Array EQ in MAPP

As part of our commitment to provide customers with the best possible design and prediction tools, Meyer Sound has added a new feature to MAPP software that allows for more accurate comparison of line array loudspeakers. Starting with MAPP XT 1.1.2, there is a new "Array EQ" loudspeaker type available for the following Meyer Sound products: LEO-M, LYON, M'elodie, MICA, and MINA.

The need for array EQ

Meyer Sound line array loudspeakers (with the exception of LEOPARD), when measured individually, exhibit an equal-magnitude frequency response in the low-mid portion of the spectrum. However, when these loudspeakers are measured in an array configuration, a low-mid buildup results from the summation of low frequencies. To compensate for this, it is necessary to apply a complementary EQ curve, or *Array EQ,* to the signal so that the frequency response of the array is more useful as a starting point.

Built-in array EQ with LEOPARD

With LEOPARD, this complementary EQ is built into the loudspeaker. When measured individually, LEOPARD loudspeakers show attenuation in the low-mid frequencies, but when measured in an array configuration, the array exhibits a frequency response that can be used as a starting point without any additional processing. (This built-in EQ feature is called "Native Response" and the capability of LEOPARD arrays to work without array EQ is called "Native Mode.")

Introducing new "Array EQ" loudspeaker types in MAPP

In order to compare the SPL capabilities and headroom characteristics of our earlier line array loudspeakers with those of LEOPARD, Meyer Sound has created new loudspeaker types in MAPP with complementary EQ applied. These new types appear in MAPP menus along with the original types, as "LEO-M Array EQ," "LYON-M Array EQ," "M'elodie Array EQ," "MICA Array EQ," and "MINA Array EQ." To create these new loudspeaker types in MAPP, we took each loudspeaker model into our anechoic chamber, applied an appropriate complementary EQ, and re-measured it to generate a new MAPP dataset.

Why we created the new "Array EQ" loudspeaker types

Why did we re-measure each model instead of just using output processing in MAPP to apply EQ? Headroom data in MAPP represents the highest SPL a loudspeaker can produce with a given signal before its performance becomes non-linear. By simply applying an EQ curve to the existing headroom data for a loudspeaker, the result would be attenuated and would not reveal the loudspeaker's full SPL capability. The new "Array EQ" loudspeaker types in MAPP reflect true measurements of each model's full SPL capability with array EQ applied.

In addition, each loudspeaker model has different response characteristics, and therefore a different complementary EQ curve. By including the appropriate array EQ for each model in the new MAPP loudspeaker types, we made it more convenient to assemble systems for comparison in a single step.

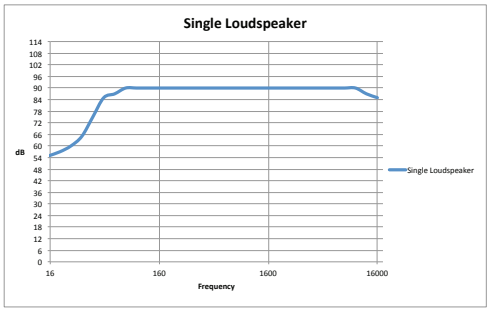
Using "Array EQ" loudspeaker types to compare loudspeaker performance in MAPP

If you are comparing LEO-M, LYON-M, M'elodie, MICA or MINA with LEOPARD, by using the "Array EQ" types in MAPP, all loudspeaker predictions will scale correctly with respect to headroom, allowing for more realistic comparison of SPL capabilities under similar conditions.

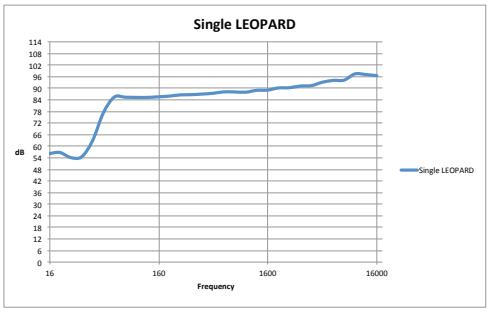
The following pages illustrate the concepts of complementary EQ and show representative headroom comparisons from MAPP.

When comparing array loudspeaker SPL capabilities and headroom in MAPP, it is important to consider how loudspeaker arrays work when the individual elements are combined into a system. Measured individually with pink noise as the stimulus, Meyer Sound line array elements (except for LEOPARD) exhibit an equal magnitude response. Measured in an array, complementary EQ is applied to counterbalance low-mid buildup.

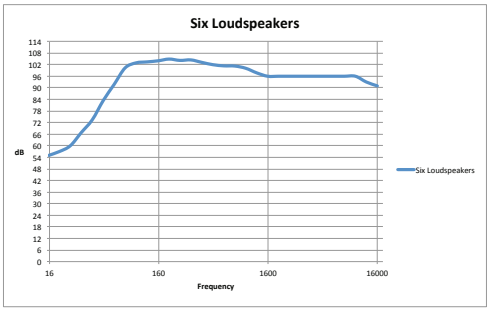
Previous Line Array Loudspeakers



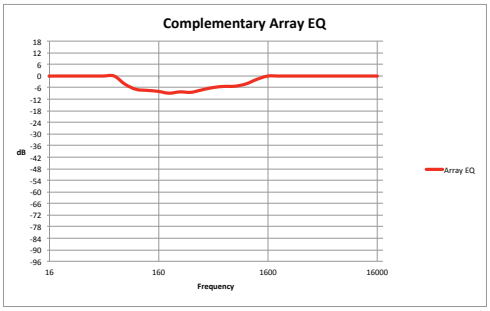
LEOPARD



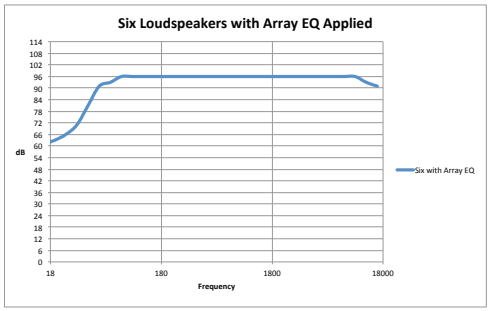
Six of the same loudspeakers in an array show a low-mid buildup

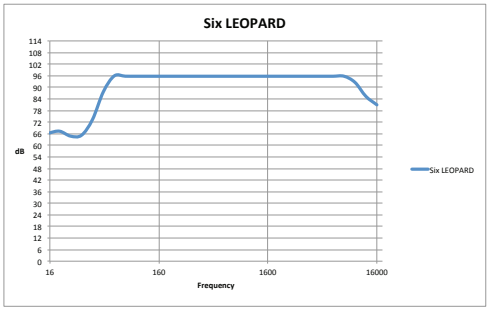


Complementary array EQ is applied in the Galileo processor



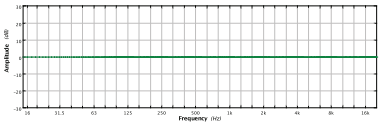
Resulting in a good starting response

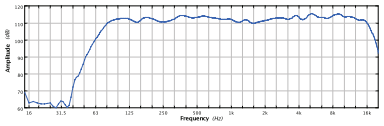




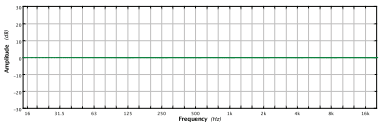
With LEOPARD, complementary array EQ is applied inside the loudspeaker. To accurately compare SPL capabilities of earlier models with LEOPARD, Meyer Sound created "Array EQ" loudspeaker types in MAPP. These "Array EQ" types show the full SPL capability of the loudspeakers with array EQ applied.

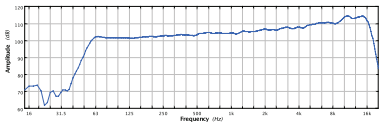
Pink Noise Signal → MICA Loudspeaker → Measured Result



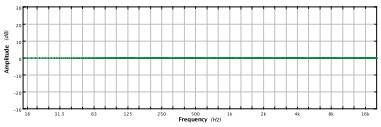


Pink Noise Signal → LEOPARD Loudspeaker → Measured Result

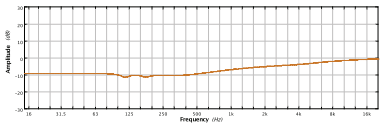




Pink Noise Signal

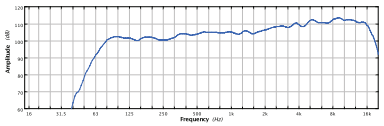


Complementary array EQ is applied in the MAPP processor

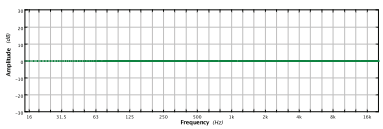


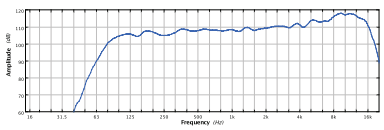
MICA Loudspeaker

Measured Result (Lower SPL)



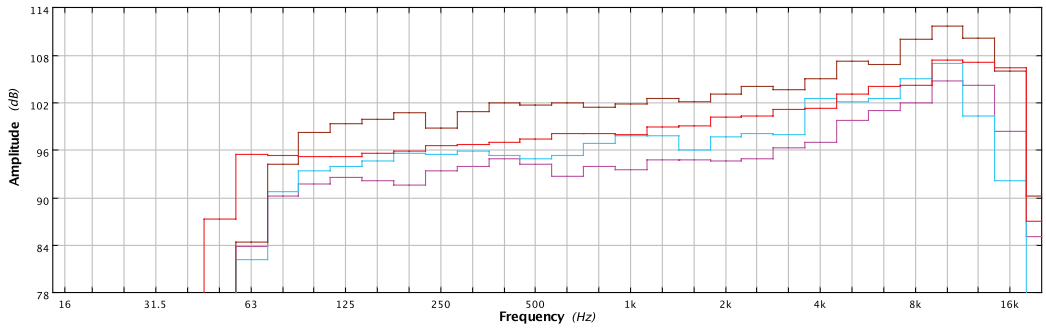
Pink Noise Signal → MICA "Array EQ" Loudspeaker → Measured Result (Higher SPL)





LEOPARD, MICA, M'elodie, MINA from MAPP

Source: Pink Noise



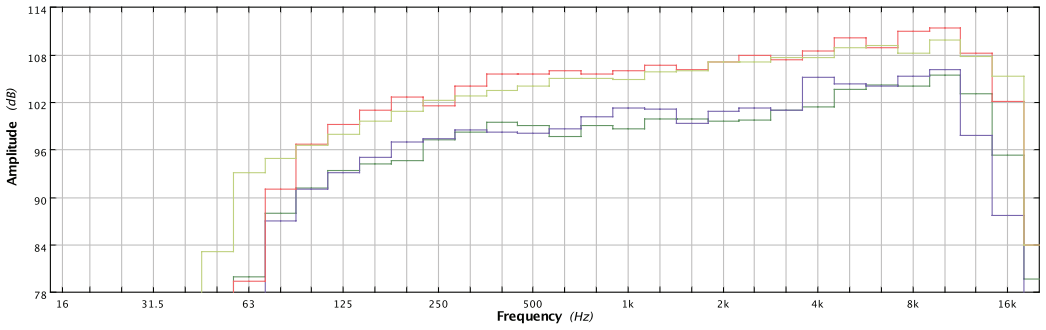
Single LEOPARD 1m
Input Source = Pink Noise
Average SPL = 113.6 dB(A), 113.0 dB(C), 115.4 dB(Z)
Linear Peak SPL = 127.9 dB(Z)

Single MICA Array EQ 1m
Input Source = Pink Noise
Average SPL = 117.3 dB(A), 116.6 dB(C), 118.8 dB(Z)
Linear Peak SPL = 131.3 dB(Z)

Single M'elodie Array EQ 1m
Input Source = Pink Noise
Average SPL = 112.2 dB(A), 111.5 dB(C), 113.3 dB(Z)
Linear Peak SPL = 125.8 dB(Z)

Single MINA Array EQ 1m
Input Source = Pink Noise
Average SPL = 109.9 dB(A), 109.3 dB(C), 111.7 dB(Z)
Linear Peak SPL = 124.2 dB(Z)

Source: B Noise



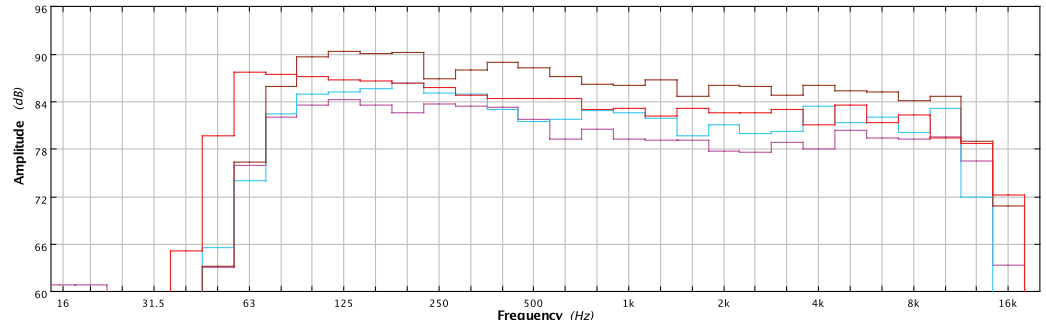
Single LEOPARD 1m
Input Source = B-Noise
Average SPL = 119.0 dB(A), 118.4 dB(C), 119.7 dB(Z)
Linear Peak SPL = 132.2 dB(Z)

Single MICA Array EQ 1m
Input Source = B-Noise
Average SPL = 119.8 dB(A), 119.2 dB(C), 120.5 dB(Z)
Linear Peak SPL = 133.0 dB(Z)

Single M'elodie Array EQ 1m
Input Source = B-Noise
Average SPL = 114.1 dB(A), 113.5 dB(C), 114.7 dB(Z)
Linear Peak SPL = 127.2 dB(Z)

Single MINA Array EQ 1m
Input Source = B-Noise
Average SPL = 113.2 dB(A), 112.6 dB(C), 114.1 dB(Z)
Linear Peak SPL = 126.6 dB(Z)

Source: Pink Noise



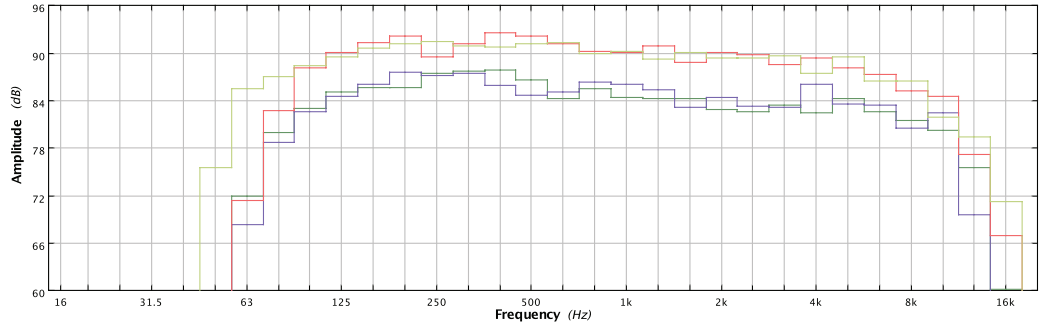
12x LEOPARD 35m
Input Source = Pink Noise
Average SPL = 94.7 dB(A), 97.9 dB(C), 98.4 dB(Z)
Linear Peak SPL = 110.9 dB(Z)

12x MICA Array EQ 35m
Input Source = Pink Noise
Average SPL = 97.8 dB(A), 100.5 dB(C), 100.8 dB(Z)
Linear Peak SPL = 113.3 dB(Z)

12x M'elodie Array EQ 35m
Input Source = Pink Noise
Average SPL = 93.6 dB(A), 96.2 dB(C), 96.6 dB(Z)
Linear Peak SPL = 109.1 dB(Z)

12x MINA Array EQ 35m
Input Source = Pink Noise
Average SPL = 91.3 dB(A), 94.4 dB(C), 94.9 dB(Z)
Linear Peak SPL = 107.4 dB(Z)

Source: B Noise



12x LEOPARD 35m
Input Source = B-Noise
Average SPL = 101.1 dB(A), 102.9 dB(C), 103.1 dB(Z)
Linear Peak SPL = 115.6 dB(Z)

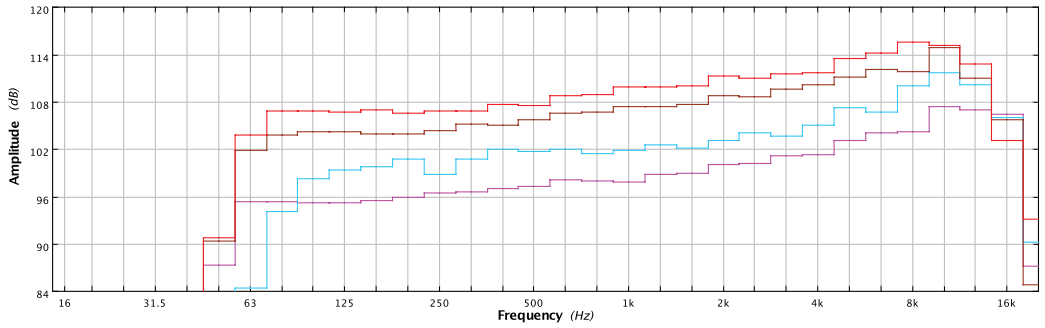
12x MICA Array EQ 35m
Input Source = B-Noise
Average SPL = 101.3 dB(A), 103.1 dB(C), 103.3 dB(Z)
Linear Peak SPL = 115.8 dB(Z)

12x M'elodie Array EQ 35m
Input Source = B-Noise
Average SPL = 96.3 dB(A), 98.0 dB(C), 98.3 dB(Z)
Linear Peak SPL = 110.8 dB(Z)

12x MINA Array EQ 35m
Input Source = B-Noise
Average SPL = 95.7 dB(A), 97.9 dB(C), 98.1 dB(Z)
Linear Peak SPL = 110.6 dB(Z)

LEO-M, LYON, MICA, LEOPARD from MAPP

Source: Pink Noise



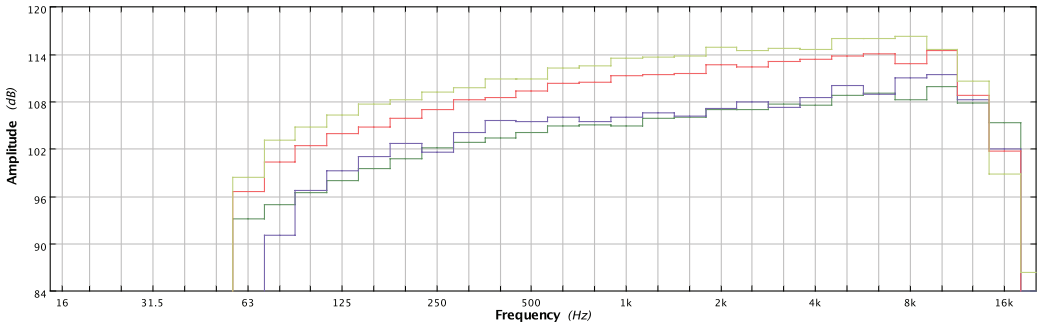
Single LEO Array EQ 1m
Input Source = Pink Noise
Average SPL = 123.6 dB(A), 123.2 dB(C), 124.6 dB(Z)
Linear Peak SPL = 137.1 dB(Z)

Single LYON Array EQ 1m
Input Source = Pink Noise
Average SPL = 121.5 dB(A), 121.0 dB(C), 122.6 dB(Z)
Linear Peak SPL = 135.1 dB(Z)

Single MICA Array EQ 1m
Input Source = Pink Noise
Average SPL = 117.3 dB(A), 116.6 dB(C), 118.8 dB(Z)
Linear Peak SPL = 131.3 dB(Z)

Single LEOPARD 1m
Input Source = Pink Noise
Average SPL = 113.6 dB(A), 113.0 dB(C), 115.4 dB(Z)
Linear Peak SPL = 127.9 dB(Z)

Source: B Noise



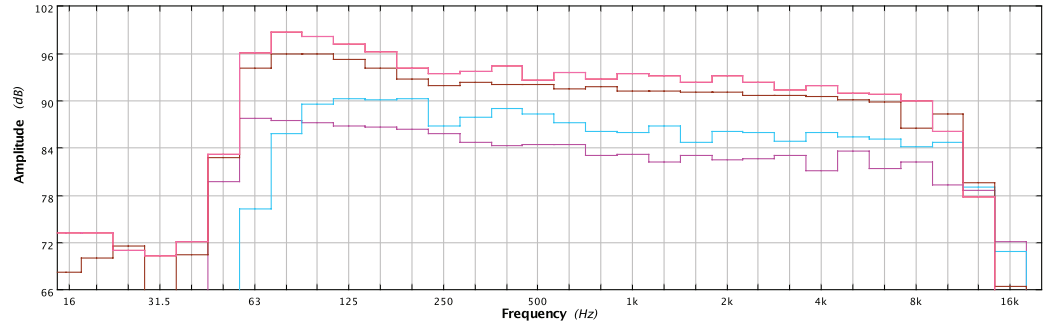
Single LEO Array EQ 1m
Input Source = B-Noise
Average SPL = 126.1 dB(A), 125.6 dB(C), 126.6 dB(Z)
Linear Peak SPL = 139.1 dB(Z)

Single LYON Array EQ 1m
Input Source = B-Noise
Average SPL = 124.2 dB(A), 123.6 dB(C), 124.6 dB(Z)
Linear Peak SPL = 137.1 dB(Z)

Single MICA Array EQ 1m
Input Source = B-Noise
Average SPL = 119.8 dB(A), 119.2 dB(C), 120.5 dB(Z)
Linear Peak SPL = 133.0 dB(Z)

Single LEOPARD 1m
Input Source = B-Noise
Average SPL = 119.0 dB(A), 118.4 dB(C), 119.7 dB(Z)
Linear Peak SPL = 132.2 dB(Z)

Source: Pink Noise



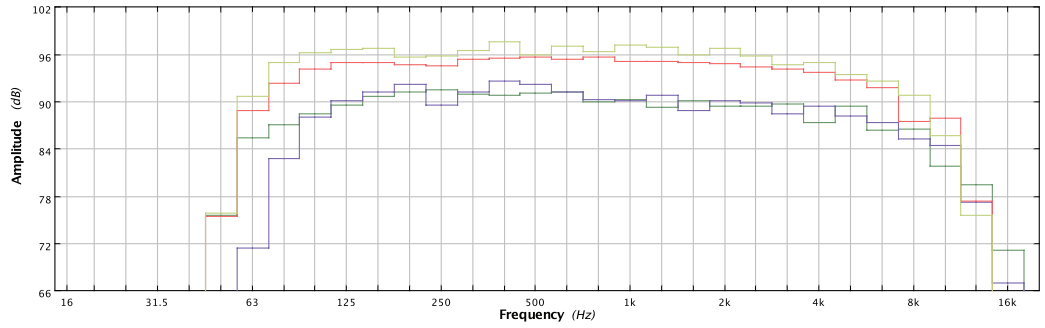
12x LEO Array EQ 35m
Input Source = Pink Noise
Average SPL = 104.1 dB(A), 107.5 dB(C), 107.8 dB(Z)
Linear Peak SPL = 120.3 dB(Z)

12x LYON Array EQ 35m
Input Source = Pink Noise
Average SPL = 102.5 dB(A), 105.7 dB(C), 106.0 dB(Z)
Linear Peak SPL = 118.5 dB(Z)

12x MICA Array EQ 35m
Input Source = Pink Noise
Average SPL = 97.8 dB(A), 100.5 dB(C), 100.8 dB(Z)
Linear Peak SPL = 113.3 dB(Z)

12x LEOPARD 35m
Input Source = Pink Noise
Average SPL = 94.7 dB(A), 97.9 dB(C), 98.4 dB(Z)
Linear Peak SPL = 110.9 dB(Z)

Source: B Noise



12x LEO Array EQ 35m
Input Source = B-Noise
Average SPL = 107.3 dB(A), 109.0 dB(C), 109.2 dB(Z)
Linear Peak SPL = 121.7 dB(Z)

12x LYON Array EQ 35m
Input Source = B-Noise
Average SPL = 105.9 dB(A), 107.5 dB(C), 107.8 dB(Z)
Linear Peak SPL = 120.3 dB(Z)

12x MICA Array EQ 35m
Input Source = B-Noise
Average SPL = 101.3 dB(A), 103.1 dB(C), 103.3 dB(Z)
Linear Peak SPL = 115.8 dB(Z)

12x LEOPARD 35m
Input Source = B-Noise
Average SPL = 101.1 dB(A), 102.9 dB(C), 103.1 dB(Z)
Linear Peak SPL = 115.6 dB(Z)