Bassic Review

Sonic Nuance Tuner + DI (TDI) Mk2 Pedal

By Tom Bowlus

We've all had that moment. You are interested in a new (or new to you) bass head or preamp, and you are digging what it has to offer. Looks like a real winner, and you are about to break out the wallet, but there's one last question to ask. "Does it have a Jensen?" For many of us, the answer to that particular question might be a deal breaker. We may not know exactly *why* it's the best, but we know that a Jensen DI *is* the best. Or, at least we know that when we tell the sound guy that our DI has a Jensen transformer, then he quits forcing this suspect looking box on us, give us a vaguely approving grunt, and moves on (oh, and then the bass sounds great through the PA!).

Well, the days of deals falling through for want of a Jensen transformer-equipped DI may finally be behind us. You see, Ted Burmas – and his company, Sonic Nuance Electronics – has crammed a Jensen transformer equipped DI into a convenient pedal form. So now, you can use whatever bass head or preamp you want, and still have that legendary Jensen performance feeding the front of house. Oh, and did I mention that he threw a fast-tracking, highly accurate tuner into the deal? Not sure what to call this Tuner + DI pedal, though...

The Company Line

Ted has a background as an analog mixed-signal circuit designer in the telecommunications, disk drive storage, aerospace and power industries. He has a master's degree in electrical engineering and computer science, and he plays bass (electric and upright) as well as classical and acoustic guitar. Ted formed Sonic Nuance Electronics in 2012, and the product lineup is limited to cables (from short patch cables, to a headphone extension cable, effects loop "snake" and more) and DI pedals. The DI pedal lineup include the Tuner + DI (TDI) pedal, both Mk1 and Mk2 iterations, and a version of the Jensen DI pedal that is mutable, but does not have the tuner – the Mutable DI (MDI). Across the board, these products are designed for the highest sonic fidelity, to allow every nuance to shine through. See what I did, there?

Sonic Nuance currently only sells direct through their website, which Ted likes, because it "keeps him close to the customer," and helps keep the costs down. Speaking of which, he will be offering a lower-cost option fairly soon, based upon customer feedback. It will employ a custom-made (not Jensen) transformer, though the TDI Mk2 (with the Jensen) will remain in the lineup.

A Closer Look

The pedal itself has a professional, no-nonsense aesthetic, with (unbalanced) ¼" In and ¼" Out on the right side, along with the balanced XLR DI out. The top edge of the case features the DC adapter power input, which was a relatively recent addition. Prior to this, the TDI was powered exclusively via 48V phantom power, supplied via the XLR connection. However, based upon user feedback, Ted modified the circuit to allow for the use of an external DC adapter. In this regard, it is very flexible as far as what adapter may be used, and will accept voltage outputs from 9V to 24V DC. Sonic Nuance does call for a 100mA minimum, which most power supplies should easily accommodate. What happens if you have the DC adapter plugged in, and then the unit is connected to phantom power? Well, Ted thought of that, and if 48V is present at the XLR jack, then the DC supply is automatically bypassed.

On the face of the pedal, we have the prominent footswitch for the mute function. This is a completely analog function, allowing the user to mute the signal (to both outputs), even if phantom or DC power is not available. Above this are the primary display and tuning level LEDs.

In the top portion of the face plate, we find two small, but sturdy, push button switches for on/off and for lifting the ground on the XLR output. What looks like three additional buttons are actually small, fixed posts which aim to prevent inadvertent switching of the two push-button switches. Even though the TDI features a digital tuner and display, the signal path through the pedal (to both outputs) remains entirely in the analog domain.

Directed Verdict

Seriously, though. How cool is it that someone finally put a Jensen transformer-based DI into a pedal? In this case, we are talking about the Jensen

JT-DB transformer, intended for direct boxes. But first, a refresher on why you might want to have a transformer-based DI. Transformers provide electrical isolation between your rig and the FOH (which keeps noise from one from getting to the other). Transformers can take your unbalanced instrument signal and convert it to a balanced signal (which can be transmitted through a cable for longer distances without losing signal or introducing noise). Transformers can also help match signal gain levels between different devices (like bass amp inputs and mixing board console inputs).

Some potential downsides to transformers are their cost, their added bulk, the possibility of frequency dependent phase shifts, and the potential for external magnetic interference. These last two items are directly addressed [pun intended] by the folks at Jensen, who employ a Besel low-pass filter (to eliminate phase distortion) and multiple Faraday shields to minimize hum, buzz and RF interference. Since 1974, Jensen Transformers, Inc. has been building a reputation for excellence. Forty plus years later, Sonic Nuance lets you take that legendary Jensen performance with you, wherever you (or at least your pedal board) go(es).

Our Technical Editor, Dan Kropp, put the TDI through its paces to prove its technical prowess [his technical evaluation immediately follows this Bassic Review]. I opted for some real world testing. Out on the gig, the TDI did just what I had hoped, with dead-silent connection between my pedalboard and the mixing console. In my typical pedalboard setup, I run my tuner pedal at the very front of my pedalboard, and I use this as my primary means of muting my signal when changing basses, in between sets, or – gasp! – when tuning. It only made sense to use the TDI in similar fashion. At least, it did at first. Then, I realized that if I tapped my FOH DI signal from my typical "tuner pedal slot," I wouldn't be getting any of my downstream effects in the mains. This problem was easily remedied, of course, by moving the TDI to the end of my pedal chain.

You Can Tune a Piano, but You Can't Tuna Fish

The included chromatic tuner stands out for both its tracking speed and for its accuracy. No waiting on the low *B* to track. It is basically instantaneous. Accuracy is also excellent (with the Mk2 being even more accurate than the Mk1 – which I was also allowed to audition, and which itself is more accurate than many tuner pedals on the market). In fact, it is accurate enough to show the note pull sharp as you initially pluck it. This can take a little getting used to, but with a light touch, and/or a little patience, I think you will appreciate the accuracy (as it quickly indicates the "true" tuning, once your finger quits dragging the string sharp).

The main display will indicate the note detected (if the TDI is in mute mode and power is supplied), and will show "P" for play mode. This main display does include a sharp note indicator, when appropriate, just to the right of the note display. The five tuning level indicator LEDs predictably show if the note is sharp, flat, or in tune. Once you bring the note into perfect tune, the LEDs will momentarily flash. Both the main display and the indicator LEDs are bright enough to be seen on a dark (or sunlit) stage, from standing height.

Bottom Line

What is not to love about the TDI? For less than the price of a "Jensen upgrade" to your favorite bass head or preamp, you get a quality Jensen transformer-based DI and a killer tuner, to boot. The sturdy pedal is hand-assembled, made in the USA, and features excellent customer service from Ted, himself. BGM

Manufacturer: Sonic Nuance Electronics, LLC

Website: https://www.sonicnuance.com/product/tdi/

Model: Tuner + DI (TDI) Mk2

Made in: USA

Enclosure: Hammond die-cast aluminum

Inputs: ¼" input, 9-24v DC center negative (100mA minimum recommended)

Input Impedance: 73.1 kOhms with 612 kOhm XLR load and 660Hz sine wave input at 100 mV

Outputs: ¼" out, balanced XLR

Controls: Footswitch (mute), on/off switch, XLR ground lift switch

Other Features: Option of (48V) phantom power or DC adapter

Dimensions: 3 7/8" wide, 2 1/2" high, 5" deep

Battery Operation: no

Warranty: 3-year limited

Price: $330.00 (limited time price)

Dan Kropp's

Technical Evaluation

Sonic Nuance Tuner + DI (TDI) Mk2 Pedal

The Sonic Nuance TDI is a combination isolation transformer and tuner. This pedal will electrically isolate your instrument from the rest of your gear. With the mute engaged, it also acts as a tuner. It also has a very high quality transformer-generated microphone level output. A run through the test bench will give some hard facts as to how well this pedal stands up to expectations.

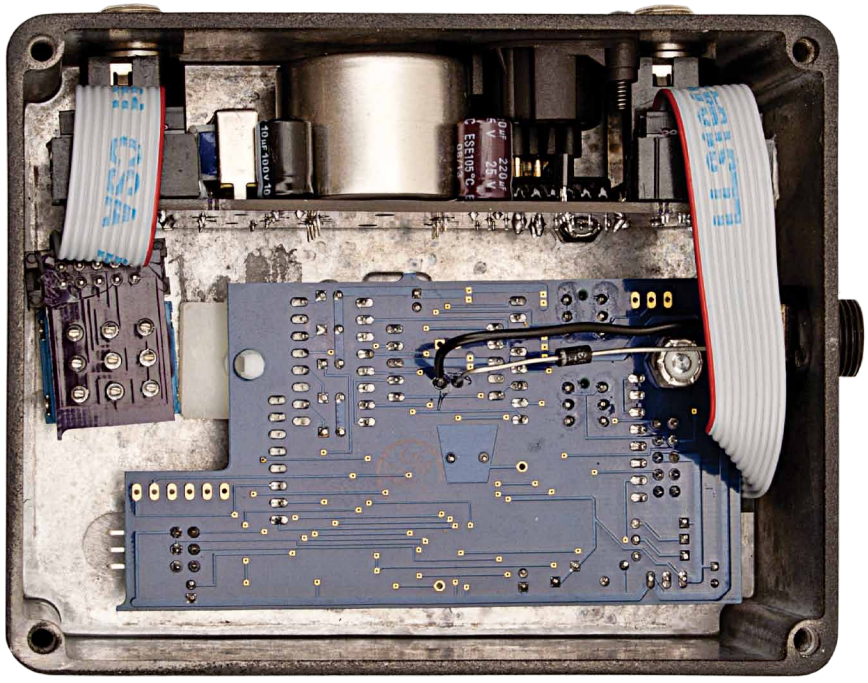

FIG. 1 Gut Shot

Internal

It only took a few seconds to get into the inside of the case, which is cast aluminum, approximately .08" thick. The top and sides are one piece, with a removable bottom that is machined for a snug fit, and even has cast reinforcements. Four Philips-head screws hold the bottom panel in place. Inside the case, as shown in ***Fig. 1***, there are two circuit boards. Two nicely trimmed ribbon cables connect everything together. The boards are laid out nicely to avoid extra wires and keep ribbon cables as short as possible. Everything in the case is board-mounted, except the large foot switch, which is securely mounted to the case. The XLR output and both ¼" jacks are attached to the case, as well as to the board. The attention to detail is very good. There is even a nyloc nut holding the circuit board place.

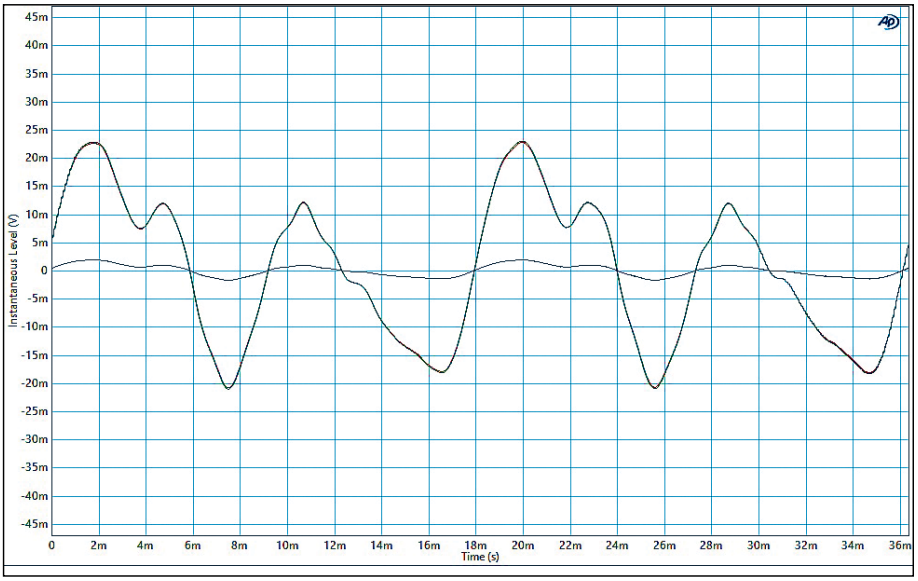

FIG. 2 Scope trace of guitar sample. Output, Input, DI

Operation

The large foot switch on the top toggles the operation of this box from pass-through mode to mute/tuner mode. In pass-through mode, the output ¼" jack is resistively tied to the input, and the XLR output is a microphone-level duplicate of the input. In mute/tuner mode,

the ¼" jack and XLR output are muted (and physically disconnected from the input). If there is power to the box (either via phantom power from the XLR connector, or from the DC adapter input) and the power button is on, then the tuner circuit will be active, as well. The isolation transformer and mute mode will work without power supplied; the tuner will not. Also, without power, there is no feedback on what setting the footswitch is on. Trial and error is the only way to determine if it is in pass-through or mute mode.

If there is power applied and the power switch is on, then the LED display will be active. In pass-through mode, there will be a "P" displayed. In mute/tuner mode, the note that is detected on the input will be displayed and the series of red and green LEDs under the display will indicate in tune, or the amount that the note is sharp or flat. It is worth noting that in mute/tuner mode, the display will continue to show the last note it could tune after the input to the box goes away.

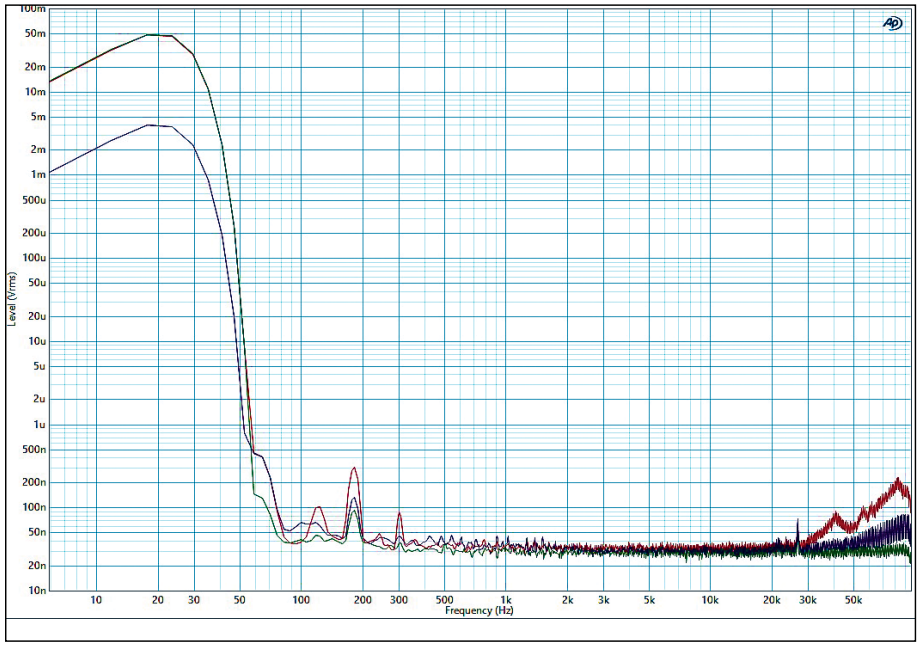

FIG. 3 FFT breakdown of 20Hz sine wave. Output, Input, DI

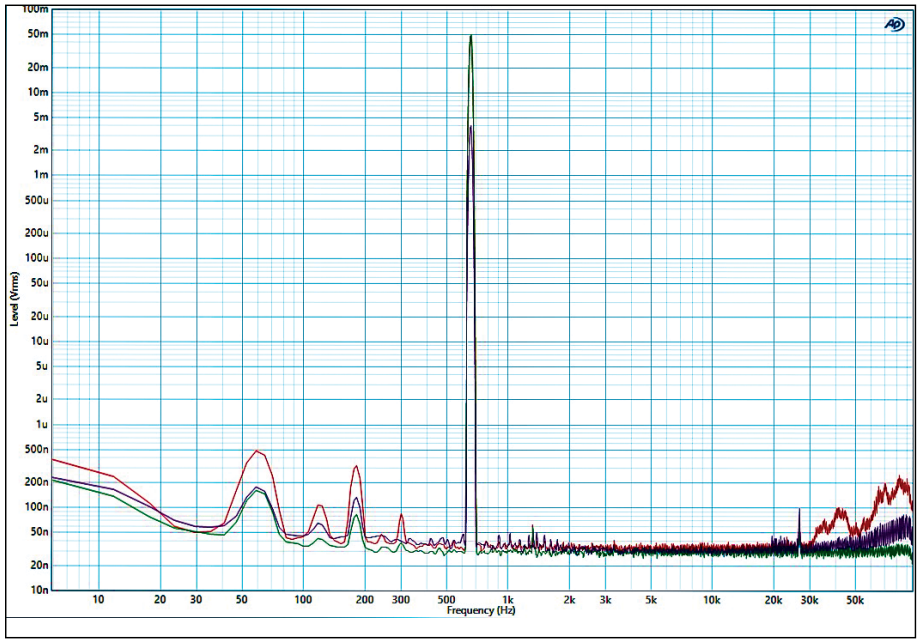

FIG. 4 FFT breakdown of 660Hz sine wave. Output, Input, DI

For this pedal, the operating range for the tuner is 20.1Hz to 660Hz, so the impedance test was changed to use a 660Hz sine wave at 100 mV as the input. The measured input impedance is 67.1 kOhms. As an added check, the impedance was also checked and 20Hz and 300Hz, which resulted in less than a 2% variance across frequencies.

Fig. 2 shows a guitar sample wave fed into the pedal. The input and output are indeed almost identical, and the smaller amplitude wave is the XLR output. A close examination of the wave showed a less than 1 mV negative shift on the output with identical amplitude. ***Fig. 3*** and ***Fig. 4*** show a breakdown of the component parts of a sine wave fed into the pedal and an equivalent breakdown of the outputs. Both graphs show the output and input levels for the target frequencies to be identical. There are very minor differences in some of the component levels of the input and output, but keep in mind that these are logarithmic scales, so the differences that are shown are in the micro- and nano-volt range. ***Fig. 5*** is the THD for frequencies from 20Hz to 1kHz. There is slightly higher THD+N across all frequencies on both the ¼" output and XLR. Once again, keep in mind the scales, here. The XLR output hovers around 0.01%, while the output and input hover below 0.001%. These are all very low numbers and unlikely to be noticeable.

Impedance

In pass-through mode, this pedal will influence the input impedance seen by the instrument. Even though the signal passes straight through the pedal, there is an element

of impedance put into the circuit by the transformer that creates the signal for the XLR connector. Because the transformer is connected in parallel across the signal wires, it will always lower the overall input impedance seen by the instrument. The amount of parallel input impedance added to the circuit is directly dependent on the input impedance of the load on the other end of the XLR cable. In summary, as far as impedance goes, this pedal effectively puts the XLR connector in parallel with the ¼" output jack, creating two parallel loads for the instrument.

For testing, a 660Hz sine wave at 100 mVrms was used as stimulus. The ¼" output jack was connected to a 98.7 kOhm load, and the XLR was connected to a 612 Ohm load. This combination created an input impedance of 42.1 kOhm, as seen by an instrument. If the XLR connector load was disconnected, leaving an open circuit, then the input impedance seen by the instrument was 71.1 kOhms. Through some math, the impedance of the pedal in parallel with the load on the ¼" jack output is 73.1 kOhms with a 612 Ohm XLR load attached, and 262.1 kOhms with and open XLR circuit.

Tuner

The range of the tuner is advertised to be from *E0* to *E5*, which is 20.602Hz to 659.255Hz. The accuracy is listed as +/- 2 cents initially, and then +/- 1 cent, as the amplitude of the note decays over time. All note frequencies are based off A4 at 440Hz. For this test, a constant sine wave was used as stimulus. Because the sine wave amplitude did not decay, the +/- 1 cent accuracy was never initiated. All results were in the +/- 2 cent range. During regular use, it may be useful to have the accuracy get more exact with a degrading input amplitude, but to keep consistent test results, the test stimulus must be kept at a reproducible standard level.

Through testing, the lower limit that is readable by the tuning circuit is 20.1Hz. Anything lower, and the tuner does not register

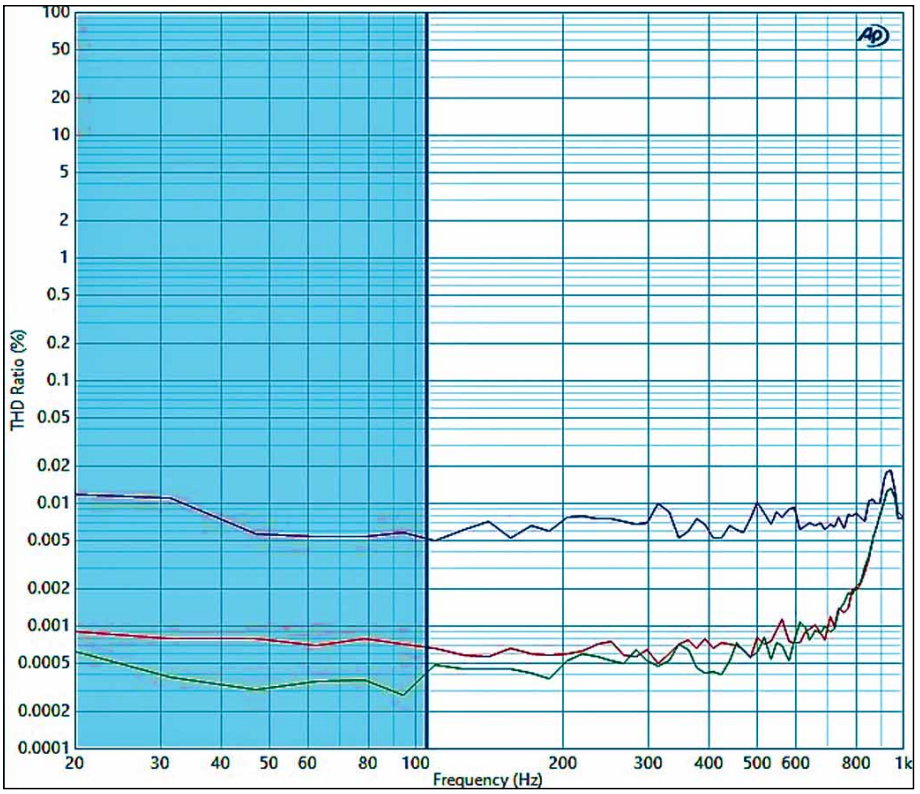

FIG. 5 THD vs. Frequency. Output, Input, DI

a note. That should be plenty of room to tune *E0*, since 5 cents flat on *E0* is still 20.542Hz, which is well within the tuning range of the circuit. There is more headroom on the other end of the scale. At *A5*, which is 880Hz, the tuner still provided accurate results. Anything higher than *A5*, and the tuner will still read that there is a note, but the accuracy drops off to the point of not being usable.

Random notes were selected to check the accuracy of the tuner. The following is a sample of the results from checking notes. *E0*, *C2* and *A4* show in tune from -1 to +1 cents. *D#3* shows in tune -1 to 0 cents. *A5* shows in tune -2 to +1 cents. All notes tested fell well within the advertised +/- 2 cents accuracy. On all tested notes, once the note was showing out of tune, one red light would illuminate dimly, at first. Then, as the note went more out of tune, the red light would come to full brightness and then another light would illuminate. This worked the same on the sharp and flat side.

Conclusion

This is one seriously sturdy and well-built pedal. Inside and out, this pedal is made to hold up and perform for a long time. The pass-through transformer provides very clean electrical isolation and the tuner accuracy is right where it should be.