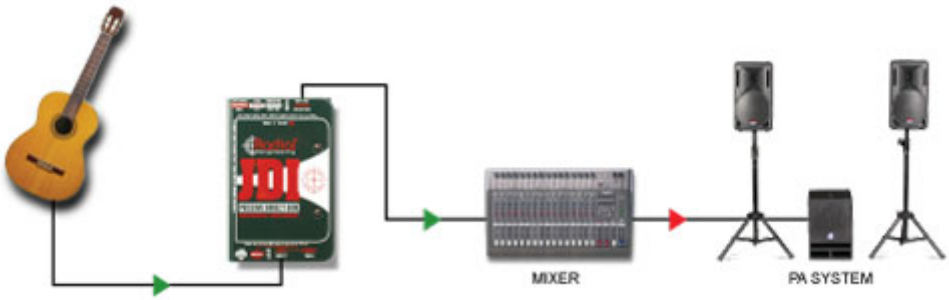
DI Basics

Why a Direct Box Anyways?

A DI box is basically the electronic equivalent of a microphone. And just like mics, there are passive ones (dynamics) and active ones (condensers). And like their microphone counterparts, passive DIs tend to be able to withstand greater signal levels, while active DIs tend to have more reach. (More on the differences are discussed later.)

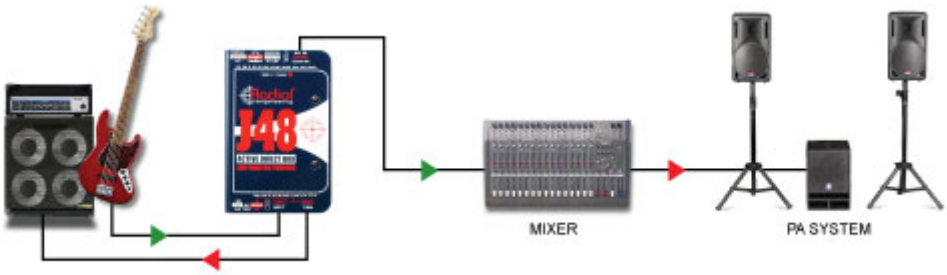
The DI's primary function is to convert an unbalanced instrument signal to a balanced one so that the sound of the instrument can feed a PA system or recording device.



In its simplest form, the instrument connects to a DI box and the XLR output is connected to the PA system. The primary advantage of using a DI versus connecting directly is noise. Balanced lines are much less susceptible to picking up noise from lighting systems, dimmers, motors and so on. As a rule, high impedance cables should not exceed 8 meters (25 feet).

The output from the direct box is mic level. This is purposely done to allow DI boxes to happily live along side microphone signals in a snake system without cross-talk due to one signal being louder than the other. The other advantage of having a mic level output is enjoyed during sound check. If one channel of a snake or mixer is not working correctly, you can quickly change channels around without having to worry if one is at a different level than the other.

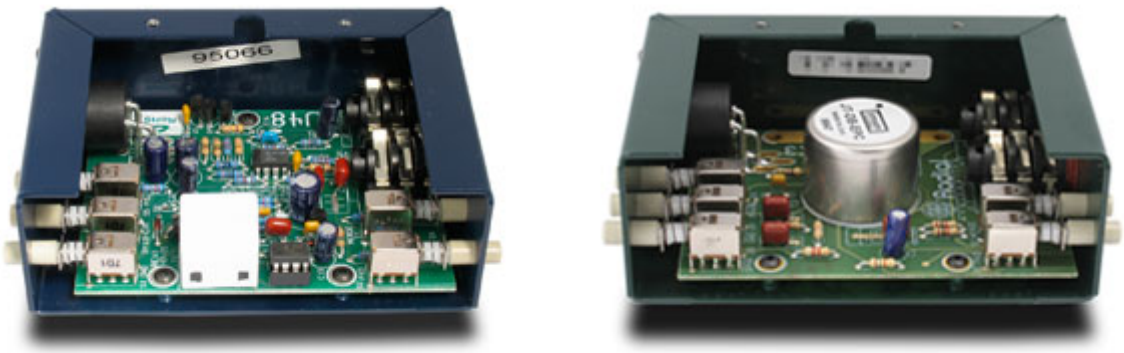
A common feature that is found on the direct box is a THRU or a throughput connector. This is typically used to send the instrument's sound to the artist's on-stage amplifier. As shown here, the DI box is actually splitting the signal between the on-stage amp and the PA system.



Active vs Passive

In order to avoid a perceptible drop in level in the stage amp, active direct boxes are generally preferred when using a passive instrument like a Fender bass. Although today's higher quality direct boxes do not load down the pickups as they did in yesteryears, the practice still continues today. Active DIs employ a buffering circuit or unity gain amplifier that boosts the signal going to the balanced XLR output so that very little draw is taken from the source.

For higher output devices that have built in buffers such as electronic keyboards or active basses, a passive direct box is usually selected. Passive DIs employ a transformer to do the work. Back in the early days low impedance 600 ohm transformers would be used which basically split the signal coming from the instrument causing it to loose punch. This effect is known as loading. Today, Radial DI boxes employ transformers with 130,000 ohm input impedance, thus greatly reducing any of the loading effect that was once a concern.



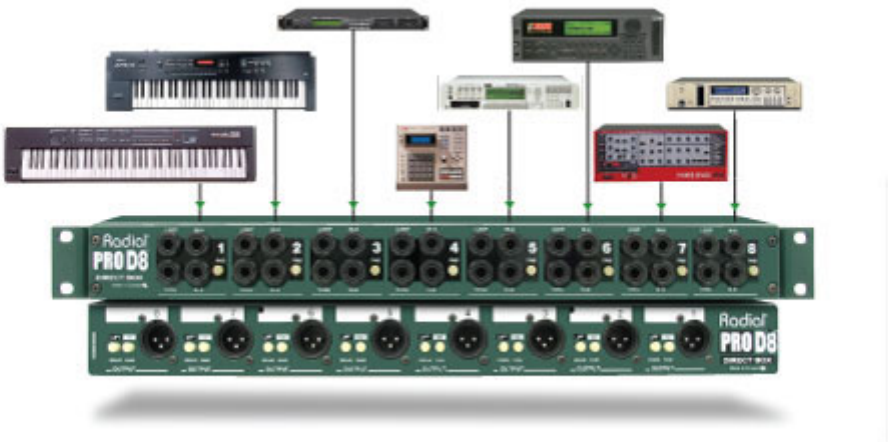
J48 and JDI inside view

Because active DI boxes employ a buffer, they tend to have more reach. This makes them a good choice when used with lower output instruments or instruments that benefit from extra sparkle. Most engineers prefer to use an active DI on acoustic guitar and bass. Because passive DIs can

handle more signal without distortion, they tend to be the preferred choice for keyboards, active basses and electronic percussion.

Multi Channel

Many keyboards to day are equipped with stereo outputs. To address these, we offer a number of stereo DIs all of which are equipped with inputs, throughputs and of course balanced XLR outputs. These designs make it easier to manage stage setups. For larger keyboard rigs, multi-channel rack DIs can be used or a special rack adaptor called a J-Rak can house a number of DIs in a standard 19" rack format.



PROD8 connected with 8 Keyboards

Today's live shows no longer use instruments alone. They are often combined with audio visual presentations; computer generated backing tracks; or even playback devices such as iPods and turntables. Over the years, we have found that having the right connector options make interfacing these devices to the audio system so much easier. This is why we build DI boxes for so many different sources.

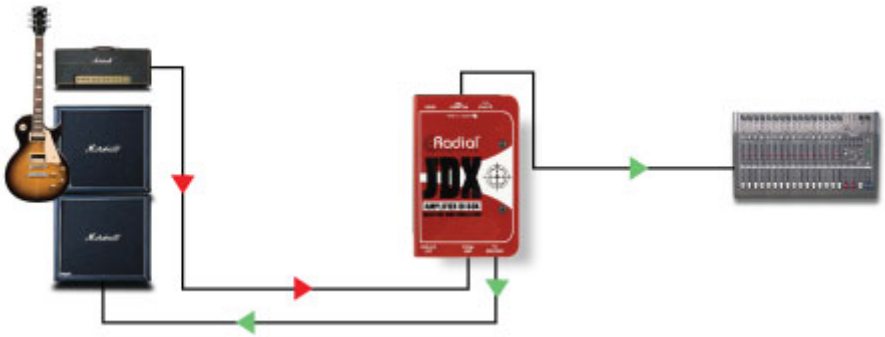
Laptop DIs

One of the most problematic sources is the computer. Computers not only tend to introduce noise into the PA system, but due to their plastic or aluminum housings and less than ideal grounding schemes, they are often easily polluted by outside magnetic fields or wire borne noise.


Amp DIs

Finally, with more and more guitarists now using in-ear monitors, there has been a shift to quieter stages with greater attention to bleed between instruments, stage resonance, ambient noise and sound quality. This has led to guitarists listening to the mic in front of their amps that is feeding the PA system. What they have found is that a mic sitting right in front of a loudspeaker rarely if ever sounds good without significant equalization. And this takes a lot of time to get right. And moving the mic by less than an inch (2 cm) the tone will change and you have to start over.

The Radial JDX is one of the most innovative direct boxes to come to market. It not only captures the sound of the amp, but also captures the effect of the loudspeaker. This produces a more natural tone and show after show consistency for the musician.



The direct box is a device that has been around for nearly 50 years, but only recently have folks begun to really pay attention to how they work or which type will do the best job for a given task. At Radial we pride ourselves in making a wide variety of DI boxes to suit every budget and application.

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