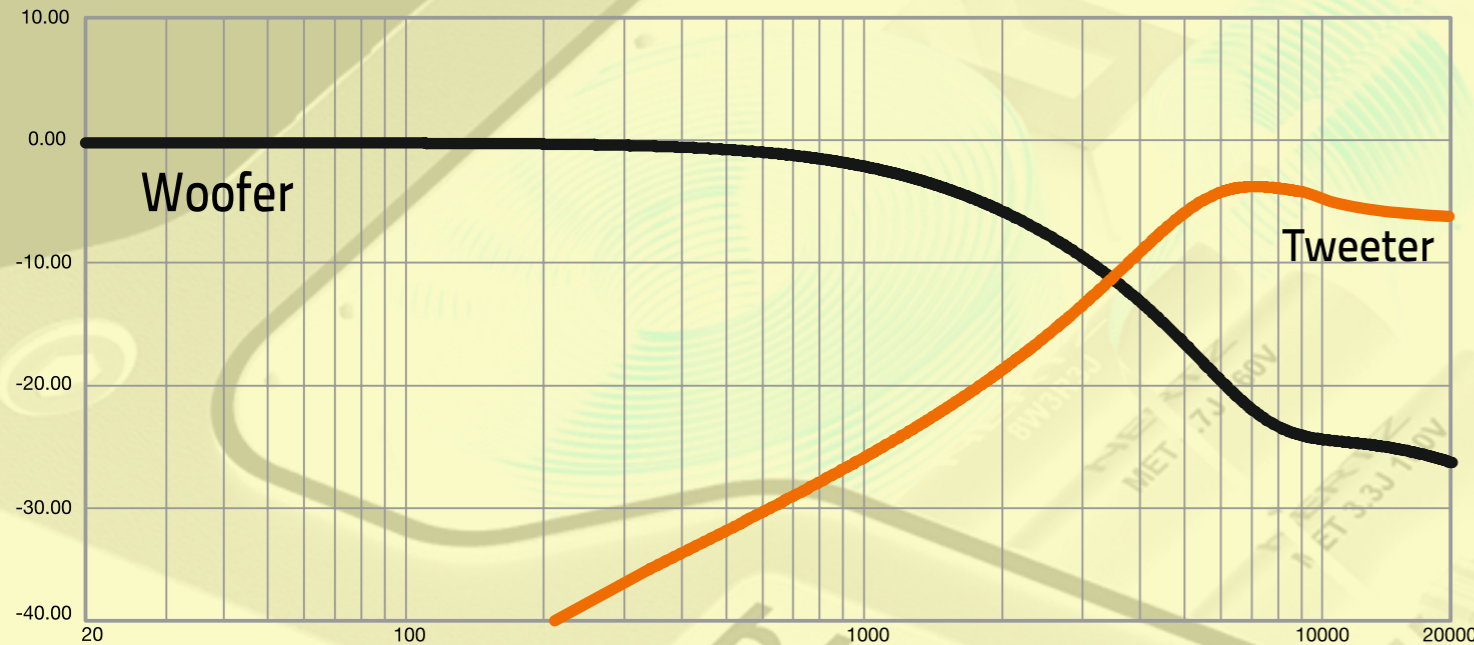


DOWN AT THE CROSSROADS

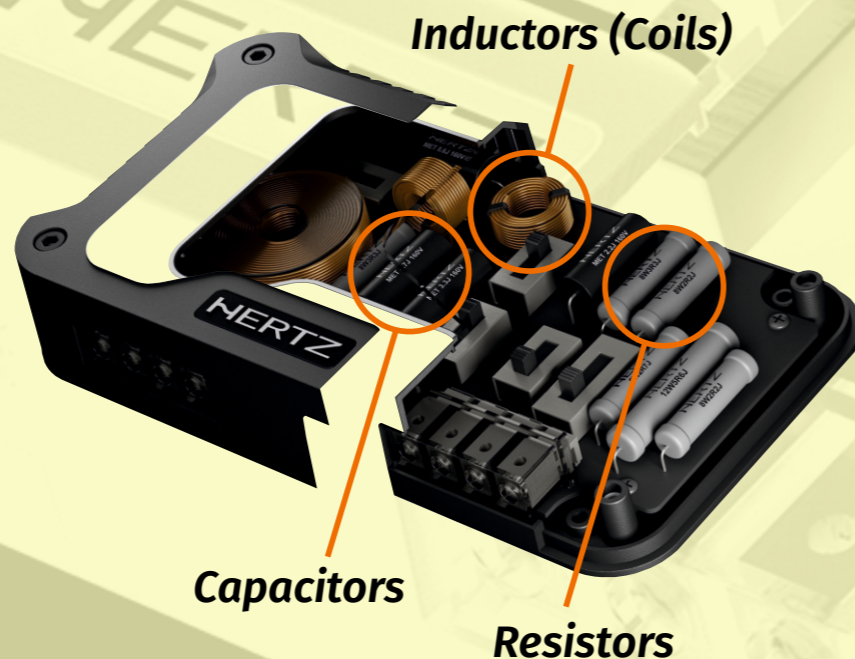
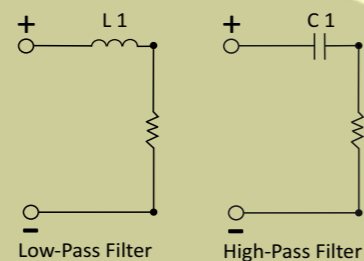
The popularity of Digital Signal Processors (DSP) has left many wondering if manufacturer-designed crossovers are necessary at all? We explore why manufacturers continue to spend time developing passive networks.



What is a passive crossover network?

It is a non-powered electrical circuit designed to operate on a full-range audio output from an amplifier. Its job is to filter frequencies to optimise the performance of a speaker system. A small tweeter should not be fed full-range audio and particularly not bass or in fact any frequency below 1.5kHz (for a very, very good one!) or more typically 2.5kHz or above. If running a 3-way system, mid-range speakers also benefit greatly from having both bass and high frequency signal removed, leaving them to focus performance on the range they are built for.

A passive crossover network is made up of inductors (coils), capacitors and resistors configured to react dynamically to different frequencies. In many networks, a steep "roll off" is often desirable. Roll off is expressed in dB/octave although this will be quoted either as a single "spot frequency" or averaged over a frequency band. The interesting thing is that due to the way components react at different levels and frequencies, each network has an often-inadvertent audio personality of its own. The higher quality the components used, the more designers are able to deliver a predictable result. That said, the interaction between crossover and speakers is also affected by mechanical factors. It is one thing to design a crossover for speakers mounted into a cabinet of standard shape and size, but results will be affected when speakers are mounted in the wide variation of settings experienced in different models of cars.



Audison Thesis TH X2 II Crossover



Audison bit 10 DSP

"A single Audison Thesis passive crossover is bigger than an Audison bit 10 DSP for instance"

Are there other pro's and con's?

Despite the possible variations in characteristics, passive crossovers are still much loved by many who prefer analogue sound. Many others claim that in an automotive environment, such differences between the pin-point accuracy of digital crossovers and the personality of passive crossovers is not discernible. All things are relative of course and much depends on the level of system you have installed.

One unassailable negative for crossovers is that space needs to be found for them within the car. A single Audison Thesis THX2 II passive crossover is bigger than an Audison bit Ten DSP for instance. In the past, some installers have been guilty of fitting passive crossovers inside door panels. This carries the risk of them becoming dislodged and ending up rattling around the bottom of the door cavity. Constant opening and closing of a vehicle doors can cause additional stress on connections. Some of the larger crossover networks are simply too large for this anyway.

The wiring runs required for passive crossovers can add time to an install and additional complexity. However, any time overhead can be exceeded by the set up time often required to programme a DSP even one with a "self setting" function. Most of these will still require additional tweaking to suit a listener's preferences. With a passive crossover, there is less capacity to tweak the final sound in this way, so this could be seen as both a pro and a con when making the best choice for your own installation.

Many DSP's will be able to store two or more different settings and for those with a very contrasting taste in music, this can be a positive boon and something that is simply not available with a passive crossover network.

Which is best?

There is no "best" in the traditional sense. Each solution offers its own advantages and disadvantages and it is important to take the advice of your installer. An open mind is always desirable when choosing audio, as so many compromises need to be made, particularly when budget is restricted.

One thing to bear in mind is that a DSP will offer many benefits apart from splitting signals into two, three or four ways and it may be that time-alignment for instance, is of overriding importance. In conclusion, a crossover network is a very convenient way for a manufacturer to ensure you experience what they believe to be optimum performance from their speakers. Once a DSP is introduced, the manufacturer loses control over the final sound. Having said this, the majority of good manufacturers will provide individual speakers for sale rather than only as part of a system.

If you get the opportunity, always try to make your choice based on what you hear, using familiar material. □

Why do passive crossovers vary so much in size?

This comes down simply to the quality and accuracy of the components employed. A good quality pair of speakers will usually be supplied with crossovers that feature huge capacitors and hand wound coils. Others may have a far simpler network of discrete components to do a similar thing and may only be the size of your thumb. Entry-level coaxial speakers may even have a single component soldered directly across the tweeter. As a general rule, the larger the crossover is, the more accurate the result.

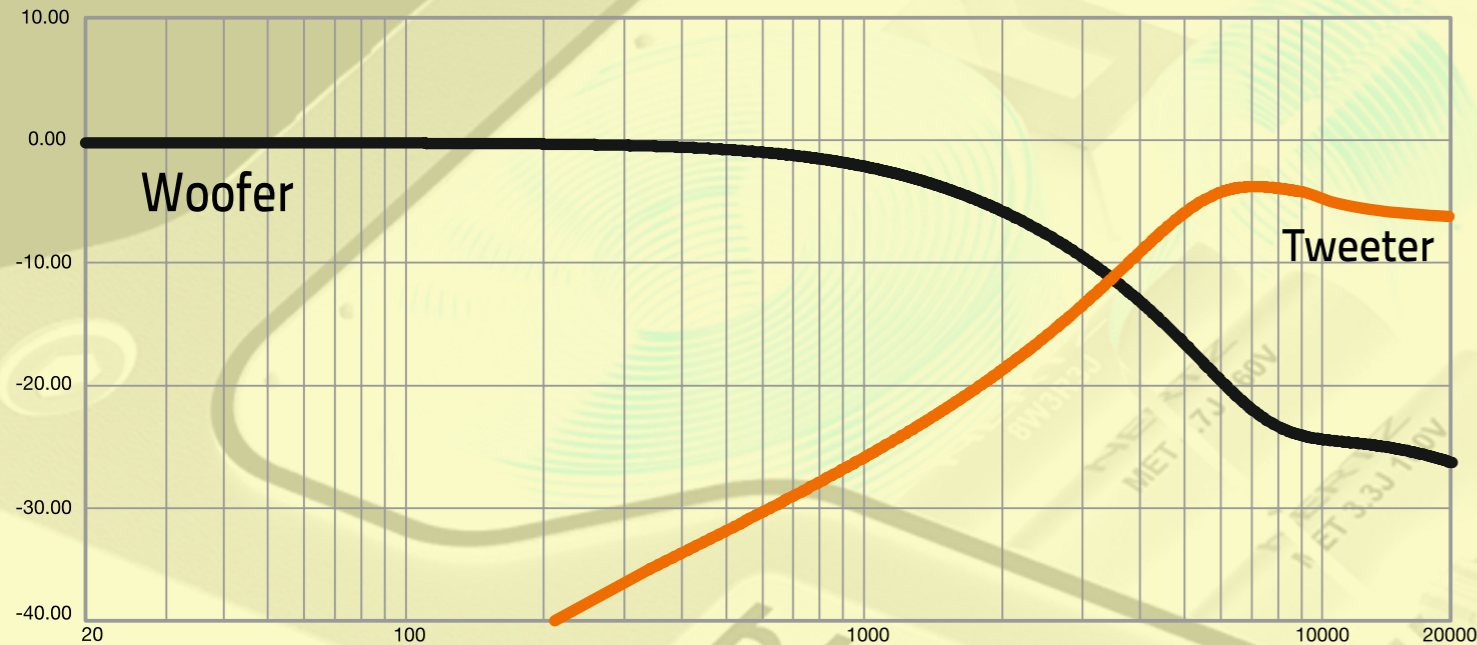
What is the alternative to a passive crossover?

For our purposes we will refer to Digital Signal Processors (DSP) rather than active crossovers. Although they do the same job, a DSP will have extra functionality including time-alignment and equalisation that helps with the set up in the sometimes-unpredictable space of a motor vehicle.

A DSP operates on the sound before amplification. Rather than being designed for a particular characteristic, a DSP is capable of allowing tiny adjustments to many more parameters. The important difference is the predictability of the result. A DSP will stick to its set of rules or parameters come what may. A passive crossover's performance may change dependent upon many factors not least, level, temperature, frequency.

DOWN AT THE CROSSROADS

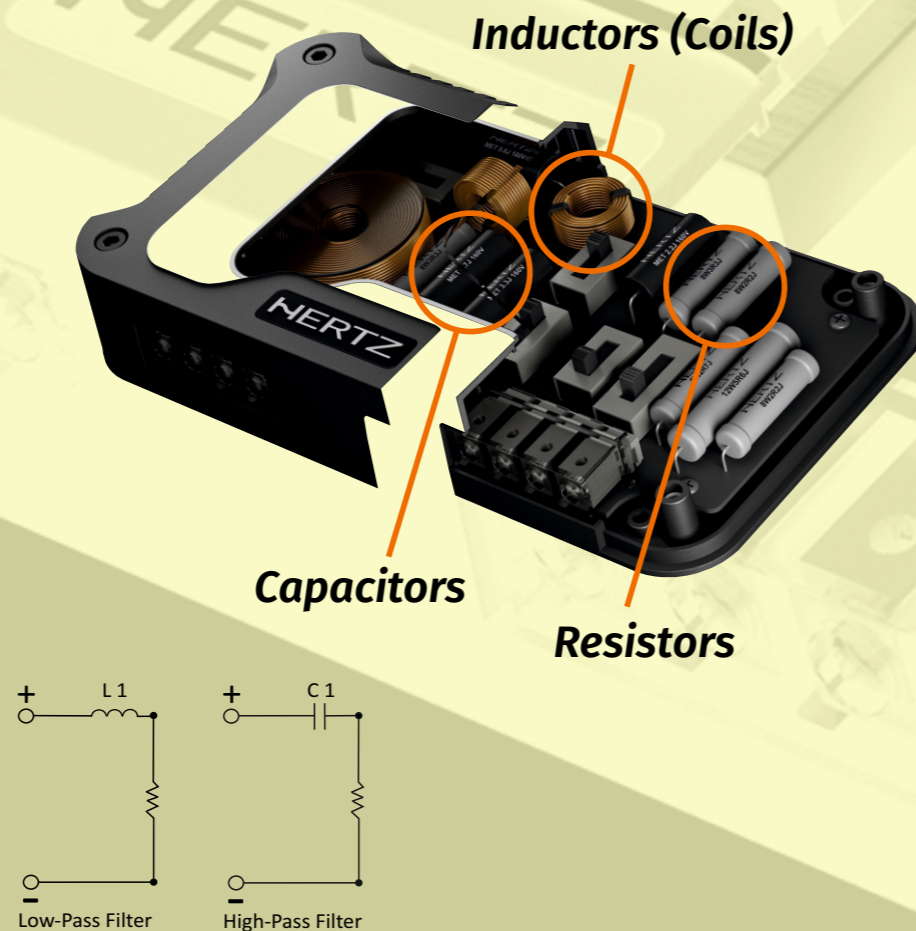
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