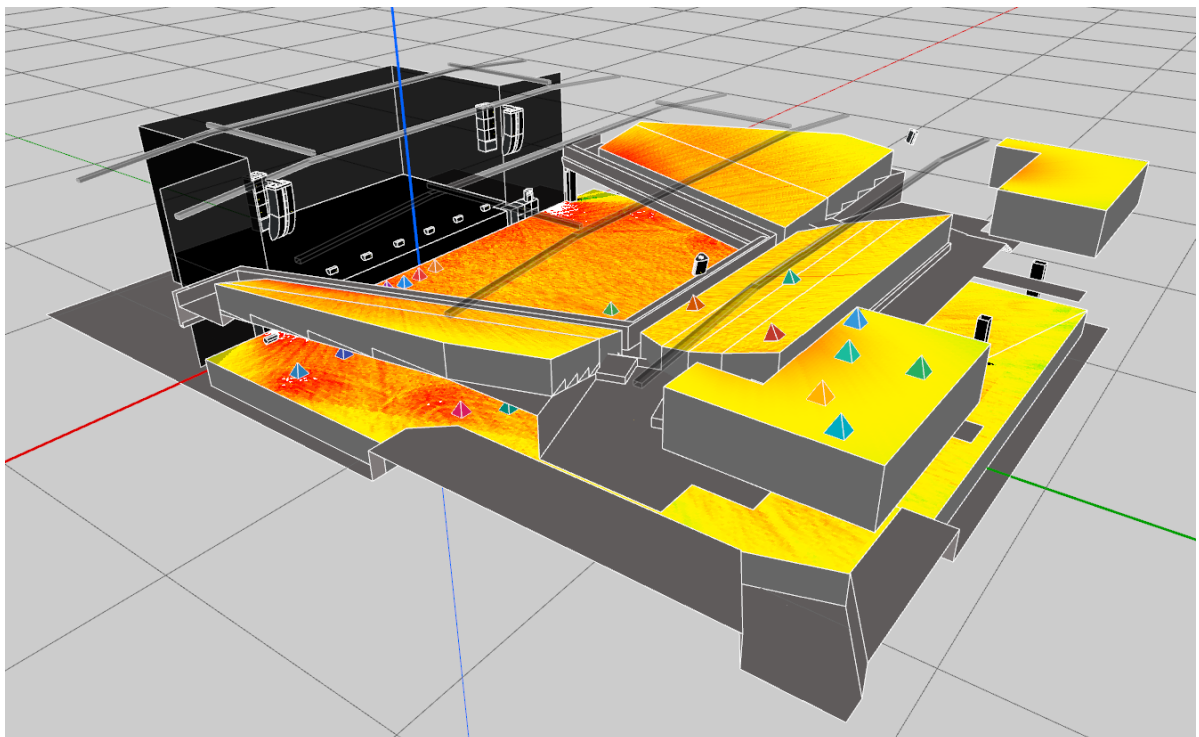


ABSTRACT PA-SYSTEM COLUMBIAHALLE BERLIN

Martin RODE

11.05.26



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INTRODUCTION

System calibration done by:

- Martin Rode; L-ACOUSTICS Application Engineer

Date of system calibration::

- 21/04/2026

Related system files:

- **Soundvision:** *DE-Berlin_Columbiahalle_Sys-Cal_MR_20260421.xmlp*
- **Networkmanager:** *DE-Berlin_Columbiahalle_Sys-Cal-final_MR_20260508-60HZ*

Overview system design



Figure 1: Soundvision L2/KS21-Main-PA, KS28-Subs, A10i-Frontfills & X8 Nearfills

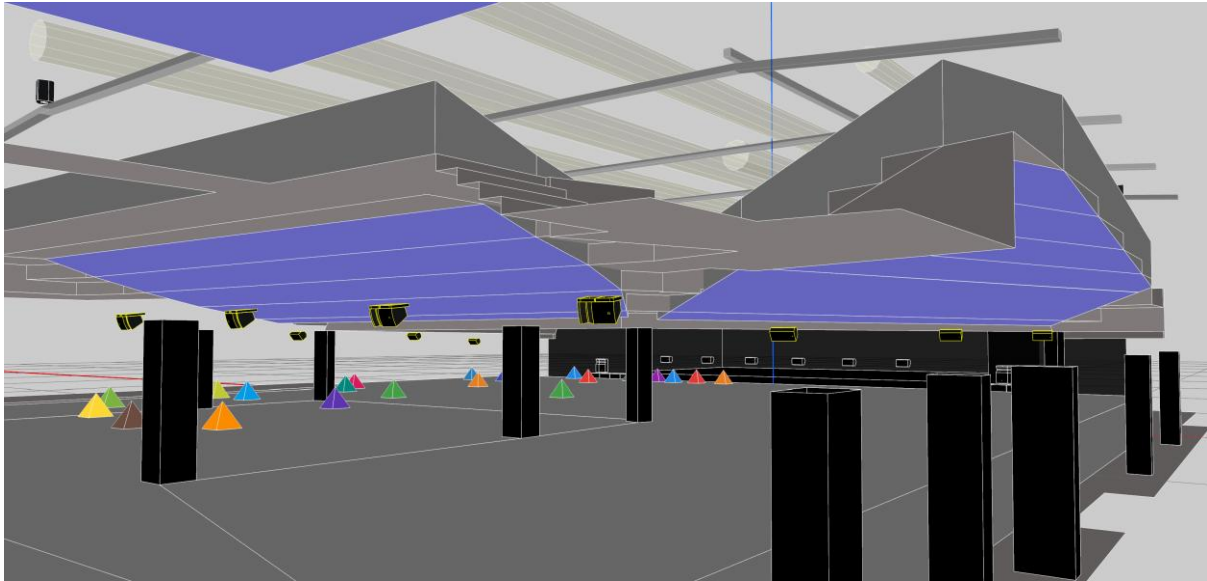


Figure 2: Soundvision X8i und A10i Underbalcony-Delays

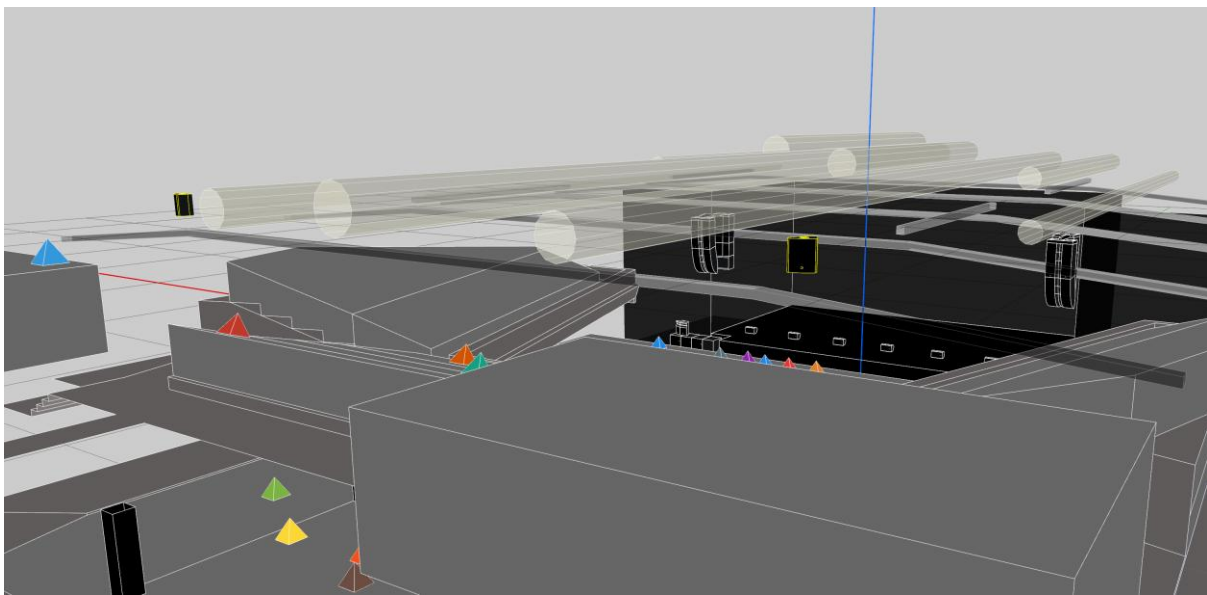


Figure 3: Soundvision X12 Delays VIP-Logen

Module	Description
Main system	Two Arrays , (L/R) each consisting of: • 1 x L2 • 1 x L2D
Subs flown:	Two Hangs (L/R) applied with cardioid setup, behind main arrays, each consisting of: • 4 x KS21
Subs stacked	Two stacks (L/R) applied with cardioid setup, each consisting of: • 4 x KS28
Front fill-L/R:	Two arrays stacked on KS28 (L/R), each consisting of: • 2 x A10 Wide applied as horizontal array
Near fill stage:	Six positions , each consisting of: • 1 x X8
Under balcony delays side-L/R	Six positions below side balconies, each consisting of: • 1 x X8i
Under balcony delays rear	Four Positions below centered rear balcony, each consisting of: • 1 x A10i Wide
Delay VIP-loges L/R	Two positions , each consisting of: • 1 x X12

SYSTEM DESIGN

Soundvision Direktschall Simulation

The simulations below illustrate the direct sound distribution in the audience area for an A-weighted pink noise signal within the 20 Hz – 20 kHz frequency range. The values represent the **maximum long-term SPL (RMS)** resulting from the maximum gain settings on the controller amplifiers. Peak SPL values are 12 dB higher, based on the crest factor defined in Soundvision.

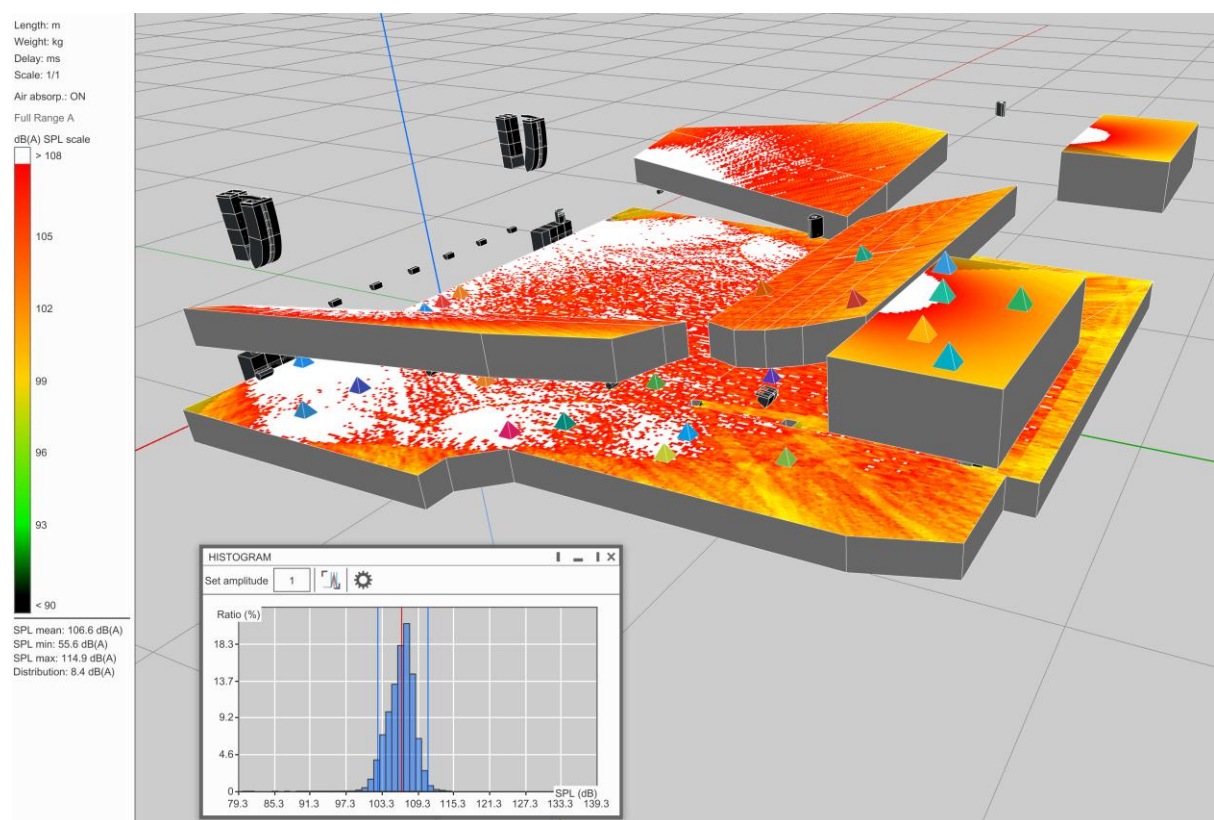


Figure 4: A-weighted Direct-SPL of all frontal- and delay systems

Source cutview und SPL-target L2 main systems

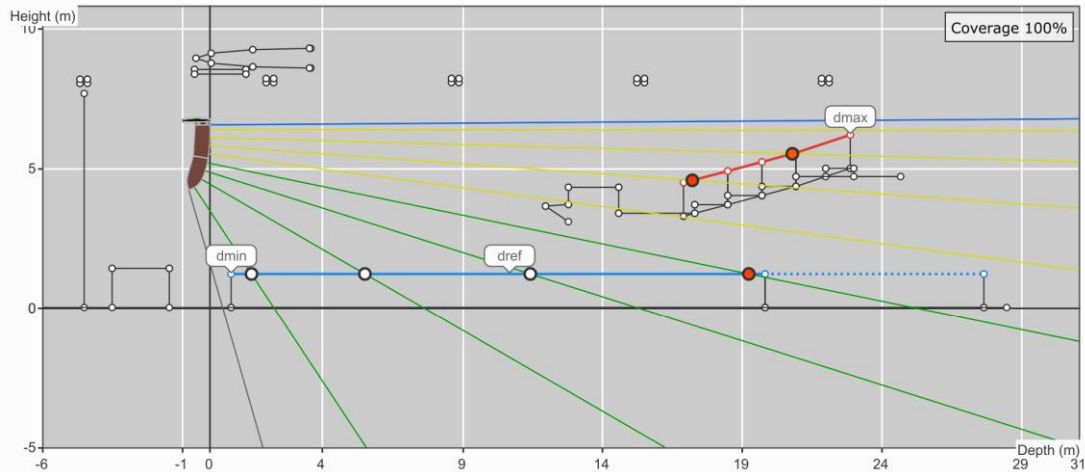


Figure 5: L2 PA-L/R, source cutview & orientation

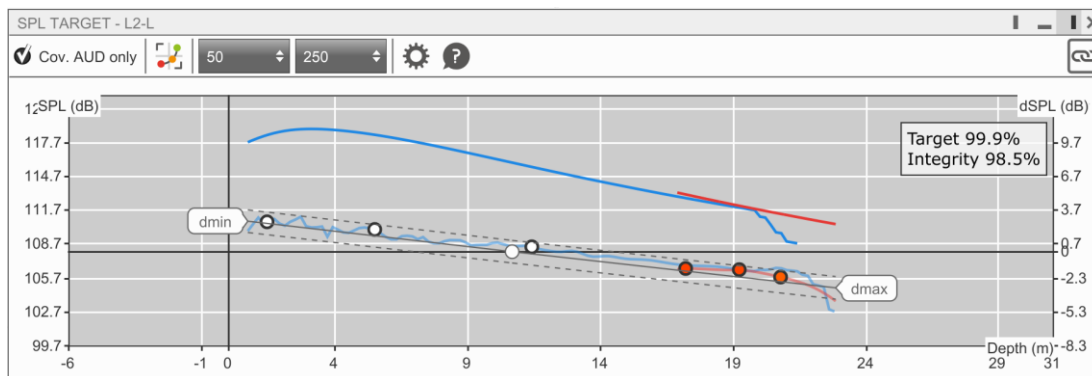


Figure 6: L2 PA-L/R, SPL target: 1 kHz-10 kHz (thin) and 50 Hz -250 Hz (bold)

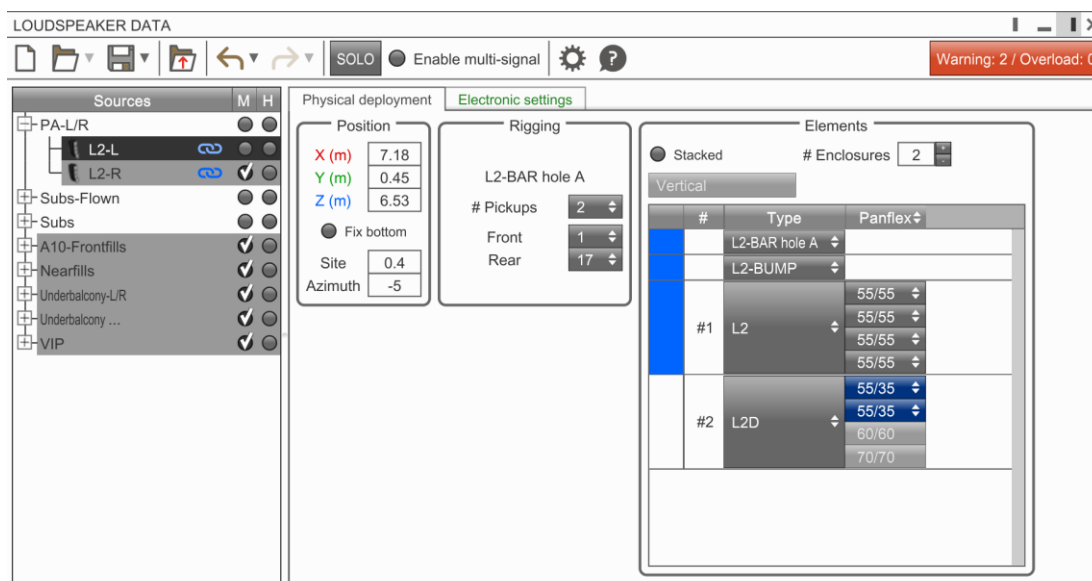


Figure 7: Mechanical PANFLEX settings L2 main systems

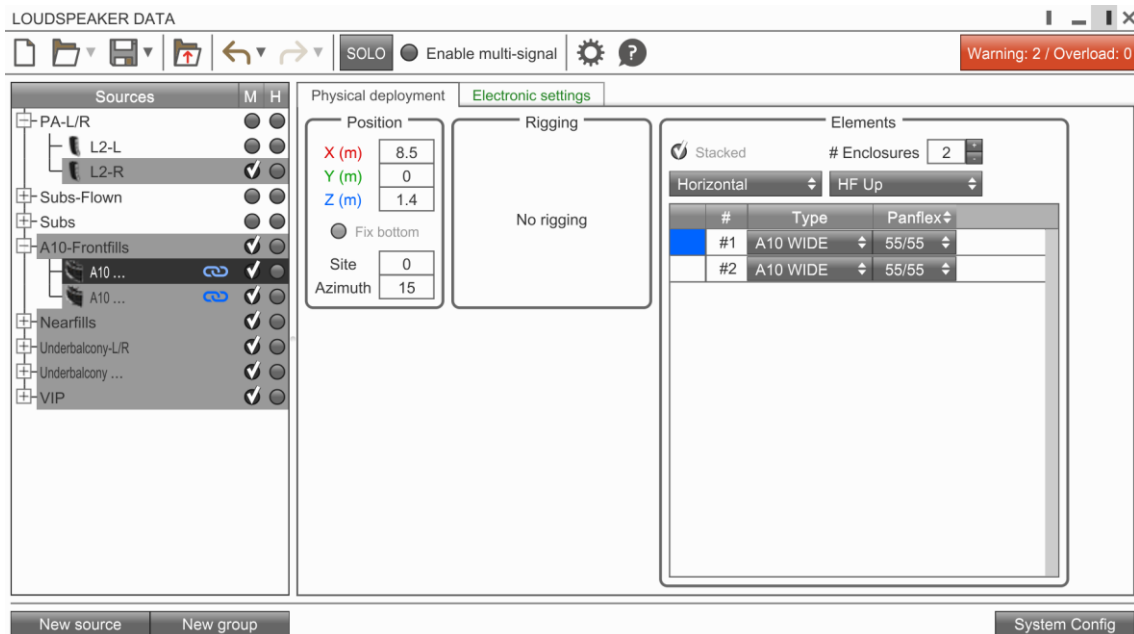


Figure 8: Mechanical PANFLEX settings A10i front fills L/R

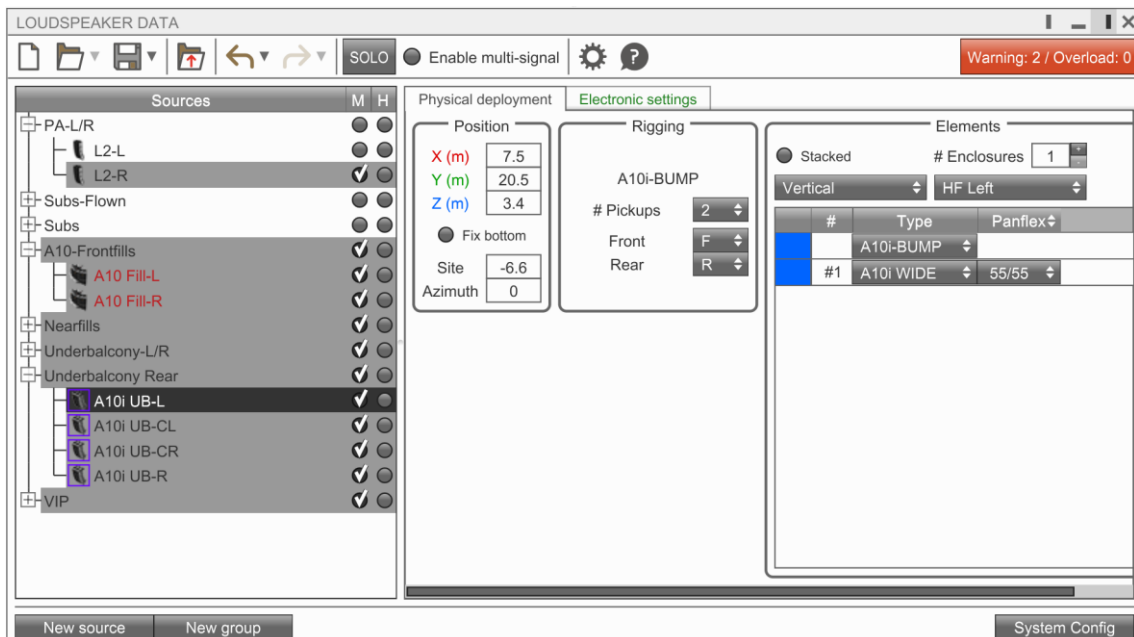


Figure 9: Mechanical PANFLEX settings A10i underbalcony delay

NWM-Session Abbildungen

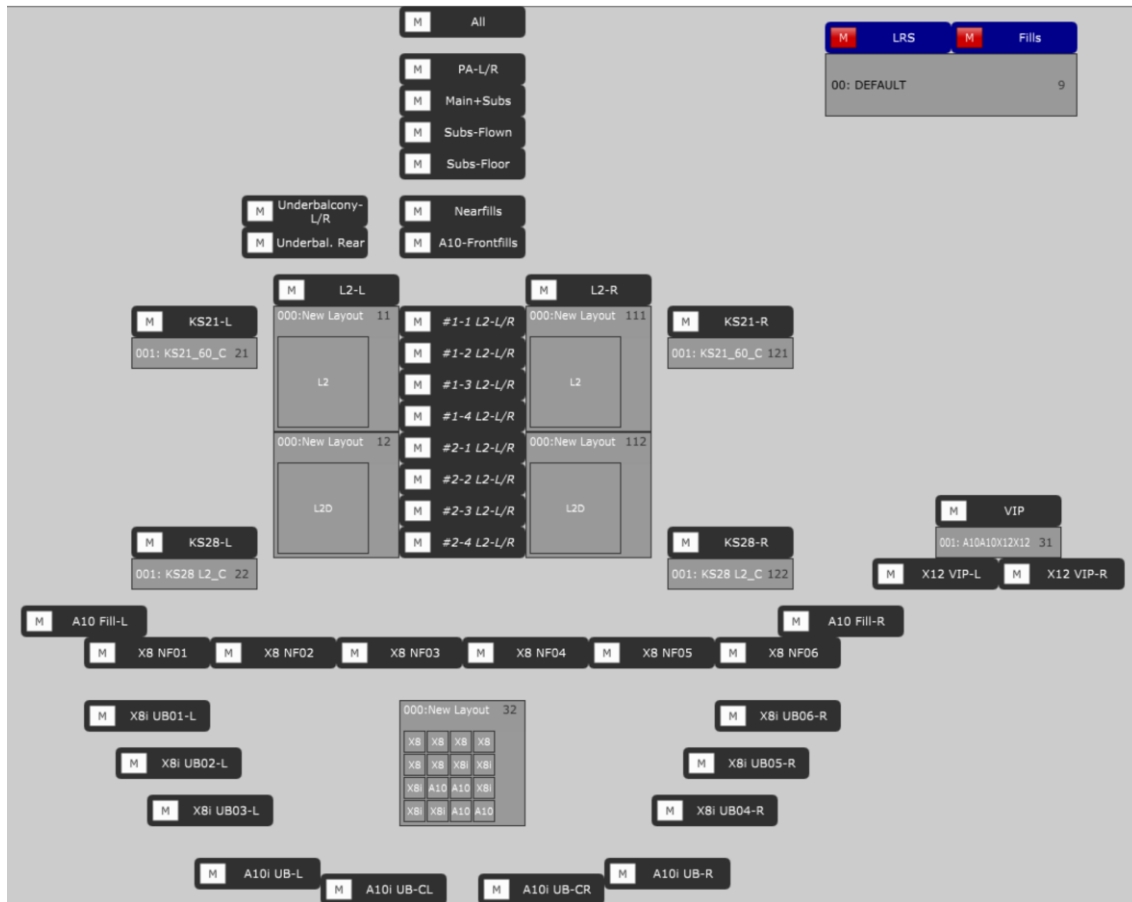


Figure 10: NWM Surface

SYSTEM CALIBRATION

Frequency response optimization L2-/KS21-/KS28 main systems

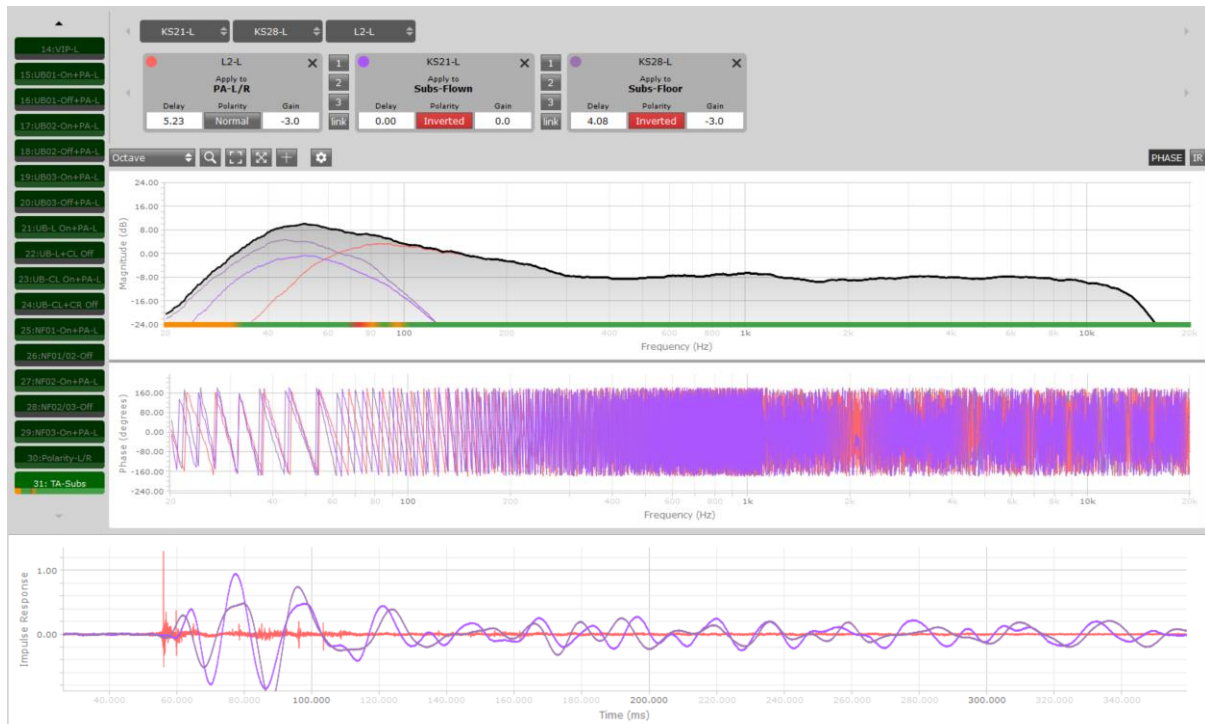


Figure 11: Time-Alignment L2-L vs. KS21-L vs. KS28-L measured at Position #31

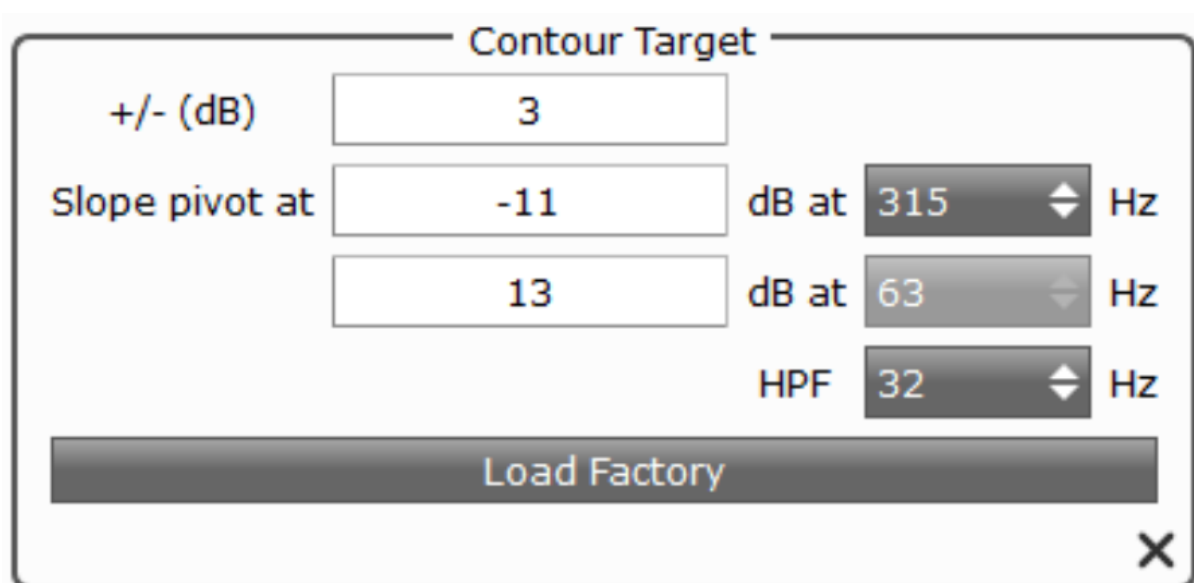


Figure 12: Target frequency response L2/KS21/KS28 main systems

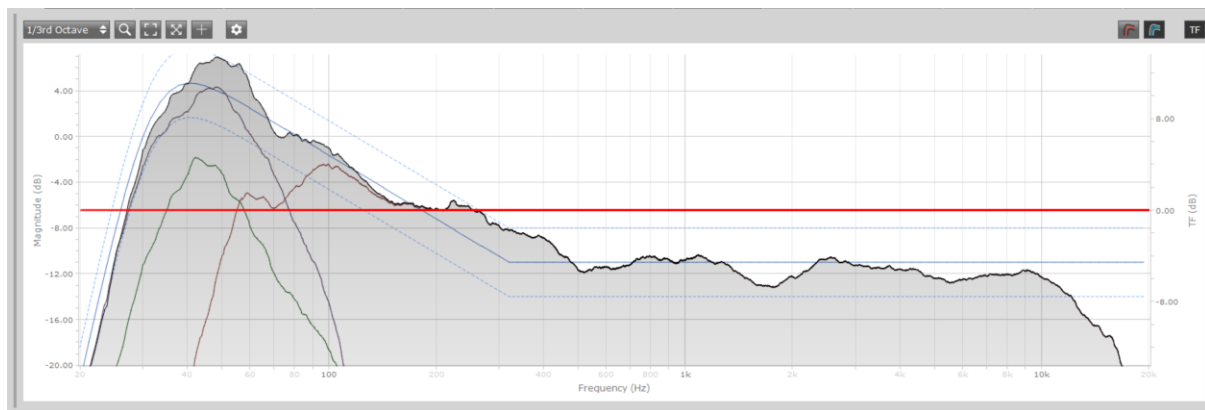


Figure 13: L2/KS21/KS28, summed and averaged frequency response over nine position #01-#09, 1/3-Octave smoothing **without EQ**

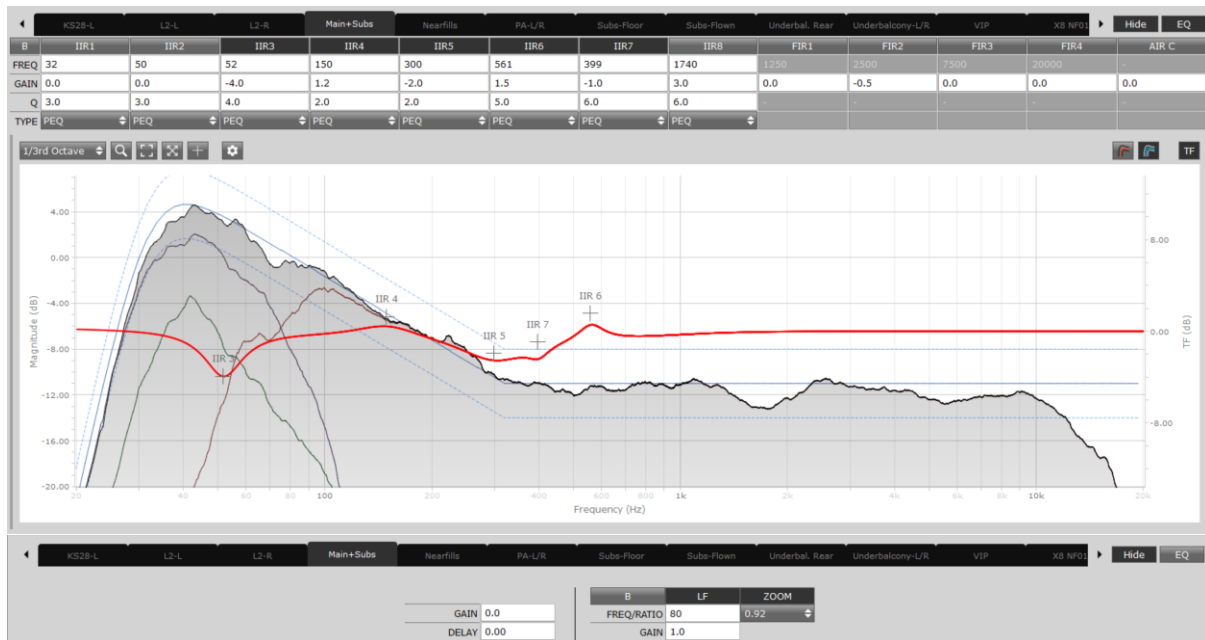


Figure 14: L2/KS21/KS28, summed and averaged frequency response over nine position #01-#09, 1/3-Octave smoothing **with EQ**

Frequency response optimization A10 front fills

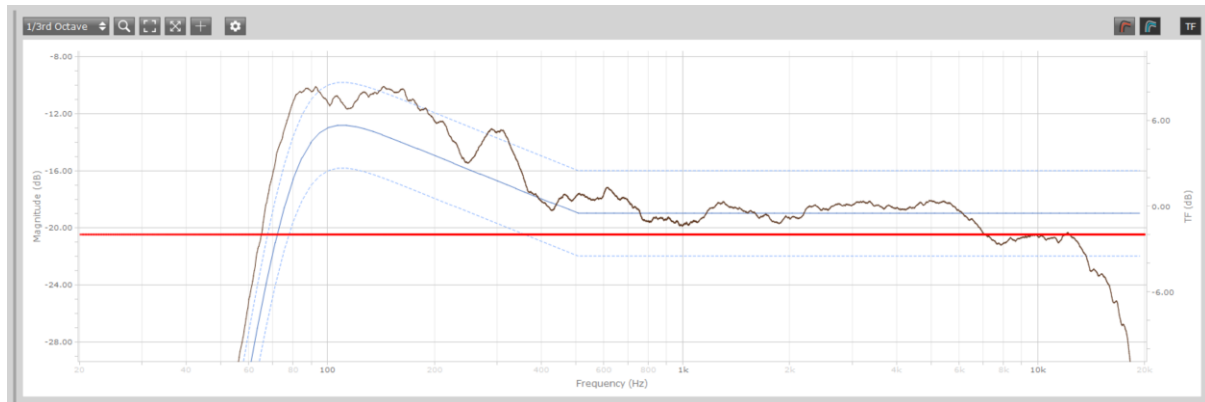


Figure 15: A10 front fill-L, summed and averaged frequency response over six positions #01-04, #15 & #16. 1/3-Octave-smoothing **without EQ**

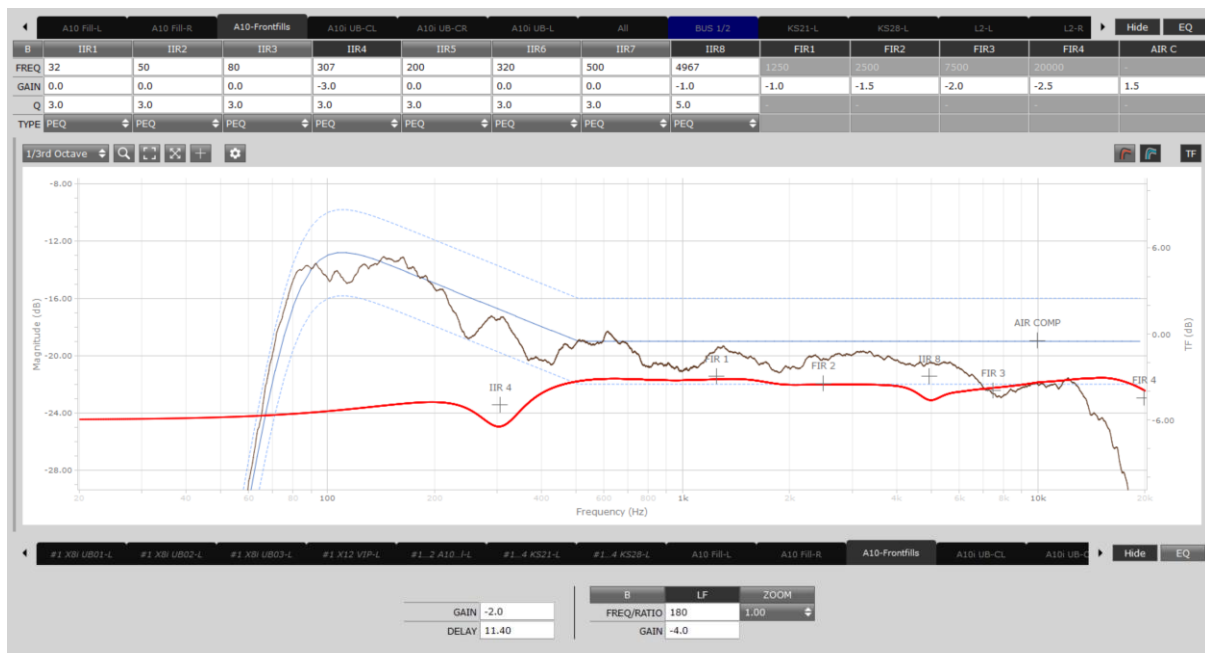


Abbildung 1: A10 front fill-L, summed and averaged frequency response over six positions #01-04, #15 & #16. 1/3-Octave-smoothing **with EQ**

Frequency response optimization X8 near fills

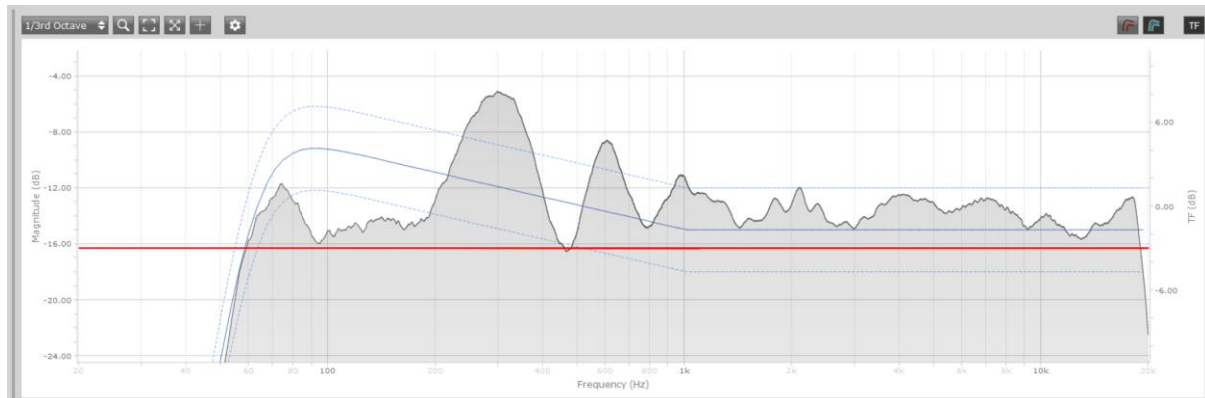


Figure 16: X8 near fills, summed and averaged frequency response over seven positions at position #25 - #29, 1/3-Octave smoothing **without EQ**

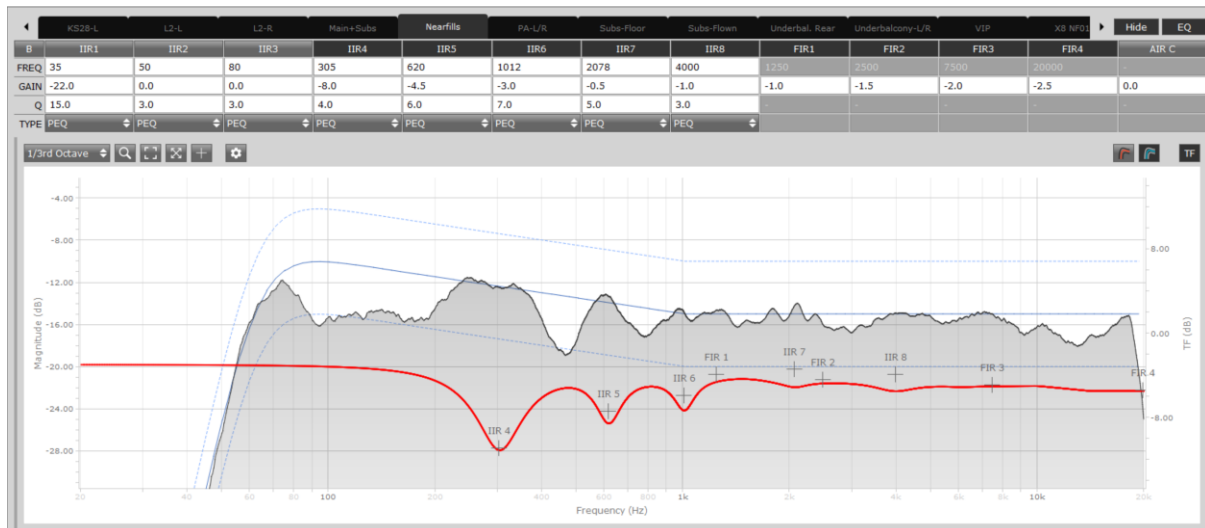
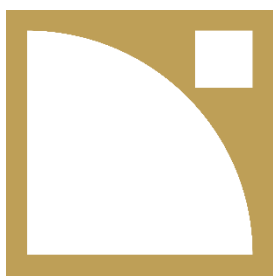


Figure 17: X8 near fills, summed and averaged frequency response over seven positions at position #25 - #29, 1/3-Octave smoothing **with EQ**

Table of gain and delay settings within Networkmanager groups

Name Gruppe	Gain (dB)	Delay (ms)	Array Morphing + Zoom Factor, Polarität
All	0	0	No parameters set
PA-L/R	-3	5,23	No parameters set
Main-Subs	0	0	Zoom Factor = 0,92 LF-Contour = 80Hz/1dB
Subs-Flown	0	0	Polarity reversed
Subs-Floor	-3	4,08	Polarity reversed
A10-Frontfills	-2	11,4	Zoom Factor = off LF-Contour = 180Hz/-4dB
Nearfills	-3	7	No parameters set
X8 NF01	0	5.69	No parameters set
X8 NF02	0	9,23	No parameters set
X8 NF03	0	13,15	No parameters set
X8 NF04	0	13,15	No parameters set
X8 NF05	0	9,23	No parameters set
X8 NF06	0	5.69	No parameters set
Underbalcony L/R	0	2,5	No parameters set
X8i UB01-L	-3	26,75	No parameters set
X8i UB02-L	-4	38	No parameters set
X8i UB03-L	-3	54	No parameters set
X8i UB04-R	-3	54	No parameters set
X8i UB05-R	-4	38	No parameters set
X8i UB06-R	-3	26,75	No parameters set
Underbal. Rear	0	2	Zoom Factor = 0,95 LF-Contour = off
A10i UB-L	-3	70,8	No parameters set
A10i UB-CL	-3	69,5	No parameters set
A10i UB-CR	-3	69,5	No parameters set
A10i UB-R	-3	70,8	No parameters set
VIP	-9	70	Zoom Factor = off LF-Contour = 180Hz/-4dB

Table 1: Settings within all relevant Networkmanager groups. Groups, which are not mentioned, do not contain any settings.



L-ACOUSTICS

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