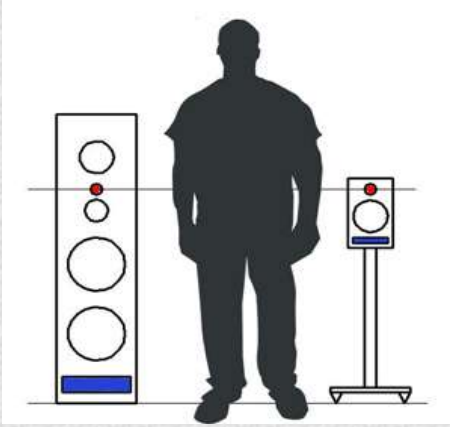
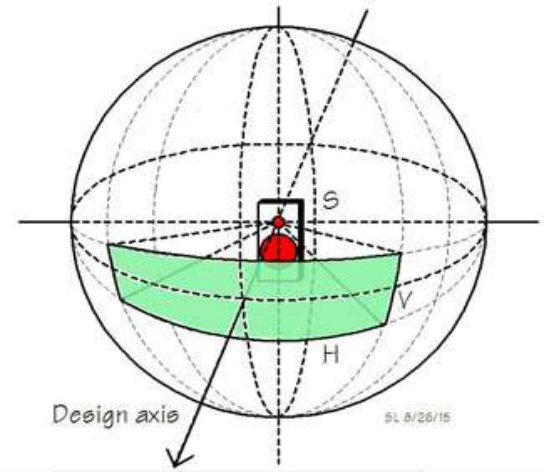
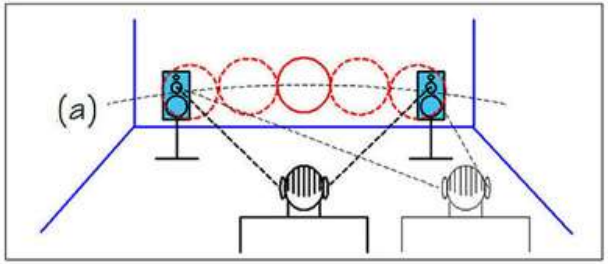
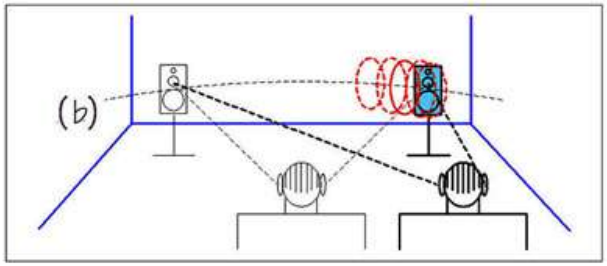
Baffle design, Diffraction, Radiation pattern, and Stereo imaging









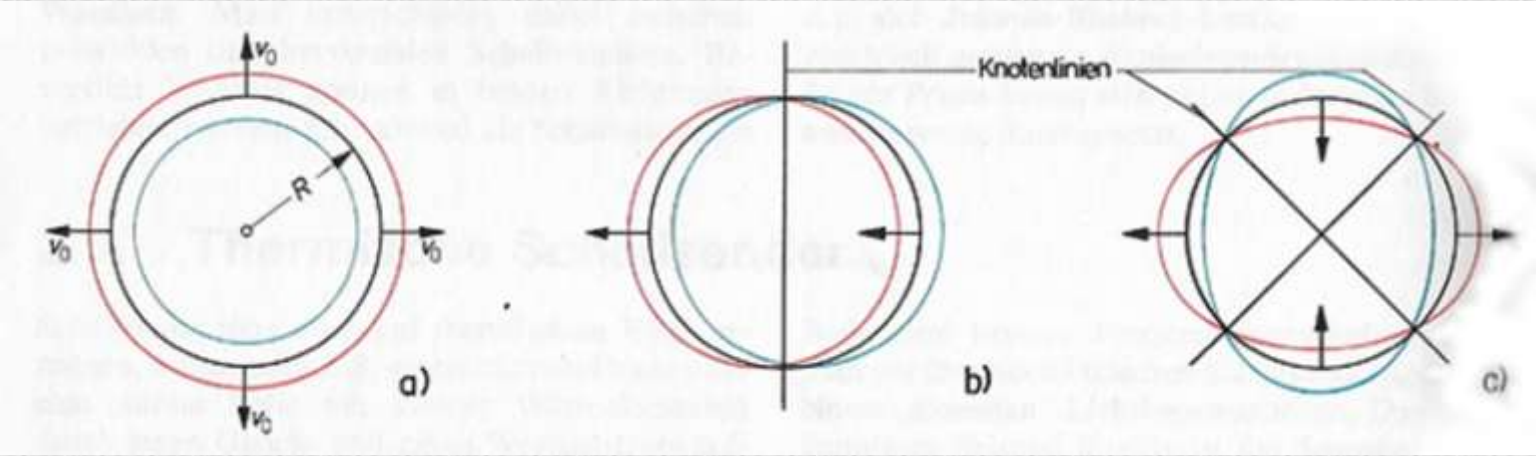
Light source – Light Reflection
- Spatial Perception -

Radiation pattern

Omni-directional

Controlled directivity

Spherical Acoustics / Harmonics k

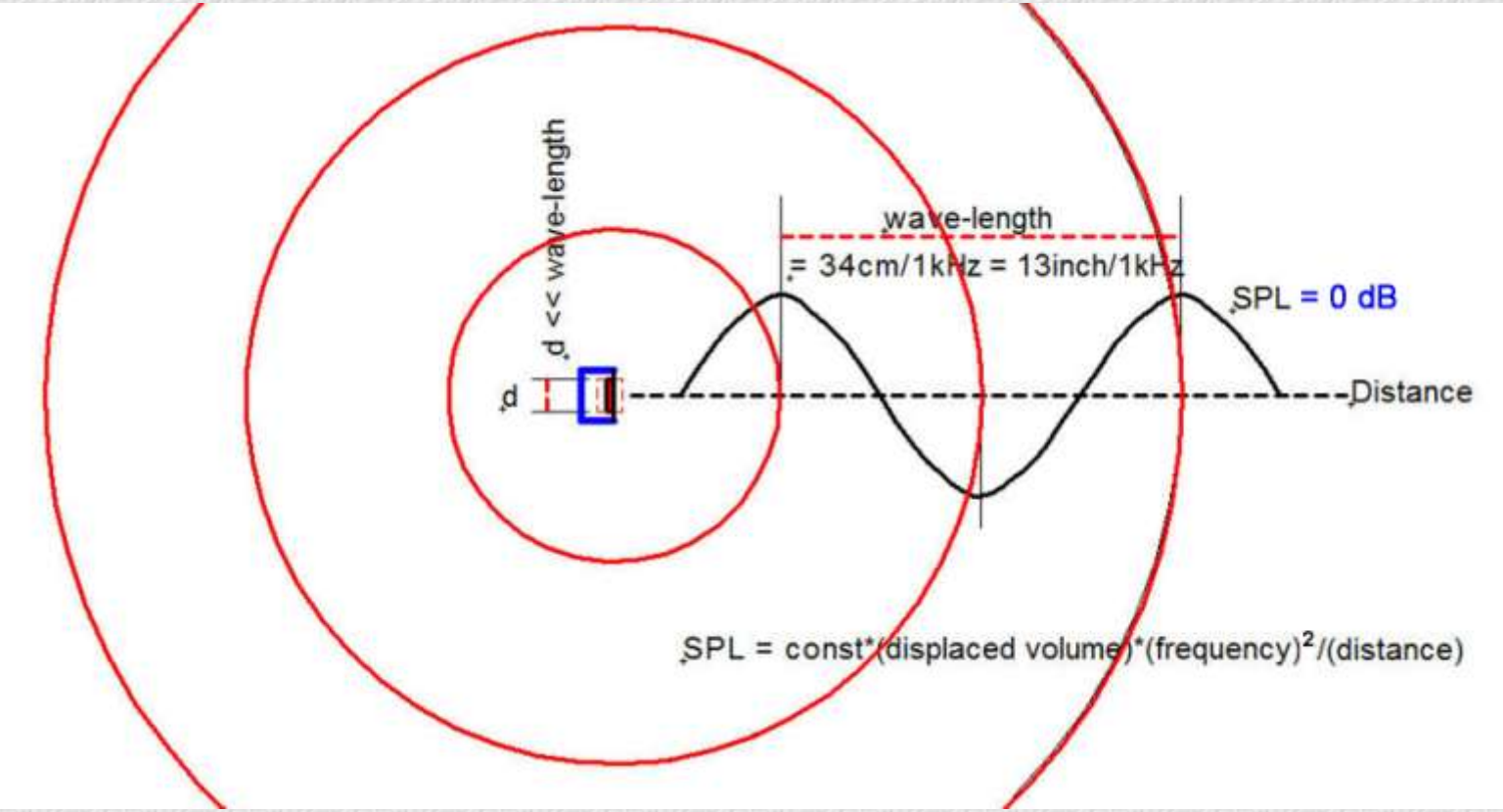


Breathing Sphere
Monopole
= Omni-directional
k0

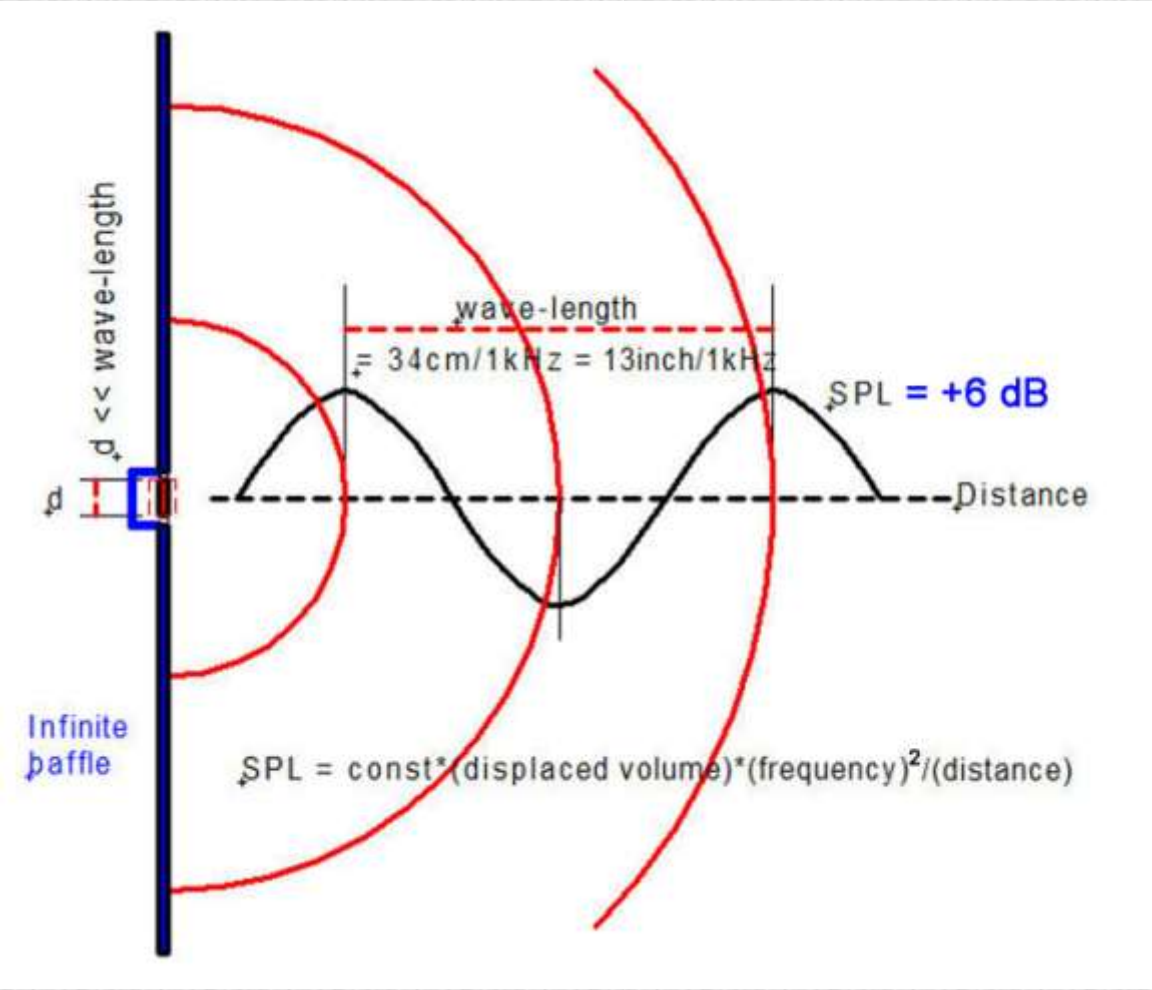
Oscillating Sphere
Dipole
= Bi-directional
k1

??
= Multi-directional
k2

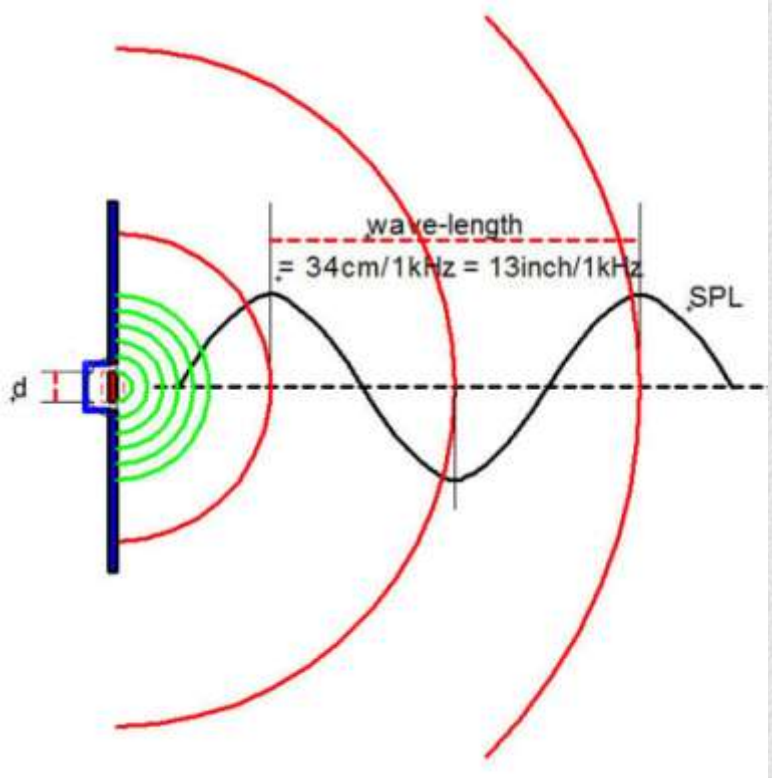
Omni-radiation, if d and box << radiated wavelength

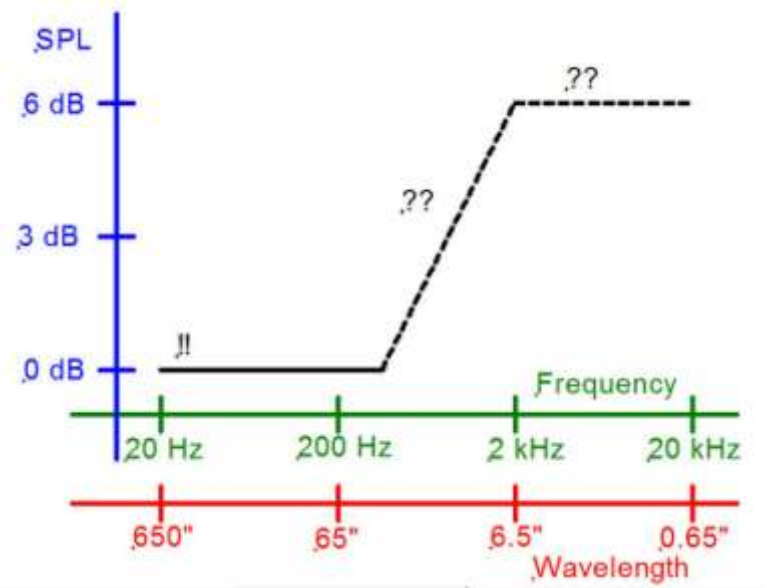


Same radiation into half-space adds 6 dB SPL



SPL for wave lengths << baffle size ??

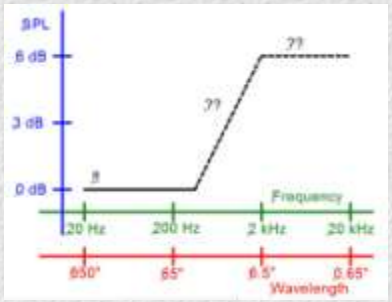


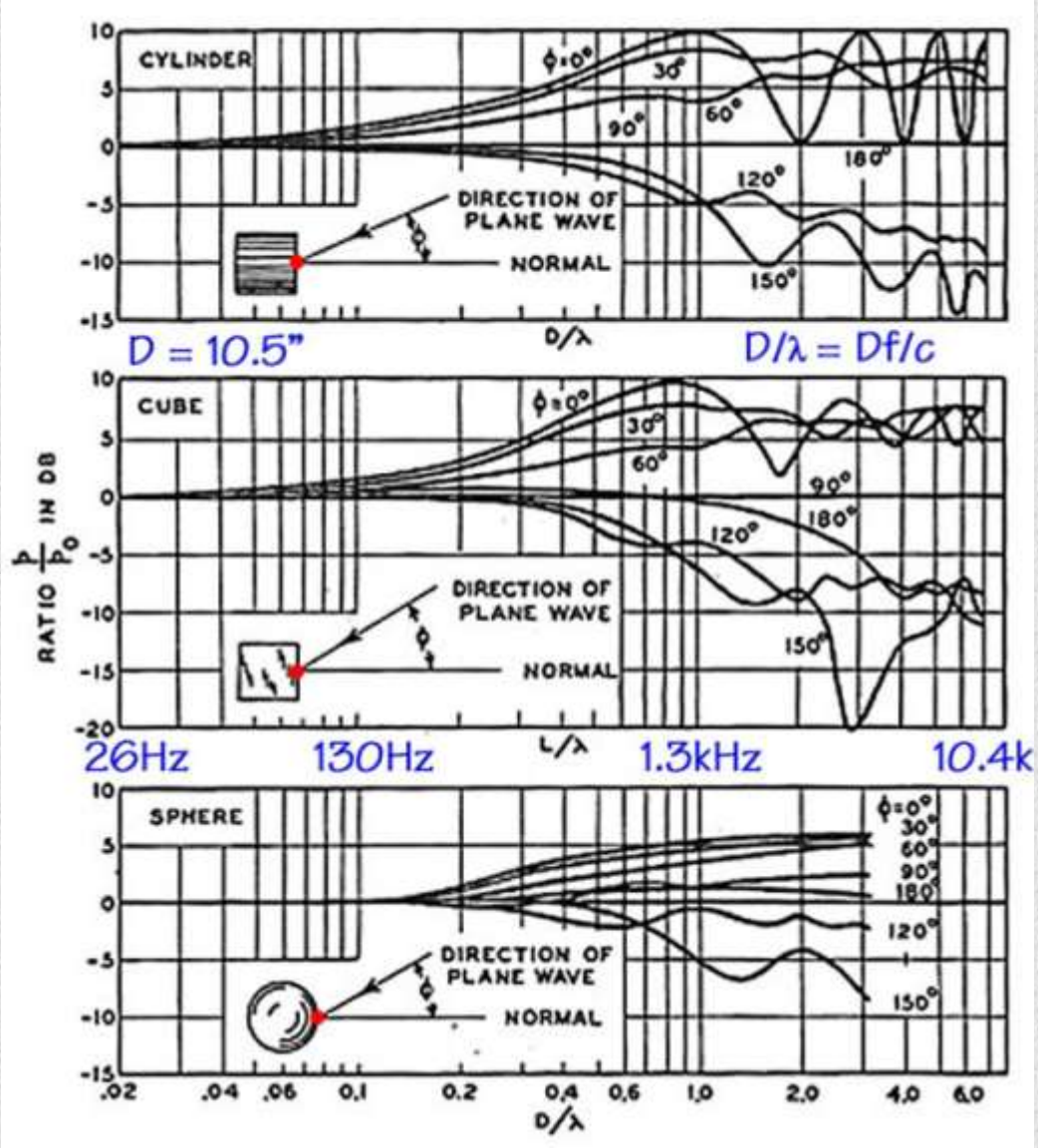


“Baffle step”

Bell Labs
JASA, 1938

G. G. Muller
R. Black
T. E. Davis





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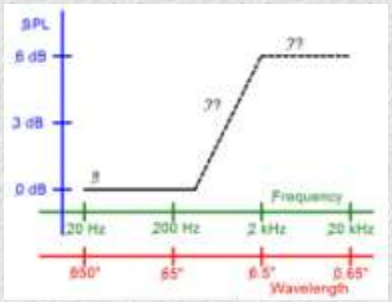
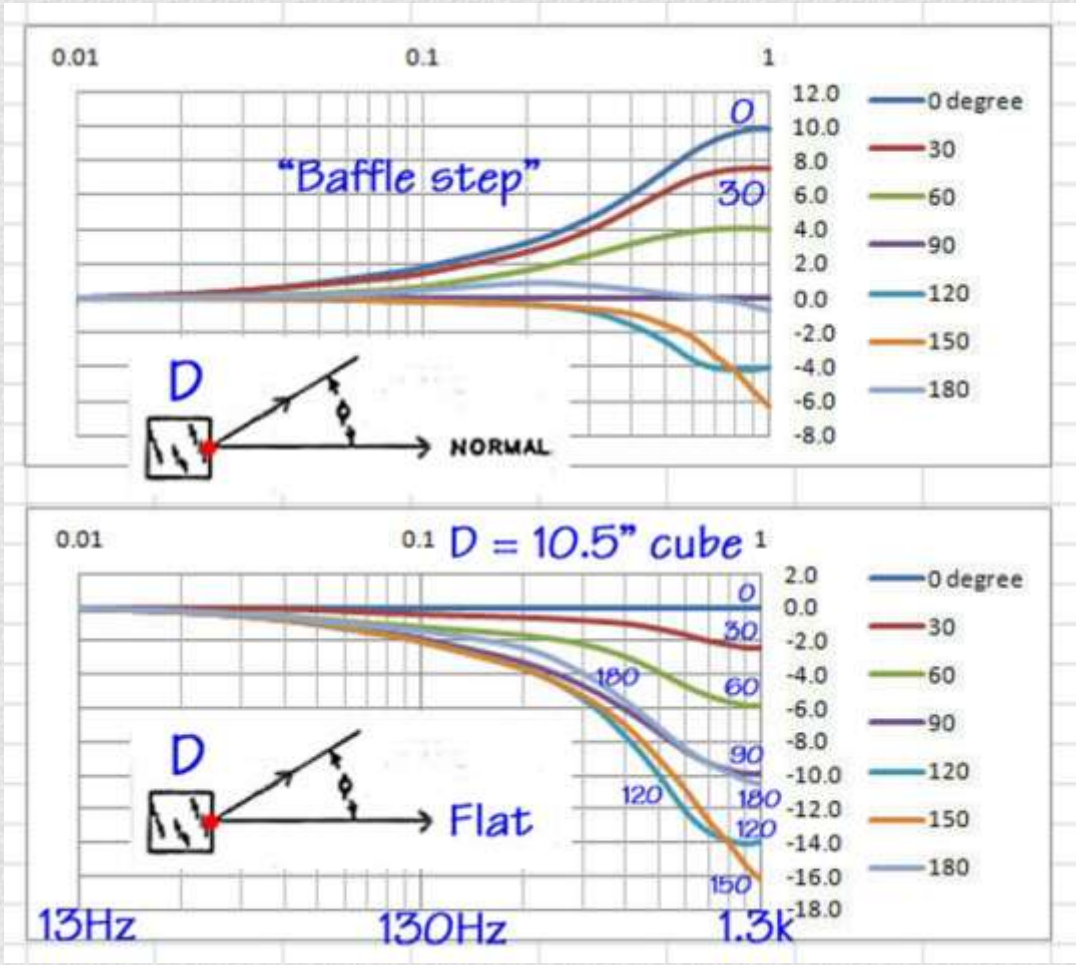
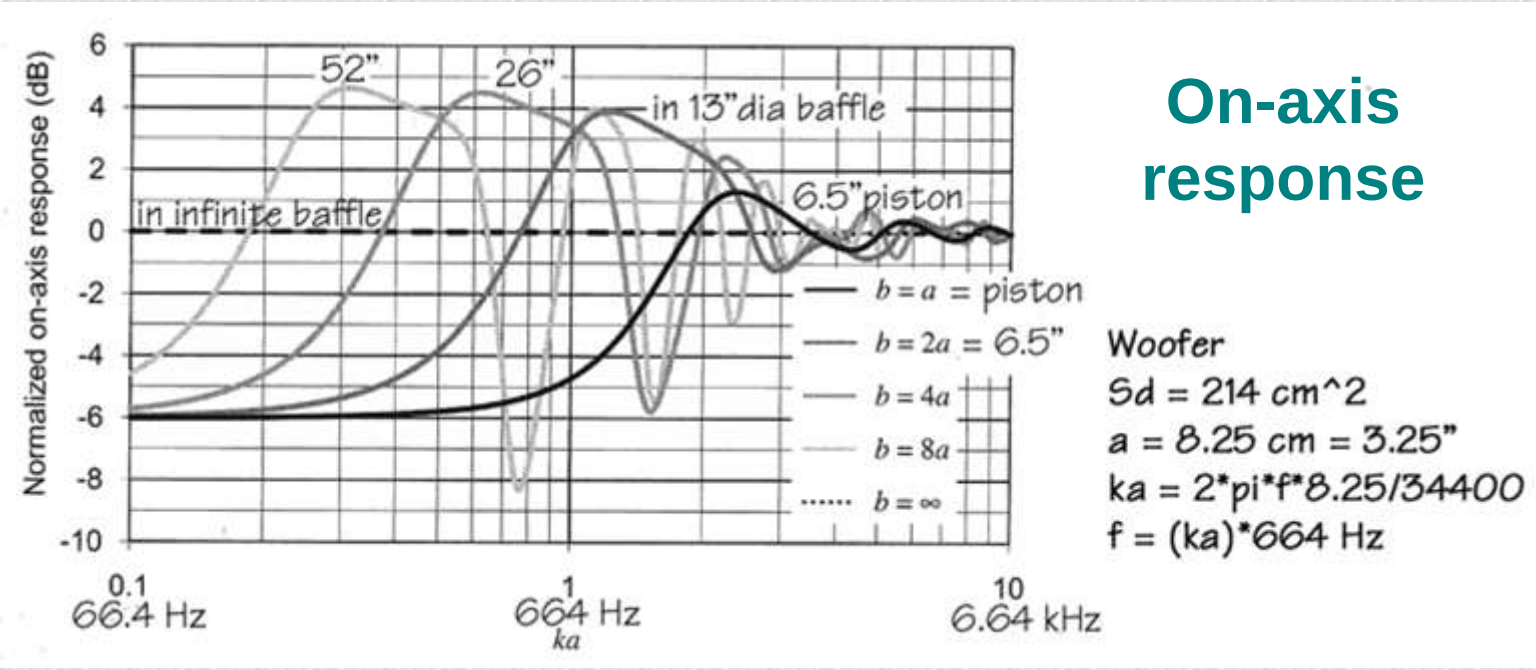
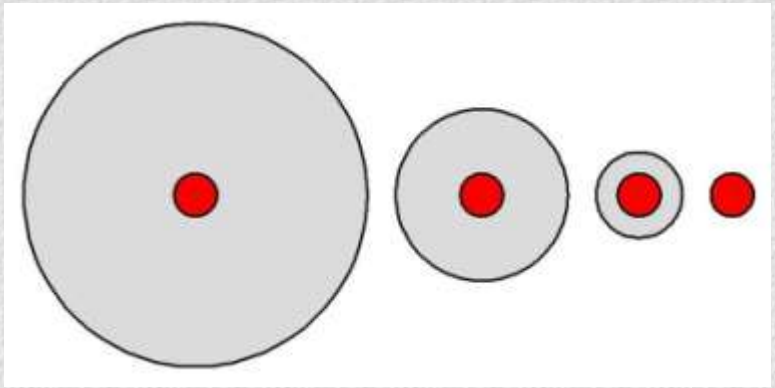






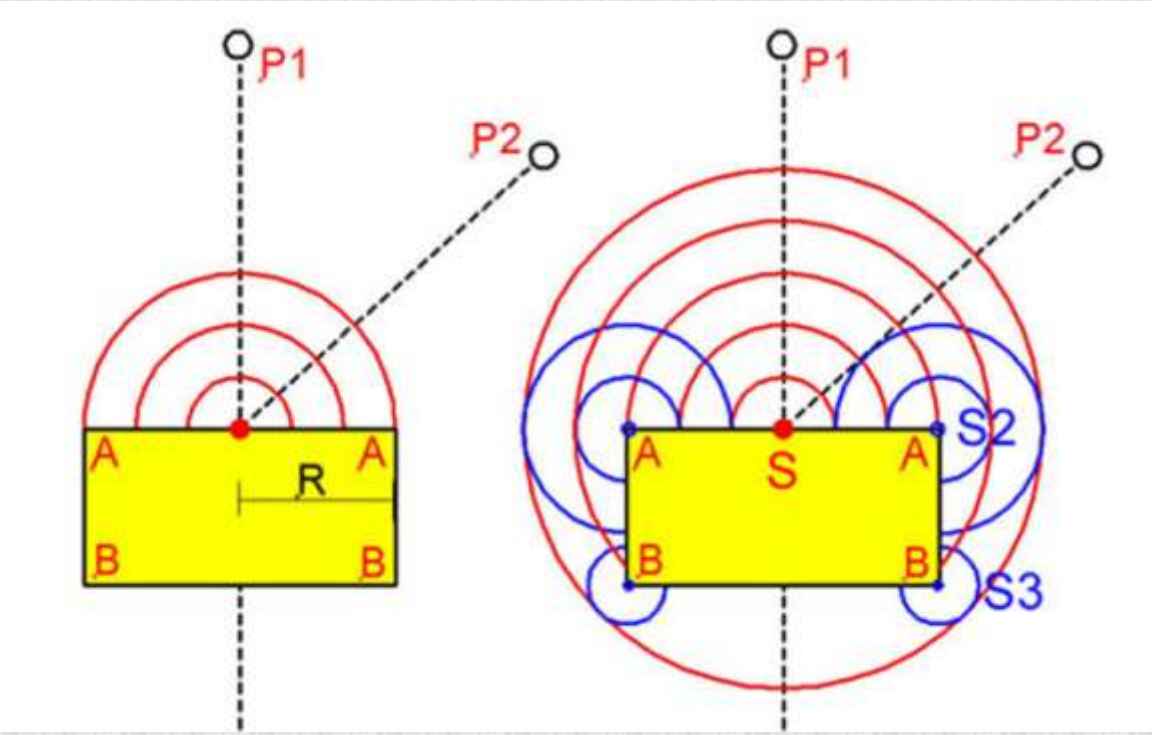
On-axis response

Woofer
Sd = 214 cm^2
a = 8.25 cm = 3.25"
ka = 2*pi*f*8.25/34400
f = (ka)*664 Hz



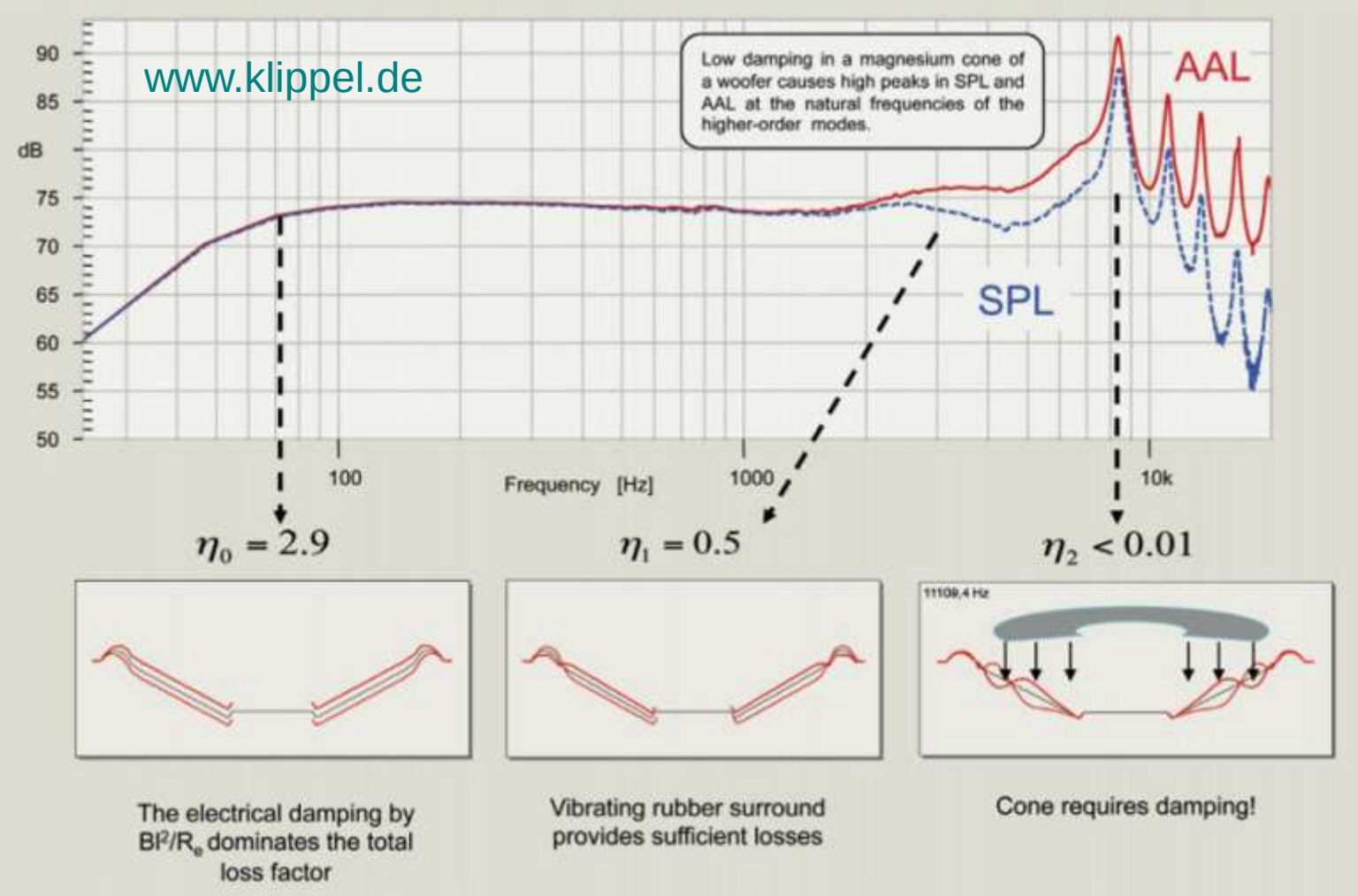
Leo L. Beranek & Tim J. Mellow, "Acoustics – Sound Fields and Transducers“ 2012

Diffraction



and Cone Breakup …

Cone Breakup



Omni experiment – “Watson”

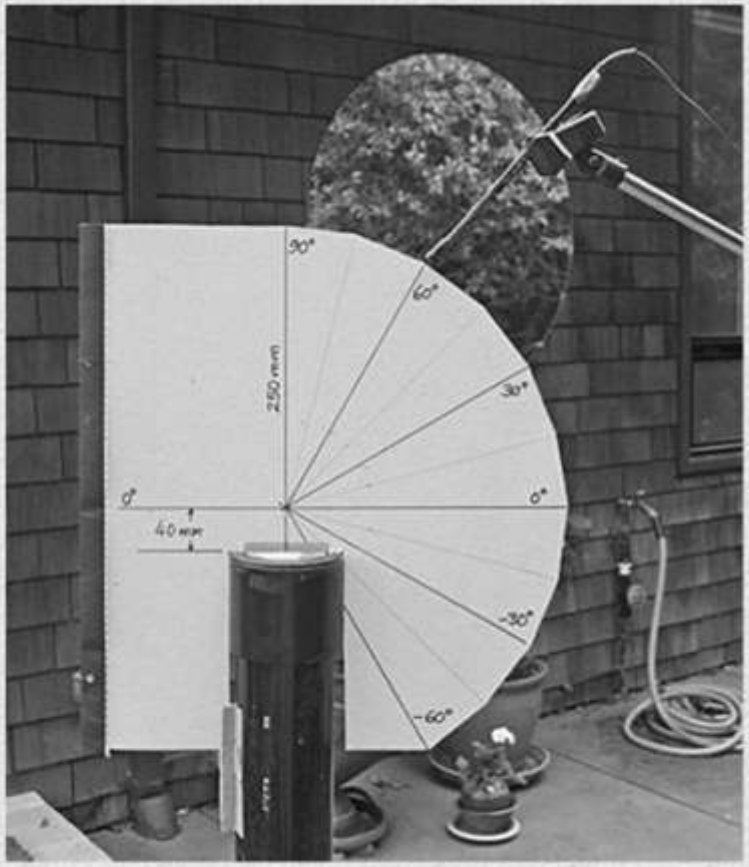


Figure 3: Template for microphone positioning to measure the frequency response in the vertical plane

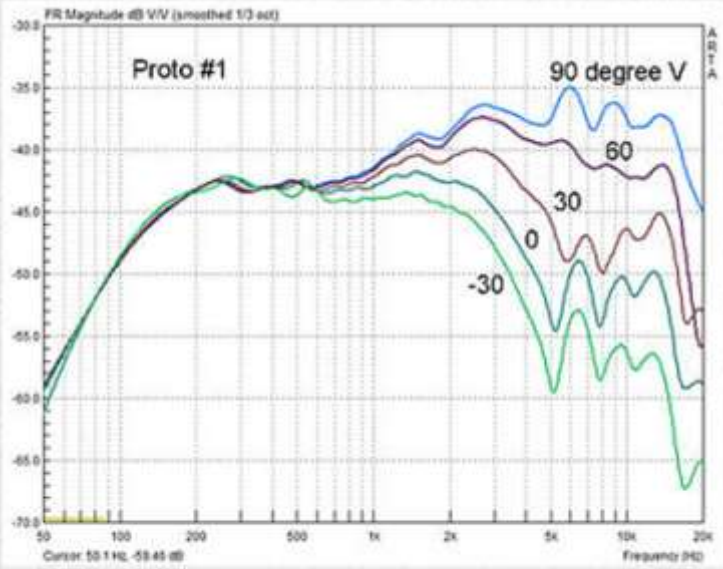
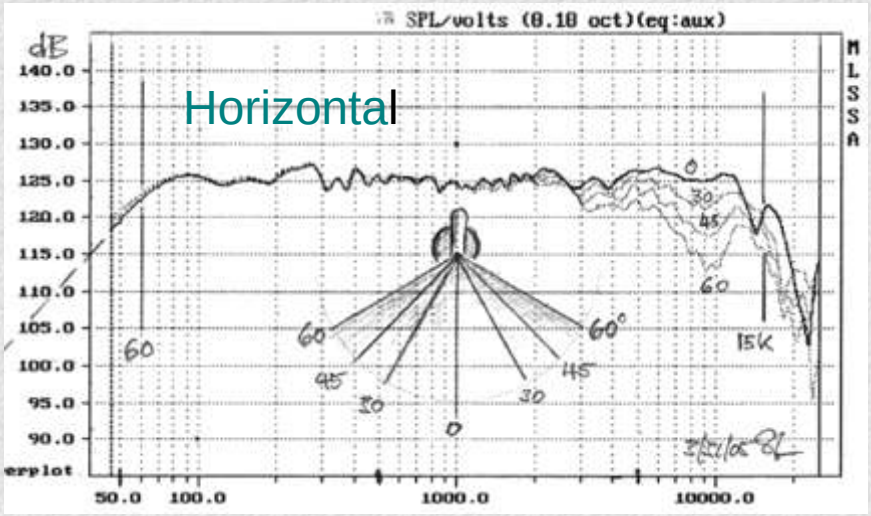
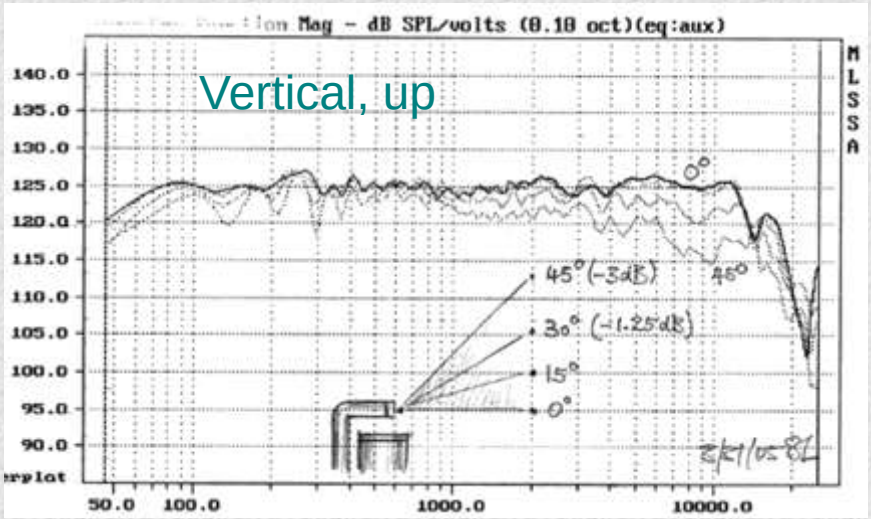


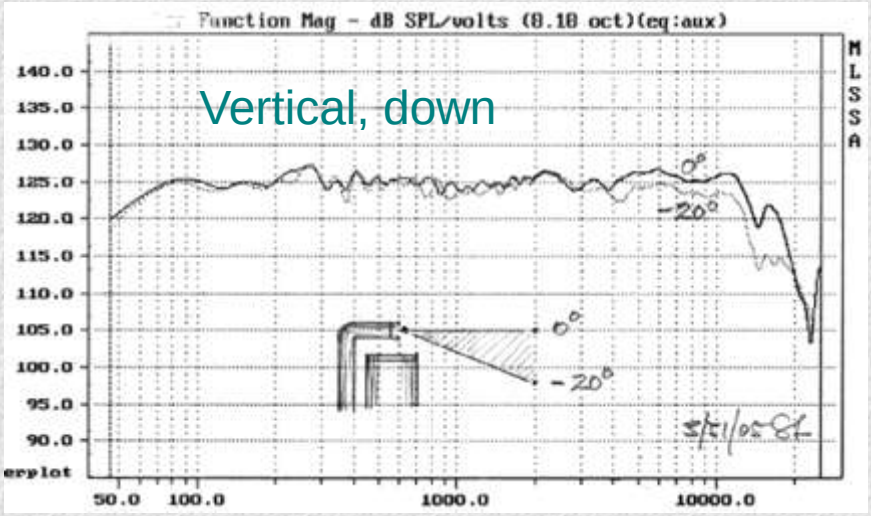
Figure 2: Frequency response in the vertical plane. D/I = 1 at 3.4 kHz.

Figure 1: Loudspeaker setup in an equilateral triangle with the listener's head.

PLUTO – “omni”



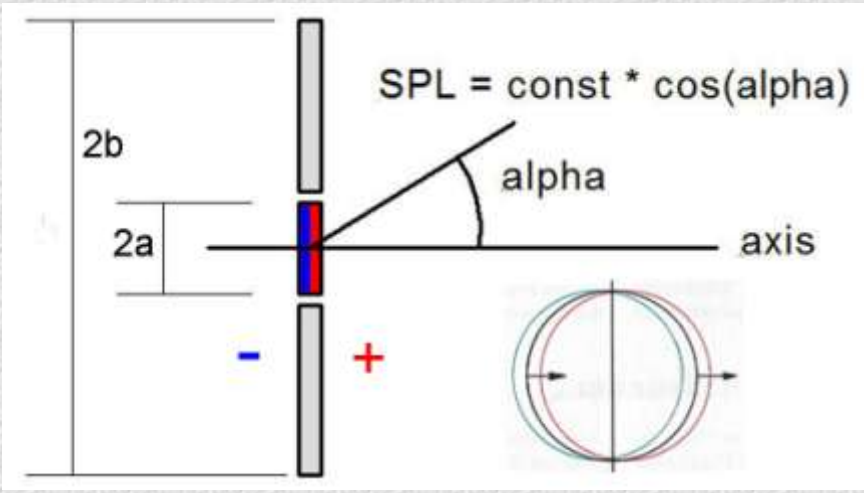


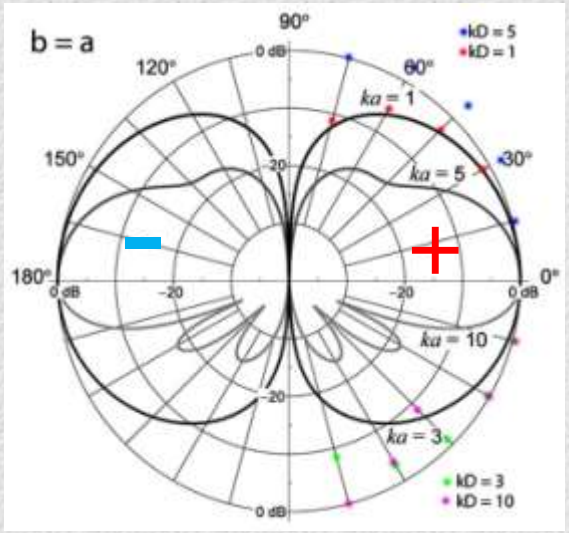


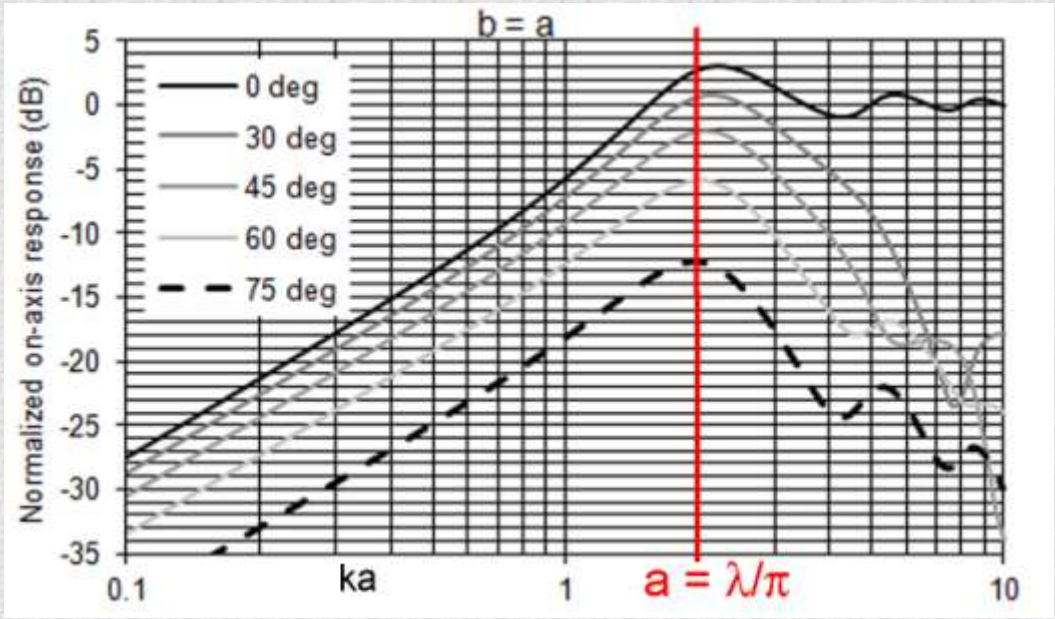
LINKWITZ LAB

Sensible Recording and Rendering of Acoustic Scenes

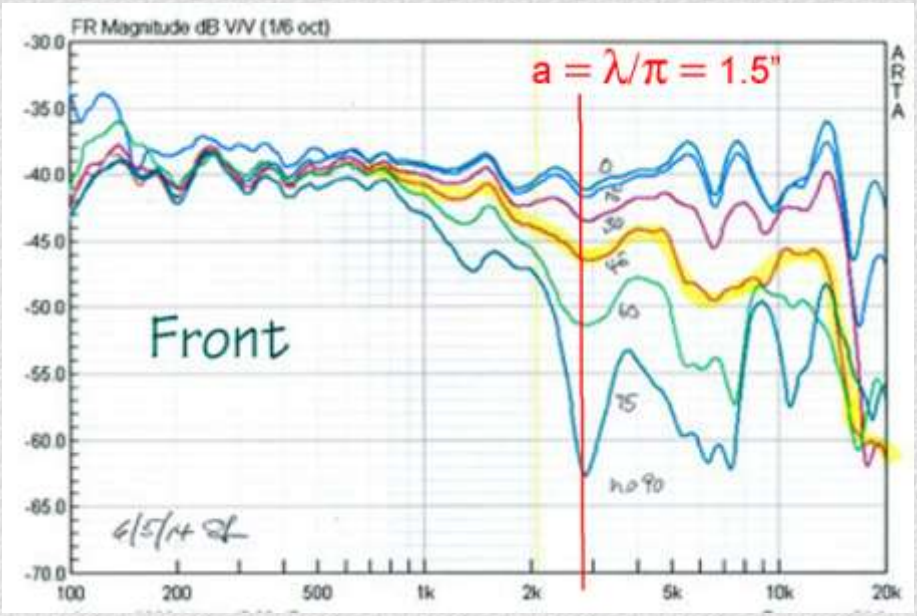
Lxmini – “hybrid”

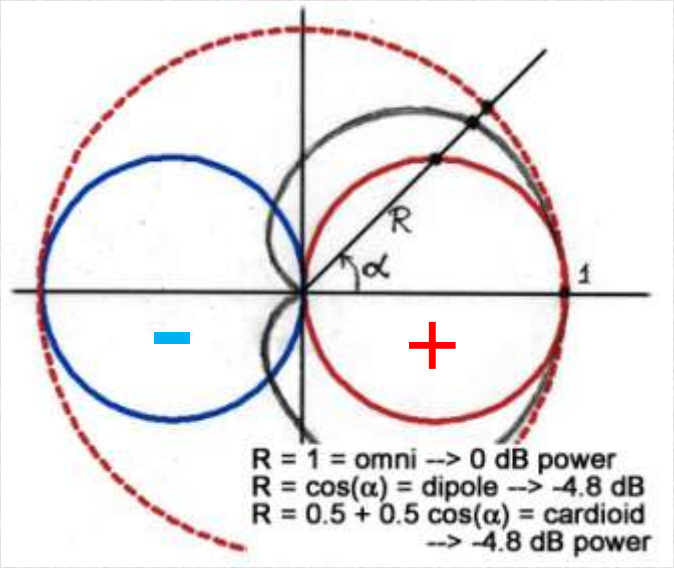


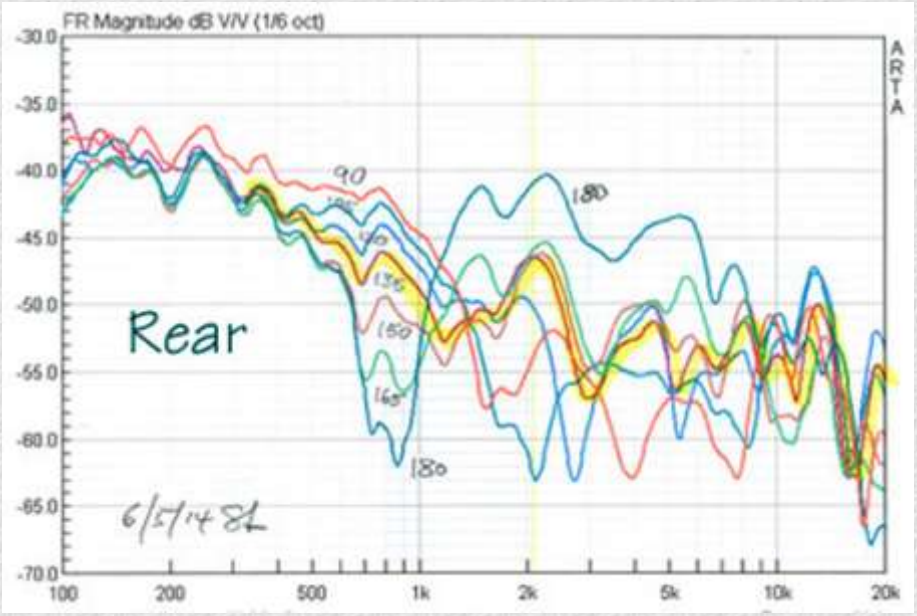




Lxmini – “hybrid”



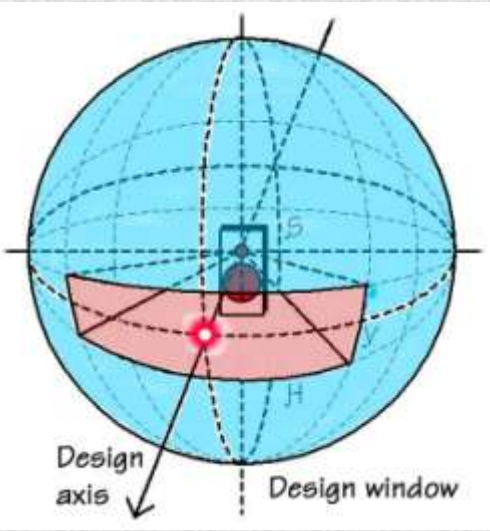


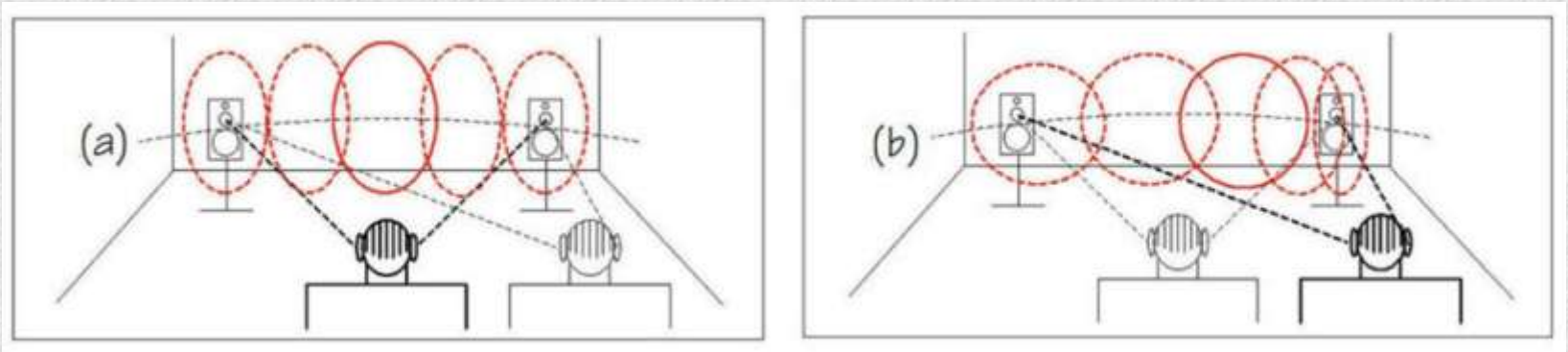


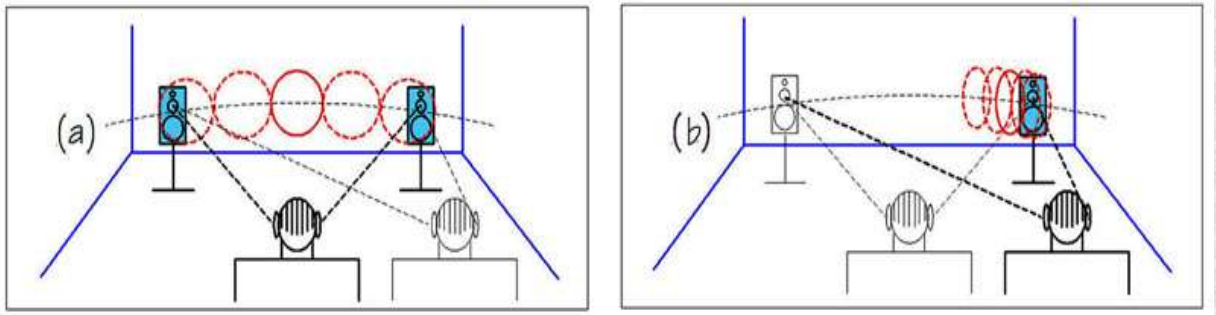
LINKWITZ LAB

Sensible Recording and Rendering of Acoustic Scenes

Wide & neutral dispersion of sound radiation & >1 m reflections



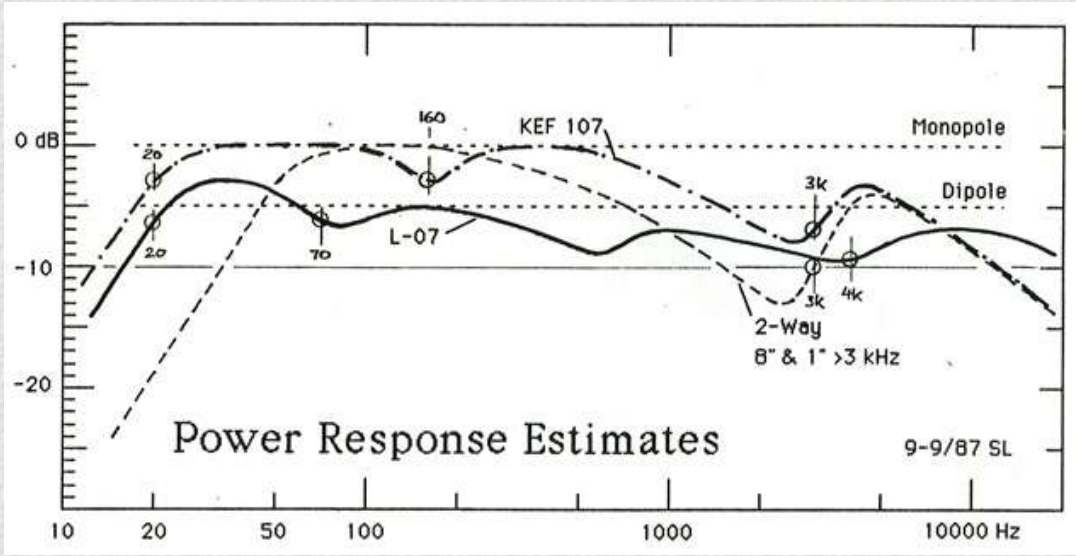




Thank you for your attention

QUESTIONS?

Earlier Dipole Loudspeaker Design



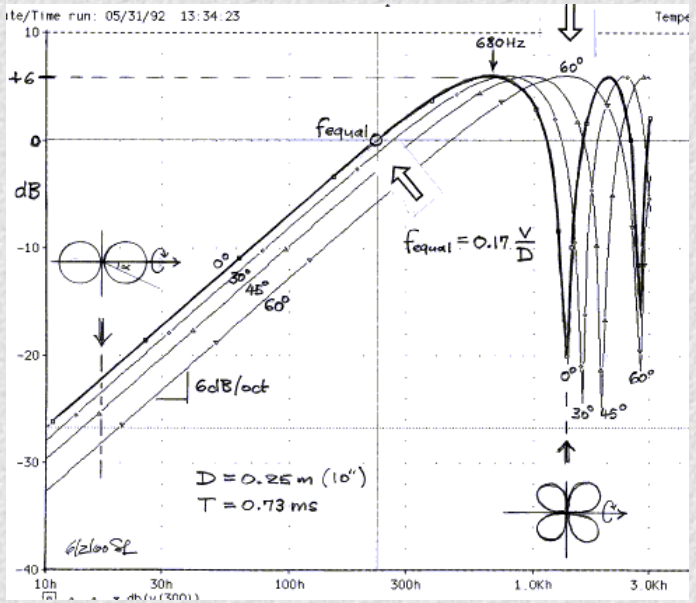
- 4-way System
- 3-way Dipole
  LM-UM-T-UM-LM
- 2π-Woofer, L&R summed

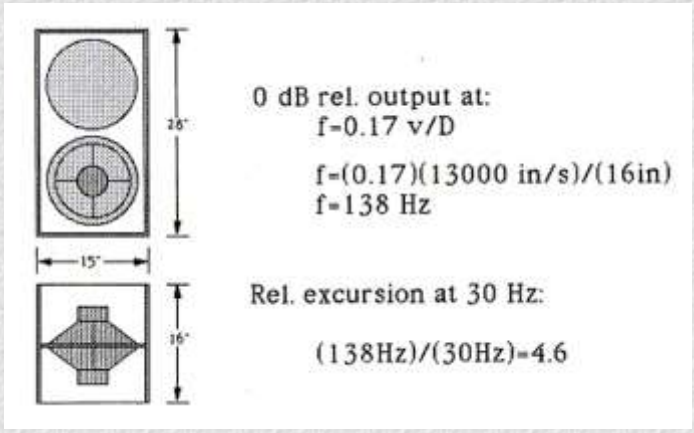
LX521 - dipole

- Full range, acoustically small dipole
- Form Follows Function

H-frame Dipole Woofer

Brian Elliott





- Compact, symmetrical baffle
- Large excursions
- Reduced even-order distortion