

MACKIE ACTIVE ELECTRONICS: A history of innovation

There was a time when a powered speaker was nothing more than a power amp strapped to a speaker enclosure. Although effective, this type of system was hardly optimized to reach full potential of the amps or the speakers. The introduction of the SRM450 in 1999 marked a new era for powered loudspeakers: Active electronics. By incorporating a precision crossover, phase alignment and driver time correction, Mackie “Active” loudspeakers were able to get the most out of the power amps and speakers, providing a high-output and highly portable system that was affordable to the average engineer. This technology is found in each and every Mackie powered loudspeaker. HD Series loudspeakers advance “Active” technology through the use of premium DSP algorithms that streamline this processing, resulting in unmatched clarity and system optimization.

PRECISION CROSSOVER

Right from the start, incoming audio is split into various frequency bands to send to each power amplifier and transducer in the loudspeaker. Mackie HD Series loudspeakers include multiple EQ stages that perform tasks that no coil-and-capacitor crossover could possibly do. Since there is no transducer on earth which has “ruler-flat” response across its entire frequency bandwidth, we enlisted the gurus at Eastern Acoustic Works (EAW) to tune the HD models’ system equalization. Only asymmetrical crossover slopes designed with a lengthy iterative process can precisely match the characteristics of a specific driver through the crossover transition. Other manufacturers cut corners using mathematical abstractions employing simple symmetrical crossover slopes. So while the competition has sonic issues robbing the system of mid frequency intelligibility, the HD Series has a smooth response through the crossover and the entire mid range.

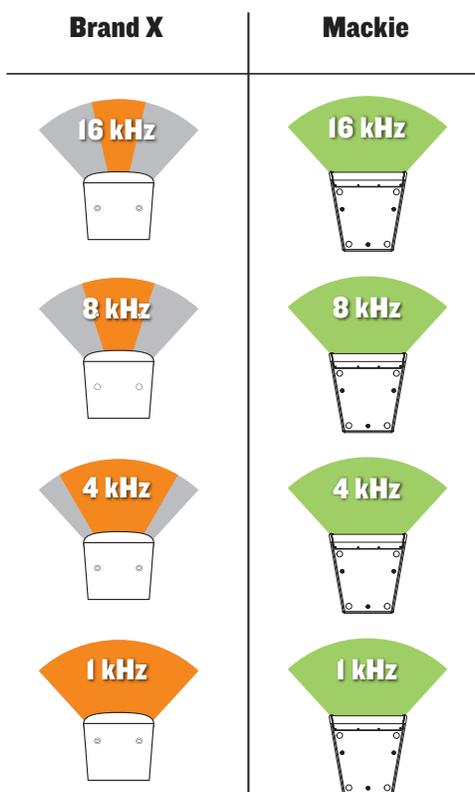


Fig. B - Dispersion

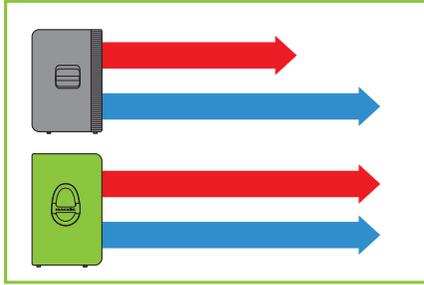
PHASE ALIGNMENT

When the audio leaving the transducers in a multi-way loudspeaker system is completely in phase, the results are detailed imaging, greater depth of field and higher definition. When the audio is not in phase, you hear inconsistent sound with lots of muddy artifacts, which spoils the listening experience throughout the room. Even typical 2- and 3-way systems with properly connected components encounter phase anomalies that are too expensive and unwieldy to correct due to the high cost of premium passive crossover components.

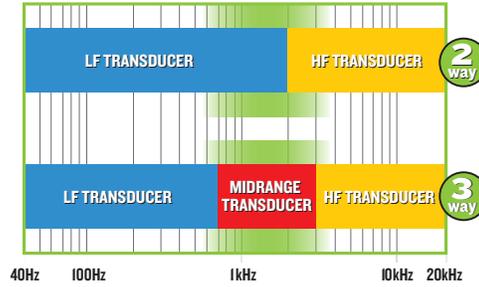
The processing inside HD Series loudspeakers allows us to refine the phase alignment characteristics to eliminate such anomalies. The result is clear, consistent sound, as well as superior dispersion characteristics. What it all means; every seat gets the same amazing sound. In the back. In the front. On the sides. The improvement will be instantly noticeable. (see Fig. A)

TIME CORRECTION

Each transducer has a “plane of origin” where its sound generation begins. The compression driver’s plane of origin is deep inside the enclosure. The woofer’s sound-producing cone is much closer to the front of the enclosure. The result is bass that arrives at listeners’ ears sooner than treble. In the case of a 3-way system, you end up with three staggered time arrivals. To solve this puzzle, you need a method of correctly timing the arrival of electrical impulses at each transducer.



An example of Mackie's superior arrow launching technology.



The benefits of a 3-Way... need we say more?

In other words, the HF transducer needs a “head start” over the LF transducer so the differences in sound generation speed can be accounted for, and both signals can arrive at the listeners’ ears simultaneously. (see Fig. B) Clever processing inside our 2- and 3-way systems allows precise alignment

Fig. A - Time Correction

among the system components without any audio signal degradation. To the audience this means better clarity and intelligibility, improved imaging, and an overall higher quality of sound reproduction.

Now, every powered loudspeaker out there incorporates some version of Mackie’s “Active” electronics. Our enhancements to this legendary technology put us ahead of the pack. However, there is more to the HD story. [Find out more about our revolutionary acoustic correction algorithms here.](#) This patented processing is what truly makes HD Series loudspeakers “High-Definition.”