

# Pro48<sup>™</sup>

## Active Direct Box



## User Guide

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**CONGRATULATIONS** on your purchase of the Radial Pro48 active direct box. As with all Radial products the Pro48 is easy to use. This short manual contains all the information you need to start using the Pro48 right away. For more information on the Pro48 and other Radial products, visit our website at [www.radialeng.com](http://www.radialeng.com).

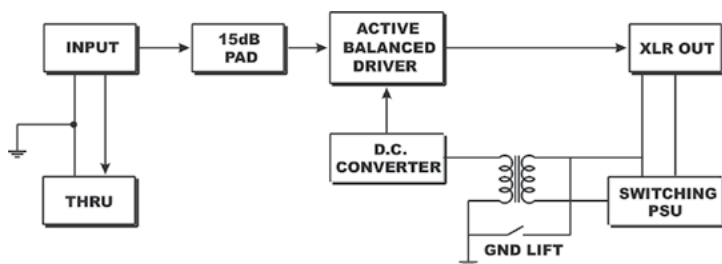
## OVERVIEW

The Pro48 is a great sounding active direct box. It has been optimized to produce maximum headroom and dynamics while working within the limited current available from 48V phantom power.

The Pro48 employs a unique switching power supply that steps up the current from phantom power to produce higher internal rail voltage than typical active DI's. This makes the Pro48 capable of peak input transients to 9 volts without any noticeable distortion, making it perfect for both active and passive instruments. The Pro48 is equipped with an input PAD to help prevent overload from hot signals and a ground lift to reduce noise caused by ground loops. The balanced XLR output can drive very long cables without appreciable signal loss. The Pro48 is constructed for heavy use in the studio and on stage.

## Pro48 BLOCK DIAGRAM

To fully understand the Pro48 follow the block diagram from the inputs on the left to the outputs on the right.



After the paralleled input and thru jacks the signal passes through a switchable 15dB PAD which allows the Pro48 to handle virtually any audio device from passive pickups to high output instruments without overloading.

Next comes the active drive circuit that converts the signal to balanced low impedance mic-level for transmission over long cables without noise or signal loss. The switching PSU steps up the current from phantom power and the drive circuit uses the higher rail voltage to increase headroom and dynamic range.

The switching PSU uses a transformer in the DC path to block noise caused by ground loops. The ground LIFT switch interrupts the ground path around the transformer to help suppress noise from bleeding through into the audio path.

## FEATURES AND FUNCTIONS

- ① **INPUT** - jack connects to instruments like guitars and keyboards.
- ② **-15dB PAD** - reduces the input level by 15dB to prevent overload from high output devices.
- ③ **LED INDICATOR** - lights to confirm phantom power is active and the Pro48 is working.
- ④ **THRU** - jack passes the instrument signal to the on-stage amplifier.
- ⑤ **FULL BOTTOM FOOT** - neoprene foam foot provides electrical isolation and plenty of friction to stay put.



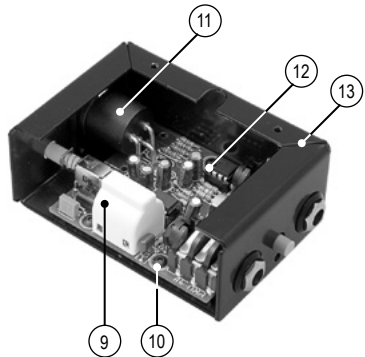
- ⑥ **14 GAUGE STEEL** - bookend shell creates a protective zone around the switches and connectors.
- ⑦ **OUTPUT** - Balanced mic-level output drives long cables without appreciable loss.
- ⑧ **GROUND LIFT** - helps to reduce hum and buzz caused by ground loops.



- ⑨ **SWITCHING POWER SUPPLY** - steps up the current from phantom power to produce 9 volt internal rails. With more voltage to work with than typical active DI's, the Pro48 exhibits more headroom and dynamic range while lowering noise.
- ⑩ **MILITARY-GRADE** - double-sided PCB is bolted to steel standoffs for road-tough construction.

- ⑪ **ISOLATED CONNECTORS** - are 100% electrically isolated from the chassis.
- ⑫ **ACTIVE DRIVE CIRCUIT** - electronically balances the signal and converts it to low-Z mic-level.

- ⑬ **I-BEAM DESIGN** - inner steel enclosure is made extremely rigid with an I-beam profile. This eliminates stress that could torque the PC board and cause solder joint failure.

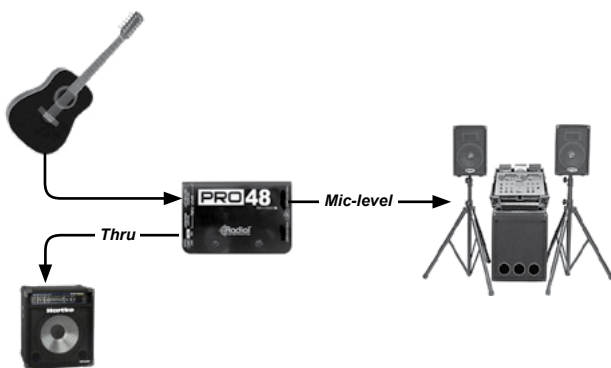


## CONNECTING THE Pro48

Before connecting the Pro48, start by making sure all volume levels are set to zero. This will avoid any loud pops in your sound system that could cause driver damage. Confirm the Pro48 switches are in their 'out' position.

Begin by connecting your instrument to the 1/4" INPUT jack on the Pro48. The instrument signal may be connected through the Pro48 to an amplifier using the 1/4" THRU jack.

Finally, connect the LOW-Z OUT to the input of a microphone snake or mixing console using a balanced XLR cable. The Pro48 can drive very long cable in excess of 300 feet without signal loss.



## USING THE Pro48

Once your cables are connected, turn on the phantom power source. The LED on the Pro48 will light to confirm phantom power is present and the Pro48 is active. Start at a low volume to make sure everything is working properly before increasing the level.

If you encounter distortion, check the input level at your mixer first. If your mixer controls appear normal, try depressing the input PAD switch on the Pro48. This will reduce the input level by -15dB.

If you encounter any buzz or hum, try lifting the ground switch on the Pro48 with the LIFT switch. This interrupts the signal ground between the input and output to reduce hum and buzz caused by ground loops.

Now close your eyes and rediscover the sound of your instrument.

## FREQUENTLY ASKED QUESTIONS

### ***What is the difference between active & passive?***

Active DI's have a built-in pre-amp requiring power to run while passive DI's use a transformer to convert the signal. Both transform or convert the instrument's high-impedance output to a low impedance balanced microphone level. This allows long cable runs without adding unwanted noise. Passive boxes have the advantage of providing isolation over typical DI's, which can reduce ground hum and noise in systems. The Pro48 features an isolation transformer in the power supply to address this problem.

### ***Which is better - active or passive?***

Both have their place just like dynamic and condenser microphones. Passive DI's are often easier to use because they do not require power while, active ones tend to have more reach. As a rule, passive direct boxes are best suited for electrically powered devices like keyboards, while active boxes are often preferred for instruments like acoustic guitars and basses.

### ***What makes the Radial Pro48 so special?***

Let's begin by understanding how active DI's work: active direct boxes are in fact preamplifiers. They boost the instrument's signal to a manageable level. This means that active direct boxes require power to run. As such, they must either get their power from batteries or phantom power from the console.

When using batteries, they must be fresh for the direct box to work properly. As soon as the power is low, the direct box will distort. This is why engineers hate batteries and prefer phantom power. But phantom has limitations; phantom power was originally developed to supply low-current condenser microphones. The AES specification for phantom is 48 volts with only a few milliamps of current. We tested a popular acoustic guitar with built-in pre-amp and found that when pushed to the max, the output peaked at 7 volts. Considering that most DI's can barely manage 3 volts, it is no wonder guitars often sound harsh in a PA system. The Radial Pro48 was specifically designed to solve this problem by increasing the internal rail voltage so that these high output instruments would not overload the DI's input.

### ***How does Radial increase the rail voltage?***

We take the phantom power voltage and drive it through a special custom made DC-to-DC transformer. The transformer is coupled to a timing chip that essentially drives the signal in the same way as the newer switch mode or digital power amplifiers work. This brings the current up to a workable level and creates a higher internal rail voltage to handle the dynamics.

### ***What is phantom power?***

Phantom power is a 48 volt DC supply that comes from the mixing console that was originally designed to provide power to condenser microphones. The Radial Pro48 takes the phantom power and converts it using an internal switching power supply. This allows the Pro48 to handle higher transients without the distortion associated with most active direct boxes.

<b>Pro48 SPECIFICATIONS</b>	
Frequency response:	20Hz to 40kHz
Linear performance:	+/- 0.12dB 20Hz to 20kHz
Total harmonic distortion:	0.01 % from 20Hz to 20kHz
Input impedance:	220K ohms
Balanced outputs:	600 ohms, mic level
PAD:	-15dB
Power:	48V Phantom
This device complies with section 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.	

## **RADIAL LIMITED THREE YEAR TRANSFERABLE WARRANTY**

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