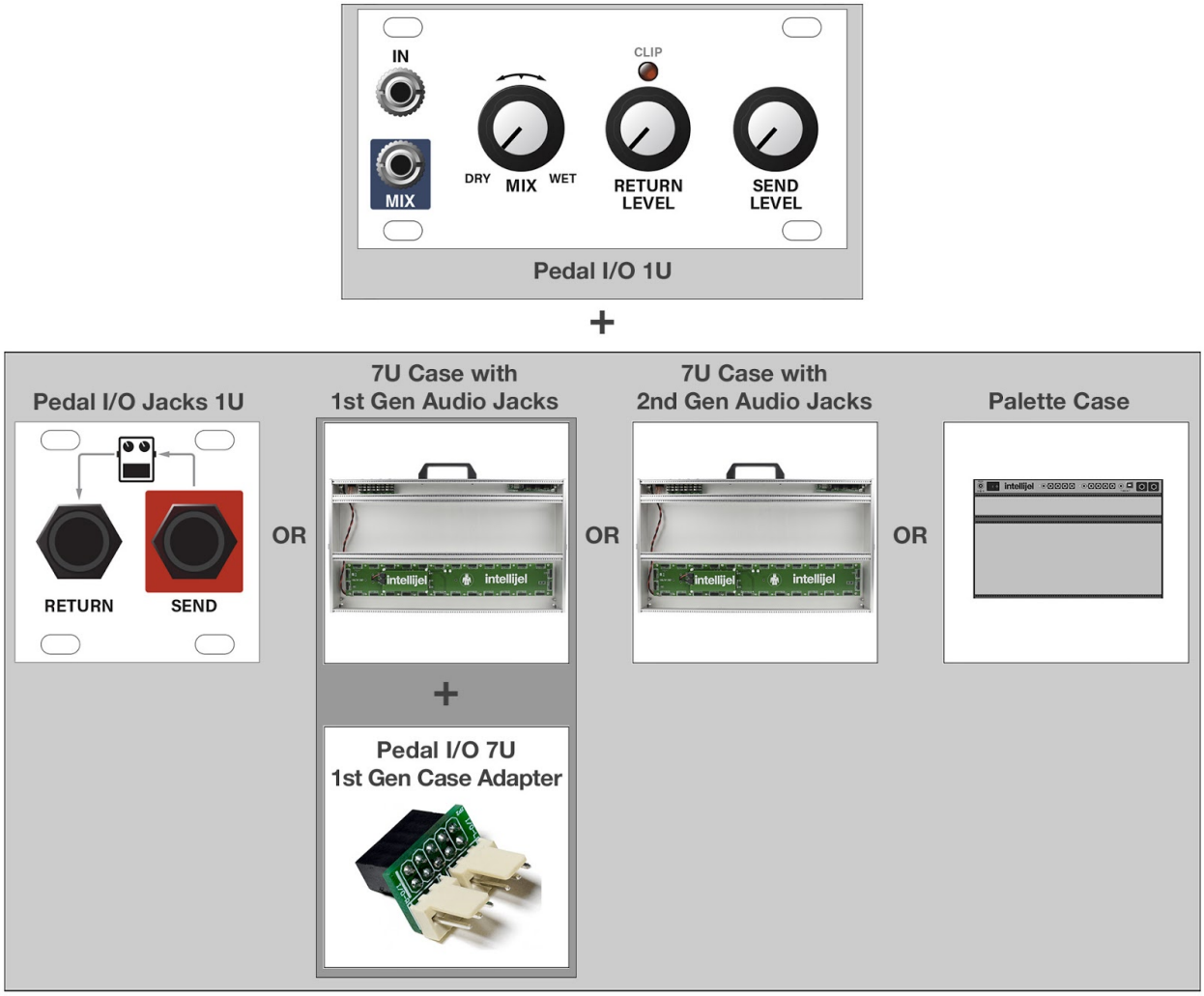
Pedal I/O 1U System

Effects Pedal Send/Return and High Impedance Instrument Input for Eurorack



Manual Revision: 2019.05.12

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Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by Intellijel Designs, Inc. could void the user's authority to operate the equipment.

Any digital equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

This device meets the requirements of the following standards and directives:

EMC: 2014/30/EU
EN55032:2015 ; EN55103-2:2009 (EN55024) ; EN61000-3-2 ; EN61000-3-3

Low Voltage: 2014/35/EU
EN 60065:2002+A1:2006+A11:2008+A2:2010+A12:2011

RoHS2: 2011/65/EU

WEEE: 2012/19/EU

Overview

Eurorack is a synthesist's toy chest. Stompboxes are a guitarist's toy chest. Each industry offers a seemingly infinite variety of products that enable musicians to build systems unique to their needs, and to create a signature sound. Each is also somewhat addictive. Rare is the musician who doesn't eventually need a larger toy chest to house the accumulated toys.

Fortunately for the budget conscious musician, Eurorack modules and stompboxes have always existed in separate worlds — someone whose eurorack system consumes an entire wall in their home is usually not the same person whose pedalboard now requires a dedicated roadie just to transport it to the gig.

But those worlds have now collided. Thanks to the release of the Pedal I/O 1U system, Intellijel has knocked down the barrier between eurorack and stompbox. This seemingly innocuous little product is both a modular synthesist's portal to stompbox nirvana, and a guitarist's wormhole to the sonic manipulations of eurorack modules.

The Pedal I/O 1U system enables the modular synthesist to interact with the impressive assortment of delays, choruses, flangers, phasers, fuzz boxes, tremolos, wah-wahs, amp simulators, compressors and pitch shifter pedals available to guitarists. Conversely, it also grants guitarists access to the myriad filters, ring mods, wavefolders and — most importantly — the near infinite CV modulation delights inherent in eurorack.

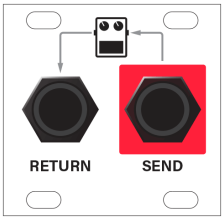
System

A complete Pedal I/O solution requires two components:

1. A **Pedal I/O 1U** Module:

	The **Pedal I/O 1U** module houses all the necessary gain and impedance-matching circuitry, along with the ⅛" jacks required to interface with eurorack modules. It also includes the link cable for connecting one of the several ¼" jack options outlined below.

2. A pair of ¼" jacks (one send, and one return) for connecting your pedal. There are several ways to acquire these jacks, including:

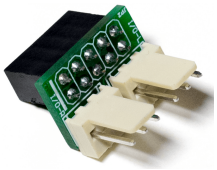
	**Pedal I/O Jacks 1U Module** If you don't own an Intellijel case with built-in ¼" jacks (or if you prefer to use those jacks or other purposes), then you need to purchase a **Pedal I/O Jacks 1U** module, which connects behind-the-panel to the Pedal I/O 1U module, and provides a pair of ¼" in/out jacks for connecting guitars or stompboxes.
	**Palette Case** If you own an Intellijel Palette case, you can connect the **Pedal I/O 1U** module directly to its built-in pair of ¼" jacks, rather than purchasing a **Pedal I/O Jacks 1U** module.
	**7U Case w/ 2nd Generation Audio Jacks Board** If you own an Intellijel 7U case with a 2nd generation **Audio Jacks Board** (distinguished by the row of shrouded headers along its bottom edge), you can use its jacks rather than purchasing a **Pedal I/O Jacks 1U** module.

7U Case w/ 1st Generation Audio Jacks Board

If you own an Intellijel 7U case with a 1st generation **Audio Jacks Board** (no row of shrouded headers along its bottom edge), you have two choices:

A) Purchase and install a 2nd generation Audio Jacks Board to replace the 1st generation.

B) Purchase the **Pedal I/O 7U 1st Gen Case Adapter**, which allows you to connect a pair of *Pedal I/O 1U* modules to a 1st generation Audio Jacks Board.

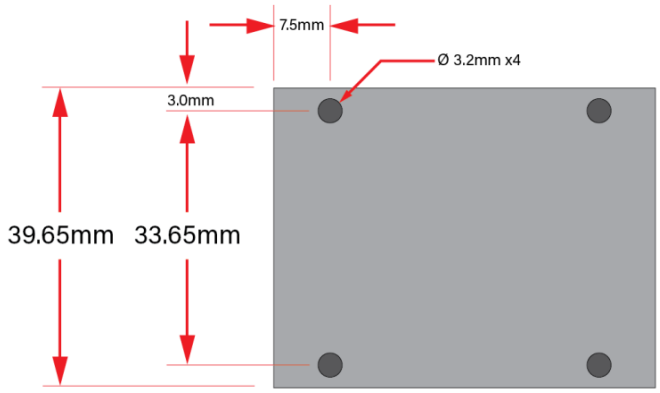


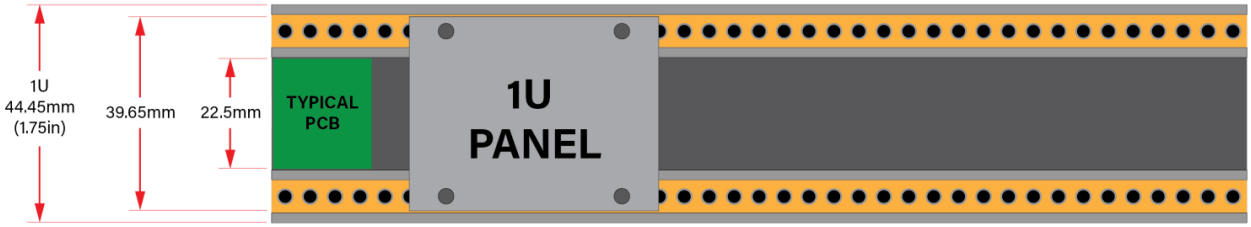
Features

- Signals arriving at the Pedal I/O System through the RETURN jack (or from your case's IN jack if using a 7U or Palette case) pass through a Class A triode emulator, allowing for some tube-like overdrive at high gain setting.
- The Pedal I/O is more than just a simple level shifter — it's also an impedance converter, which provides proper drive and loading for any FX pedals or instruments you connect.
- Separate gain controls on both the SEND and RETURN. This enables you to adjust the level of any audio being sent to the FX pedals as well as any audio coming back into the modular. Not only does this allow you to optimize the signal-to-noise ratio, but by significantly boosting the RETURN level, you can achieve some pleasingly overdriven tones.
- Use the Pedal I/O's RETURN circuit as a "direct box" for connecting any instrument.
- The high input impedance of the RETURN circuit allows it to be used as a piezo pickup preamp for acoustic instruments.
- Use Pedal I/O in the studio as an active "re-amping" device to play pre-recorded tracks back through guitar amplifiers or pedals.
- All inputs are protected for minimum RF interference.
- Low MIX output impedance for driving long cables, lower noise, and minimum interference from outside sources.

Installation

This module is designed for use within an Intellijel-standard 1U row, such as contained within the Intellijel 4U and 7U Eurorack cases. Intellijel's 1U specification is derived from the Eurorack mechanical specification set by Doepfer that is designed to support the use of lipped rails within industry standard rack heights.





Before Your Start

Intellijel Eurorack modules are designed to be used with a Eurorack-compatible case and power supply. We recommend you use Intellijel cases and power supplies.

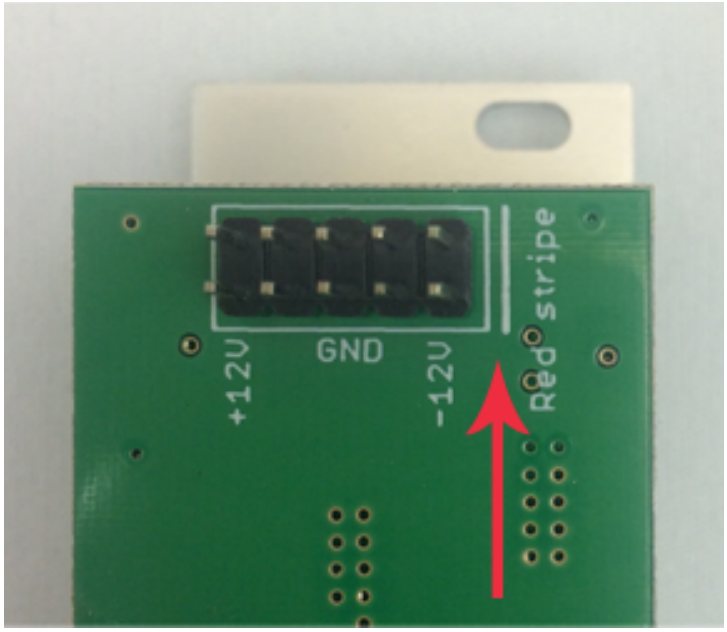
Before installing a new module in your case, you must ensure your power supply has a free power header and sufficient available capacity to power the module:

- Sum up the specified +12V current draw for all modules, including the new one. Do the same for the -12 V and +5V current draw. The current draw will be specified in the manufacturer's technical specifications for each module.
- Compare each of the sums to specifications for your case's power supply.
- Only proceed with installation if none of the values exceeds the power supply's specifications. Otherwise you must remove modules to free up capacity or upgrade your power supply.

You will also need to ensure your case has enough free space (hp) to fit the new module. To prevent screws or other debris from falling into the case and shorting any electrical contacts, not leave gaps between adjacent modules, and cover all unused areas with blank panels. Similarly, do not use open frames or any other enclosure that exposes the backside of any module or the power distribution board.

You can use a tool like ModularGrid to assist in your planning. Failure to adequately power your modules may result in damage to your modules or power supply. If you are unsure, please contact us before proceeding.

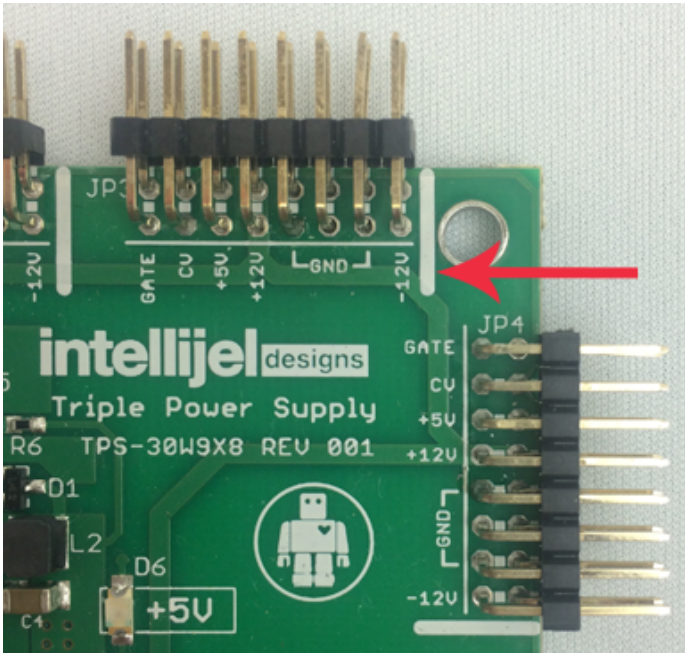
Installing Your Module



When installing or removing a module from your case always turn off the power to the case and disconnect the power cable. Failure to do so may result in serious injury or equipment damage.

Ensure the 10-pin connector on the power cable is connected correctly to the module before proceeding. The red stripe on the cable must line up with the -12V pins on the module's power connector. The pins are indicated with the label -12V, a white stripe next to the connector, the words "red stripe", or some combination of those indicators.

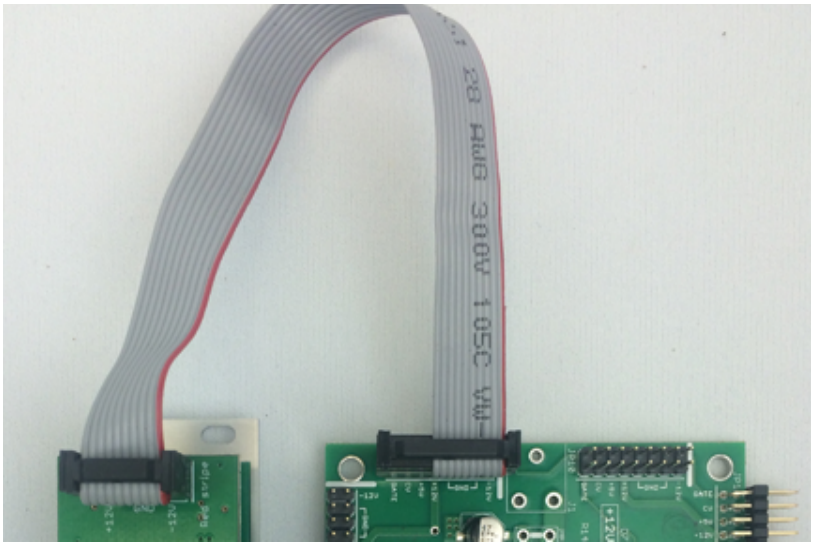
Most modules will come with the cable already connected but it is good to double check the orientation. Be aware that some modules may have headers that serve other purposes so ensure the cable is connected to the right one.



The other end of the cable, with a 16-pin connector, connects to the power bus board of your Eurorack case. Ensure the red stripe on the cable lines up with the -12V pins on the bus board. On Intellijel power supplies the pins are labelled with the label "-12V" and a thick white stripe:

If you are using another manufacturer's power supply, check their documentation for instructions.

Once connected, the cabling between the module and power supply should resemble the picture below:

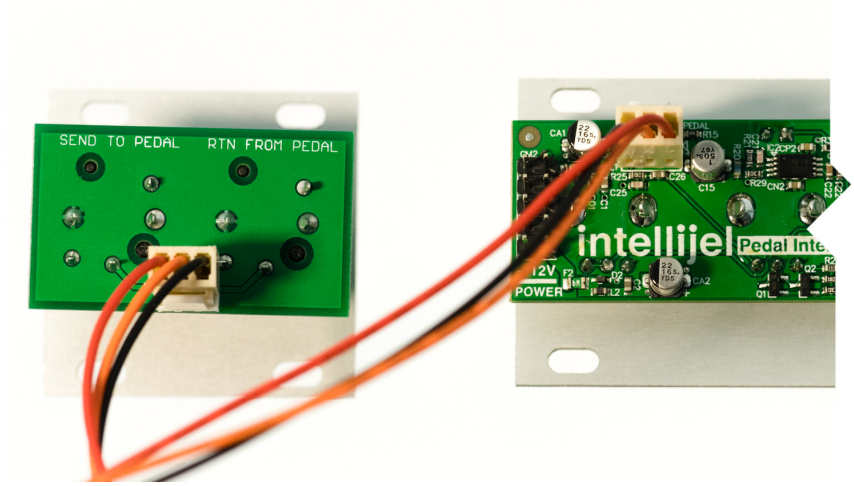


Before reconnecting power and turning on your modular system, double check that the ribbon cable is fully seated on both ends and that all the pins are correctly aligned. If the pins are misaligned in any direction or the ribbon is backwards you can cause damage to your module, power supply, or other modules.

After you have confirmed all the connections, you can reconnect the power cable and turn on your modular system. You should immediately check that all your modules have powered on and are functioning correctly. If you notice any anomalies, turn your system off right away and check your cabling again for mistakes.

Connecting the Pedal I/O to a Pedal I/O Jacks 1U Module

The *Pedal I/O 1U* module ships with a 3-wire link cable. Use this to connect the *Pedal I/O* to either a *Pedal I/O Jacks* module or to a compatible case with built in ¼" jacks.



If you purchased the *Pedal I/O Jacks* module, simply connect it to the *Pedal I/O* module with the link cable as shown to the right.

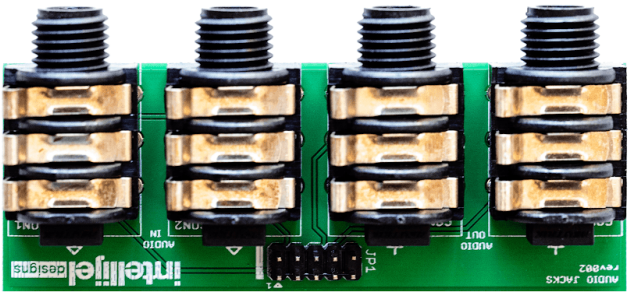
The connectors are keyed, so you can orient them only one way — ensuring that you can't connect the cable backwards. The *Pedal I/O Jacks* does not require power, and the link cable is long enough that the two modules don't have to be installed side-by-side if you don't wish.

*NOTE: Never use the 3-wire link cable to connect a **Pedal I/O** module to an Intellijel **Mixup** module. Although both modules use this same cable/connector — they serve different purposes and carry different signals.*

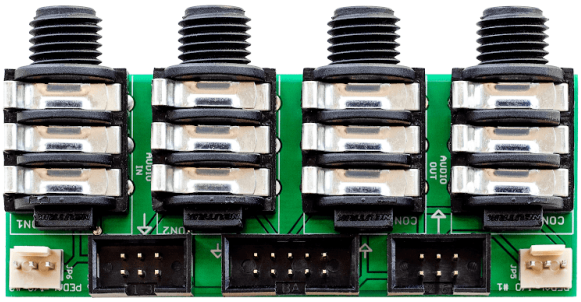
Connecting the Pedal I/O to a 7U Case

The *Pedal I/O 1U* module ships with a 3-wire link cable. Use this to connect the *Pedal I/O* to either a *Pedal I/O Jacks* module or to a compatible case with built in ¼" jacks.

If you're connecting to a 7U case, first determine whether it has a 1st or 2nd generation Audio Jacks board. 1st gen boards (included with cases built before early 2019) have a single connector (other than the power connector). 2nd gen boards have a large shrouded header flanked by two smaller shrouded headers, flanked by two link connectors at either end.



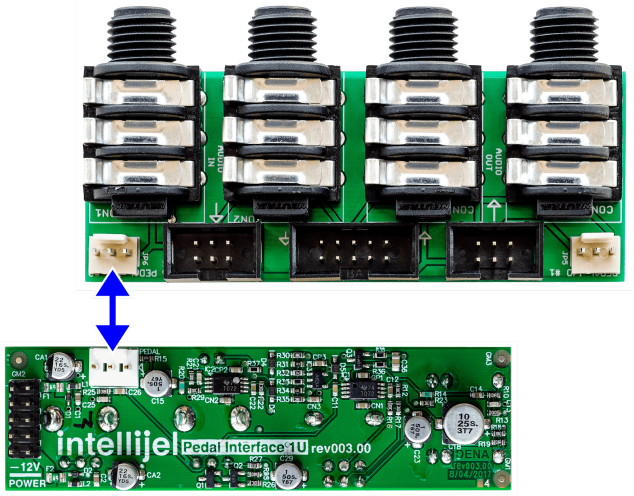
1st GENERATION AUDIO JACKS



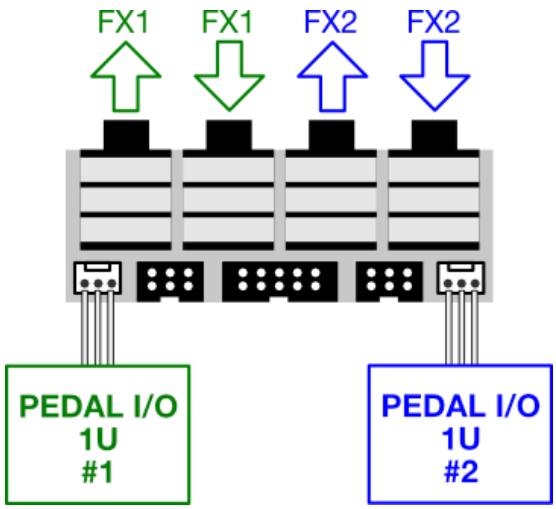
2nd GENERATION AUDIO JACKS

Connecting to a 2nd Generation Audio Jacks Board

If your case has the 2nd generation board, you can connect the link cable directly between the *Pedal I/O 1U* module and one of the two link connectors on your *Audio Jacks Board*. The connectors are keyed, so you can orient them only one way — ensuring that you can't connect the cable backwards.



The left connector sends/returns from the left pair of jacks and the right connecter sends/returns from the right pair of jacks. You can connect two Pedal I/O's to a single Audio Jack board if you wish.



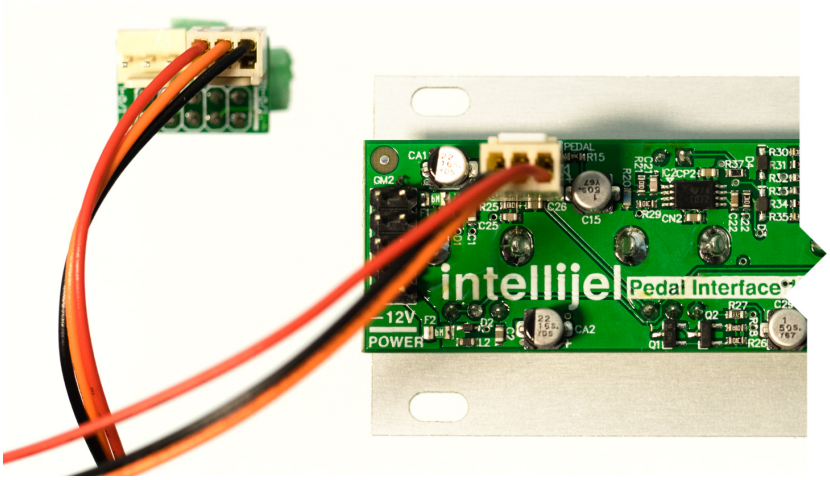
Connecting to a 1st Generation Audio Jacks Board

If your case has the 1st generation board, you have two choices:

A) Purchase and install a 2nd generation *Audio Jacks Board*. This has the advantage of providing you with greater flexibility, allowing you to mix and match which modules you wish to connect to the jacks.

B) Purchase a *Pedal I/O 7U Case Adapter*, which connects to the single connector on a 1st generation audio jacks board, enabling you to use it with a pair of *Pedal I/O 1U* modules.

If you chose to purchase the *Pedal I/O 7U Case Adapter*, simply connect it to the *Pedal I/O* module with the link cable as shown to the right. Note that you can connect **two** *Pedal I/O* modules to a single *Pedal I/O 7U Case Adapter*.

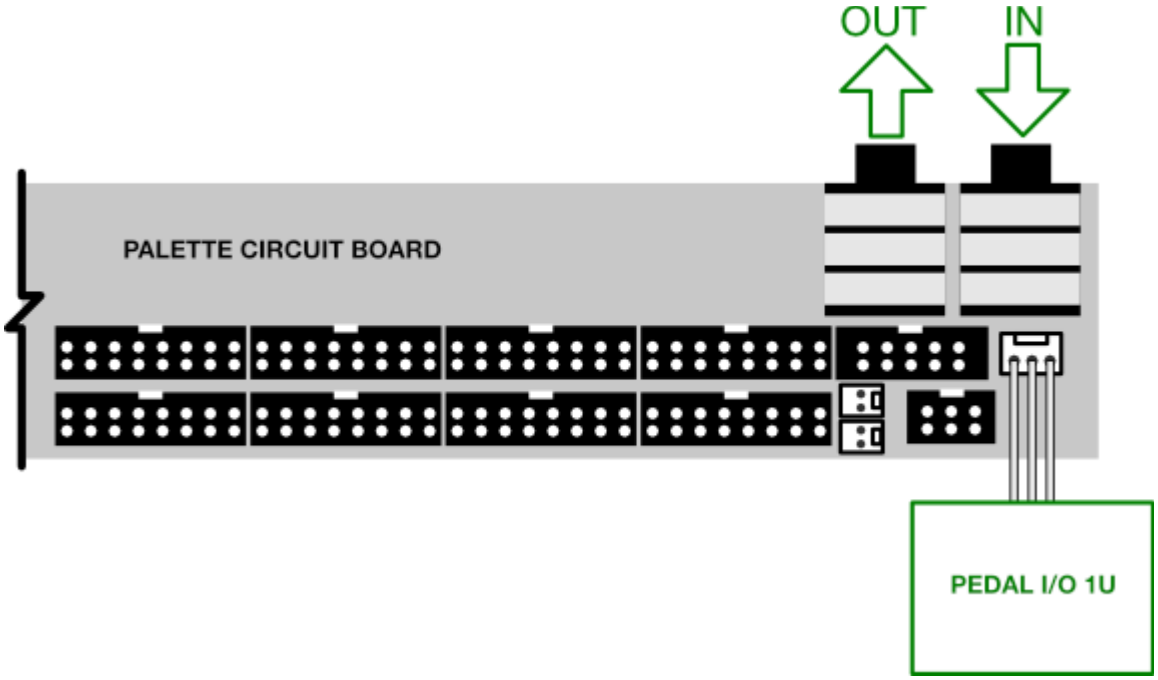


Next, plug the *Pedal I/O 7U Case Adapter* into the your case's first generation *Audio Jacks Board*, making sure to align the white lines on the two boards, as shown to the right.

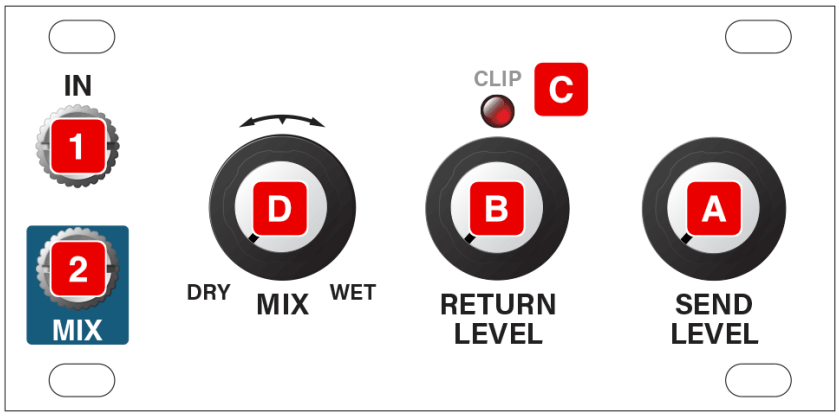
Connecting the Pedal I/O to a Palette Case

The *Pedal I/O 1U* module ships with a 3-wire link cable. Use this to connect the *Pedal I/O* to either a *Pedal I/O Jacks* module or to a compatible case with built in ¼" jacks.

If you're installing the *Pedal I/O 1U* in a Palette case, simply connect the link cable directly between the *Pedal I/O 1U* module and the single 3-pin link connector on your Palette case's circuit board. The connectors are keyed, so you can orient them only one way — ensuring that you can't connect the cable backwards.



Front Panel (Pedal I/O 1U)



Controls

A. **SEND LEVEL** knob - Adjusts the level of the signal arriving at the Pedal I/O's **IN** jack before it's sent out of your modular and into your FX pedals (by way of either the ¼" SEND jack on the Pedal I/O Jacks, or a ¼" OUT on a compatible case).

B. **RETURN LEVEL** knob - Adjusts the signal level coming back into the modular from your external effects pedals, or from an instrument plugged directly into either the ¼" RETURN jack on the Pedal I/O Jacks, or a ¼" IN on a compatible case.

C. **CLIP** Indicator LED - This LED monitors the signal level coming back into the modular from either your external effects pedals, or from a connected instrument input. It lights slightly before clipping, giving you a bit of headroom before actual clipping occurs. This lets you maximize levels by allowing the **CLIP** LED to light occasionally on the highest peaks. But as with all things musical — use your ears as the deciding factor!

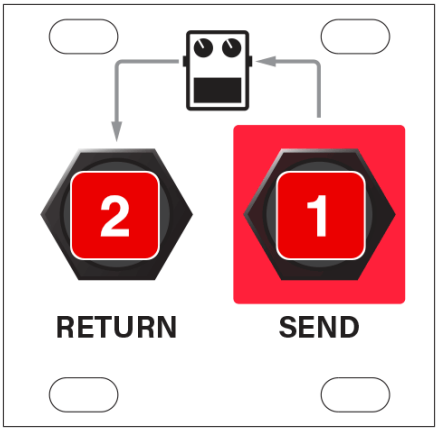
D. **MIX (DRY/WET)** knob - Determines the wet/dry balance of the signal sent to the module's **MIX** output. Fully counterclockwise, only the DRY (unprocessed) signal is heard in the MIX. Fully clockwise, only the WET (processed) signal is heard in the **MIX**. At the noon position, equal amounts of WET and DRY appear in the **MIX**.

NOTE: Not every pedal is designed to have its input signal mixed in with its output. Some (for example, phase shifters) may return a signal that is out of phase with the original audio, so balancing the Wet & Dry levels could result in phase cancellation. In such cases, you'll probably want to set the MIX knob to maximum wetness.

Inputs & Outputs

1. **IN** - Connect the audio signal you want processed by your external pedals to the **IN** jack. Modular-level audio arriving at this jack is converted to instrument-level audio and impedance-matched before it's sent to either the Pedal I/O Jacks' SEND jack or to the ¼" OUT jack on a compatible case.
2. **MIX** - Any audio that's returned from your FX pedals is converted back to modular-level and impedance-matched prior to appearing here at the **MIX** jack. If you plug a guitar or other instrument into the Pedal I/O Jacks' RETURN jack (or into a ¼" IN jack on a compatible case), then the modular-level and impedance-matched signal from that instrument appears at the **MIX** jack.

Front Panel (Pedal I/O Jacks 1U)



Inputs & Outputs

1. **SEND -** Connect a ¼” instrument cable from the **SEND** jack to the input of your external FX pedal. The audio coming out the **SEND** jack is an instrument-level & impedance-matched version of the modular-level audio signal you connected to the *Pedal I/O* module’s IN jack.

   NOTE: This is an unbalanced TS cable (standard for guitars and FX pedals), though you can use TRS cables — you just won’t get any benefit from doing so.

2. **RETURN -** Connect a ¼” instrument cable from the output of your external FX pedal to the **RETURN** jack on this module. The audio arriving at this jack is impedance-matched and converted to modular-level by the *Pedal I/O* module, where it’s then made available at that module’s MIX jack.

   You can also plug a guitar or other instrument directly into the **RETURN** jack and process it with your modular synth. This is a high impedance input, allowing the Pedal I/O system to act as a piezo pickup preamp for acoustic instruments. Audio arriving at the **RETURN** jack passes through a Class A triode emulator (enabling anything from clean to tube-like distortion) and an impedance converter and level shifter to insure full integration in a modular synth environment.

   NOTE: This is an unbalanced TS cable (standard for guitars and FX pedals), though you can use TRS cables — you just won’t get any benefit from doing so.

Technical Specifications

Pedal I/O IN jack:

- Input level = 0 dBV nominal, +17 dBV max
- Input impedance = 60 KΩ
- Gain = -30 dB to -20 dB
- RF filter protected

Pedal I/O Jack SEND (or 7U Case Adapter OUT):

- Output level = -20 dBV to -30 dbV nominal based on Send Level
- Output impedance = 12 KΩ to simulate the impedance of magnetic guitar pickup

Pedal I/O Jack RETURN (or 7U Case Adapter IN):

- Input level = -20 dBV to -30 dBV nominal based on Return Level
- Input impedance = 1 MegΩ
- Return Gain = fully off to +30 dB
- RF filter protected

Pedal I/O MIX jack:

- Output level = 0 dBV nominal, +17dB max
- Output impedance = 100Ω
- Frequency response is 20Hz to 22KHz
- THD = 0.002% to 0.085% at Vin = 0dBV to +17dBV
  (Pedal In to Pedal Out, Mix = effect, Return Level = min, Send Level = max)

  THD = 0.04% to 4.0% at Vin = 0dBV to +17dBV
  (Pedal In to Pedal Out, Mix = effect, Return Level = max, Send Level = max)

Pedal I/O Width Pedal I/O Jacks Width	16 hp 8 hp
Pedal I/O Maximum Depth Pedal I/O Jacks Depth	29 mm 44 mm
Current Draw	10 mA @ +12V 10 mA @ -12V