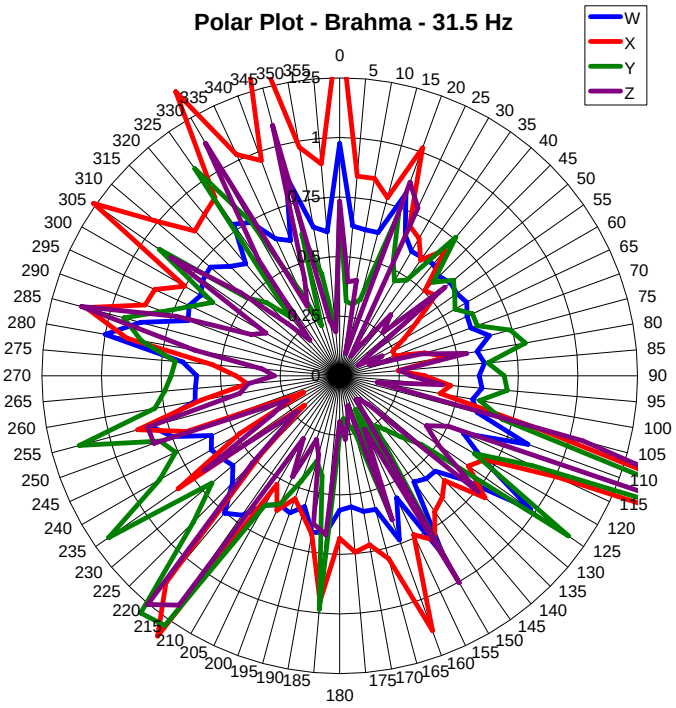
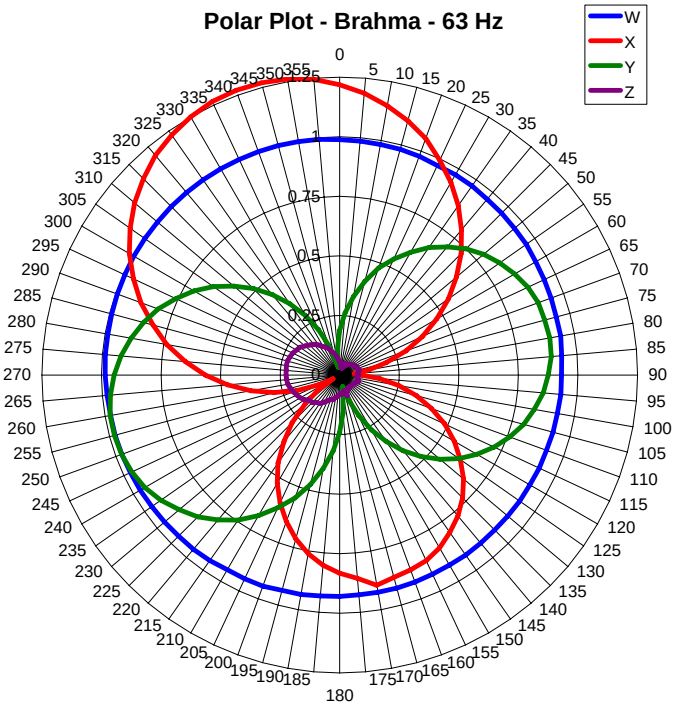
Brahma Prototype – Anechoic measurements at the University of Ferrara

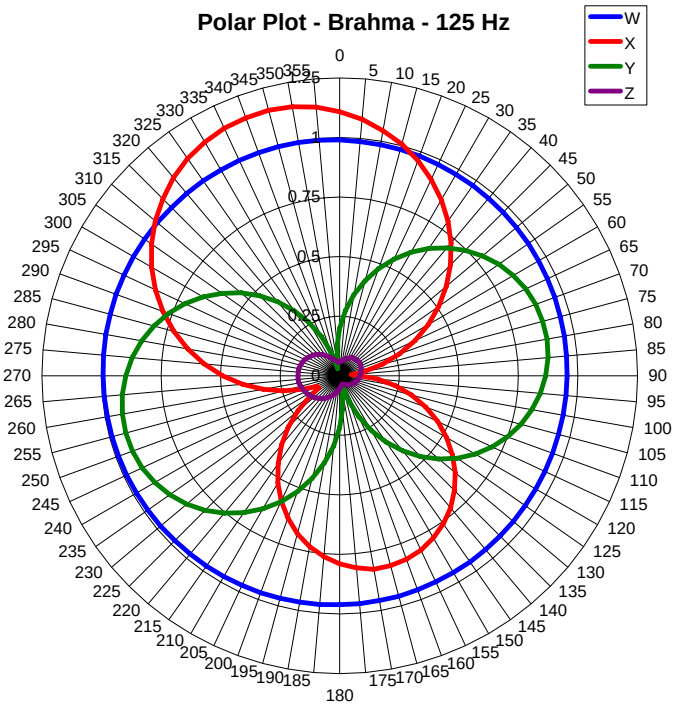
Some photos of the Brahma microphonic system & modified Zoom H2 recorder

The Brahma probe in the anechoic room of Ferrara University, on the turntable

Details on the measurements:
Tannoy dual-concentric loudspeaker, for “true” point source, at 2.5 m distance form the mike.
Three measurements, one at 0 deg elevation, one at +45 deg elevation, one at -45 deg elevation
The first measurement is every 5 degrees, the other two every 10 degrees
15 s sine sweep, 50 Hz to 20 kHz, pre-equalized for flattening the loudspeaker’s response.
The turntable (Outline ET3) was remotely controlled by the Aurora software, generating suitable control pulses on the right output channel.
Asynchronous measurements, employing the 4-channels zoom recorder. It was necessary to compensate between the clocks of the computer, which was generating the signal, and the Zoom, which was recording. This required to generate a new inverse sweep for deconvolution, slightly longer than the nominal 15 s (15.0188 s long).
After deconvolving the IR, a 4-channels WAV file was created, containing the A-format signal in standard “quad” order (FL,FR,BL,BR). This file was convolved with the set of 4x4 filters provided by FOns Adriaensen, yielding another 4-channels WAV file, containing the B-format components (WXYZ).
For computing the polar patterns, the sequence of impulse responses obtained by the previous processing was cut at 16384 samples each, and processed with SpectraLAB (hanning window, 16384-point FFT, no overlap, octave band analysis, data-logging).
This way, a multispectrum of 72 octrave-band spectra was obtained for each of the 4 channels WXYZ. These data were analyzed with Excel for plotting the polar patterns and the frequency response curves.


Polar Plot - Brahma - 31.5 Hz
W
X
Y
Z


Polar Plot - Brahma - 63 Hz
W
X
Y
Z


Polar Plot - Brahma - 125 Hz
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0.75
0.5
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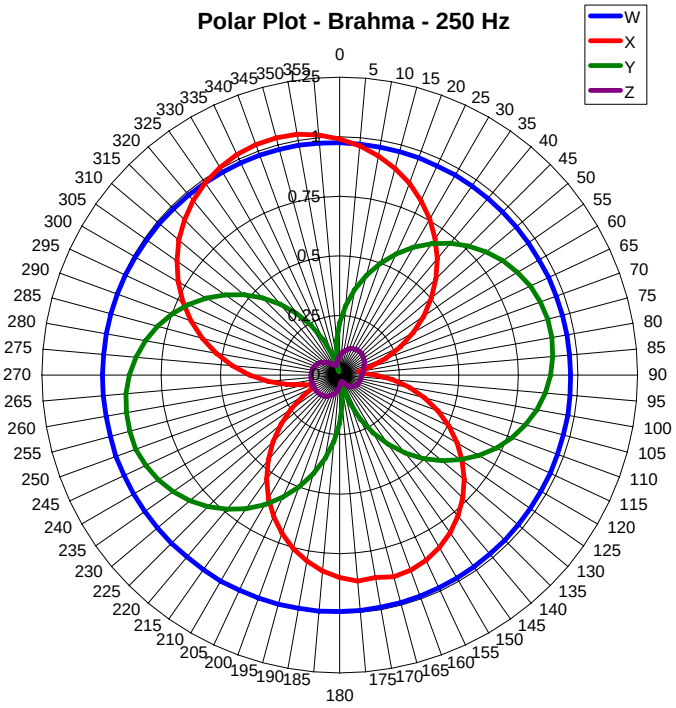
Polar Plot - Brahma - 250 Hz
W
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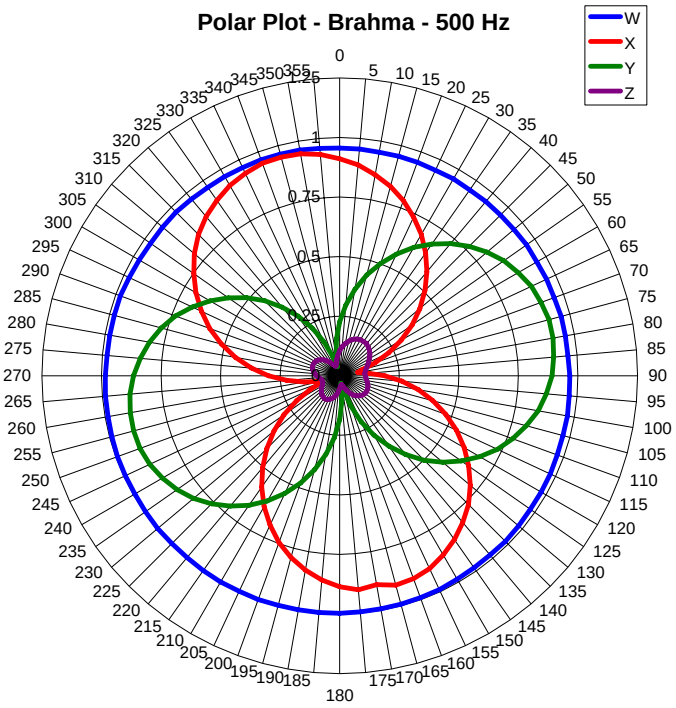
0.75
0.5
0.25
0


Polar Plot - Brahma - 500 Hz
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Z
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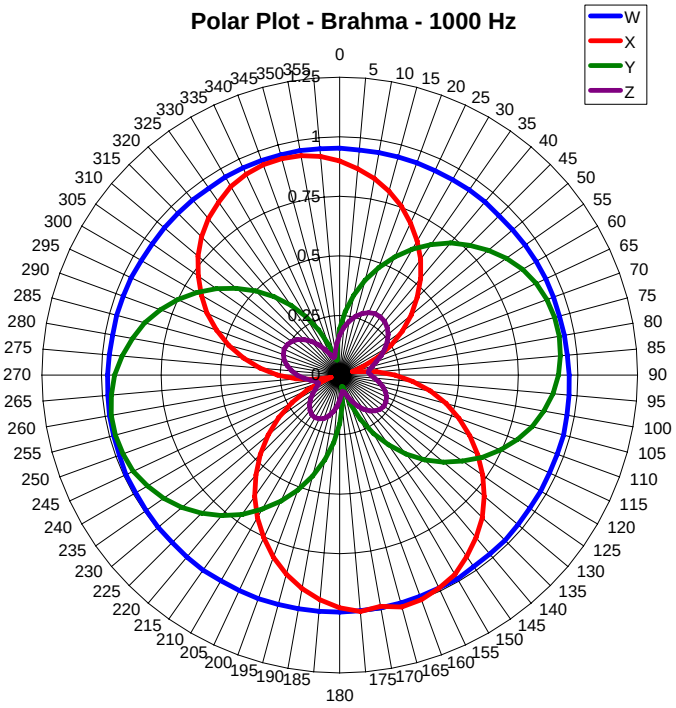
1.25
1
0.75
0.5
0.25


Polar Plot - Brahma - 1000 Hz
W
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Y
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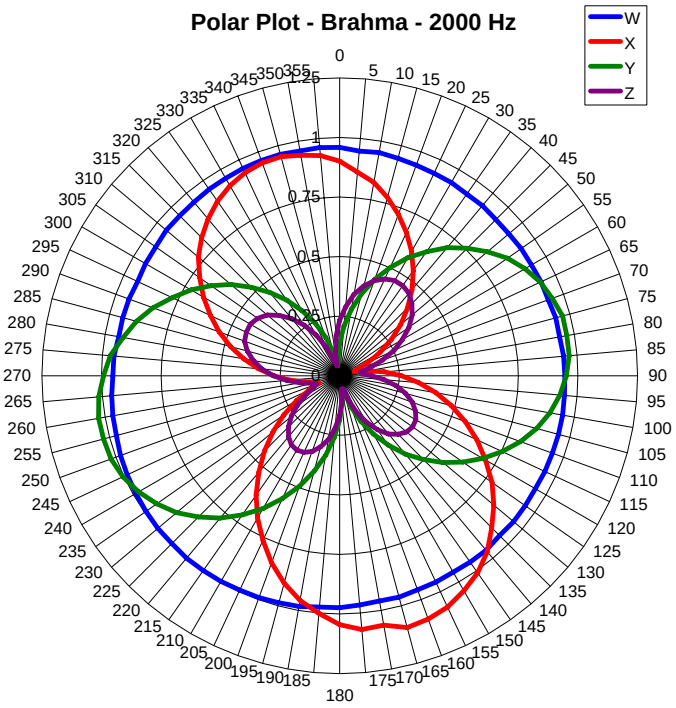
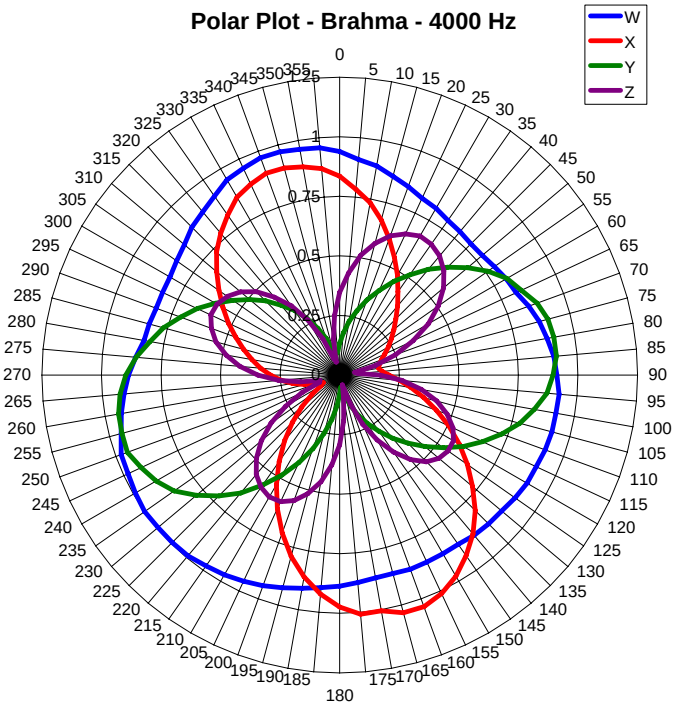
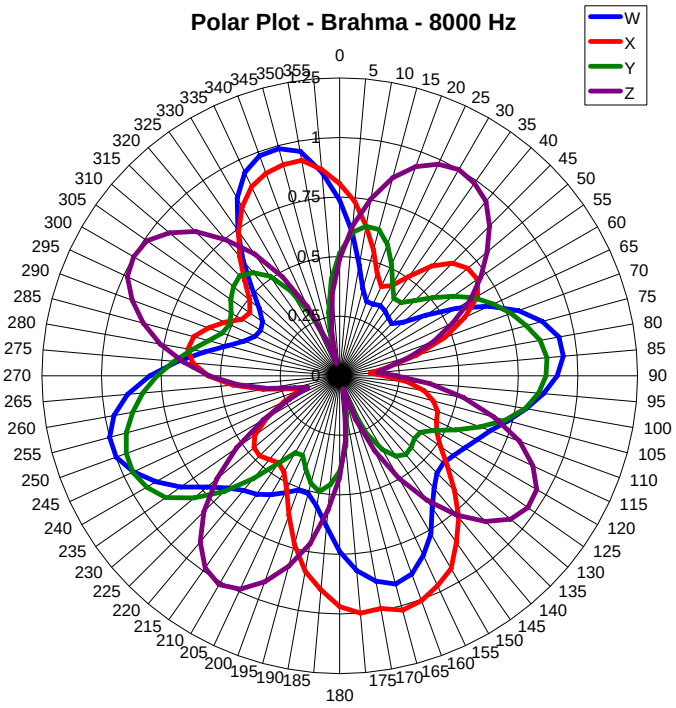
0.75
0.5
0.25


Polar Plot - Brahma - 2000 Hz
W
X
Y
Z


Polar Plot - Brahma - 4000 Hz
W
X
Y
Z


Polar Plot - Brahma - 8000 Hz
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0.75
0.5
0.25
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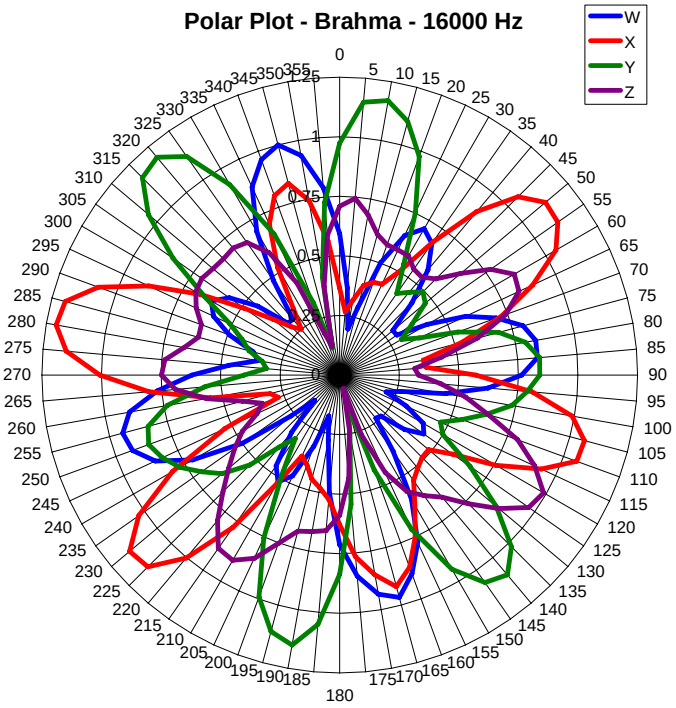
Polar Plot - Brahma - 16000 Hz
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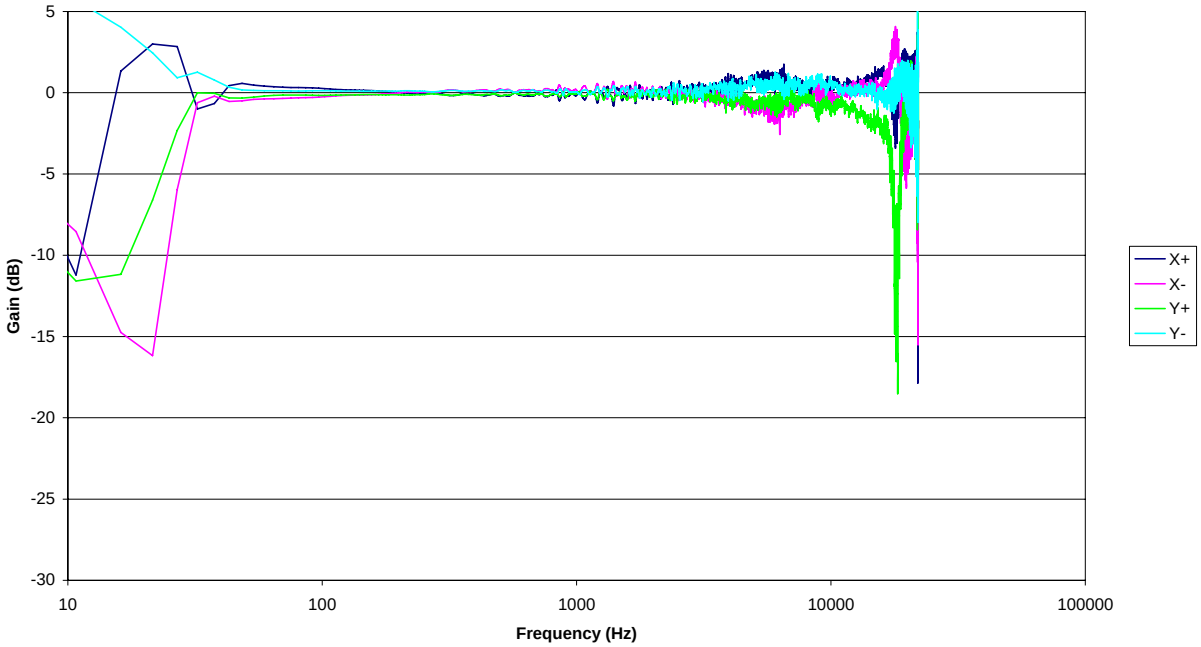
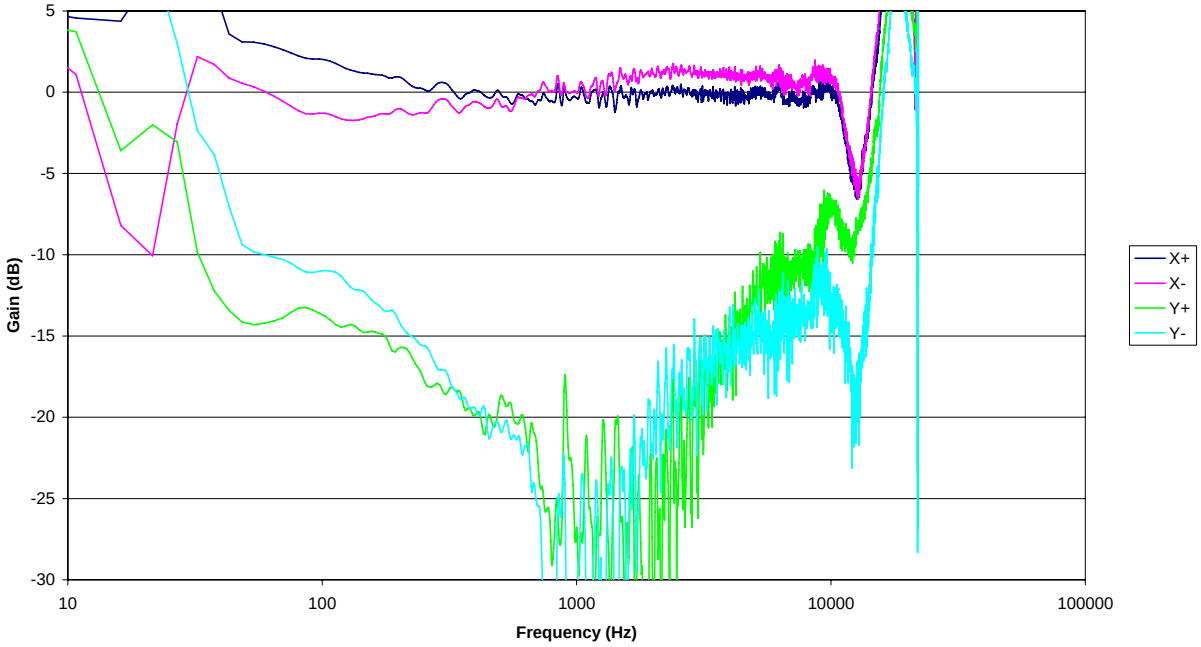
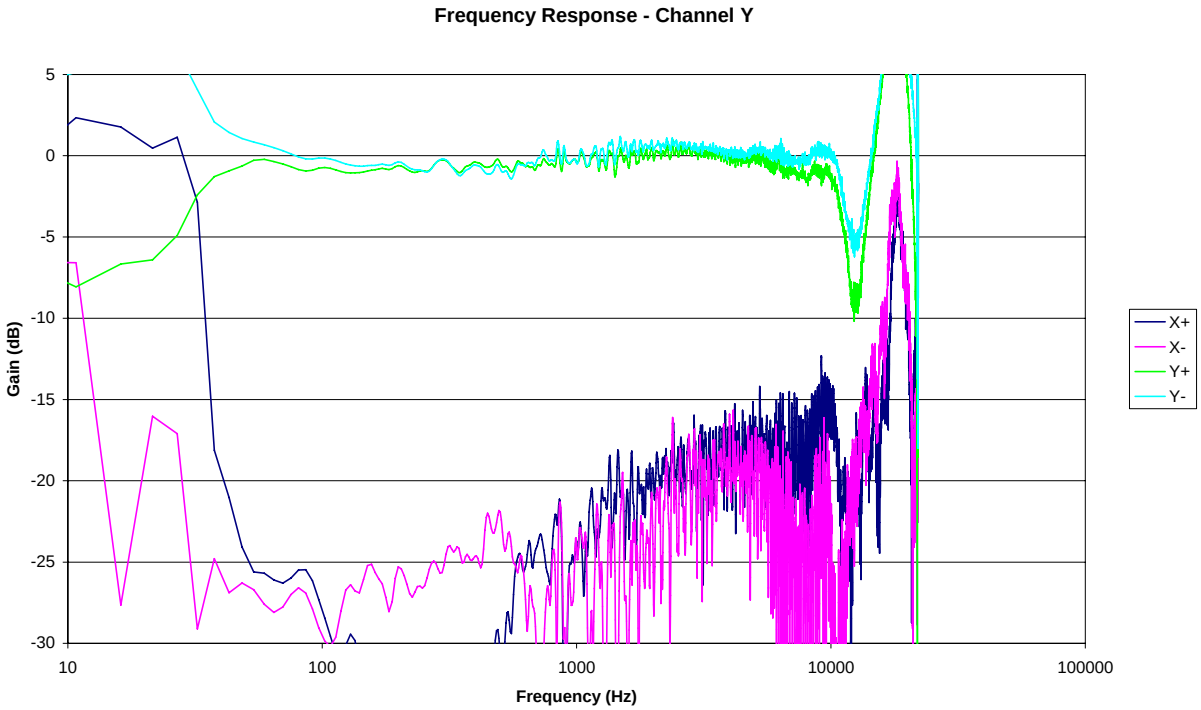
Frequency Response - Channel W



Frequency Response - Channel X





Conclusions:

A) the polar patterns look rotated by approximately 15 degrees with regard to the standard mounting of the microphone. It is not clear if this is due to an error while mounting it on the turntable or to an error when computing the Fons' inverse filters.

B) The frequency response of X is significantly asymmetrical, with too much gain from X- direction

C) The polar pattern become too much irregular at 4 kHz and above, due to the excessive distance between the diaphragms of the mikes.

D) Probably a better set of inverse filter could result in more regular patterns, and with better gain matching between directive patterns (XYZ) and the omni W signal.