



Simulation Tools in Sound Reinforcement: Multichannel Digital Audio Cinema Design

**Athens Course UPM94
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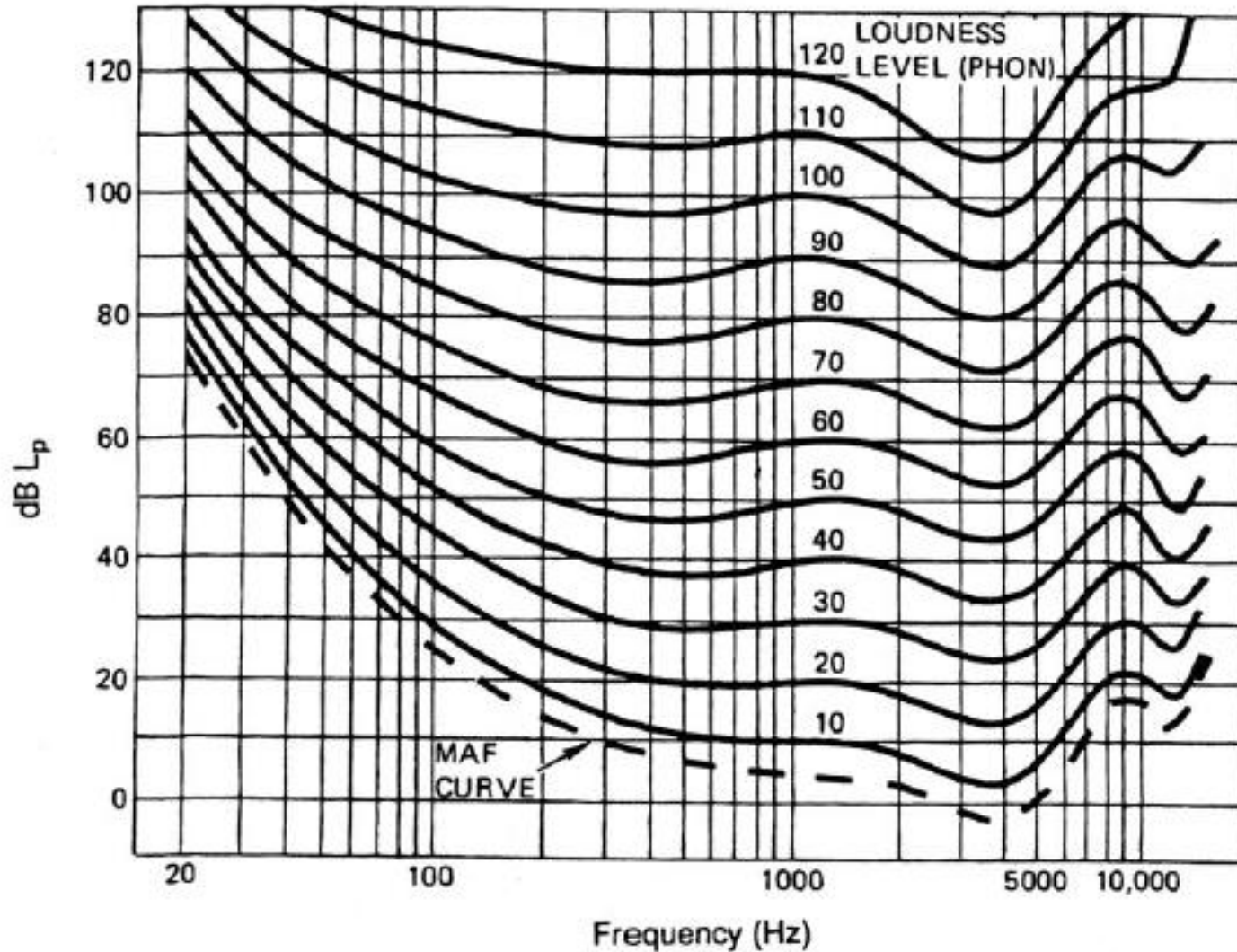
SUBWOOFERS (LFE) CHANNEL



- When it comes to sizing up the quantity and type of subwoofers to be included in the room, must take into account the difference in hearing sensitivity in low frequency with respect to the frequency half.
- If we compare the level of 85 dB at 1 kHz frequency, we can see that that is perceived the same sound sensation at frequencies of 30-40 Hz, the signal level must be increased in about 15 to 20 dB (100-105 dB).
- Since the reverb is important at lower frequencies, the calculation of the level of bass should be based on the size of the room.



SUBWOOFERS (LFE) CHANNEL





SUBWOOFERS (LFE) CHANNEL



- For every 700 m³ (25000 ft³) should be placed one or two bass speakers 18 "mounted in the corresponding box.
- The continuous power of the speakers will be between 400-800 W.
- Where you should place more than one subwoofer, these must be placed as more coming together in order to increase mutual coupling.



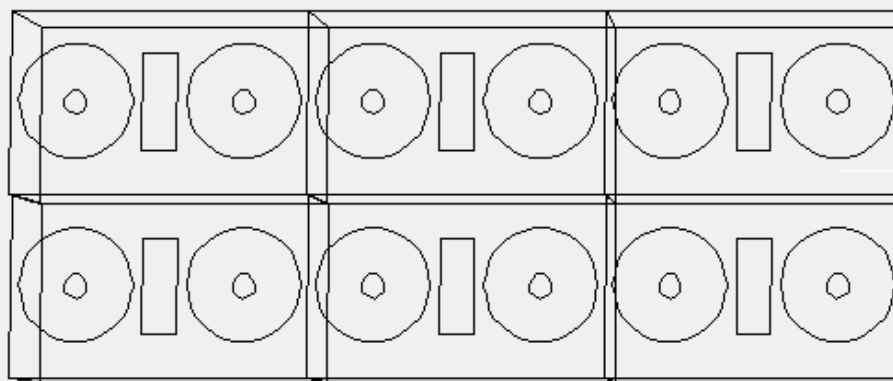
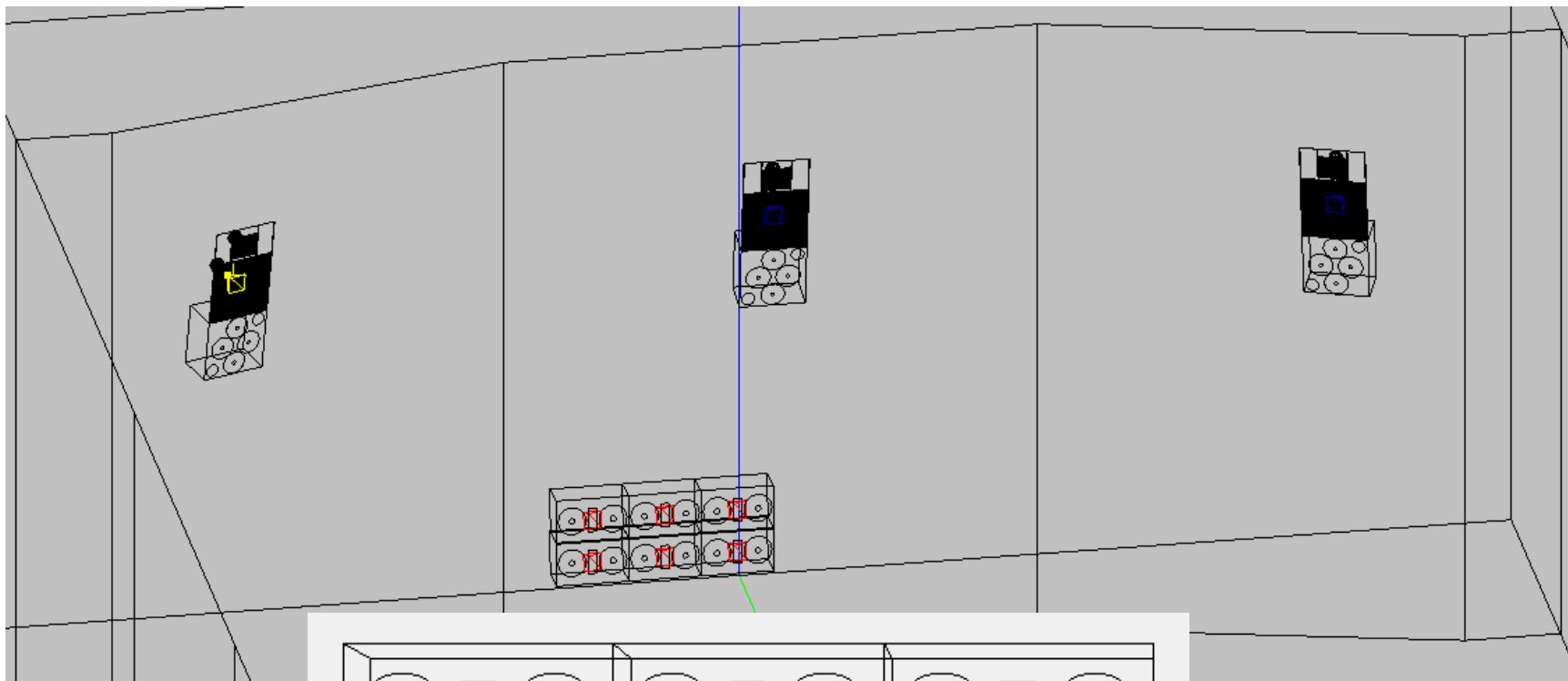
SUBWOOFERS (LFE) CHANNEL



- Systems must be placed at the base of the screen against the wall of the screen and the soil, to effect generate radiation in space (p radians) $1/4$, which will increase level radiated at low frequency.
- Full set of subwoofers must be able to deliver a pressure level of 110 to 115 dB in the range of 20-120 Hz.
- Each subwoofer speaker will be powered by its own power amplifier.

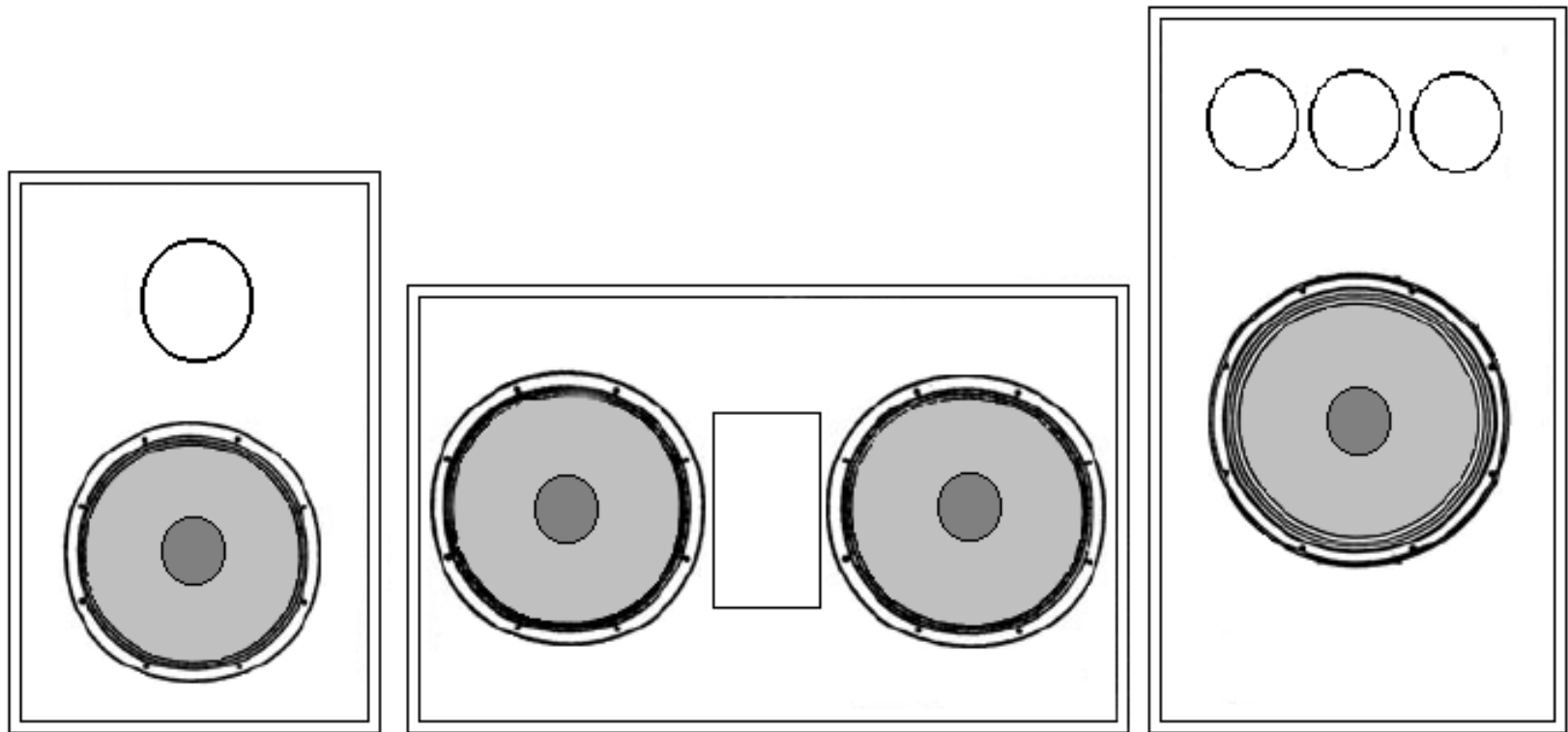


SUBWOOFERS (LFE) CHANNEL





SUBWOOFERS (LFE) CHANNEL





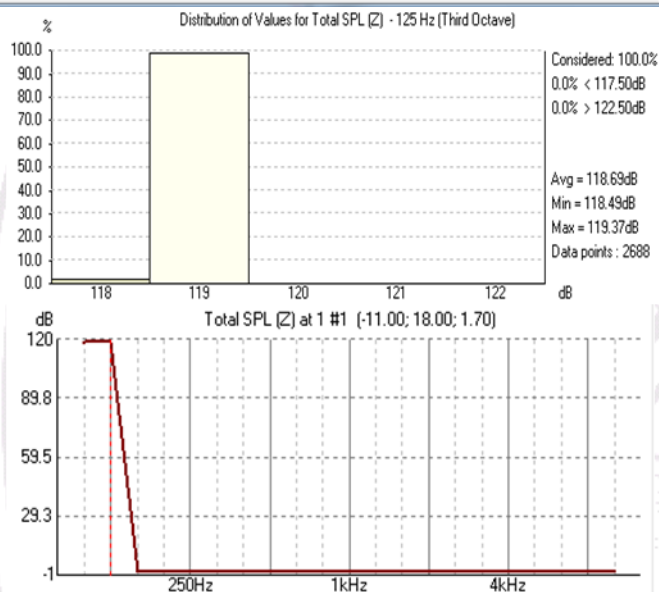
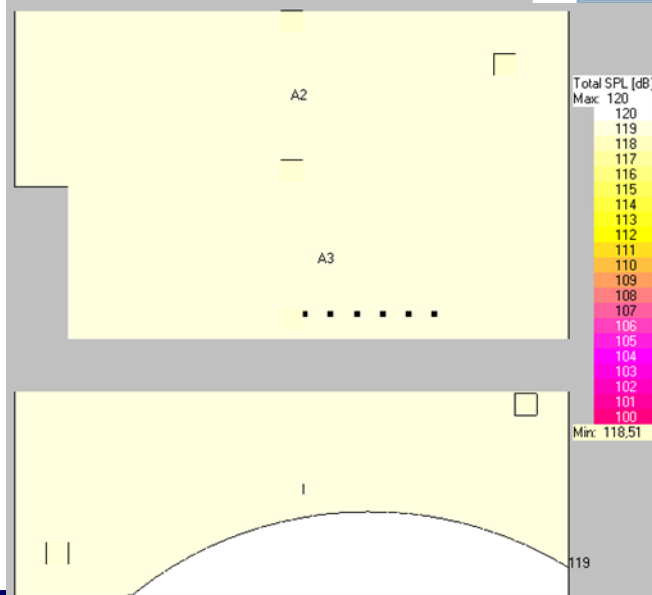
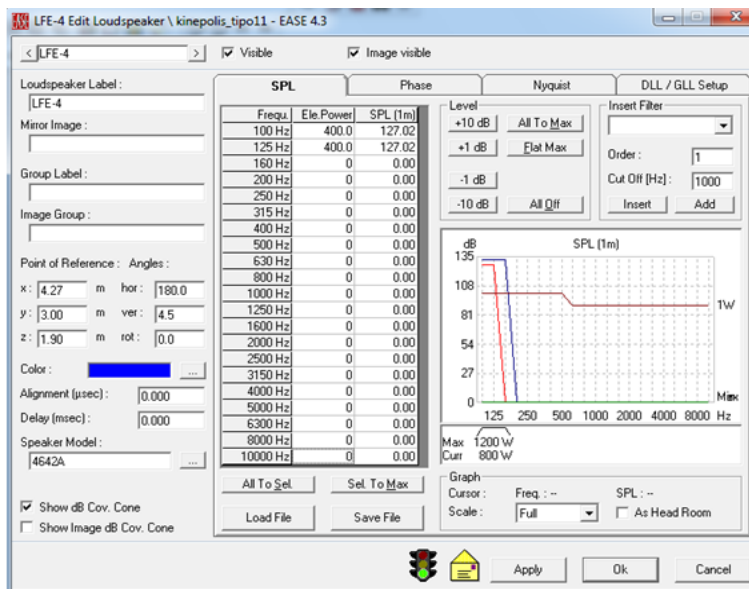
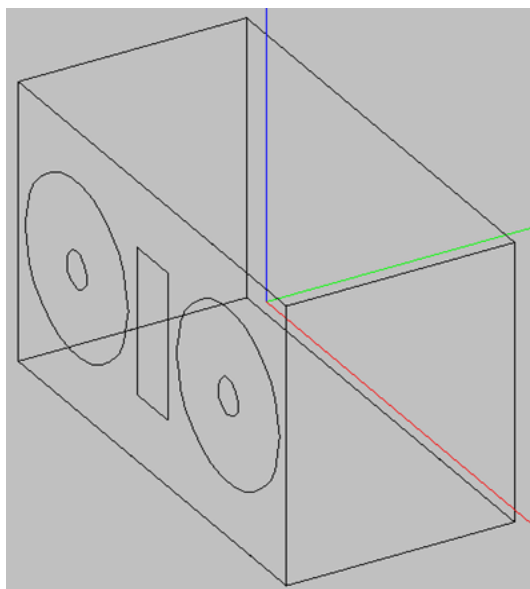
SUBWOOFERS (LFE) CHANNEL



| Volumen | Potencia acústica necesaria para 110 dB SPL |
|---|--|
| 270 m ³ (10000 ft ³) | 10 W |
| 540 m ³ (20000 ft ³) | 15 W |
| 1350 m ³ (50000 ft ³) | 20 W |
| 2700 m ³ (100000 ft ³) | 40 W |
| 5400 m ³ (200000 ft ³) | 100 W |

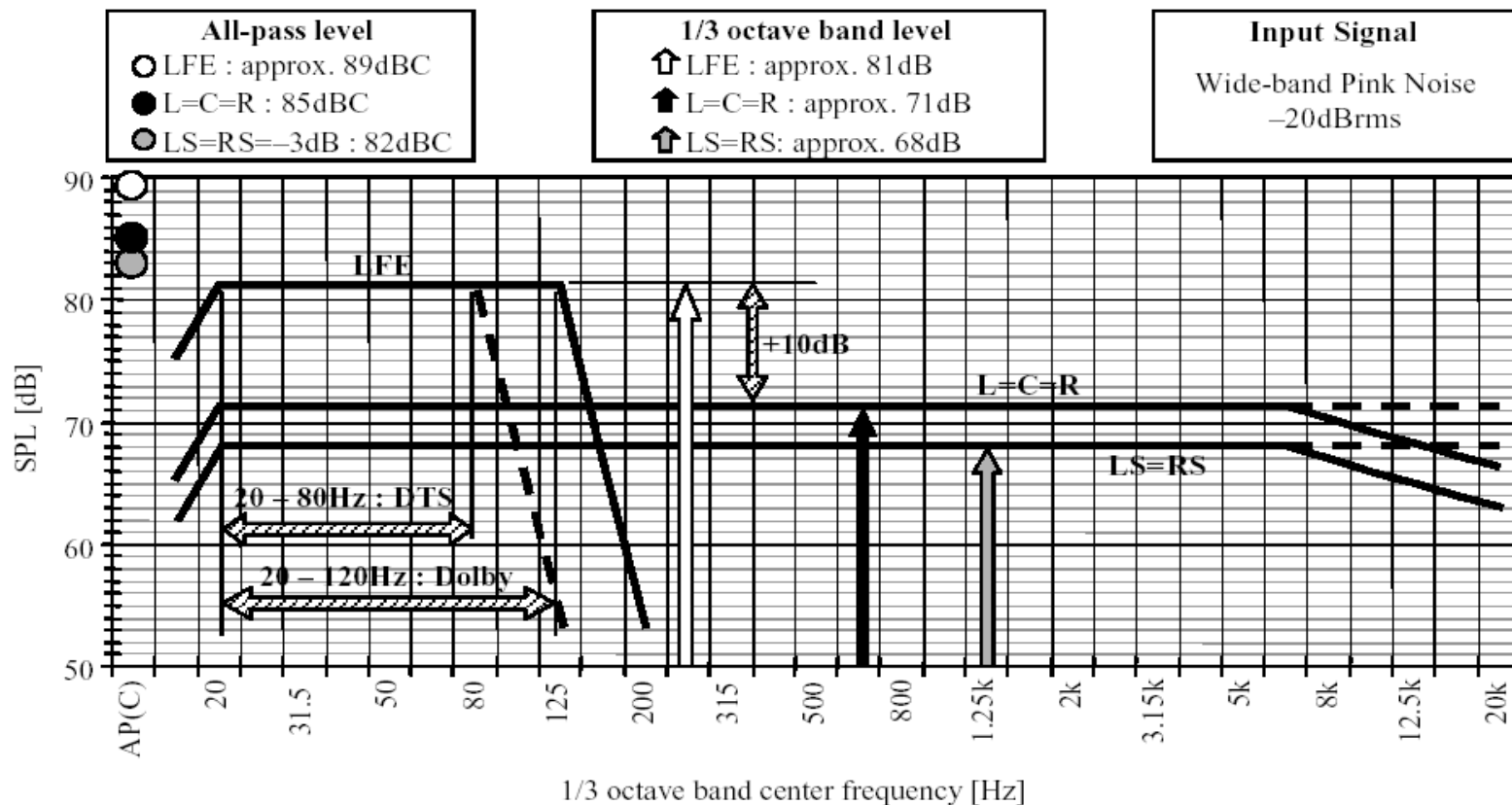


SUBWOOFERS (LFE) CHANNEL





SUBWOOFERS (LFE) CHANNEL



[Level balance of the surround channels]

For film productions, set the playback level of the surround channels at -3 dB relative to the front channels.

In the case of $L = C = R = 85 \text{ dBC}$,

3-1: $LS = RS = 82 \text{ dB}$; in other words, $S (LS+RS) = 85 \text{ dBC}$

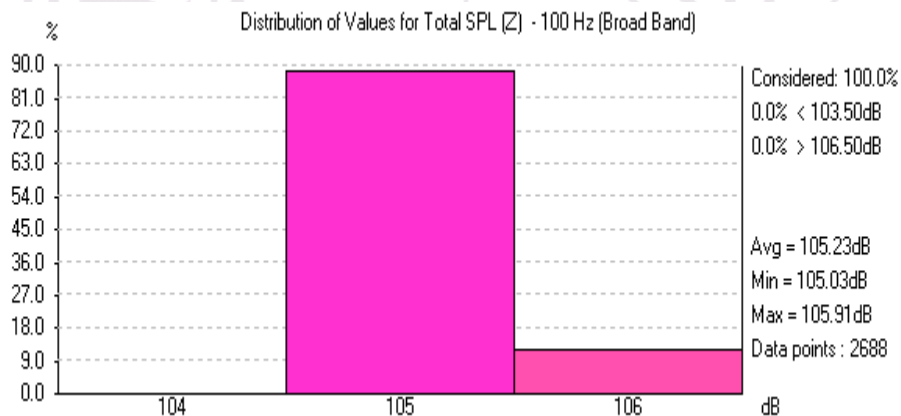
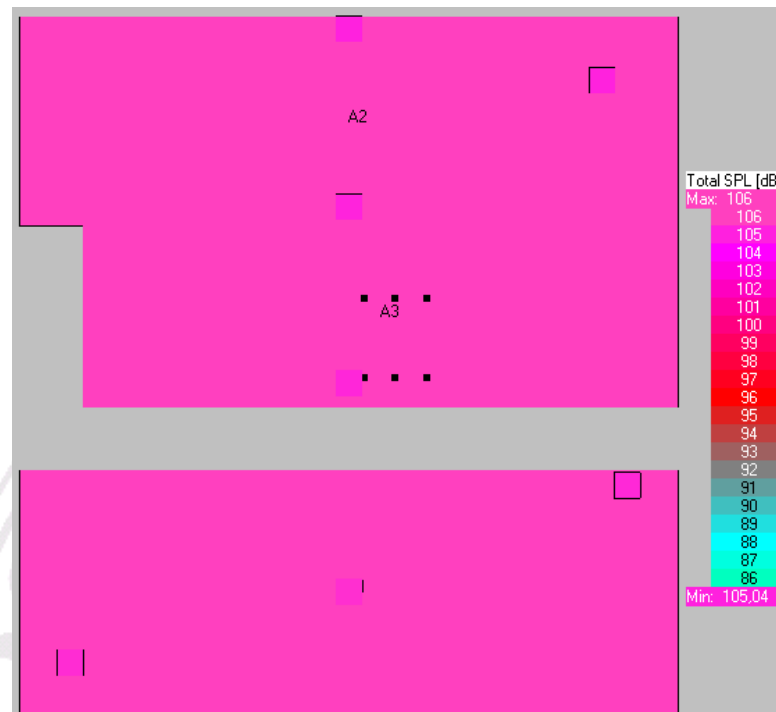
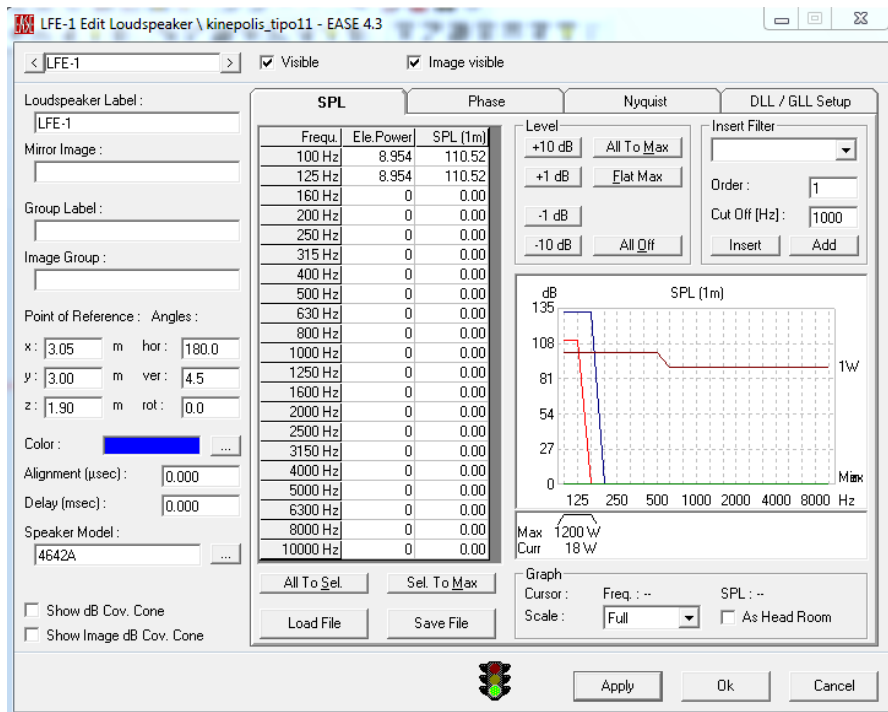
5.1: $LS = RS = 82 \text{ dBC}$

6.1: $LS = RS = BS = 82 \text{ dB}$

[X Curve of the B-Chain: SMPTE 202M-1998]

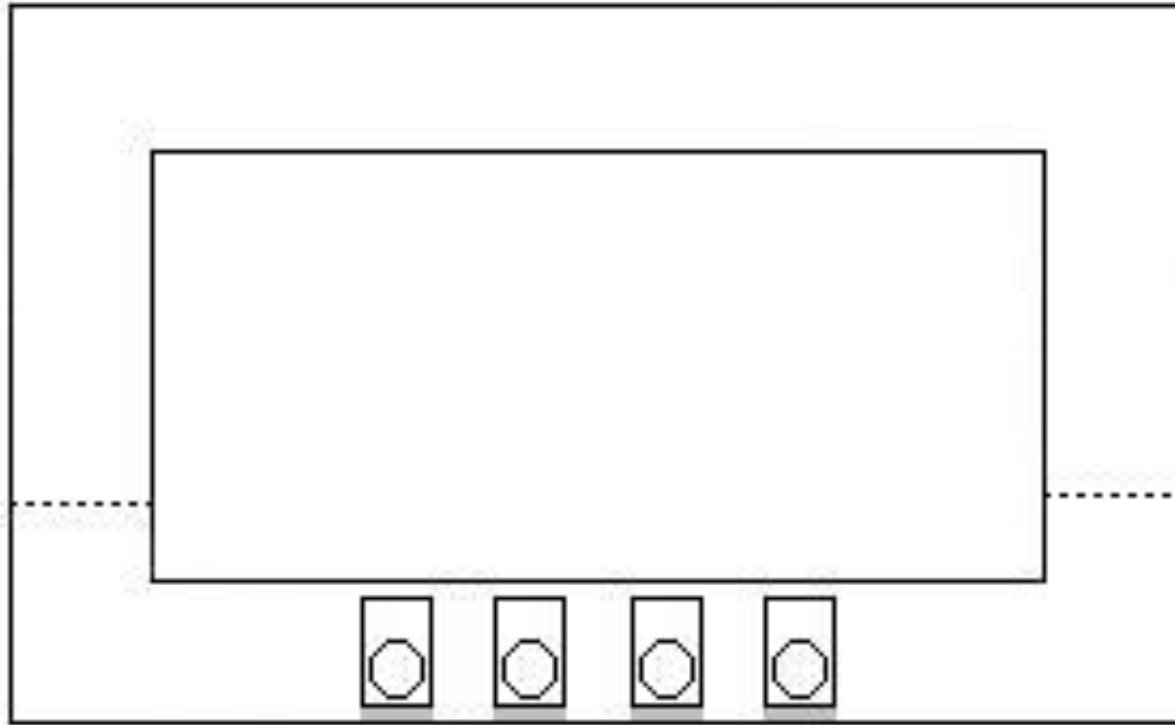


SUBWOOFERS (LFE) CHANNEL

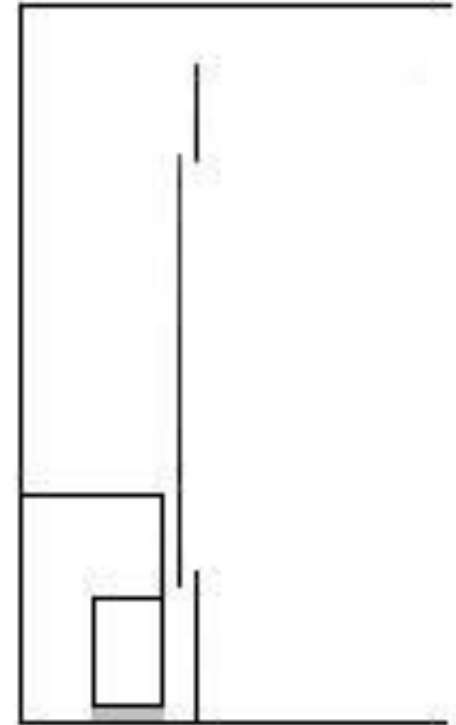




SUBWOOFERS (LFE) CHANNEL



Vista Frontal



Vista Lateral