



# LOUDSPEAKER PLACEMENT

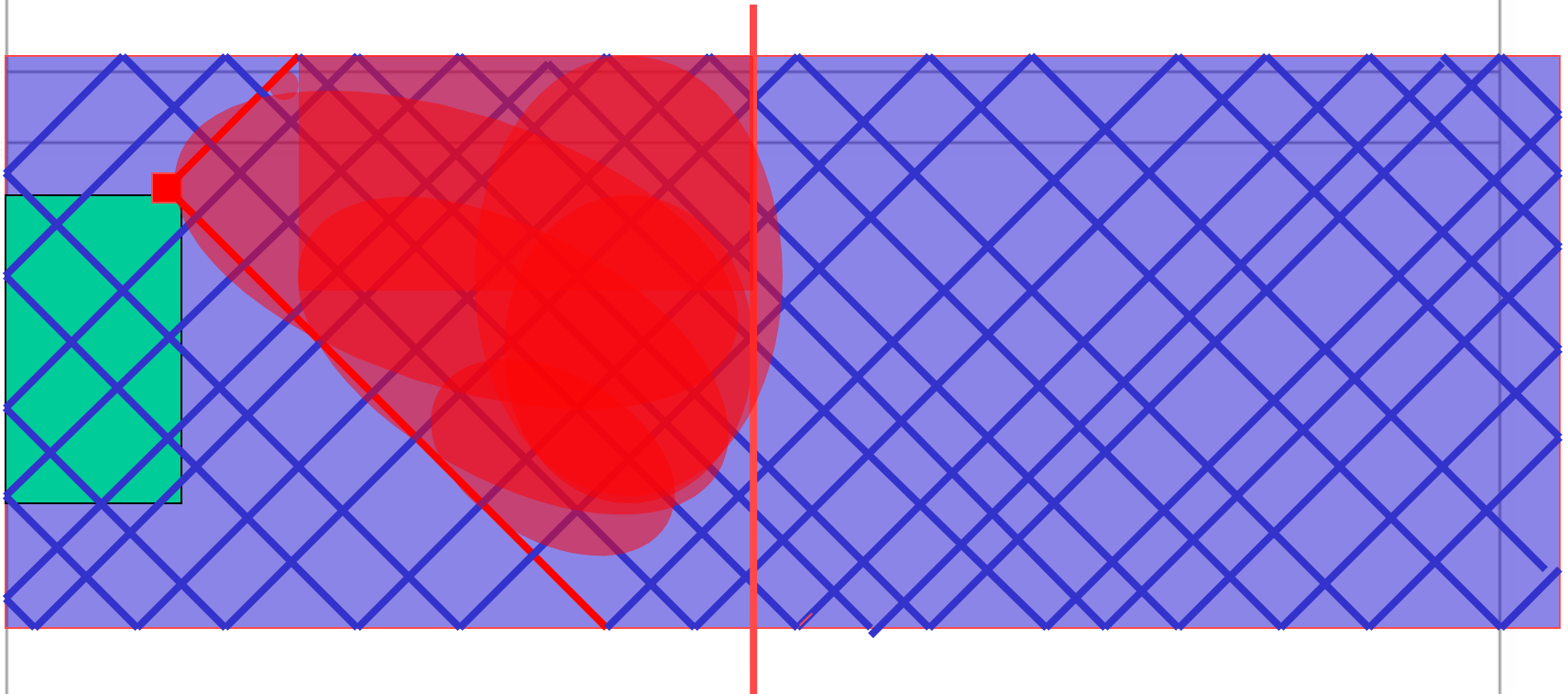
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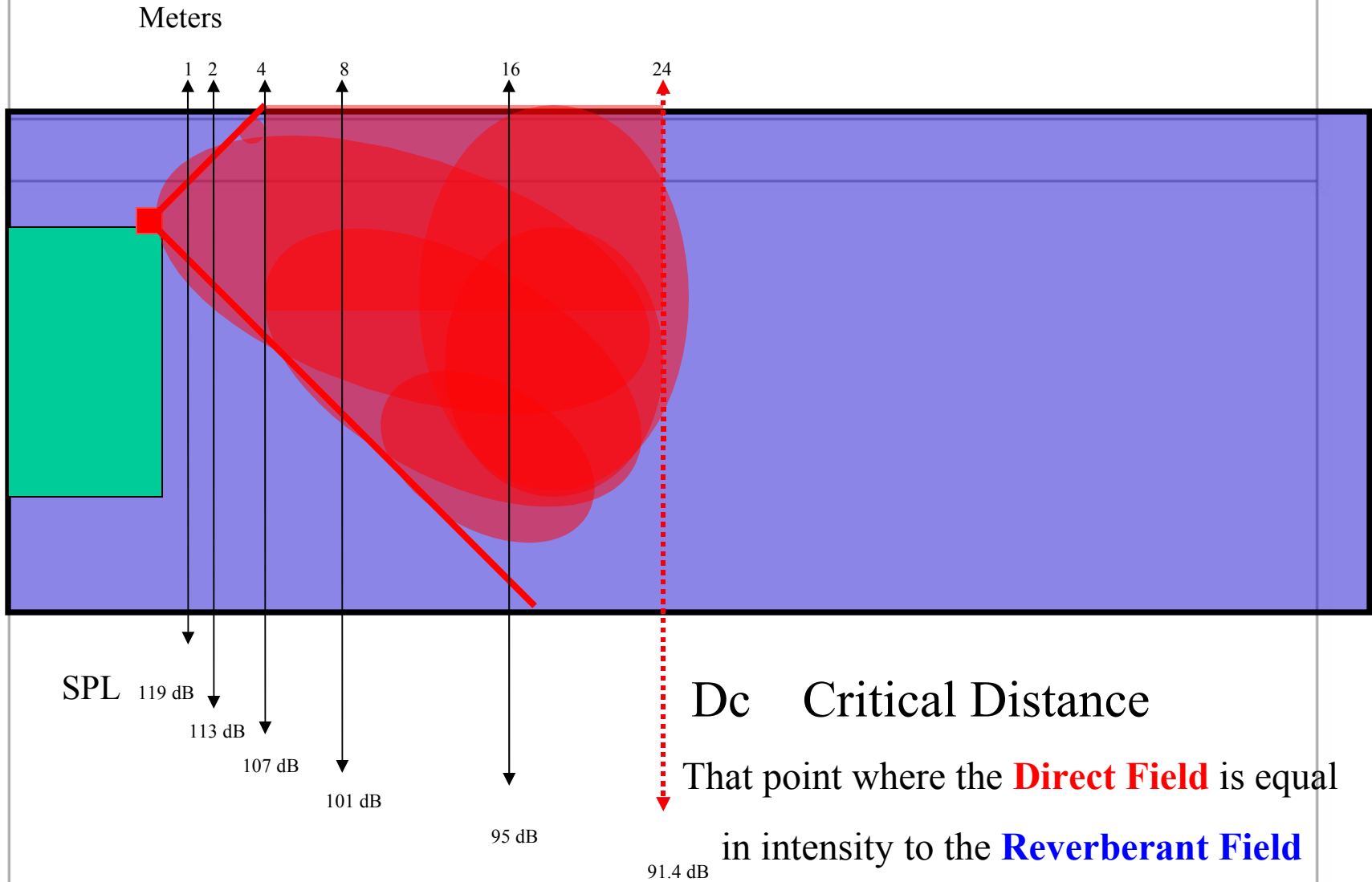
# Basic Placement Rules

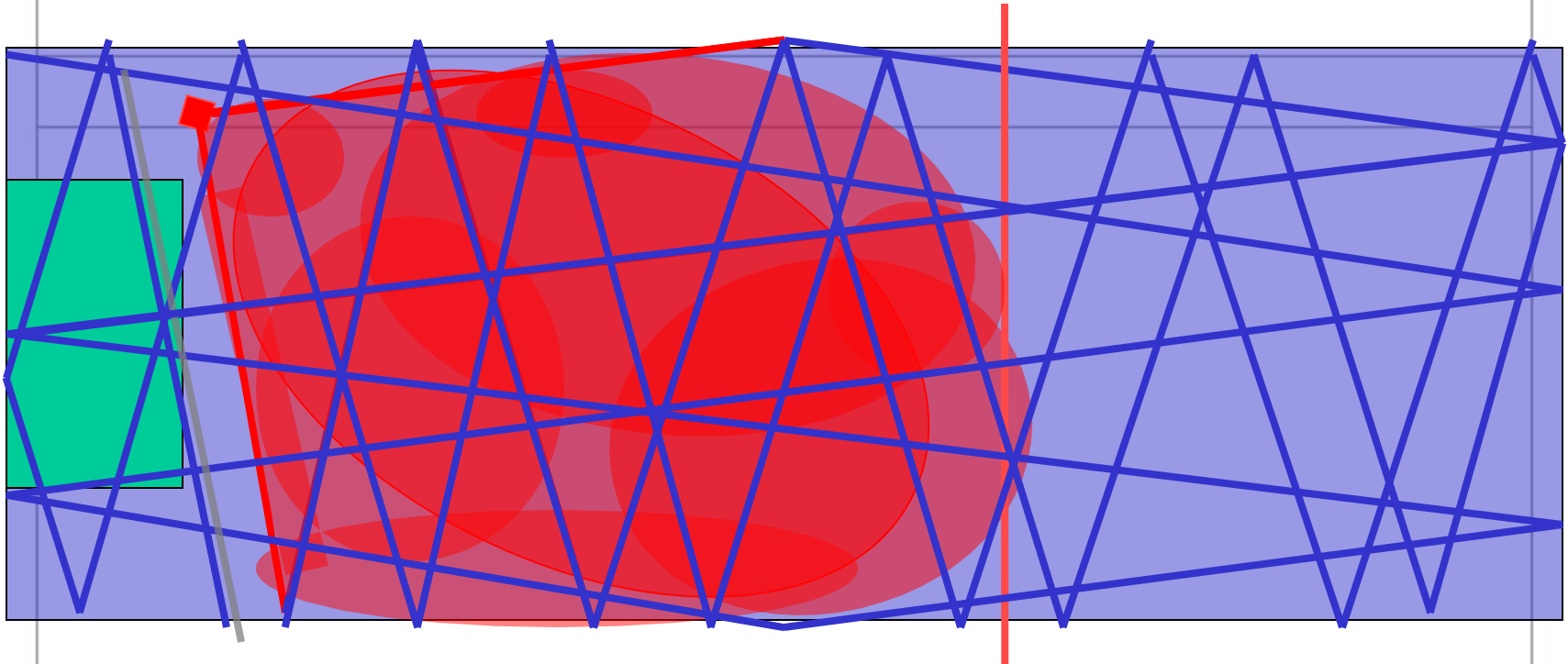
- **The Loudspeaker needs to be forward of the most forward microphone.**
- **The Loudspeaker needs to be at a height that will allow it to project farther into the room, this will also insure that it is not too loud to those close to the speaker.**
- **The Loudspeaker should have some downward angle, and when near the side walls, it must be angled inward.**



$D_c$  Critical Distance

That point where the **Direct Field** is equal in intensity to the **Reverberant Field**





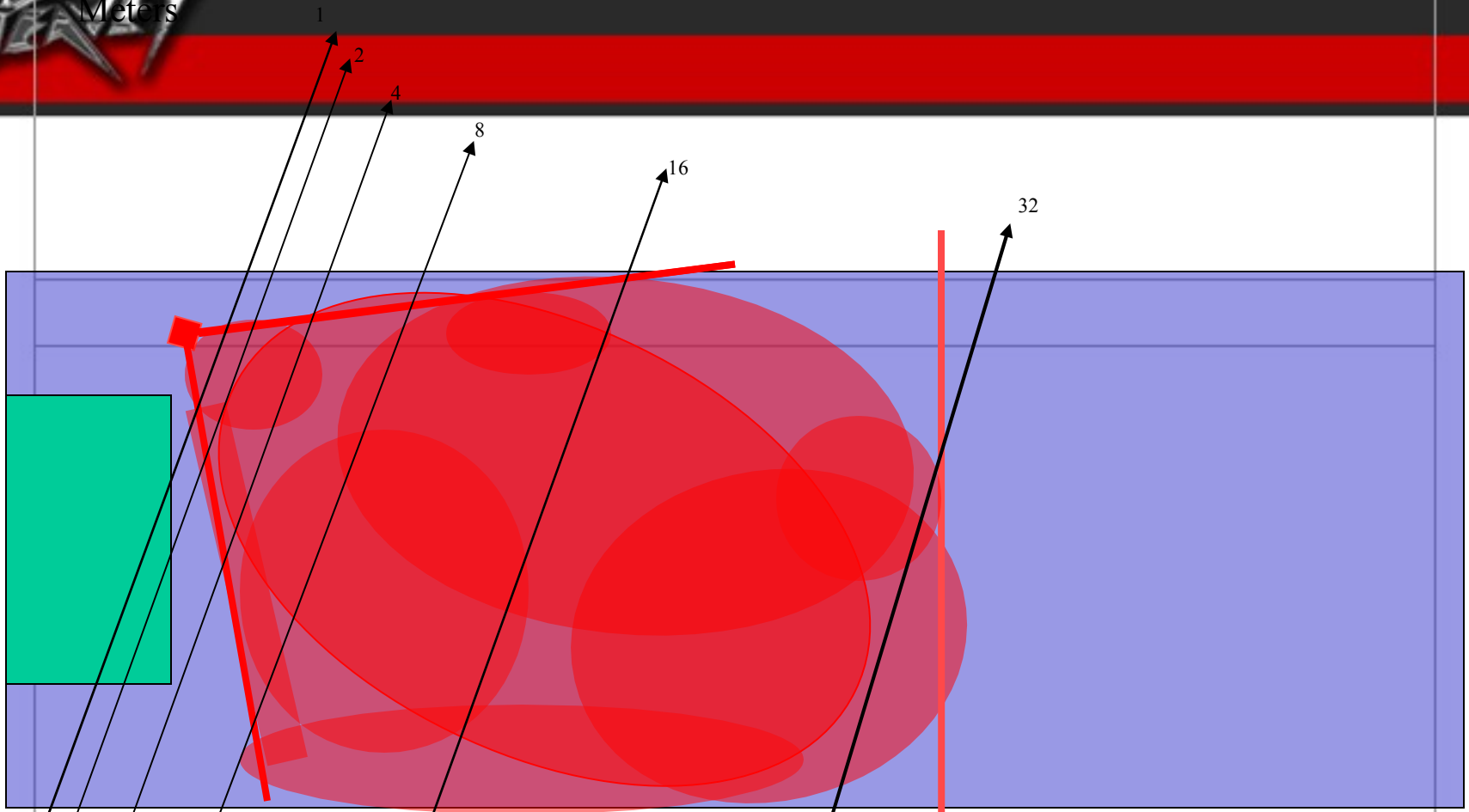
**Direct Field**

$D_c$  Critical Distance

**Reverberant Field**



Meters



SPL

119

113

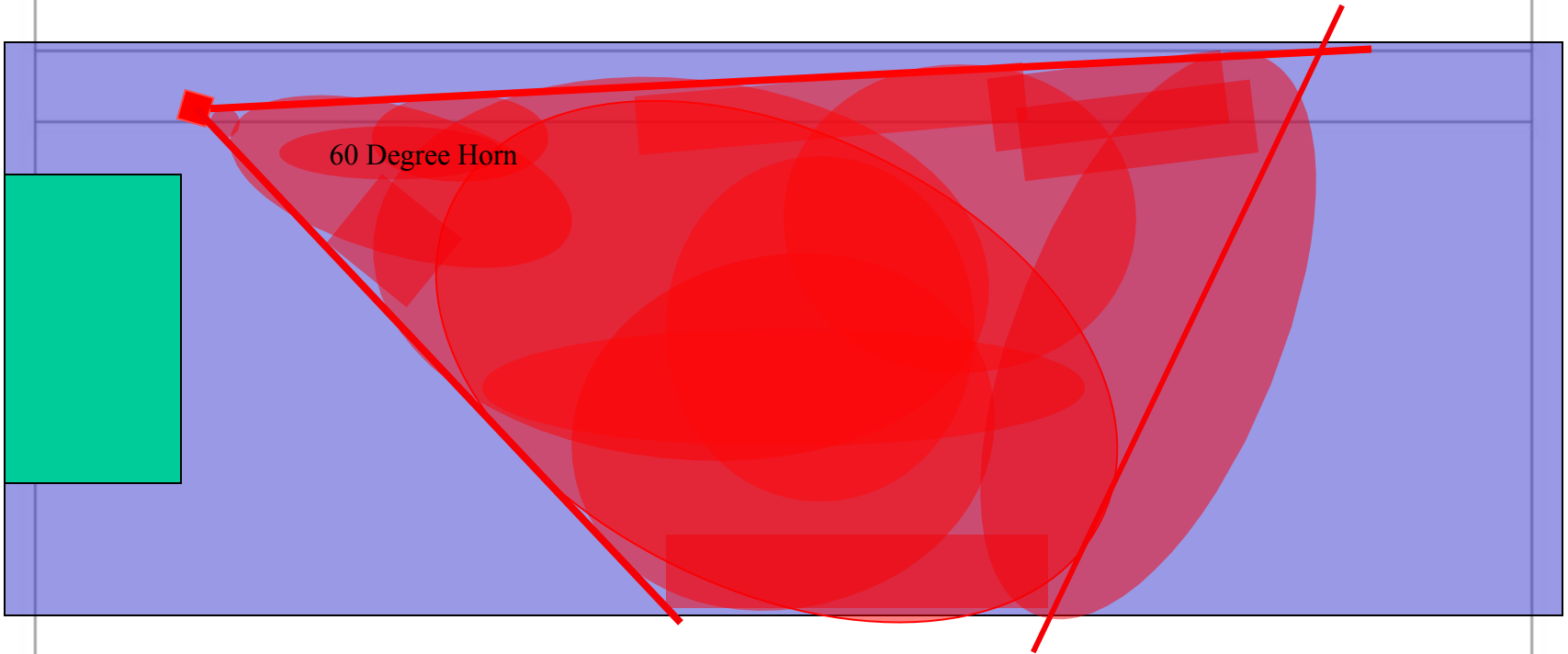
107

101

95

89

$D_c$  Critical Distance

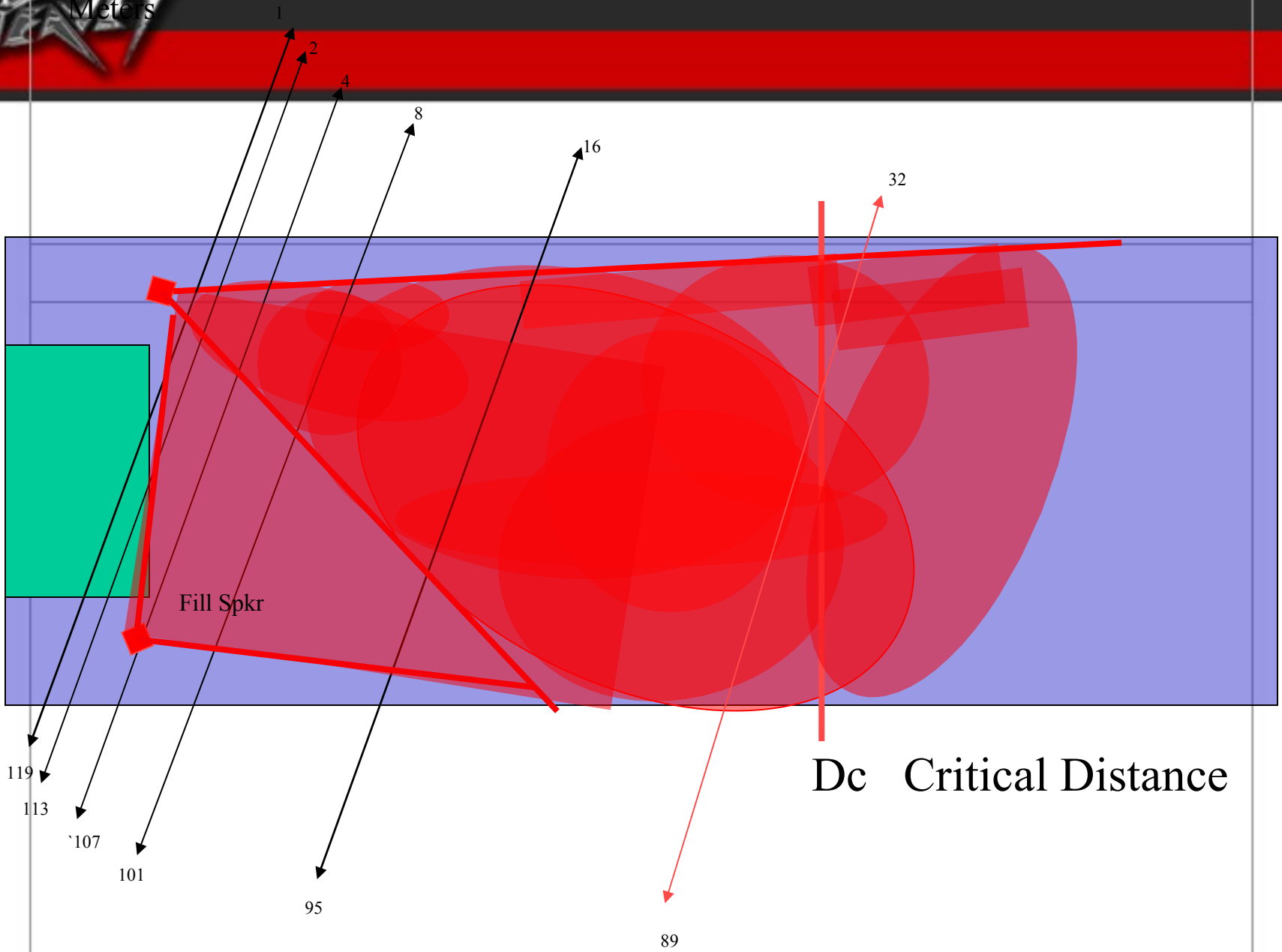


60 Degree Horn

$D_c$  Critical Distance



Meters



Fill Spkr

Dc Critical Distance

SPL

119

113

107

101

95

89

32

1

2

4

8

16





# **Multiple Loudspeaker Systems**



# **Stage Stacking Loudspeakers**

**So you want to use more than  
One Loudspeaker per side . . . .**

**WHY?**



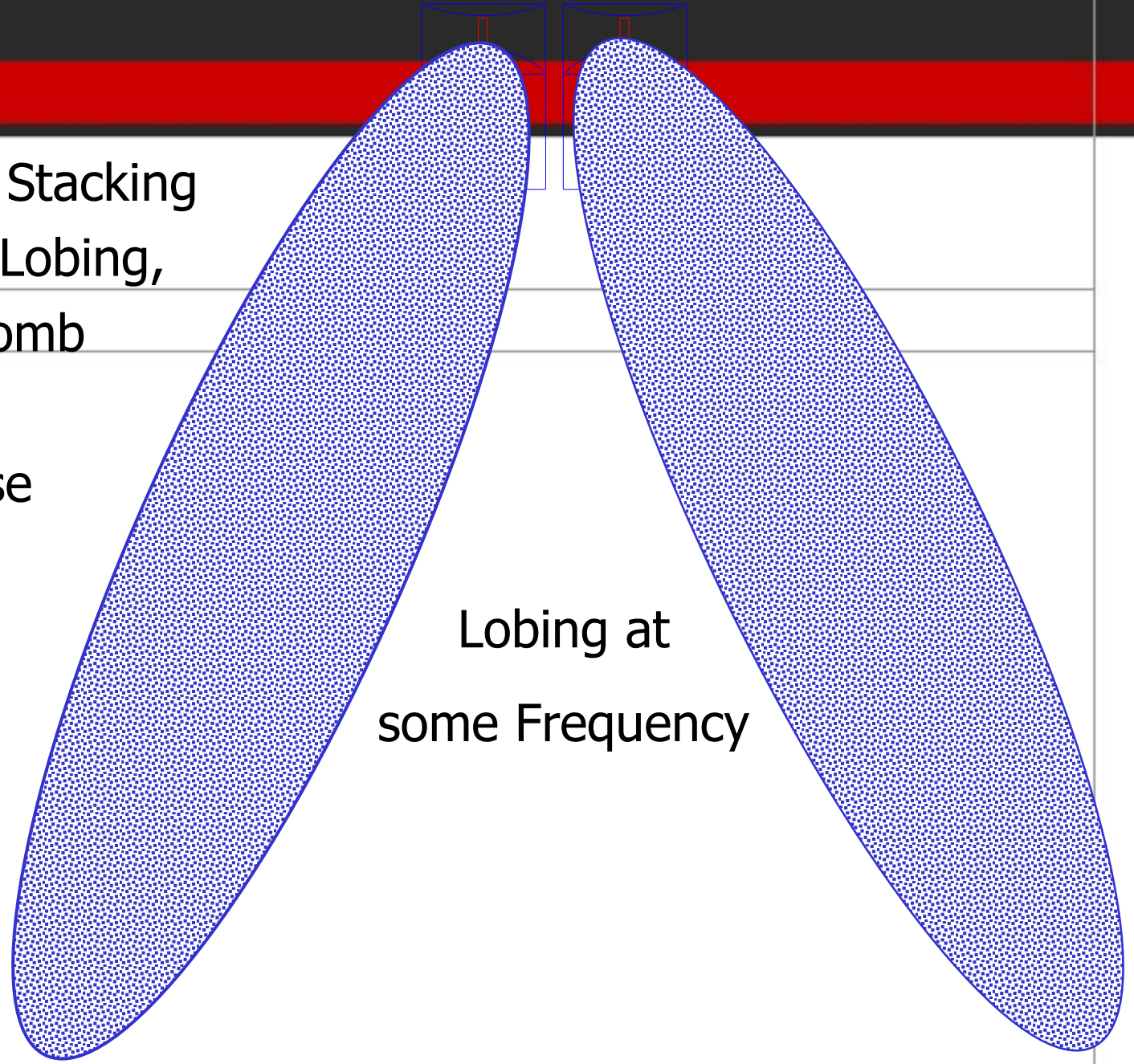
# First of All

**How NOT to do it . . . .**

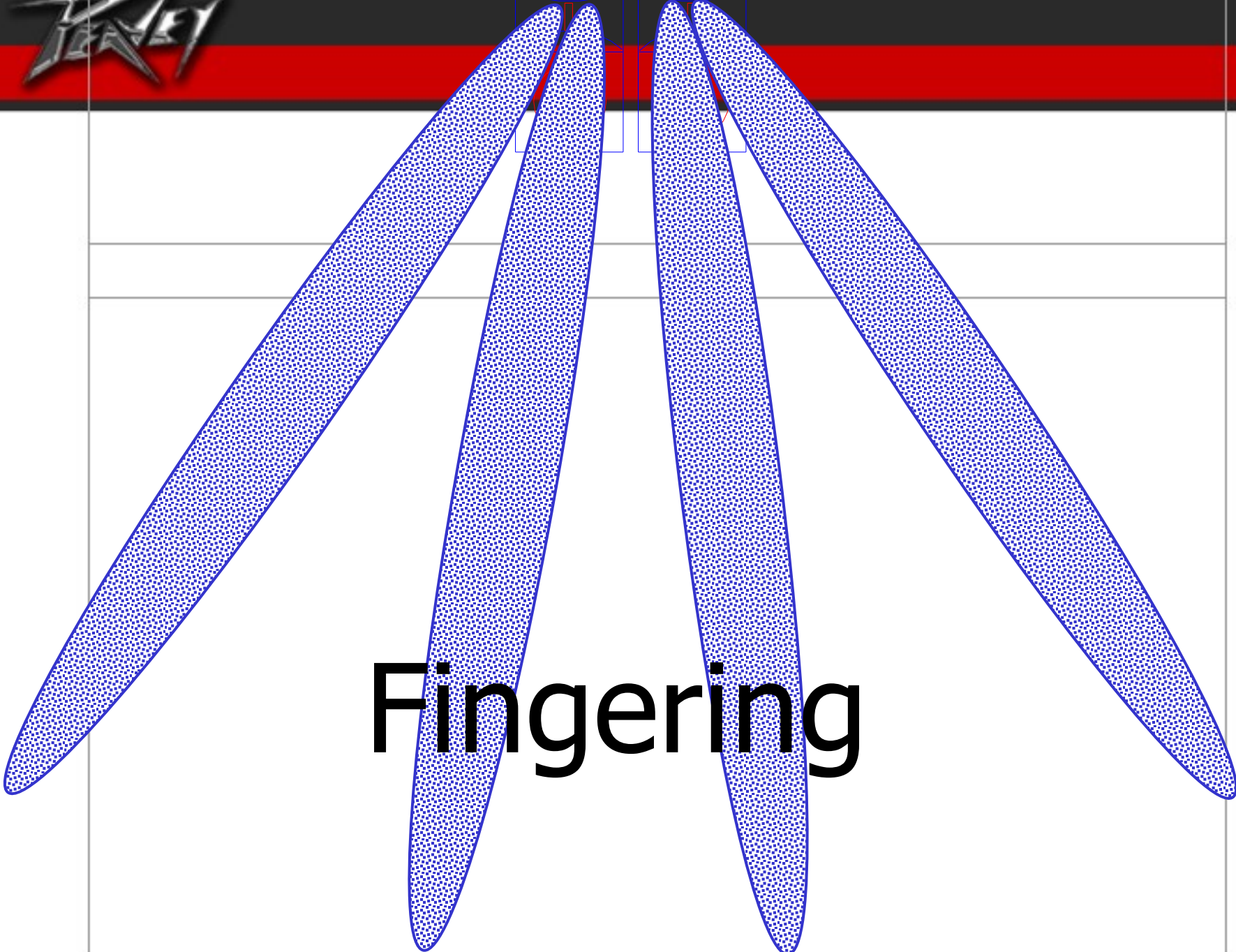
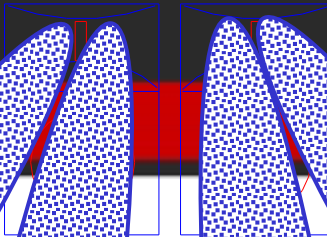
**> > >**



Side by Side Stacking  
Results in: Lobing,  
Fingering, Comb  
Filtering,  
and otherwise  
Poor Sound



Lobing at  
some Frequency

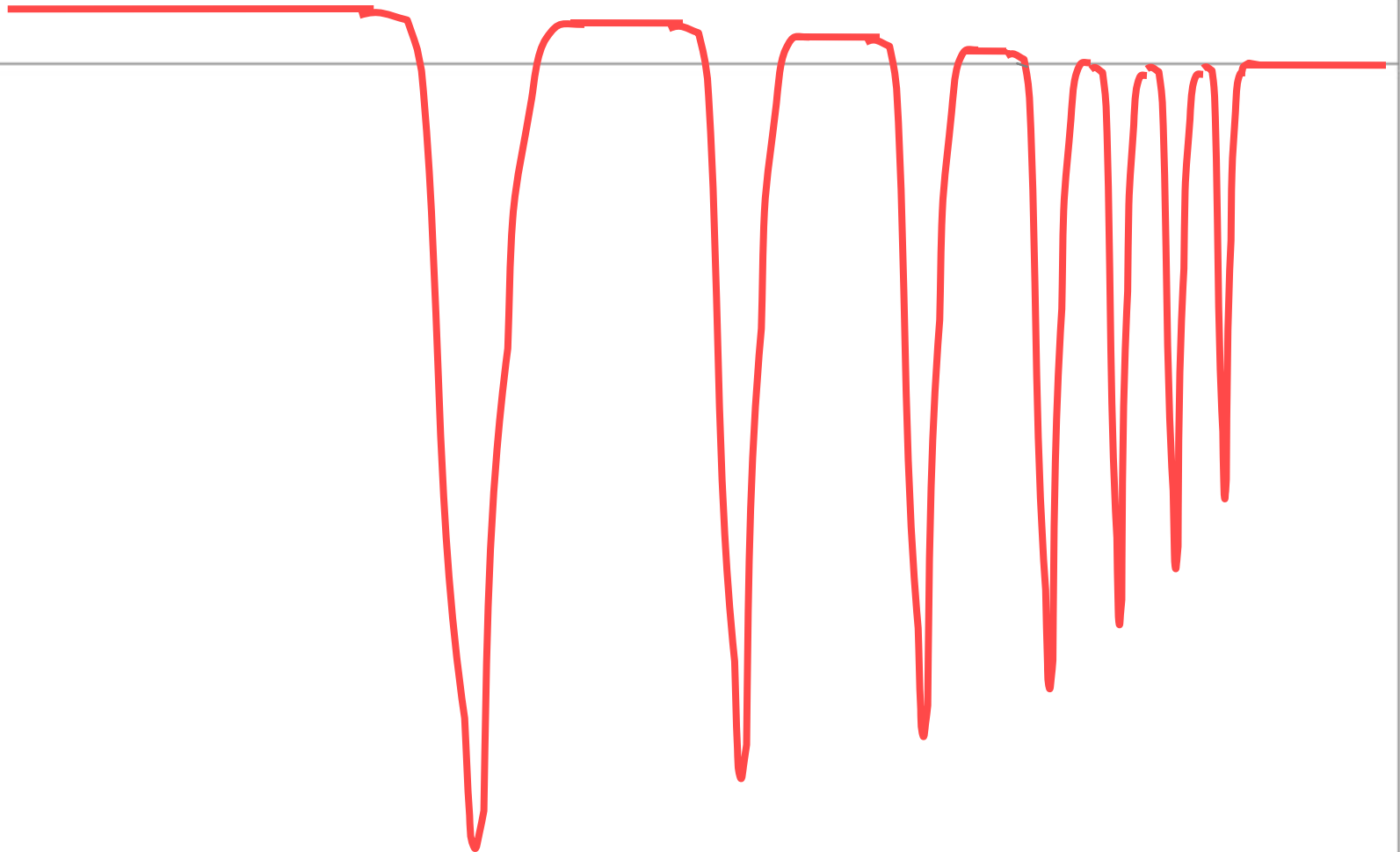


**Fingering**



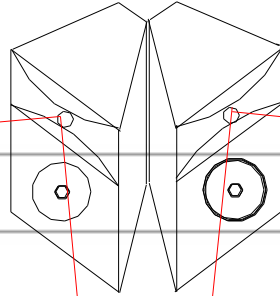
# Comb Filtering

Frequency Response





More Horizontal Coverage



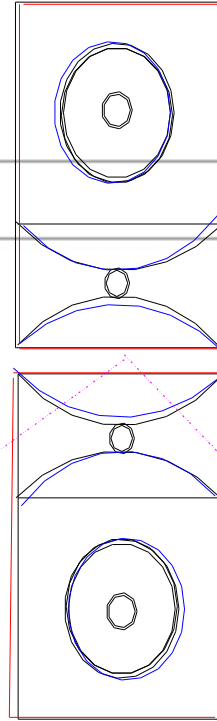
Only allow horns to overlap at a Minimum.

Overlap of 5 degrees results in 175 degrees of coverage and a loss of -2 dB on axis.



Need to be  
Louder  
on Axis?

Stack Horn to Horn

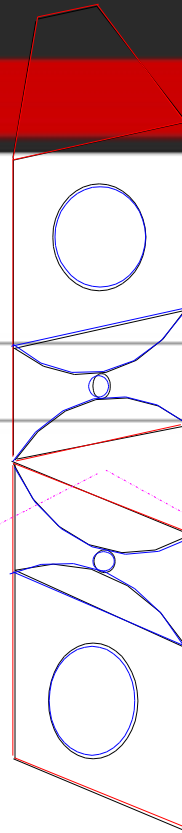


+3 dB Increase in SPL  
Projects 40% Farther





Need to be Louder on Axis  
and have more  
Horizontal Coverage?



135 Degrees of Coverage  
w/ +2 dB SPL Increase  
or 25% more Distance