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Anechoic measurement of the polar plot of B-format microphones

This brief document contains the results of a verification test made on a couple of very different microphonic probes suitable of measurement of omnidirectional pressure (W) and figure-of-eight particle velocity (X).

The two microphones were a Bruel & Kjaer type 3595 (connected with a B&K 2260 Investigator, which makes the necessary processing for computing average pressure and particle velocity, and outputs these signals on its AC outlets), and a Soundfield ST-250, connected to its own preamplifier / power supply.

The measurements were made in an anechoic chamber (m 4 x 3 x 2.5), with a cutoff frequency of 185 Hz. The sound source was a Quested F11P studio monitor, powered with a Crown K1 amplifier.

Figures 1 and 2 show the microphones in the anechoic chamber.

The measuring system was a PC (Pentium 2 – 400) equipped with a professional multichannel sound board (Echo Layla), working at 48 kHz, 20 bit resolution. The rotating table was an Outline ST-1, driven directly from an analog output of the Layla board.

The measurement software was Aurora v. 3.2 (www.ramsete.com/aurora). The test signal was MLS, order 14. Each measured impulse response was truncated at 4096 samples. An average of 8 sequences was computed at each angular step. The angular resolution was 5°.

Fig. 3 shows a photograph of the measuring system.

After the measurements were made, for each microphone a 24-bit, stereo WAV file was saved, containing the sequence of measured IRs. These files were later post-processed by means of the software Spectra Lab. V.4.32.16 (www.soundtechnology.com), by means of a sliding window of 4096 point, and re-computation of the octave-band spectra from each FFT block. The sequence of 72 spectra were automatically saved in an SCII text file, from which they were read and imported in Microsoft Excel, which was employed for plotting the directivity patterns.

The last two pages contain the directivity plots, measured in 8 octave bands, for the two microphonic probes.

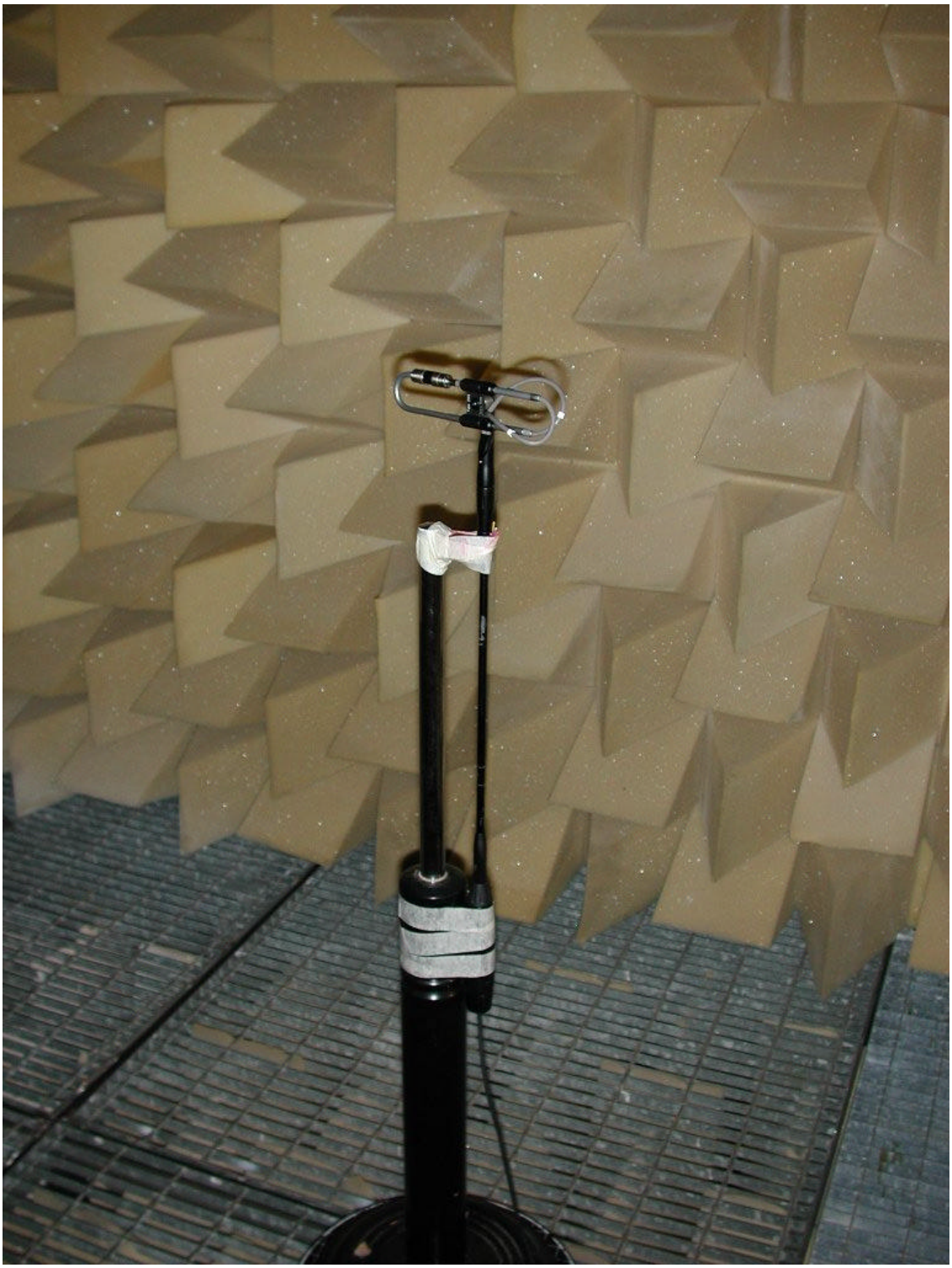
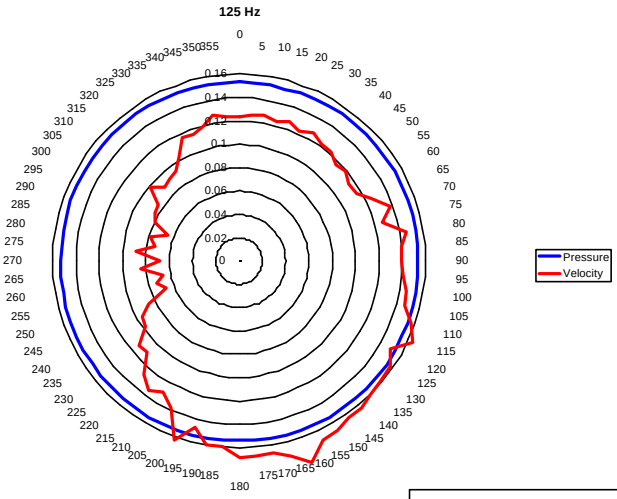


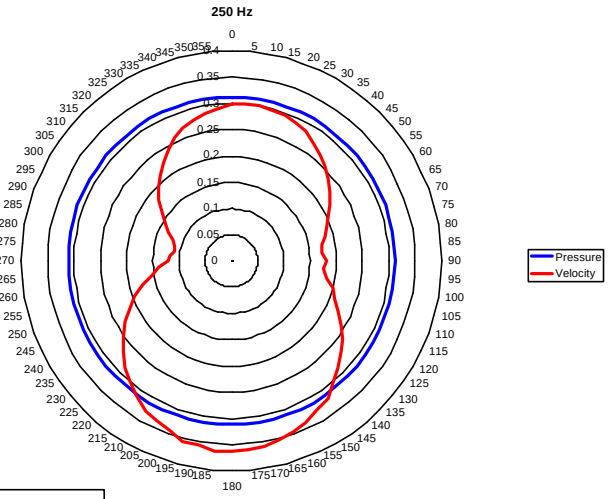
Fig. 1 – B&K Sound Intensity probe on the rotating table.

Fig. 2 – The Soundfield ST-250 and the loudspeaker

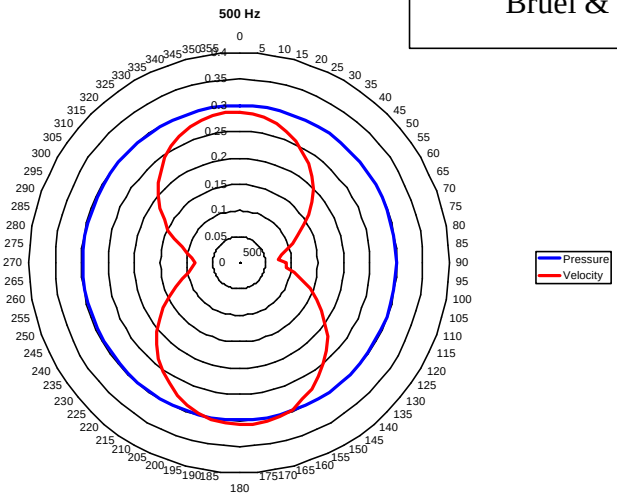
Fig. 3 – the instrumentation rack, containing (from top to bottom):
Echo Layla sound board
Outline ST-1 control unit
Soundfield MK-V preamplifier (not used here)
Crown K1 amplifier
QSC PLX-1200 amplifier (not used here)
Syntec computer (Pentium-II 400 MHz)

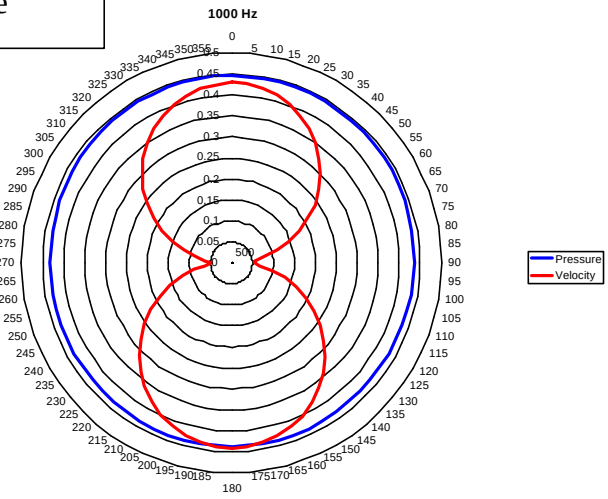
Over the table, on the right of the rack, it is visible the preamplifier of the Soundfield ST-250.
The image on the computer screen is one of the measured impulse responses, being reprocessed with the MLSSA software after exporting from Aurora.

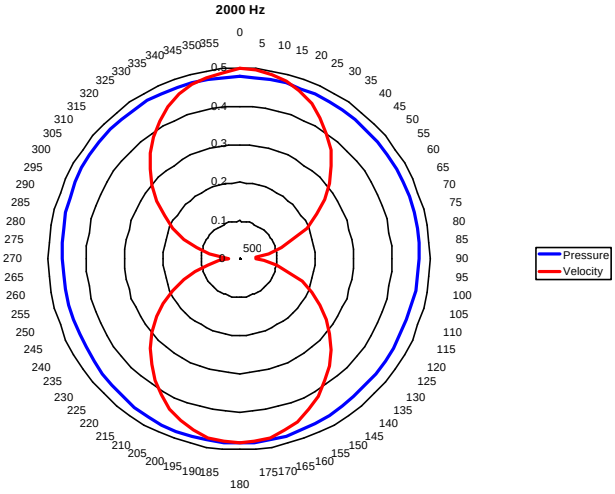


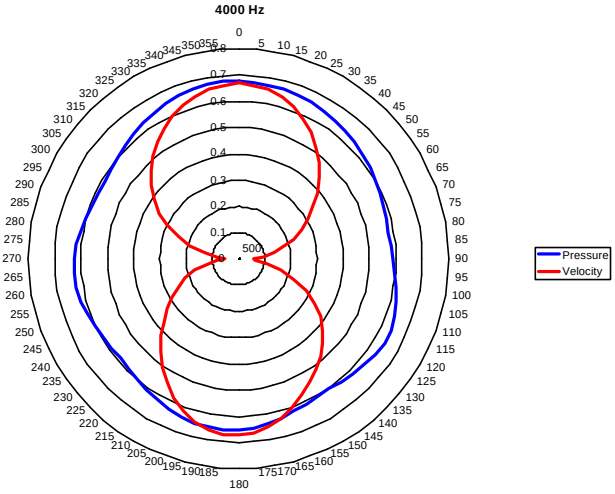


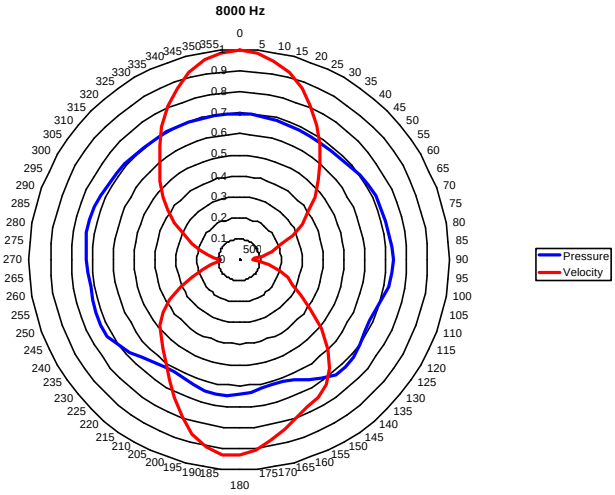
Bruel & Kjaer Probe

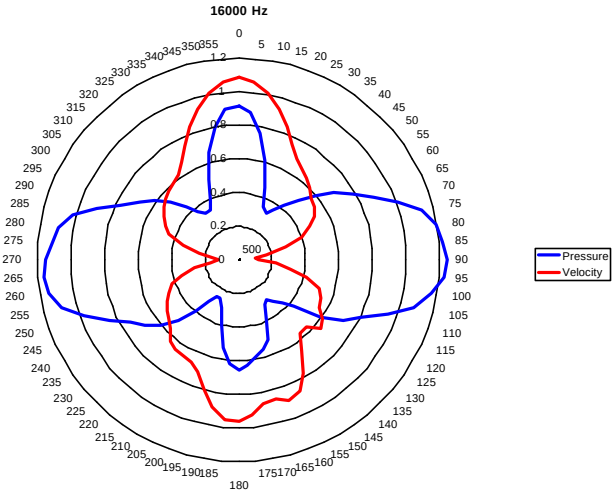












Soundfield ST-250 W-X