USER-DEFINED EQUALIZATION CURVES WITH THE LD-3 COMPENSATING LINE DRIVER

Utilizing multiple-variable atmospheric loss equations and pre-calculated Meyer Sound MAPP Online® stored values, the LD-3 compensating line driver deploys digitally-controlled analog filters that combine the wide dynamic range of advanced analog filters with the precise repeatability and computer connectivity of digital control, while exhibiting no latency.

Capable of correcting frequency response up to 16 kHz at a resolution down to 1 dB, the LD-3 was made to optimize line or curvilinear arrays for atmospheric conditions and managing low-frequency build-up. In addition, the LD-3 line driver is a robust tool for contouring any user-defined curve equalization — opening up a still wider range of system design and integration scenarios.

Array Size and Distance

In a typical system design, small vertical splay angles in the upper part of the array boost long-distance coverage, while larger angles in the lower elements increase vertical coverage for shorter distances. Those angles, along with the number of cabinets and the distance from the array to the listening area, determine the overall response of the array. The LD-3 compensates for the overall response of the array to help achieve a flat frequency response based on its input parameters.

NOTE: MAPP Online is the tool of choice for accurate and comprehensive predictions for optimal coverage(s) during the design phase. Visit www.meyersound.com/mapponline for information.

You can use the LD-3 to drive an array with multiple vertical zones — usually two or three zones, depending on the design and number of elements. For designs where a flat response is not desired (for example, user-defined equalization curves) use the LD-3's Array Size and Distance parameters to effectively create the desired equalization curve. The key is to apply different strategies for low and high frequencies in both the long and short throw.

High-Frequency Equalization Strategies

For the far field, air absorption plays a critical role: The longer the distance, the greater the attenuation at high frequencies. In this zone, high frequencies generally need correction to compensate for energy lost over distance, and the gain needed is usually proportional to the distance and high-frequency air absorption.

NOTE: In the near to mid-field, air absorption is not nearly as critical. Therefore, high frequencies need less correction in this zone.

For high frequencies, the Distance setting can be used to obtain the desired correction. Start with an accurate Distance setting for the distance to which the correction is needed; if the result is too flat and/or sounds unnatural, reduce the Distance parameter to achieve the desired response.

NOTE: For designs where user-defined curves or other types of response curves are desired, always use the Distance parameter for each channel, NOT the Temperature, Relative Humidity or Altitude controls.

Low-Frequency Strategies

The number of elements in an array plays a critical role for the low to mid-low frequencies. The more elements, the more coupling and therefore the more build-up in this end of the spectrum. Although the array can (and usually should) be zoned for implementing different equalization curves at high frequencies, identical equalization should be maintained in all the low-frequency filters. Different low-frequency equalization settings in the same array will degrade the coupling effect.

For this same reason, gain tapering is not recommended for line arrays, since adjusting various zones with an overall amplitude control for each zone results in the following:

1. Directionality decreases.
2. Low-frequency headroom decreases.
3. The length of the line array column is effectively shortened.

For low to mid-low frequencies, the Array Size setting can be used to obtain the desired correction. Start with an accurate Array Size setting for the number of elements in the array and reduce the Array Size to achieve the desired response.

NOTE: For designs where user-defined curves or other types of response curves are desired, always use the Array Size parameter for each channel, NOT the Array Type selector.

NOTE: Keep in mind that the Array Correction section has no effect on the Atmospheric Correction section; the two functions are independent of each other. Changing the Array Type or Array Size will not change the correction produced by the LD-3's atmospheric functions.

For additional information on the operation of the LD-3 compensating line driver, please refer to the ***LD-3 Operating Instructions****, which can be downloaded from www.meyersound.com/ld-3.*

Example Curves

The following curves show how changing the settings on the LD-3 allow you to tailor the response to create different user-defined contour curves. These examples use eight MILO™ high-power curvilinear array loudspeakers in a single zone array at a distance of 60 meters, temperature of 20° C, and 50% relative humidity at sea level.

NOTE: The examples in this section are not meant to be used as a template for your own system designs. Acoustical characteristics, physical constraints, audio content, audience and a slew of other factors should always be uniquely weighed into your own applications.

Simple Flat Response Curve

As shown in Figure 3.1, MILO was designed to have a very flat frequency response on its own.

In a typical design, however, the response of a MILO array is affected by two primary factors:

- Depending on atmospheric conditions and distance, high frequencies may attenuate due to air absorption.
- Depending on the number of elements in the array, low and low-mid frequency build-up may occur due to coupling at those frequencies.

With eight elements at 60 meters, Figure 3.2 shows the response of the example MILO array and the effect of air absorption as well as low and low-mid coupling.

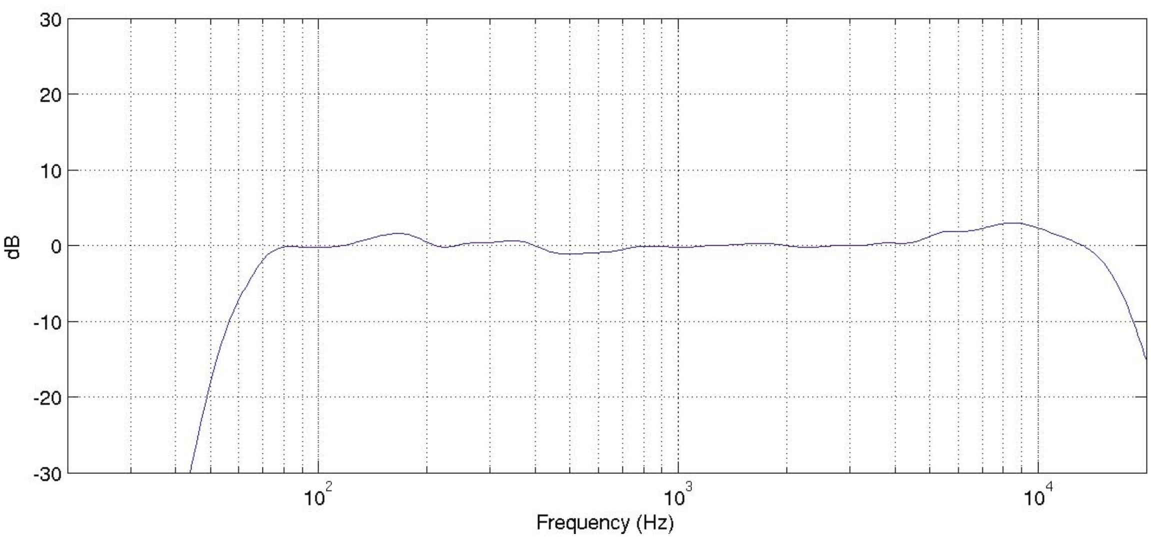

Figure 3.1. Single MILO at 4 meters

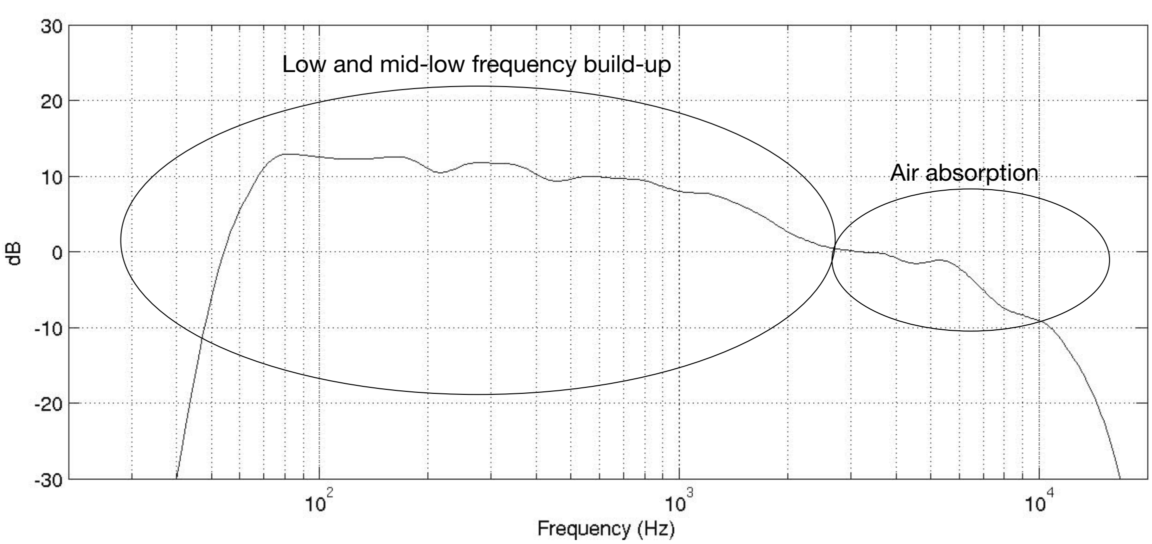

Figure 3.2. MILO array of eight elements at a distance of 60 meters

The LD-3 corrects for these conditions (Figure 3.3) — and yields a very flat response, by performing these functions:

- High-frequency attenuation is corrected by setting the LD-3 to actual conditions: Temperature of 20° C, 50% Relative Humidity, 0 Altitude (sea level) and Distance at 60 meters.
- Low and low-mid frequency build-up is corrected by setting the LD-3 to reflect the actual type and number of loudspeakers: Array Type MILO and Array Size 8.

The response in this example could be the ideal response or the perfect starting point for achieving other equalization curves.

High-Frequency Response Curves

Reducing the LD-3's Distance parameter changes the amount of air absorption correction, making it possible to produce different responses in the high frequency range. Figure 3.4 shows the response of our MILO array (already compensated in the low frequencies) with Distance settings at 60, 40, and 20 meters.

At a Distance setting of 60 meters — the actual distance of the array — the LD-3 produces the flatest result; any setting below 60 can be used to achieve a different response in the high frequencies.

NOTE: For designs where user-defined curves or other types of response curves are desired, always use the Distance parameter for each channel, NOT the Temperature and Relative Humidity or Altitude controls.

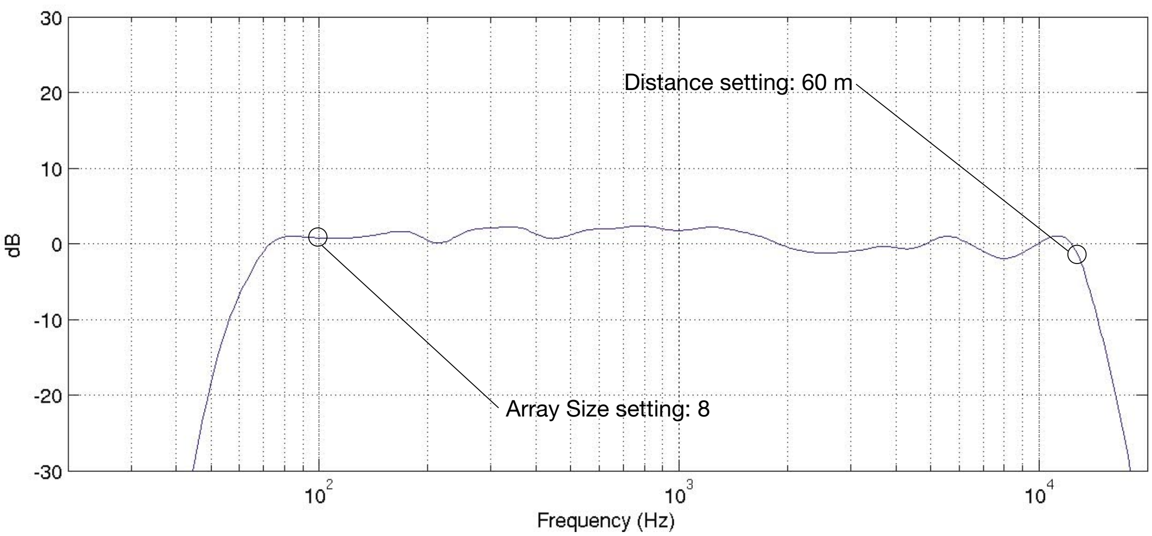

Figure 3.3. LD-3 corrected MILO array of eight elements at a distance of 60 meters

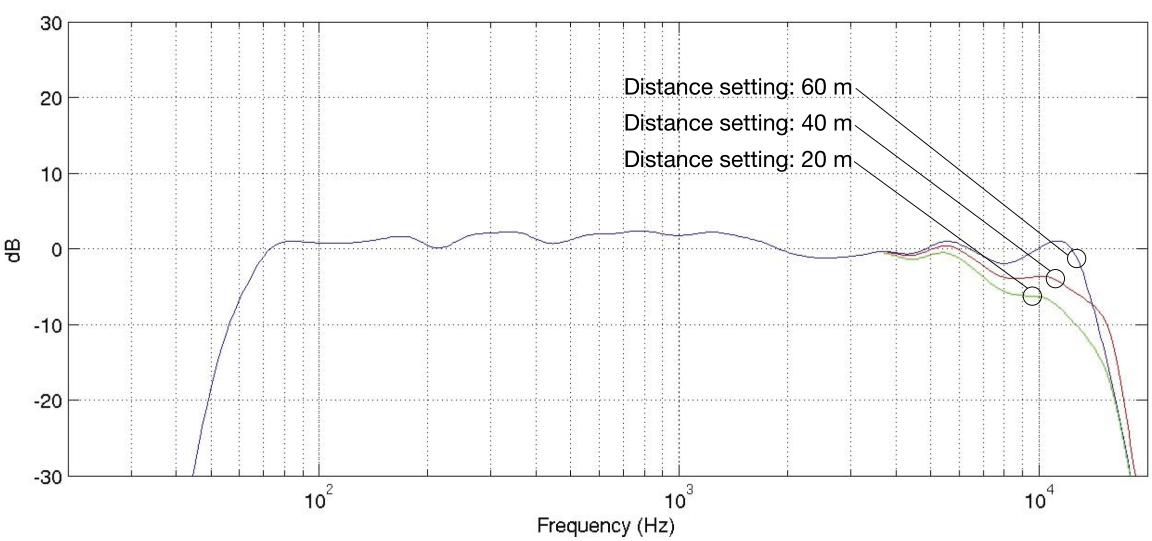

Figure 3.4. MILO array of eight elements at a distance of 60 meters, with Distance correction at 60, 40 and 20 meters

Low-Frequency Response Curves

In the low to low-mid frequency range, reducing the LD-3's Array Size parameter changes the amount of array correction to produce different responses. Figure 3.5 shows the response of our MILO array (compensated in the high frequencies) with Array Size settings at 8, 6 and 4.

An Array Size of 8 — which matches the number of elements in the array — achieves the flattest result. However, any setting below 8 can be used to achieve a different desired response in the low to low-mid frequencies.

NOTE: For designs where user-defined curves or other types of response curves are desired, always use the Array Size parameter for each channel, NOT the Array Type selector.

Combined Response Curves

Figure 3.6 shows all the curves that can be obtained based on only four settings of Array Size and Distance. Keep in mind that the Array Correction section has no effect on the Atmospheric Correction section and vice-versa; the two functions are totally independent of each other.

Figure 3.6 shows that the LD-3's key parameters — Distance and Array Size — make it extremely versatile; it can produce a wide range of equalization curves to satisfy almost any application or personal taste.

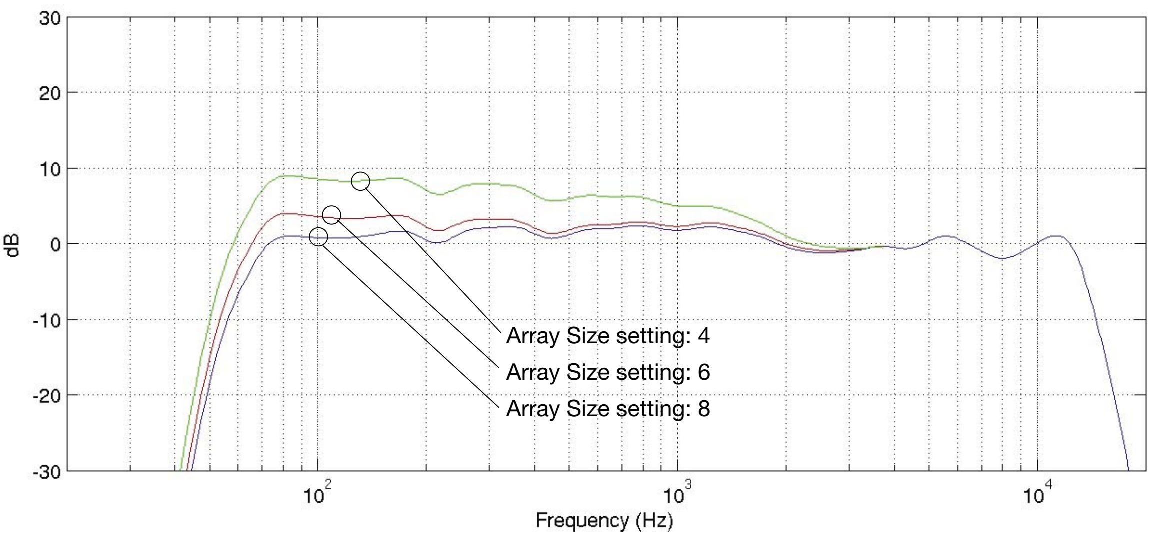

Figure 3.5. MILO array of eight elements at a distance of 60 meters, with Array Size correction at 8, 6 and 4

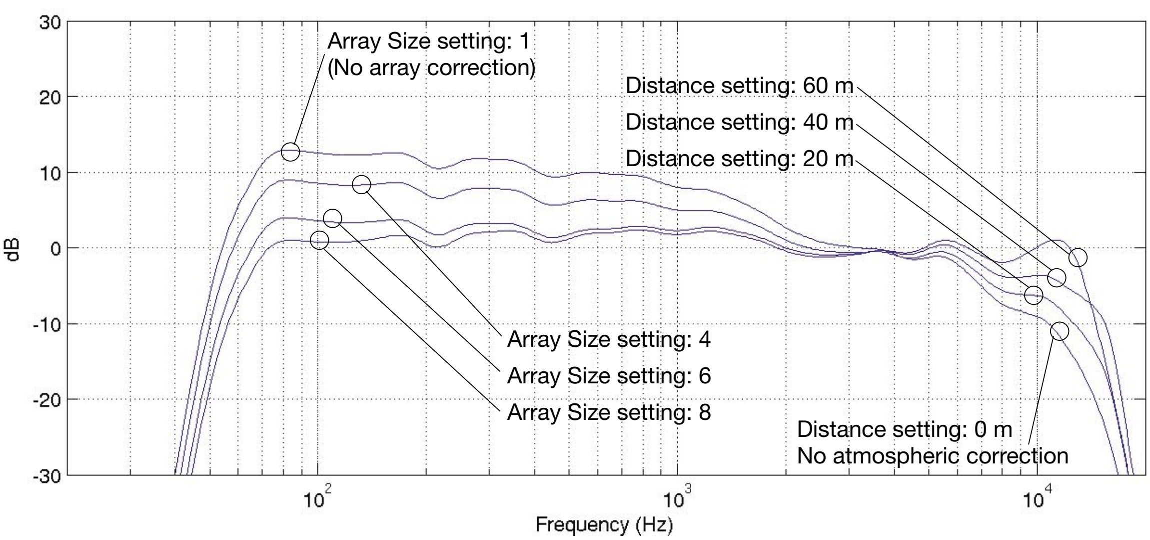

Figure 3.6. MILO array of eight elements at a distance of 60 meters, with four different settings each for Distance and Array Size

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