Introduction

Thank you for your purchase and welcome to the Sonic Nuance Electronics family - people like you who crave to hear every nuance of a performance! The Sonic Nuance TDI (Tuner & Passive Direct Injection) and MDI (Mutable Direct Injection) units are single channel, transformer coupled passive musical instrument direct boxes. Both units have quiet mute features as well as 48V XLR or dc-jack powered, super bright light emitting diode (LED) indicators. Both units use audiophile quality Jensen JT-DB direct box transformers for the signal path to provide uncompromising sound quality over a wide dynamic range. Both units are designed with uncompromising sound quality and ruggedness as primary importance.

The TDI contains a simple and precise **48V-powered chromatic instrument tuner** with high visibility LED indicators. The TDI contains proprietary , patented circuits.

The MDI preserves the mute function with LED indicator function of the TDI but does not include the chromatic tuner function.

While the TDI and MDI are simple to use, reading this manual will help you get the most out of them and help answer common questions.

Front Panel Description

Figure 1 shows the common inputs and outputs (I/O) for the TDI and MDI. Below is a description of the numbered pointers shown in the figure.

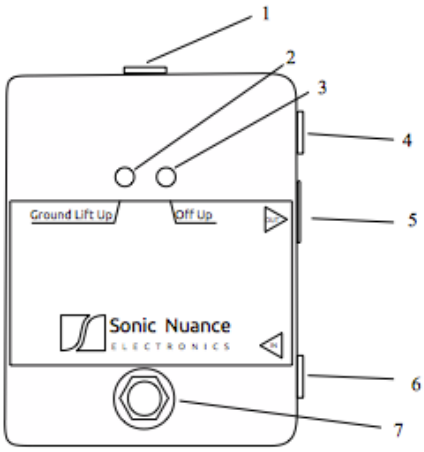


Figure 1: Common I/O

Both TDI & MDI:

1) DC Power Jack (most models): 2.1mm center negative. Voltage should be regulated and in the range of 9 to 24V with minimum 100mA capability (Boss PSA-120S or equivalent). If 48V is available via jack 4, the dc supply is automatically bypassed. This allows the unit to be either powered via the DC jack or the XLR jack.

2) XLR Ground Lift: Disconnects the ground connection between the ring of the input jack (6) and Pin1 of XLR out (5). This can be useful for reducing or eliminating ground loop hum and buzz that can occur when two pieces of electronic gear are connected together. When the switch in is in the "up" position, the ground is disconnected or "lifted". When the ground is lifted, there is no dc path between Pin1 of the XLR connector and the ground of the unit (a "true" ground lift).

3) Power: To turn the unit on, put the switch in the down position **after** the XLR jack is connected and power is applied to the unit. The proprietary circuit will then allow for hot plugging the unit. See the **Usage Details** section for more information

4) AMP Output: An unbalanced, tip/sleeve 1/4" output jack for making connections to an amplifier, mixer, etc. The muting function controlled by the foot switch (7) applies to this output which can be used to drive the input of an amp or the return jack of an amp's effects loop. This output is not get by the transformer in the TDI. The output is essentially a direct connection to the input with a switch in series to break the connection.

5) XLR Output: Provides a transformer isolated, balanced and low-impedance microphone level signal for connecting to a mic input of an audio interface. This jack has the muting feature in "mute" mode controlled by foot switch (7). It is important to use a high quality XLR connector which locks in place to keep the current draw to the TDI stable. *Loose connectors can cause intermitted noise on the XLR's signal especially when phantom powered!*

6) INPUT: Connect an instrument or other signal source into this jack. Connection is for standard unbalanced tip/sleeve instrument type 1/4" plugs NOT stereo 1/4" plugs. Signal level is standard "instrument level".

7) Foot switch: The foot switch toggles the XLR (5) and AMP (4) outputs between "play" and "mute" modes. This analog and passive function will work even if 48V power or DC power is not provided. Muting will physically disconnect the input signal path from the AMP and XLR outputs.

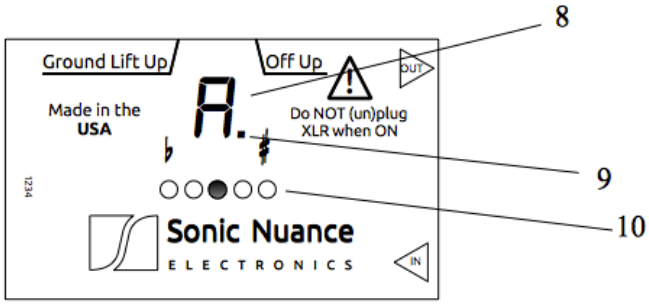


Figure 2: Note & Accuracy Display

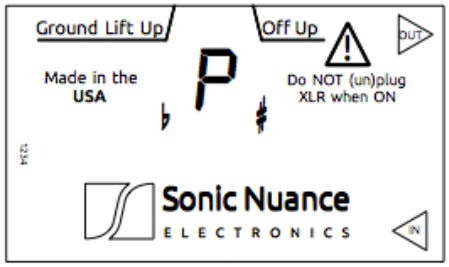


Figure 3: PLAY Mode Display

TDI Only:

Figures 2-4 show displays specific to the TDI. Below is a description of the figures.

8) Note and Mode display. When the Power Switch (3) is in the ON position, the TDI can be in one of two modes. In MUTE mode, this shows the note detected (8) on the input jack. In PLAY mode, it indicates a "P" as in Figure 3.

9) Sharp note indication. When this indicator is lit (only in mute mode), it indicates the note is the sharp version of the note displayed. For example, if an "A" and a "." is displayed, this indicates the note "A#". See **TDI Usage Details** for more information.

10) Tuning level indicators. The center green LED indicates the displayed note is in tune when in mute mode. LEDs to the right indicate how sharp the note is. Similarly, LEDs to the left indicate how flat the note is. There are two sharp tuning level LEDs and two flat tuning level LEDs. The outermost LEDs indicate the note is further away from being in tune than the inner red LEDs.

MDI Only

Figure 5 shows the display for the MDI. Below is a description of the numbered pointers shown in the Figure.

11) Mute LED indicator. When lit, the XLR (5) and AMP (4) outputs are muted. When not lit, the outputs are active.

12) Power LED indicator. When lit, the unit is powered on and drawing current from the XLR jack (5). This allows for a way to check if 48V power is available on the XLR cable.

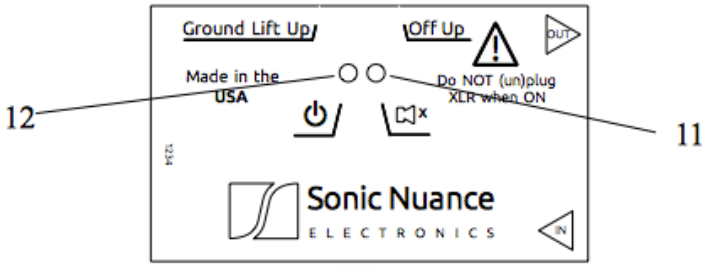


Figure 4: MDI Display

Usage Details

It is recommended to **not plug or unplug an XLR cable to the XLR jack when the unit (TDI or MDI) is ON**. Doing so will not damage the unit itself but may send a large signal to the mixing board. There are many reasons for this that are tied to the initial specification for P48 phantom power. (This is no different than any other XLR powered microphones put on a channel and should be treated in the same manner).

For this reason, the recommended power up and power down sequence is the following:

Power up Sequence:
1) While the TDI/MDI power switch is in the OFF position and no power is applied to the dc jack, connect the XLR plug to the XLR jack.
a)Preferably 48V is off on the channel and it is muted at the mixing board.

2) Once 48V poweris provided to the XLR plug or dc power is provided on the dc jack, put the TDI/MDI's power switch in the ON position.
a) In the case of the TDI a startup calibration sequence will be initiated.
b) For the MDI, the Power LED indicator will light.

Power down sequence:
1) Put the TDI/MDI power switch in the "OFF" position

2) Wait until all LEDs on the unit are no longer lit before unplugging the XLR plug from the unit's XLR jack

In summary: Do not (un)plug the XLR cable when the unit is ON.

In so doing, the unit can be connected/disconnected from the mixing board without having to ask the sound engineer to mute the channel. However, it is always a good practice to have the *channel* muted that the TDI/MDI is connected to as it is impossible to completely eliminate the audio artifact of charging/discharging the XLR jack (5) to the long XLR cable's level in all cases.

Note about quiet muting

Due to the passive nature of the mute function in the TDI/MDI and the unknown source and load impedances, in some situations there may be a slight audible "click" in the signal path when pressing the foot switch to enter or exit mute mode. This may be mitigated by turning the instrument's volume control to minimum when depressing the foot switch. However, it may be impossible to *completely* eliminate this slight click in some cases.

Tuning with the TDI

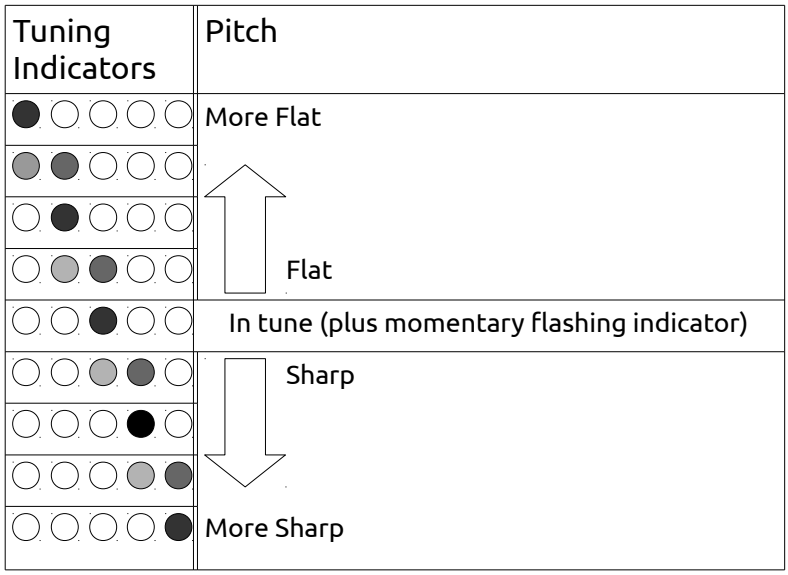
The TDI only uses the digital tuning circuitry when in the "mute" mode. Thus to engage the tuner, make sure the display does NOT show a "P".

Press the foot switch (7) to activate the tuner if in play mode. When the tuner is activated, both XLR (5) and AMP (4) outputs are muted for silent tuning. (Note that this could also be used to change instruments without bothering the soundman in live situations.)

Pluck a **single note at a time** (you should mute the strings not being tuned) and the display window will indicate the note that is being played. A dot in the lower right corner of the display indicates the sharp (#) of the note. The display indicates the chromatic notes detected in "mute mode" as follows:

Note	A	A#	B	C	C#	D	D#	E	F	F#	G	G#
Display	A	A.	B	C	C.	D	D.	E	F	F.	G	G.

Tune your string up or down until the green "in tune" light is displayed and a sequence of red leds go toward it in a flashing pattern indicating proper tuning is achieved. The figure below shows the mapping between the LED tuning indicators and the level of tuning.



The TDI's tuner is quite sensitive and has a large dynamic range. You may find that plucking a string lightly with the volume knob at maximum gives faster and/or more stable note detection. This is due to the fact that most instrument strings pull sharp by up to 10 cents depending on how hard they are plucked and introduce more overtones. Rather than completely eliminating this information, the TDI shows some of it allowing the user to see the effect of attack and overtones on pitch. The harder the string is plucked, the more sharp the initial attack will be and the more overtones there will be. For this reason, either plucking the string lightly or waiting for the string amplitude to decay may give more stable results.

If tuning is still difficult, try one or more of the following:

1) tune using the 12th fret harmonic on a guitar/bass

2) pluck closer to the neck to get fewer overtones

3) use the neck pickup vs the bridge pickup to get fewer overtones (assuming your instrument has more than one pickup)

4) Tune going from flat to sharp while slowly turning the instrument's tuning machine

5) Dampen all strings but the one you are focusing on

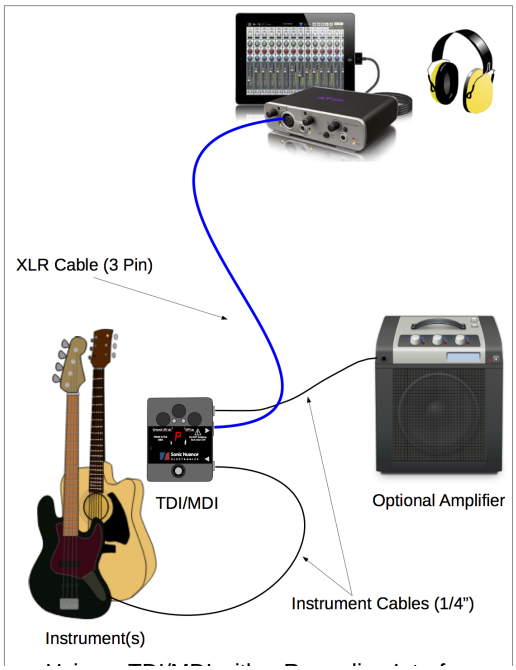
6) Tune an acoustic-electric instrument when the soundboard isn't vibrating due to other band instruments playing (i.e. drums, loud bass, etc)

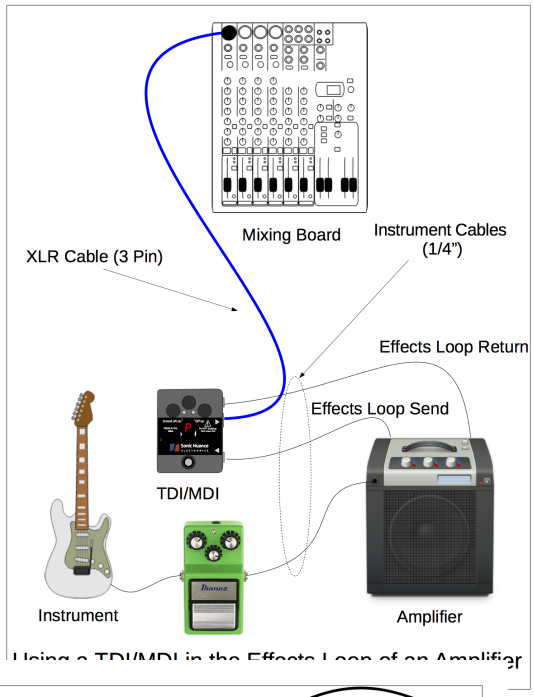
Due to the accuracy of the TDI, you may also notice the following:

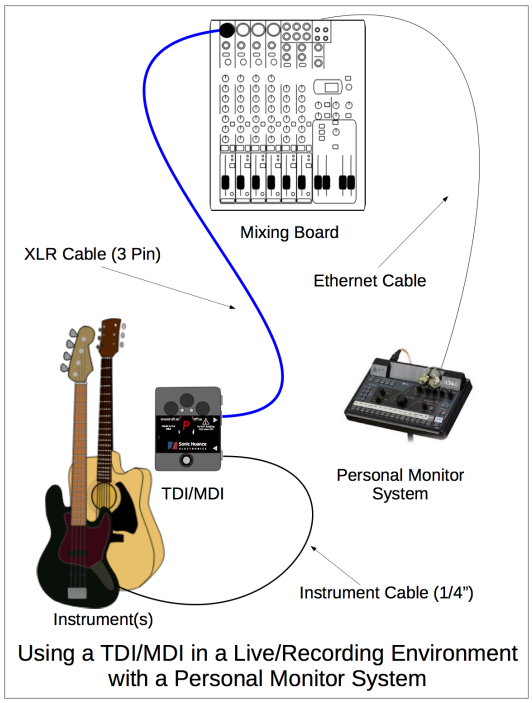
1) tuning while sitting with your instrument gives a different result than when standing (since the torque on the neck is slightly different between sitting and standing).

2) As a note decays it may not stay at the same tuning level. This depends on many factors regarding stability of the instrument's saddles, neck and body.

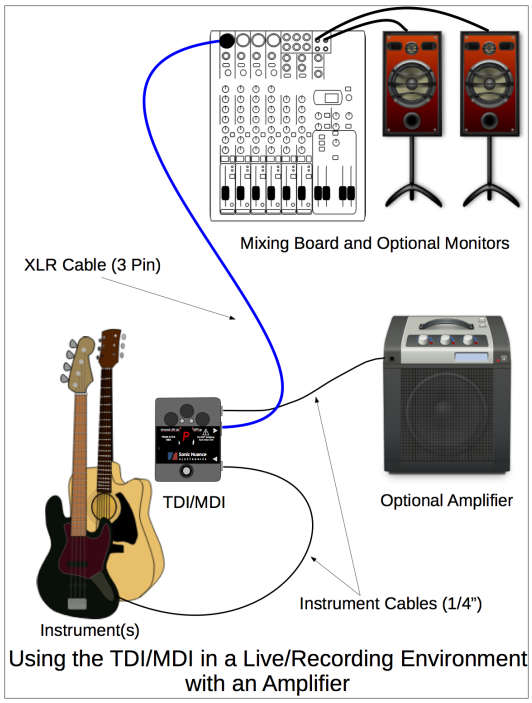
Typical Usage Models







Using a TDI/MDI in a Live/Recording Environment with a Personal Monitor System



Using the TDI/MDI in a Live/Recording Environment with an Amplifier

Specifications

TDI Specs	
Construction Approach	Modular military-style for field serviceability. Chassis mounting for all I/O. All components selected for ruggedness and sound quality.
DI Type	Passive transformer balanced. DI operates with or without phantom (48V) power.
Transformer	Jensen JT-DB
Mute type	Output electrically disconnected from input. Mute operates with or without phantom power.
Voltage gain	-22dB typ
Frequency Response	-0.25dB at 20Hz to 0.1dB at 20kHz.
¼ jacks	Switchcraft with rugged metal threads
Foot switch	Rugged latching type.
Power & ground lift switches	Self cleaning toggle or pushbutton type
XLR jack	Neutrik. Balanced (via transformer) AES Standard: Pin 2 positive Pin 3 Negative Pin 1 Ground
DC power jack (mk2 only, optional other models)	2.1mm center negative. 9 to 24V DC regulated supply. 100mA current capacity minimum
XLR THD @ 20Hz 1kohm load +4dBu input	0.04% typical (dominant distortion is the 3rd harmonic)
XLR THD @ 1kHz 1kohm load +4dBu input	0.003% typical (dominant distortion is the 3rd harmonic)
Tuning indicators	Mk2: from +/-1,cent continuously variable to +/-50cents, Mk1: from +/-2cents, continuously variable to +/-50cents
Reference Pitch	A4=440Hz
Tuning algorithm	Proprietary low power with adaptive analog and digital filtering
Tuning range	E0-E5 (~20Hz to ~660Hz) (below low B of bass to 12th fret high E string of a standard tuned guitar)
Tuning Accuracy	Mk2: Better than +/-1 cents E0 (~20Hz) to A4 (440Hz) (-20dBu pure sine wave). Mk1: Better than +/-2 cents E0 (~20Hz) to A4 (440Hz) (-20dBu pure sine wave).
Power circuitry	Proprietary soft power on/power off and dynamic load control
Enclosure	Hammond Die cast Aluminum with lap-joint construction. Precision CNC machined after a rugged textured polyester powder coat is applied for better electrical connectivity for jacks.
Current Draw	Less than 8mA average from P48 Phantom power per IEC 61938 specification. Active power regulation.
FCC Approval	Complies with Title 47 CFR Part 15 Subpart B (unintentional radiators)
Warranty	Three year limited (see www.sonicnuance.com for details)
Specifications subject to change without notice. See www.sonicnuance.com for latest information	

MDI Specs	
Construction Approach	Modular military-style for field serviceability. Chassis mounting for all I/O. All components selected for ruggedness and sound quality.
DI Type	Passive transformer balanced. DI operates with or without phantom power.
Transformer	Jensen JT-DB
Voltage gain	-22dB typ
Frequency Response	-0.25dB 20Hz to 0.1dB 20kHz
Mute type	Output electrically disconnected from input. Mute operates with or without phantom power.
¼ jacks	Switchcraft with rugged metal threads
¼ jacks	Switchcraft with rugged metal threads

Foot switch	Rugged latching type.
Power & ground lift switches	Self cleaning toggle type
XLR jack	Neutrik. Balanced (via transformer) AES Standard: Pin 2 positive Pin 3 Negative Pin 1 Ground
DC power jack (optional feature)	2.1mm center negative. 9 to 24V DC regulated supply. 100mA current capacity minimum
XLR THD @ 20Hz 1kohm load +4dBu input	0.04% typical (dominant distortion is the 3rd harmonic)
XLR THD @ 1kHz 1kohm load +4dBu input	0.003% typical (dominant distortion is the 3rd harmonic)
Power circuitry	Proprietary soft power on/power off and dynamic load control
Indicators	LEDs for power and mute indication P48 phantom powered. DI and mute feature operate without phantom power
Enclosure	Hammond Die cast Aluminum with lap-joint construction. Precision CNC machined after a rugged textured polyester powder coat is applied for better electrical connectivity for jacks.
Current Draw	Less than 10mA average from P48 Phantom power per IEC 61938 specification. Active power regulation.
Warranty	Three year limited (see www.sonicnuance.com for details)
Specifications subject to change without notice. See www.sonicnuance.com for latest information	

To meet the requirements of California Proposition 65, it is our responsibility to inform you of the following: WARNING: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Please take proper care when handling and consult local government regulations before discarding.

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