Differential Balanced Inputs

JL AUDIO | Help Center

Today's vehicles are equipped with sophisticated electronics capable of generating noise and interference that can intrude into the audio path, ruining the listening experience.

Most audio equipment uses single-ended, ground-referenced RCA jacks to receive audio signals. This means that the RCA shield is connected directly to signal ground. This is a simple, cost effective input design that works well for short runs in noise free environments. In noisier environments, this method cannot reject the common mode noise that could be on both RCA conductors (shield and center conductor).

By having more than one chassis-grounded RCA shield on a device, single-ended input designs are also more susceptible to ground loops. If noise is present on both conductors while the shield is connected to ground, the input amplifier will amplify the noise relative to the grounded RCA shield. When there are multiple RCA connections or any other conductors subjected to a magnetic field, this will cause a difference in potential across the RCA loop to be amplified at the grounded RCA as noise (a classic ground loop).

JL Audio's Differential-Balanced Input circuits measure the center pin of the RCA connection relative to the RCA shield, even when the shield is not connected to ground, and even when the voltages at both conductors are moving relative to ground. Because both the center conductor and the shield see high impedance to ground at the input, a ground loop cannot be formed, as there is no current flow to induce a voltage as noise. This works equally well with differential-balanced, or unbalanced signal sources, making this input architecture compatible with all standard car and marine audio equipment, using standard, unshielded, twisted-pair RCA cables. No special cables are required, unlike the fully balanced connections used in professional audio. JL Audio's XD-CLRAIC2-SW Speaker Wire to RCA Adaptors easily adapt to the existing speaker wire and plug directly into the Balanced Differential Inputs of your amplifier.

Another benefit of the Differential-Balanced Input design is that it easily accepts low-level and high-level signals from a variety of factory head unit outputs and amplifiers, including single ended "ground referenced" sources, as well as Balanced or Unbalanced "Bridged or BTL" sources. This eliminates the need for Line Output Converters (LOCs) in most installation scenarios. The obvious question is: "Why don't all car audio amplifiers use Differential-Balanced Inputs?" The answer is simple: it costs more. Executing a proper differential-balanced input section requires more components and better quality components than a basic single-ended design, so you generally won't find them on less expensive amplifiers. Balanced Differential Inputs can currently be found on HD, MHD, Slash v3, XDv2 and Mv2 series amplifiers.