#### Comparison between loudspeakers.audio and Genelec GLM report, v2

Example from *loudspeakers.audio* website

1/ Ratings inspired by Harman's score

72

7.5

= 6.1

6.9

NBD smoothness L/R

Deviation >125Hz L/R

Performance

Deviation 25-125Hz LR

#### Example from Genelec GRADE Report



Table 2.1: Summary of results, colour coded to indicate excellent/good/problematic performance.





2/L+R is also displayed

L and R are on separate graphs, no L+R







Figure 3.2: Sub 7360A frequency response.

L and R lows are on separate graphs, no L+R, frequencies shown on log scale



15

10

5

#### 4/ Smoothing is 1/20 below 200Hz and 1/6 octave above

### Accusmooth is 1/12 below 250Hz and 1/6 octave above

eft 8341A Right 8341A



5/ L,R and L+R on same graph

S3 Low frequency response MMM 1/50oct

100 110

6/ L,R and L+R,

low frequencies shown on linear scale



Figure 3.5: Frequency responses for monitors. One octave smoothing.

L and R on same graph with 1 octave smoothing



Figure 3.6: Filtered frequency responses for subwoofers. 1/12 octave smoothing.

L and R on separate graphs after correction, no L+R, frequencies shown on log scale

delta level L = 0 R = 2.6dB(B) L = 76dB(B)L = 76dB(C)

60

18

delta time L = 0 R = 0.021 ms R = 78.5 dB(B)R = 78.5dB(C) L+R = 81.8dB(B)

140 150 160 170 180

130

120

L+R = 80.7dB(40-160Hz) SPL in dB only valid with Umik

> 7/ Absolute and relative levels in dB (B) and (C) weightings

Speaker name	Level compensation (dB)	Level offset after calibration (dB)
Left 8341A	-4.2	0.0
Sub 7360A	0.0	0.0
Right 8341A	-4.2	0.0

Table 3.1: Relative level compensation of speakers.

Mean relative levels from 0.5 to 3kHz

Speaker name	Model	Measured -6 dB point (Hz)	Anechoic -6 dB point (Hz)	Gain in low frequency extension (Hz)
Left 8341A	8341A	41.4	38.0	-3.4
Sub 7360A	7360A	13.4	19.0	5.6
Right 8341A	8341A	35.8	38.0	2.2

Table 3.2: Low cutoff -6 dB point.

# Cutoff frequencies



Figure 3.7: Left 8341A peaks and notches (before calibration).



9/





# 10/ Bandpass 1 to 8kHz filtered impulse, time compensated



Figure 4.1: Bandpass filtered impulse responses of monitors, before time of flight compensation.

# Bandpass 1 to 8kHz filtered impulse

Monitor name	ToF compensation (ms)
Left 8341A	0.1
Right 8341A	0.0

delta time L = 0 R = 0.021ms

Table 4.1: Time of Flight.

11/ Delta time between channels

Delta time between channels

8/



12/ Subwoofer timing by special one period sine signal

S6 Energy-time curve 1-8 kHz, dB/ms

10

12

14

16

18

-10

-20

-30



Figure 4.3: Lowpass-filtered impulse response envelopes of subwoofers.

12 Subwoofer timing by pulse max







Figure 4.7: Right 8341A. Response and lowest cancellation frequency resulting from early reflection.

Reflection number	Gain (dBFS)	Time (ms)	Time in distance (cm / in)	Frequency of first dip (Hz)	Comb filtering ripple (dB)
1	-13.7	1.1	37 / 14.5	461.5	1.6
2	-14.8	4.2	144 / 56.6	118.2	1.4
3	-14.4	13.0	441 / 173.5	38.6	1.5

Table 4.3: Right 8341A. Peaks in impulse response.

13/ Early reflections with AES limits in green

# Early reflections with maximums and distance indication



Figure 4.8: Left 8341A. Full, early and late frequency response.



Figure 4.9: Sub 7360A. Full, early and late frequency response.

Monitor name	Early vs late sound ratio, 100 Hz - 10 kHz mean (dB)
Left 8341A	6.5
Right 8341A	5.9

Table 4.4: Early vs late sound ratio.







Monitor name	RT60 (s)	T60 min (s)	T60 max (s)
Mean of all monitors	0.22	0.16	0.32
Left 8341A	0.21	0.17	0.30
Right 8341A	0.22	0.14	0.35



#### 15/ Graph from 63 to 8kHz with mean RT60

# Detailed RT60 from 63Hz to 16kHz, green limits from ITU-R BS.1116

#### 14/ Total response at different times





16/ Step, phase and group-delay



Waterfall (Fourier) - 0.167 oct sm - win left 5 & right 500 ms







Speaker name	Unit	Mode 1	Mode 2	Mode 3	Mode 4
	Freq (Hz)	54.5	195.2		
Left 8341A	Gain (dB)	-9.8	-22.3		
	Decay time T60 (s)	0.31	0.20		
Sub 7360A	Freq (Hz)	14.2	20.3		
	Gain (dB)	-4.4	-6.1		
	Decay time T60 (s)	0.69	0.87		
Right 8341A	Freq (Hz)	35.3	56.9		
	Gain (dB)	-16.1	-6.2		
	Decay time T60 (s)	0.30	0.29		

Table 5.2: Room modes - all monitors and subwoofers.

17/ Waterfall of lower frequencies

Full range waterfall with decay times and room

#### modes



Figure 5.10: Left 8341A. Wavelet.

# 18/ In periods (cycles) from 25Hz to 15kHz

Fixed times, missing lowest frequencies



# 19/ House curve predicted from measurements or choice of various targets

No house curve, sole target is from ITU-R BS.1116









Figure 3.3: Right 8341A frequency response.

L and R before/after correction on separated graphs

20/ L.R and L+R before/after correction on same graphs

Comparison

### loudspeakers.audio website

- for any loudspeaker brand/model
- only a measurement mic is needed (80€)
  - no acoustic skills required
  - must install recording software
  - learning curve to play/record/upload
- measurement+graphs take about 10mn
- easy to compare with other brands/models
  - includes a house curve calculation
    - missing early/late ratio
- modes and decay times only on waterfall
  - phase, group-delay and step response
  - cutoff and mode frequencies are not shown but only seen on graphs
    - various standards available AES/ITU/Atmos/music/...
  - L+R measurements (usefull in low frequencies)
  - low frequency graphs on linear scale
  - FIR correction for various processors
- export to REW for other EQ/processors
  - for stereo and 5.1

# Genelec GRADE Report

- only for Genelec speakers
- need to buy the GLM kit (300€)
  - no acoustic skills required
  - must install GLM software easy to setup
  - very quick to get report
- cannot compare to other bands/models
  - no house curve calculation
    - early/late ratios
- some graphs are more detailed (early reflections, modes and decay times) nothing phase related
- detailed indication of cutoff and mode frequencies
- only ITU-R BS.1116 standard limits
  - no L+R measurements
  - low frequency graphs on log scale
- auto PEQ correction for Genelec SAM
  - no link to other software
  - for stereo and multichannel