

Application Note

M2X Version 2 Crossover Configuration Suggestions

As a bi-amplified device, the M2X Version 2 loudspeaker requires separate amplifier channels for the LF and HF sections. Through testing and extensive listening tests, suggested crossover and equalization parameters were established.

Crossover: For optimum performance an asymmetrical crossover configuration is desired. For the LF channel a -6dB crossover point of 1KHz works very well. For the HF channel a -6dB crossover point of 1.1KHz is desired. The slope of both the low-pass and high-pass filters should be 24dB per octave, with a Linkwitz-Riley filter implementation preferred. Note that if the electronic crossover available does not allow asymmetrical crossover points, using a 1KHz crossover point for both LF and HF is perfectly acceptable. While not optimized, a symmetrical crossover will provide good M2X Version 2 performance.

Equalization: No equalization (notch filters, shelf filters, etc.) is required for excellent sonic performance. For additional LF impact a $1/3$ octave "bass bump" at 80Hz can be implemented. Depending on the taste of the listener, anywhere from $+2$ to $+6\text{dB}$ of equalization (bump) can be very effective. The test listeners who liked "bass to the max" selected $+6\text{dB}$ as their preference. The author (a more reasonable and refined person) felt that $+3\text{dB}$ was more to his liking. No high-frequency horn compensation ("CD horn EQ") seemed to be required. But adding some if desired should not be a problem.

Loudspeaker Protection: Applying a high-pass filter to the LF channel can provide significant loudspeaker protection. When using a filter whose slope is 24dB per octave, a -6dB point at 55Hz would be appropriate. This will prevent the M2X Version 2's woofer from receiving energy in a frequency band where it is not capable of generating significant acoustic output. Almost all of the energy at this low a frequency would simply be dissipated in the voice coil as heat. Give your amplifier and loudspeaker a break and apply a high-pass filter!

Practical Implementation: Using an XTA Electronics Ltd. DP224 Speaker Management System, the mode was set for 2×2 way crossover mode. A low-pass setting of 1.02KHz for the LF output and a high-pass setting of 1.12KHz for the HF output worked very well. The filter types were set for Linkwitz-Riley at 24dB per octave. Setting the LF output to have a high-pass filter frequency of 55Hz provides protection for the woofer. A "bass bump" of $+6\text{dB}$ at 80Hz , bandwidth 0.32 ($Q=3.125$), created a very intense bass performance. The overall sonic performance of the M2X Version 2 was quite good. Other fine loudspeaker management systems, such as from BSS or Ashly Audio, should be able to be similarly configured.