



ProAudio Review
PAR
 session trial

Trusty DI Boxes

Compared to other crucial pro audio components, it may seem that DI (“direct input” or “direct injection”) boxes receive little admiration from producers, engineers, or musician end-users. Not as glamorous as one’s favorite microphone, not fully featured like a boutique compressor or pre-amp, and nowhere near fragile, a common DI box simply does its job without much consideration or fuss. After all, how many times have you heard a flip statement like, “Ah, just throw a DI on it?”

by Rob Tavaglione

Thus our ninth Session Trial — *PAR*’s ongoing series of comparative, real-world gear evaluations — examines a field of six popular DI boxes to discover if there are significant differences and any resulting application-based preferences amongst the lot. Like the Shure SM57 in our “Workhorse Dynamic Microphones” Session Trial [*PAR* January 2010], we first selected an industry standard for a baseline reference: the Countryman Type 85 [active electronics, w/ input pad, ground lift, and thru jack]. Popular on the touring scene, Radial Engineering’s active J48 [pad, lift, thru, merge, low cut] and passive JDI [dual pad, lift, thru, merge] DIs were natural choices, too. We also picked an old-favorite active DI, the AR-133 from BSS Audio [dual pad, lift, thru, power switch], as well as the budget-friendly S-Direct active DI from Samson [pad, lift, thru]. Adding another passive

model to be thorough, the new Switchcraft SC800 [pad, lift, thru] with its rugged body and Jensen transformer completed the roster nicely. At the end of this Session Trial evaluation, I also tried Countryman’s latest — the Type 85 active DI — with interesting results; see the Type 85 sidebar after the summary.

I proceeded to test our DIs in the most common/popular live and recording applications: on bass guitar, pickup-equipped acoustic guitar, and electric keyboards. Within our test group, I found obvious sonic differences, tempered with plenty of room for choice suiting personal tastes and divergent sonic goals.

Bass Guitar

Being a bass player, I took the opportunity to lay down a three-part bass “song,” accompanied by drum loops for some backing track inspiration. My song included some funk passages for popping

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and slapping, some hi-hat-oriented, 16th-note grooving for soulful fingered bass, as well as driving rock for some growly, picked bass. I recorded this song twice: once with a passive 1970s Ventura bass (with a big bottom and throaty low growl) and again with an original (pre-Fender) active Kubicki Factor bass (with an 18V preamp and 32-ply neck). Using a Millennia Media HV-3R preamp to amplify the signals, I skipped compression or EQ.

In this application, my overall favorite DI was the active J48, closely followed by the passive JDI, both from Radial Engineering. Yes, the J48 and JDI sound quite different from each other; in retrospect, I reason that I must prefer the pairing of active DIs with passive basses and passive DIs with active basses for tasty, smooth tones.

Further, the J48 deserves kudos for a truly complete feature set (wisely including a high-pass filter) and excellent construction as well as the hottest output and the most versatile sonic characteristics of the group. When slapping the passive Ventura bass, all the DIs were less than exciting and punchy except for the J48; it had some top end snap and springy tightness. Even popping with the active Kubicki, the J48 was the punchiest, cleanest, least distorted, and most sonically inspiring.

Conversely, the JDI was the most balanced and musical sounding when grooving with my fingertips, maintaining an artful balance between the thick fundamentals and “clicky” fret noise. The JDI also had my favorite sound for rock picking the active bass, with an exceptionally usable balance that presented no emphasis at all, in any area.

I found the BSS AR-133 and the Countryman Type 85 to be quite similar in many ways. Neither one seemed terribly colored, both offered ample punch (surpassed only by the Radial J48) and more top end than the passive DIs, and they sounded quite good on all apps without the fickleness of the Samson S-Direct. The BSS AR-133 had a rounder bottom end; the Type 85 had a more focused midrange.

Frankly, the Samson S-Direct surprised me with some very nice tones. You see, right off the

bat, it shook my confidence by making my system illicit an odd thump or fizzle when applying/removing phantom power to/from the DI; these noises were with the fader down, mind you. In addition, the

S-Direct seemed a little muddy with some apps and a little thin with others. However, it was downright excellent for certain uses — my passive bass was helped by the S-Direct via a very musical midrange when finger picking and a very smooth, balanced accent when picked. I also loved the S-Direct on the active bass’ picking with a tasteful low-mid growl that no other DI captured.

The Switchcraft SC800 sounded good, but wasn’t as lively or musical as its active counterparts. Although a little plain on some apps, the SC800 sounded particularly nice when finger picking either the active or passive bass, due in part to some subtly carved out low-mids and a smooth top.

Acoustic Guitar

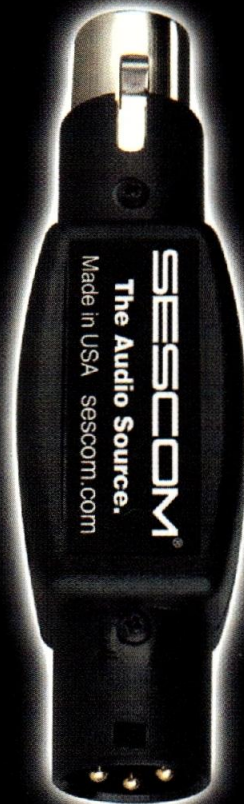
With my studio booked solid and dominated by a large mixing job, I again was faced with personally testing our DIs without a client tracking session; perhaps the approach was “anti-Session Trial,” but this solitude proved to be useful in picking apart the minute details amongst these DIs. With my trusty Taylor 310 solid-top acoustic guitar, an aftermarket contact pickup (nice and clean but with a bump at 300-400 Hz), and Millennia Media HV-3R preamps, I continued with my little sound-test song via overdubs (wishing I could put up a nice condenser and a ribbon, but I digress).

Here, the depth and girth that I previously found in the BSS AR-133 were a little muddy and murky, while the Radial JDI was a little boxy, even as I moved from big ringing open chords, muted mid-neck seventh chords and some bar chords, too. The Samson S-Direct was slightly compressed in a way that I liked (as I was missing my usual compression), but its transients and frequency response lacked a certain

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excitement. There was nothing wrong with our old friend, the Countryman Type 85, but it wasn't my top pick, even though it is quite a familiar and acceptable sound to my — and many, many others' — ears.

The Radial J48 was hands-down the winner for my tastes with negligible distortion and fine frequency balance; it was the only DI in the bunch that actually made my Taylor sound downright punchy. Although I was also quite fond of the animation and slightly colored mids of the Switchcraft SC800 — I recorded my guitar overdub with both J48 and SC800 for some possible “stereo-ish” options later — the clean definition and gut-bumping punch of the J48 was undeniable.

Keyboards

With the help of veteran keyboardist Jason Atkins and his trusty Roland VR-760 (which features some very authentic vintage key patches à la Wurly, Rhodes, and Hammond B3 complete with drawbars) we tried out a variety of sounds, all in mono, with each DI and the ultra-honest Millennia Media preamp again. To confirm our findings, we went back a second and third time to re-record and rethink.

At the onset, I was sure that Jason would pick the BSS AR-133 as his favorite (it sure was mine!) based on his pleased expression upon hearing it and his comments on its “warmth,” “roundness,” and fullness. The left hand of his chording when using a Fender Rhodes sound was downright bubbly, and the B3 sounds were full of dimension and huge. Yet he ultimately chose my second fave, the Radial J48 as the one he “would buy” because it was “so balanced,” with the most “clarity and versatility.” Although it wasn't as fat as the AR-133, it had more even-handed mids and a lack of distortion that was notable, especially when digging in high up the keyboard. Jason elaborated that once he bought a Radial J48 for his “anything-with-keys” live gigs, the AR-133 would be a “must-have for the studio.”

Jason chose the Countryman Type 85 as his third pick, as he particularly liked its rugged design and good “in between” sound (as in “between the clarity of the J48 and the warmth of the AR-133”). We noticed a slight comparative forwardness to the midrange of the Type 85, and Jason pointed out it wasn't as “round” as he desired.

Even though they sounded different, Jason found the Radial JDI and the Switchcraft SC800 to be about equal. We both noticed that

A New Favorite? Countryman Type 10 Active DI

Upon completion of this Session Trial, I had a nagging feeling I'd missed something. In my efforts to provide a baseline control with the Countryman Type 85, I wondered how much I'd missed in skipping the newer Countryman Type 10. Turns out, I missed plenty.

The Type 10 looks and feels a lot like the Type 85: Countryman's famous “wheel chock-worthy” construction, recessed “drunk-proof” jacks, yet

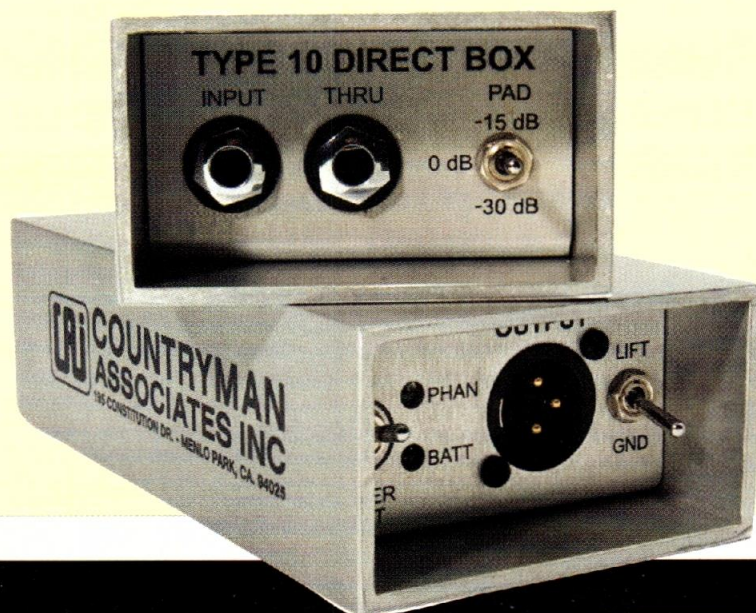
in a silver finish with an additional level of input pad (-15 or -30 dB). FET-based, the Type 10 uses “an analog circuit that tunes itself ... to maintain exceptionally low THD and IMD specifications across the entire audio band, and for a wide range of input voltages,” says manufacturer-provided documentation.

And sure enough, on passive bass guitar the Type 10 was about 2 dB lower in output level,

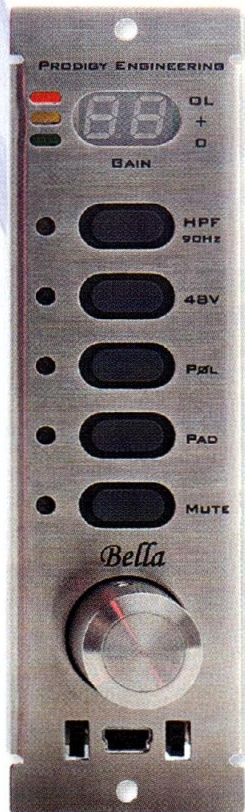
but seemed even a little cleaner and less smeared than the Radial J48. With the active Kubicki, the difference was more apparent, the absence of distortion on the thumb slaps was percussive and impressive, and the clarity when finger picking or 16th-note rocking maintained every little nuance (without adding any nuance). In direct comparison, the Radial J48 did actually have a little more bass extension and general thickness, so choosing one over the other was a tossup.

On acoustic guitar, the Type 10 was absolutely fantastic! I've never heard my Taylor's internal mic sound so sweet on the top end, almost like a proper condenser mic. It offered nice mids (flatter than the Type 85), solid bottom, good punch. It was so clean and distortion-free it was almost sparkly.

So, to rationalize, maybe it's a good thing this Session Trial was limited to six DIs, or I might not have been able to pick a number one. — Rob Tavaglione



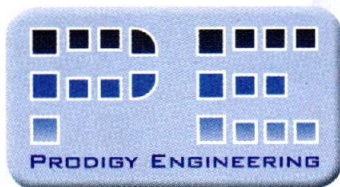
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Keyboardist Jason Atkins auditions DIs for this Session Trial at Catalyt Recording.

these two passive DIs sounded smaller than their active counterparts, and, likely as a cause, exhibited less response way down low or way up high in comparison. The JDI seemed to have a smoother, more “vintage” sound; the SC800 had the bolder midrange and a bit more bite.

Even though I thought the Samson S-Direct sounded pretty good on most all the Roland’s sounds, Jason didn’t like its subtle “compression” or its build quality. Although it didn’t sound as big as the other actives did, it was mostly balanced with a moderated sound, absent of any shrillness or deep lows.

After completing this testing, Jason said he determined that he clearly prefers active DIs and that all of the boxes tested sounded quite good and eminently usable — actually better than the pair of passive models he’s been using for years.

Summary

In this evaluation, my overall favorite is the Radial J48 (\$220 list) for its accurate transients, lack of distortion, wide frequency response, headroom, and overall versatility. This is the DI I would choose when I like the tone of the instrument and just want to stay out of its way.

The BSS AR-133 (\$185 list) is clearly my second favorite for fantastic bass response, a soundstage that seemed nearly “bigger than life,” and a fullness that would be very helpful with troublesome things like ply-top acoustic guitars and lightweight, anemic bass guitars.

My third pick goes to the industry-standard Countryman Type 85 (\$210 list) for a time-proven, rugged design, wide frequen-

cy response, and good headroom. Its slightly forward midrange and lean bottom was largely useful, but only occasionally less than flattering.

To my ears and Jason Atkins’ as well, the passive DI models couldn’t match the sheen, accuracy, and punch of the active models, so the Radial JDI (\$220 list) and Switchcraft SC800 (\$270 list) don’t get top picks here. Don’t get me wrong, though: many active bass and keys tones were smoother and more musical with our passive DIs and their “narrower bandwidth/slightly subdued transients” response is useful and flattering on sources with edginess or harshness. I did prefer the JDI here for its wide feature set and useful options (such as being able to merge a stereo signal into mono with the thru jack), but liked the Switchcraft SC800 to put a little teeth on sources that needed to step forward.

The Samson S-Direct (\$125 list) may not be the most versatile DI, or the most rugged, but it had that “active” sound with a touch of smoothing compression that could be quite useful. For novices buying their first DI (or in the market for a new DI) and pros who need a lot of DIs at a very affordable price — an unbelievable \$29 street (\$39 street for the stereo model) — the S-Direct’s price-to-performance ratio is rather good.

So carry on with your fancy active ribbons, multi-pattern condensers and ultra-picky transducer choices. But just put a little extra time into your DI selection on your next session, gig, or shopping experience; rediscover the joys, pure isolation, and upfront clarity of a nice transformer driving your direct input. You’ll be glad you did.

Trusty DI Boxes

by Frank Wells

Identical DIs as evaluated by Rob Tavaglione were bench tested. A CEntrance MicPort Pro was Y'd with the output of the DIs and the high-impedance bridging input of my Prism dScope III test set, providing 48 VDC and a mic pre load (nominally 5 k Ω) to the DI outs. The mic pre was not employed. All units were tested with phantom power applied — tests repeated without phantom on the passive units showed only a minute difference in DI loading.

All units tested measured clean at 1 kHz — THD+N numbers with a 22 Hz to 22 kHz measurement bandwidth were all in the 0.00x percent range with a -10 dBu sine wave input. Gain structures were all over the map. The passive units both had a similar loss relative to input (no pads) — the Radial JDI measured -21.3 dBr, the Switchcraft SC800 -21.6 dBr (all relative to -10 dBu). The Radial J48 measured +4.9 dBr, the BSS AR-133 measured -0.29 dBr, the Samson S-direct measured -.3 dBr, the Countryman Type 85 and Type 10 measured -9.5 dBr and -0.87 dBr, respectively.

Noise floors were all low, with the passive units performing the best, unsurprisingly — both the Radial JDI and Switchcraft measured -111.5 dBu. The Radial J48 had the highest noise floor — a still respectable -95.7 dBu. The Samson measured -99.5 dBu, the Countryman Type 10 -102.5 dBu, the BSS -102.8 dBu

and the Countryman Type 85 -108 dBu.

With no pads, maximum 1 kHz input handling was in the 8 to 11.5 dBu range for the active units. The clipping points (measured as where the THD+N crossed 0.1 percent with a wide DC to 40 kHz bandwidth) were, for the active units, 8 dBu for the Countryman Type 85, 8.5 dBu for the Countryman Type 10, 8.7 dBu for the Radial J48, 10 dBu for the Samson and 11.5 dBu for the BSS. All of these units easily handled a 22 dBu input with pads engaged (save for the Countryman Type 85, which has no pad available). The two passive units (Radial JDI and Switchcraft SC800) have the broadest input handling capability — the JDI clipping around 20 dBu and the Switchcraft easily handling the Prism dScope's full 22 dBu output.

The 1 kHz distortion numbers stayed generally good on all units till the clip point, the Samson and Countryman Type 10 producing perhaps barely audible distortion a bit before clipping. The bigger exception to the trend was the Countryman Type 85, which had a gradually increasing distortion curve as level was increased, crossing 0.05 percent THD+N about 4.5 dB below clipping.

Though very clean at 1 kHz (-10 dB input), there was some distortion rise at lower frequencies in some units. Plotting the curves, the Samson S-direct exceeded 0.1 percent THD+N at 50 Hz, the BSS AR-133 at 20 Hz. The Countryman Type 85 and the Switchcraft SC800 measured about 0.04 percent at 20 Hz, the Radial JDI and Countryman Type 10 about 0.02 percent at 20 Hz and the Radial J48 stayed below 0.01 percent regardless of frequency.

► SQUAREWAVE RESPONSE

To get some idea of the transient performance of the units, a 1 kHz squarewave was fed to each at -10 dBu. The most revealing visualization of this performance came from stacking up the plots and comparing the rise and fall of the leading and trailing edges of each half cycle. Shown in Figure 1 is a zoom into the trailing edge of a positive half cycle.

The differences in amplitudes of the plots are due to the varying gain of the units. Ideally, the edge of the waveforms would be precisely vertical. The performance would have been easier to gauge with matched output levels, though you can see the differences readily enough in the time the various units take to rise and fall between the peaks. The Switchcraft SC800 (dark green) and Radial JDI (violet) traces are unsurprisingly the lowest levels (in the middle of the plot), are smack on top of each other, and have the slowest rise time/slew rate.

A bit of ripple on the edges of the waveform tops is normal with digital-based squarewave measurement (Gibbs Phenomenon), though extremes beyond nominally flat can be viewed as distortion caused by the circuit under test adding overshoot — evidenced by exaggerated or additional ripple/ringing/oscillation on the waveform top — or undershoot of the expected level. The BSS AR-133, definitely (red), and the Countryman Type 10 (orange), to a lesser degree, exhibit some overshoot here. A bit more is seen in a wider view of the same plot (Figure 2), which also shows some low-frequency filtering by the BSS unit evidenced by flat waveform top appearing "tilted." That plot also suggests some overshoot with the Countryman Type 85 (green), which also falls a little "late" in Figure 1. The Samson S-direct (olive) edges are slightly rounded indicating undershoot. The Radial J48 (blue) starts its fall a little early, appearing like a less rounded undershoot.

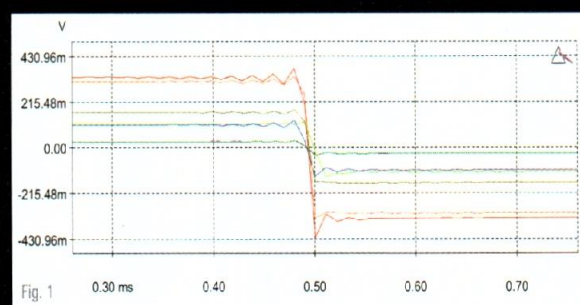


Fig. 1

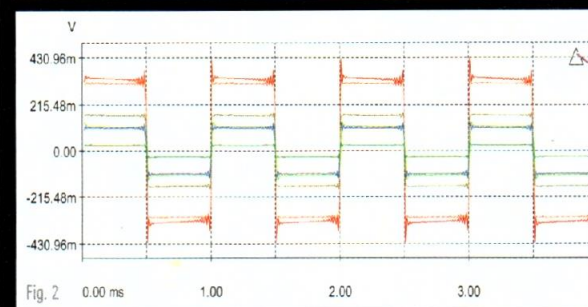
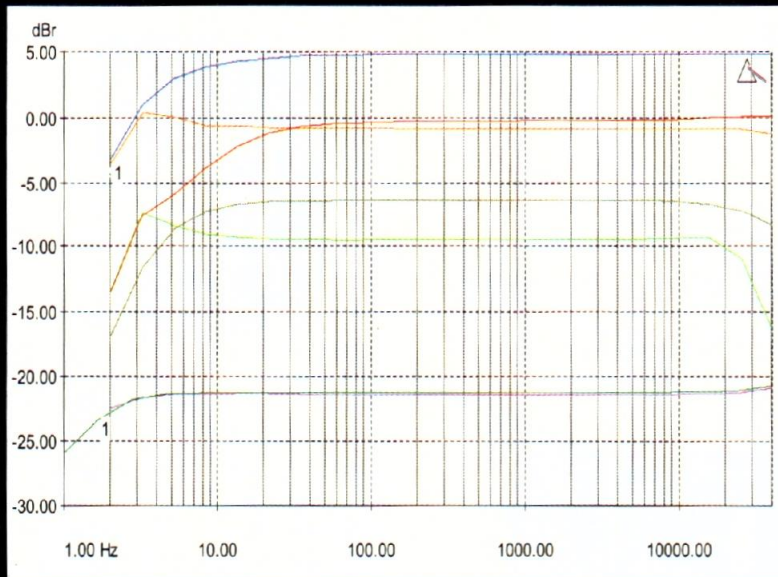


Fig. 2

► FREQUENCY RESPONSE



Frequency performance was generally flat across the board. As shown here, the BSS AR-133 (red) and the Radial J48 (blue) have some marginal roll-off at 20 Hz (the first vertical graticule to the right of the graticule marked as 10 Hz). The numbers below 10 Hz should be dismissed, as there was some interaction between the Prism's DC blocking filter and the sweep's band rejection filter. The sweeps shown run out to 40 kHz. At 20 kHz, the Samson S-direct (olive) and Countryman Type 85 (green) show some marginal roll-off. Note that the bottom two traces are nearly identical between the passive Radial JDI (violet) and Switchcraft SC800 (dark green) as is their performance in each test run — unsurprising since they are both Jensen transformer-based units. The orange trace is the Countryman Type 10.