THE AUDIO VISUAL BOUTIQUE

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A view on cable bi-wiring

Cable “bi-wiring” is a very relevant; and might I add, very controversial topic. Apart from trying to understand the implementation of bi-wiring; the nagging question arises whether it actually do make a difference or not? Unfortunately (or fortunately!) there is no simple answer to either. Some people are unmoved in their belief that it makes an audible difference. Others are convinced that it can’t actually make any difference at all. Some have even opted for theoretical analysis to try and decide whether it is at least feasible that bi-wiring can make any difference.

To shed some light on this topic, let’s start with basics: The loudspeaker consists of two drive units. – a high-frequency (HF) unit often called a “tweeter”, and a low frequency (LF) unit often called a “woofer”. Loudspeakers generally employ a cross-over network to direct low signal frequencies to the woofer, and high frequencies to the tweeter. The cross-over network is **split into distinct HF and LF sections in loudspeakers that offer the option to be bi-wired** (i.e. have four input terminals).

In the conventional single wiring arrangement, the HF and LF input terminals are wired together in parallel at the speaker, and just one pair of connecting wires are employed to link both speaker units to the amplifier. In most cases “bi-wiring” means using an extra pair of connecting wires (i.e. another cable) so that the signals for the tweeter and woofer are sent from the amplifier (the two cables are joined at the amplifier-side) to the speaker via two routes, i.e. one cable (that more effectively) carries the signals destined for the tweeter, and the other cable (that more effectively) carries the signals destined for the woofer. This is where the controversy usually creeps in! My explanation in this regard is a follows: **A cable usually has the ability to either excel in its ability to carry HF signals or LF signals (and not both). So, if one uses a combination of cables, i.e. one cable that excels in its ability to carry HF signals (i.e. a solid-core conductor) and another that excels in its ability to carry LF signals (i.e. a multi-stranded conductor), you should have a better signal overall**.

The theory: HF signals tend to occupy the periphery of a conductor, due to their failure to enter the conductor centre (the so-called “skin-effect”). These frequencies do not use the entire section of the wire and consequently meet increased resistance. The occupational area for a HF signal is greater with a **solid-core** conductor, therefore resistance is reduced and delivery of HF information is improved. Although “skin-effect” is actually only of importance at frequencies > 20kHz (just beyond human hearing), it's these frequencies which influence timbre and ambience and give smear free treble by intermodulating with lower frequencies. Similarly, LF signal meets lower resistance down the centre of a larger, **multi-stranded** conductor, thus their suitability for LF signals.

Note that for **bi-amping**; active cross-overs are firstly employed to “split” the signal into its HF and LF components; then amplifying the signals via two separate amps; and then sending the two signals via separate cable paths to the corresponding HF and LF speaker terminals.

OK, let's get back to theoretical analysis of the issue at hand: Detailed analysis of a single- versus a bi-wired configuration is made difficult by two factors. Firstly, the electrical properties of the items involved can be quite complicated. The networks used in loudspeaker crossovers may contain a number of components and have a complex behavior; which is also true for the actual loudspeaker units. The second problem for a precise analysis is that the actual details of the loudspeaker crossover, etc. will vary a great deal from one model of loudspeaker to another. Hence we can expect any results to depend upon the choice of loudspeaker, cable, etc.

To make understanding these questions easier we can address a simpler question – i.e. we can ask, "Is it possible for the changes between single- and bi-wire to make any difference, or not?" To answer this question, the computed behaviors of simplified electronic models of the two configurations have been analysed in the literature and compared. Conclusions reached are that bi-wiring may alter a system's frequency response (thereby creating a slight change in the system's sonic signature – hopefully for the better!) but the details will depend on the series impedance of the bi-wired cables and the impedance properties of the loudspeaker.

In conclusion: There is no hard and fast answer whether bi-wiring is better than single wiring. Claims are generally unclear in technical terms, and there is a general lack of any reliable analysis or measured data to support the claims. Even so, our own experience is that bi-wiring generally improves on the overall depth and width of a system's soundstage; via improved high-frequency sonics and clearer, tighter bass response.

Our advice to you? Dump the technicalities and trust your EARS!