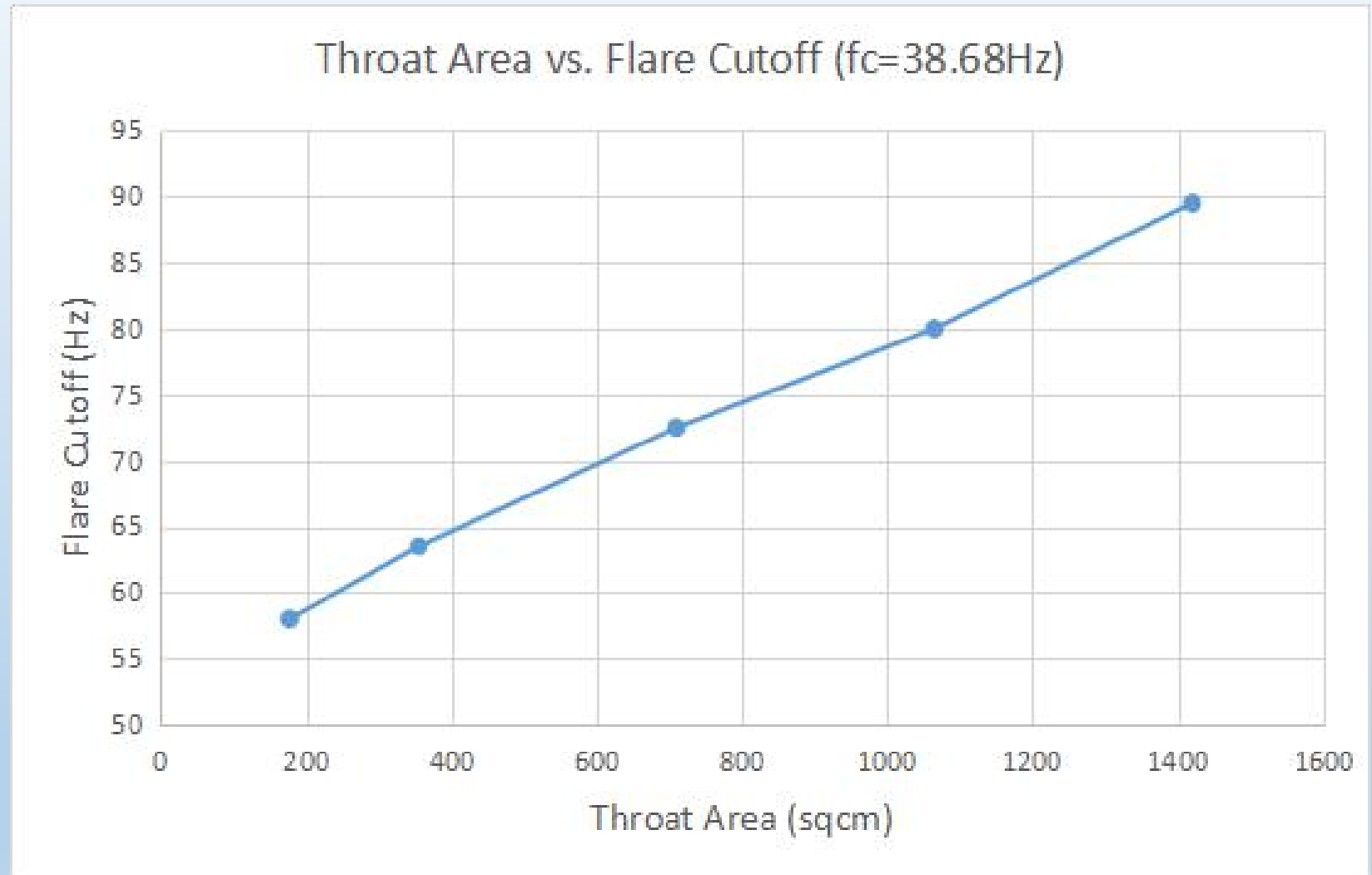
Throat with Eight Drivers SPL



The graph shows the 1) rise in efficiency, and 2) rise in f_c for a horn with a larger throat (more drivers).



The graph shows the rise in f_c for a horn with a larger throat (more drivers), with a horn design flare of 38.68 Hz.



Conclusion

A study was performed to determine if the required horn length could be reduced by creating a horn with a larger throat.

Data shows that the horn f_c goes up when trying to reduce the horn length by this technique.