www.radialeng.com

Radial™ engineering — True to the Music

Radial JD6
Six channel rack mount D.I.

User Guide

Radial Engineering Ltd.
1638 Kebet Way, Port Coquitlam BC V3C 5W9
tel: 604-942-1001 • fax: 604-942-1010
email: info@radialeng.com web: www.radialeng.com

Radial JD6 Owner's Manual

TABLE OF CONTENTS **PAGE NUMBER**

1. Introduction 1
2. The JD6 Design Concept 2
3. Development of the JD6 2
4. Rear Panel Connections 5
5. Using the JD6 6
6. Grounding Options for the System Engineer 7
7. Typical Stage Set-up Using the Radial JD6 8
8. Typical Studio Set-Up Using the Radial JD6 8
9. Optional Output Panels 9
10. The Advantage of Going Passive! 9
11. Radial JD6 - Questions & Answers 10

Warranty Information .....Back Cover

1. INTRODUCTION

Congratulations on your purchase of the Radial JD6 multi-channel direct box. The JD6 is a world-class 19" rack-mountable DI system that has been optimized for use with keyboards, audio-visual equipment, computer sound cards, samplers, electronic drums and instruments of all types.

As there are many innovative features in the JD6, we recommend that you take a few minutes to read through this manual in order to familiarize yourself with the design and features that are built in. Most importantly, the Radial JD6 features internal grounding options that will be of particular interest to engineers when integrating the JD6 with keyboard racks and audio-visual systems.

Should you have a question or application in mind that is not covered in this manual, we invite you to log onto the Radial web site at www.radialeng.com to check the Questions and Answers section for the latest updates. Of course you can also send us an email at info@radialeng.com should you have a particular need.

Have fun!

Radial Engineering
1638 Kebet Way, Port Coquitlam BC V3C 5W9
tel: 604-942-1001 • fax: 604-942-1010
email: info@radialeng.com web: www.radialeng.com

Specifications and appearance subject to change without notice.

2. THE JD6 DESIGN CONCEPT

Over the past several years, there has been a shift in the way keyboards, digital samplers and electronic drums have been used in live sound. Most notable has been the integration of the portable PC (personal computer) and sound card as part of the musical array. Add to this the insurgence of the disk jockey and his assortment of scratch samplers and one can begin to foresee the need for a new interface to 'tame the beast'.

Live sound is but a portion of this emerging market. The introduction of affordable 24bit / 96kHz technology has allowed the musician, artist and engineer to fashion a 'home office' and create a completely viable project studio in the comfort of a spare room. The same live touring equipment must be able to transition from the road to the studio right along side the computer.

Ultimately it must be easy to use, be able to adapt to a variety of set-ups, be compact for maximum rack density and sound absolutely amazing. And uh… did I mention that it must solve all those nasty ground loop problems that cause keyboard technicians to have nightmares?

3. DEVELOPMENT OF THE JD6

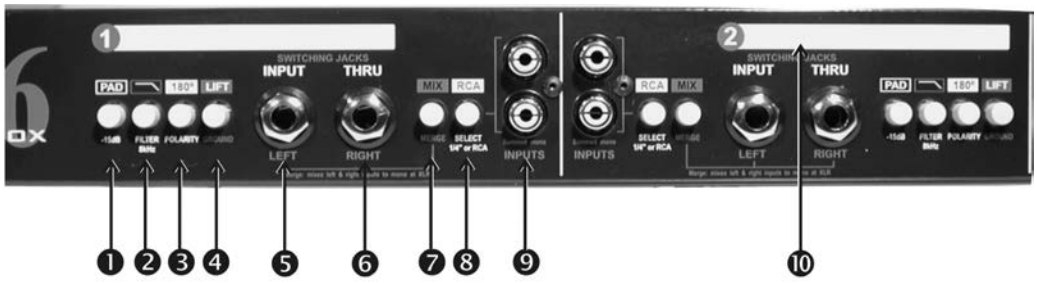
The Radial JD6 is a 6-channel version of the highly successful Radial JDI direct box and supercedes the Radial JD4 as the new standard 19" rack mounted direct box. Upon inspection you will notice that channels 1 and 2 differ from channels 3 through 6. A 'Swiss Army knife' approach is introduced to allow the 1st two channels on the JD6 to be problem solvers for stage and studio. Added features include a high frequency filter to reduce noise, a merge function to mix left & right keyboard outputs to mono and choice of ¼" inputs or RCA's for improved interfacing with audio-visual equipment and computers. The other 4 channels address basic DI requirements as normally required for keyboards, electronic drums and other electronic devices.

As with all Radial direct boxes, the audio signal path is of utmost importance. The Radial JD6 is a passive direct box and employs the Radial's finest Eclipse™ audio transformers for absolute performance. You can hit the JD6 with tons of level and you will never saturate the core! At less than 0.006% distortion at 20Hz, the JD6 has no equal. However harmonic distortion is only part of the story: the Radial JD6 exhibits less than 4º phase deviation at 20Hz making it the ultimate choice for keyboards where extreme dynamics and wide frequency range is required. There is nothing more demanding on electronics than a digitally sampled grand piano and the JD6 handles these dynamics without altering the tone, introducing phase shift or intermodulation distortion.

Key features on the JD6 include switching jacks for channels 1 and 2 whereby the front jacks take priority over the rear panel jacks. This is of particular importance in studio set-ups where the JD6 can act as a patch bay to quickly reconfigure the signal path.

To add greater efficiency for touring, a series of extension panels with individual and multipin connectors are also offered. Furthermore, each channel of the JD6 has been provided with internal grounding switches to allow the system engineer to select between floating and chassis grounding for maximum flexibility.

Of course, as with all Radial products, the JD6 is designed to handle the most abusive environments. Welded 14 gauge steel construction, baked enamel finish, high-cycle rate switches and glass-filled high-impact polymer connectors with nickel silver contacts combine for maximum durability. The Radial JD6 is supported with a 3-year limited warranty.



FRONT PANEL FEATURE AND FUNCTION SET

1. Pad, -15dB for extra hot signals
2. Filter, 8kHz high frequency roll-off
3. Polarity reverse, 180º 'phase' flip at the XLR
4. Ground lift switch lifts pin-1 at the XLR
5. Input connector from the instrument
6. Thru-put connector goes to the amplifier
7. Merge mixes the input and thru to mono at XLR
8. Input selector switch selects between ¼" and RCA
9. RCA input connectors (pre-merged)
10. Wax pencil or dry-erase label ID on each channel

1. –15dB pad: All channels of the Radial JD6 feature a -15dB pad to reduce the level coming from high output sources such as CD players, tape machines and headphone outputs. It is unlikely that you will ever need to use a pad for basses or guitars.

NOTE: When using a headphone output as a 'source', activate the –15dB pad and make sure the headphone level is first set to zero. Then, slowly increase the volume until it matches the output from an instrument such as a keyboard. Headphone outputs are much hotter than instrument levels and if not careful, can saturate the transformer and cause distortion.

2. 8kHz filter: Channels 1 and 2 feature a gentle low-pass filter that rolls off highs at 8kHz. This is designed to remove hiss and noise from older high output equipment and the upper frequency hash that is common in many of today's electronic devices. The filter can often help remove induced noise from CRT monitors and other electro-magnetic stray fields. To engage the filter, the pad must also be depressed.

3. 180º polarity reverse: The 180º polarity reverse is used to reverse the polarity (sometimes called absolute phase reverse) at the XLR by flipping pin-2 and pin-3. This is used when interfacing with older equipment that was made before the AES pin-2 standard was adopted. It can also be used in a creative way when combining direct and mic'd sources.

4. Ground lift: The ground lift switch is used to disconnect pin-1 at the XLR thus providing 100% isolation. The JD6 is passive and employs isolation transformers throughout, so problems such as 60-cycle hum, ground loops and other noises associated with electronic equipment are generally eliminated. Lifting the XLR ground connection presumes you intend to ground the JD6 at the input.

NOTE: Inside the JD6 are individual chassis ground lift switches. These are factory set to float thus providing isolation between adjacent channels and provide 100% floating circuits as if using 6 separate direct boxes. This is detailed further in the manual.

5. Input connector: For maximum flexibility, the Radial JD6 features both front and rear ¼" input and thru-put connectors on channels 1 and 2. Normally, the connection would be made on the rear to allow samplers, sound modules and rack-mounted mixer input & output connections to be made within the rack enclosure.

To facilitate connections to outside equipment such as keyboards or computers, the two first channels feature 'priority switching jacks' on the front panel. This means that when the channels are normally connected using the rear panel jacks, the front panel jacks will divert the input giving these priority, thus temporarily disconnecting the rear jacks until such time as the front panel input jacks are removed. This is of particular advantage in a studio where the JD6 may be 'wired' to a patch bay for the keyboards. To patch in a bass, one would simply plug into the channel-1 front panel ¼" jack and start recording.

NOTE: Since most rack equipment is connected via rear panel connections, the JD6 adopts the same standard. This allows clear unobstructed view of the front-panel controls. To facilitate more complex system routing and provide greater flexibility, optional extension panels are also available. This is detailed further in this manual.

6. Thru-put connector: As with all direct boxes, the JD6 is outfitted with a thru connector on each channel. This is used to pass the direct signal directly thru to the instrument amplifier or sub mixer. On channels 1 & 2 these are also duplicated on the front and the rear of the unit and feature switching jacks with front panel priority. Normally, the thru will be connected on the rear panel. By inserting a jack into the front panel THRU connector, the signal will be diverted to the front jack and disconnect the rear connection.

7. Merge function: Channels 1 & 2 also feature a function called Merge. When this switch is depressed, it turns the Input and Thru-put connections into a 'left and right' mix to mono at the XLR output. This passive (resistor) mix or summing function is a real helper when there are insufficient snake or mixer channels to handle over-abundant channel feeds in some keyboard set-ups. For instance, by depressing the merge function, a pre-programmed stereo sound module would not have to be reprogrammed. One would simply connect left and right outputs as usual and these would be summed mono at the XLR. The dual RCA's on each channel are automatically set to perform the same function. Depressing the merge switch affects both the front and rear jacks.

8. Input selector switch: A selector input switch on channels 1 & 2 toggles between the ¼" input and the RCA jacks. This handy feature allows channels 1 & 2 to work 'double time' whereby one could instantly switch between a rack module and a sound card during a performance by simply depressing this switch.

9. RCA inputs: A set of RCA input jacks are located on the front panel on channels 1 & 2 to interface with CD players, computer audio cards and other audio-visual equipment that is often combined in today's stage environments. By depressing the RCA selector switch, both rear and front ¼" inputs are diverted to the RCA inputs. Two RCA connectors are pre-merged (mixed to mono at the XLR) as most RCA source equipment comes from the consumer stereo world. To retain stereo operation, one must use two channels on the JD6. To facilitate this, the RCA connectors of channels 1 & 2 are located side by side, thus reducing cable mess on the front panel.

10. Easy ID label zones: Both front and rear panels feature 'labeling' zones for wet-erase or wax pencil channel identification. These handy ID spaces are designed to facilitate complex set-ups by providing easy to see channel information directly on the JD6 and will be of particular importance when using several JD6s in a rack for concert touring.

NOTE: As these white label zones are screened directly on the metal, only use an erasable pencil such as a wax-pencil or dry or wet erase pencil to mark the JD6. We strongly suggest you test your pen or pencil to make sure the ink does not react with the screening. Before permanently marking the front panel, check that your marker can be erased by testing a small sample on the rear panel. As there are many different manufacturers of markers, we cannot assure that these will work as intended.

4. REAR PANEL CONNECTIONS

Upon first inspection, the rear panel connections appear to be identical for all channels. Although true, it should be noted that channels 1 and 2 employ switching jacks with front panel priority. This means that these channels will work exactly the same as the others unless the front panel jacks are employed. This would of course divert the input from the rear to the front as the front input jacks have been given priority.

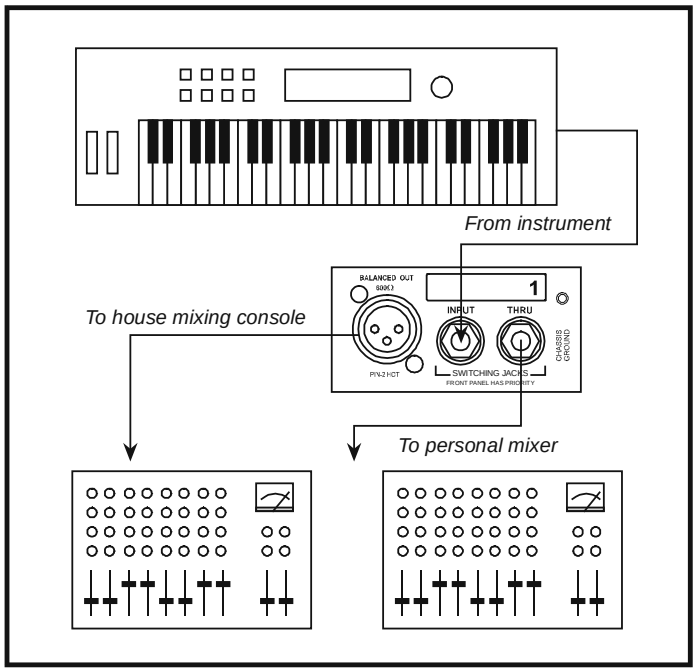
All channels feature an input connector that is connected to the source and a thru connector that is normally connected to the keyboard player's personal mixer. The XLR output employs the AES standard with pin-1 ground and pin-2 hot. This is isolated using a Radial Eclipse™ ET-DB1 transformer and is connected to the mixer. The XLR output is a transformer isolated 600 ohm mic level that can drive cables to 500 feet (165 meters) without introducing noise.

It is important to note that the output of the JD6 be microphone level so that it can run along side mic signals without introducing crosstalk or distortion when passing through typical mic splitters. As such, the output of the JD6 must be connected to the mic input on a mixer or to a mic pre-amplifier in order to properly match your levels and impedance. Doing so will provide optimum sound quality and best overall performance.

5. USING THE JD6

Before connecting the JD6 to your system, ensure all levels are turned off so that you do not cause connection pops in your system. All switches should be in the OUT position when setting up the system. The JD6 is completely passive and therefore requires no power. Just plug and play. Having 48V phantom on to power condenser microphones or active direct boxes will not harm the JD6.

Connect the source instrument to the input, your instrument amplifier or personal mixer to the thru-put and the XLR output to the main house or recording mixer. If noise is encountered try lifting the ground. If the level seems high on a particular channel, engage the –15dB pad. When recording a direct feed, as well as a microphone feed, try reversing the polarity. This can lead to some very dramatic results!



6. GROUNDING OPTIONS FOR THE SYSTEM ENGINEER

For pro-touring, the Radial JD6 is outfitted with some very clever ground schemes. This allows the system integrator, studio designer or keyboard technician to use several options to best adapt to his designs for safe and noise-free performance. As noted earlier, all JD6 channels feature a separate XLR pin-1 ground lift for each channel. It is important to note that each channel of the JD6 is also 100% isolated from each other to eliminate crosstalk and potential ground problems. This is why all of the input jacks are isolated.

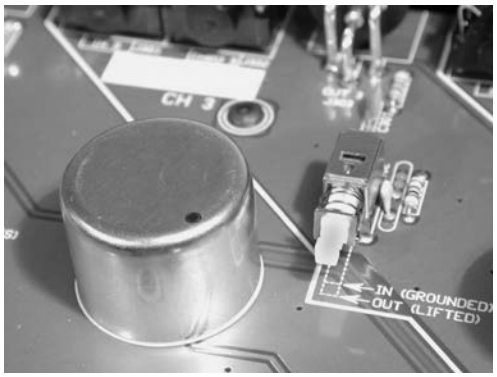


Fig. 1 Internal ground switch on each channel is factory set to "Float"

Inside the JD6 are six additional ground switches (Fig. 1) that allow the system engineer to bond the circuit ground to the chassis. Normally, each channel of the JD6 is 'floating' whereby each channel acts as if it were a separate or stand-alone direct box. Some system engineers prefer to set-up alternate ground schemes such as 'star grounds' whereby a single ground point is employed and all channel grounds are directed to this point. These switches are factory set in the floating position but may be changed by simply opening up the JD6 and depressing the chassis ground switch. A ground lug on the rear panel (Fig 2) would then be used to bond the JD6 chassis to the rack or a ground bus.

Fig. 2 A convenient chassis ground is provided to allow alternate ground schemes

As an added facility, channel-1 features a side access ground switch (Fig. 3) for system engineers that employs a single audio channel for chassis ground. This is activated using a 'tweaker' or small screwdriver.

NOTE: Chassis grounding is usually not required with the Radial JD6 because of the isolating nature of the device and the extensive ground plane that is employed. Unless you are a qualified system engineer, we recommend that these be left in the factory set position. As such, changing these has purposely been made difficult.

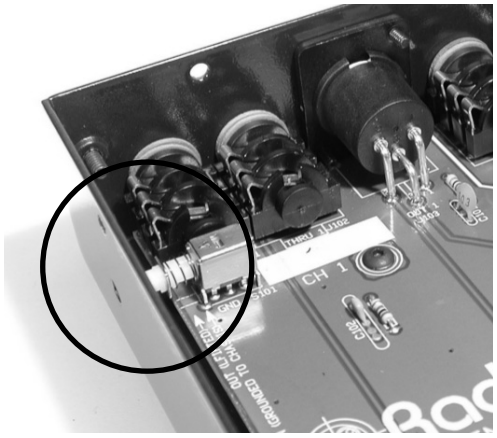
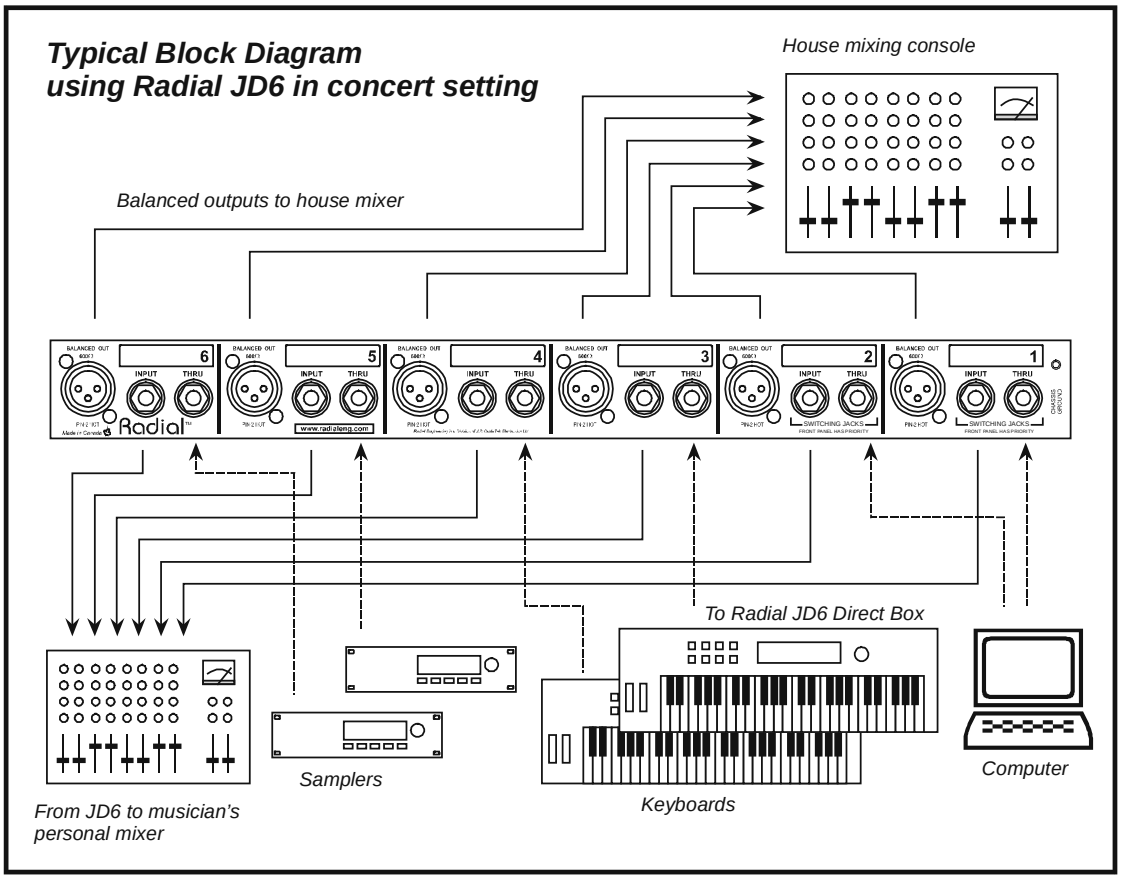


Fig. 3 Channel 1 side access switch connects chassis ground to pin 1. Factory set "Out" to "Float"

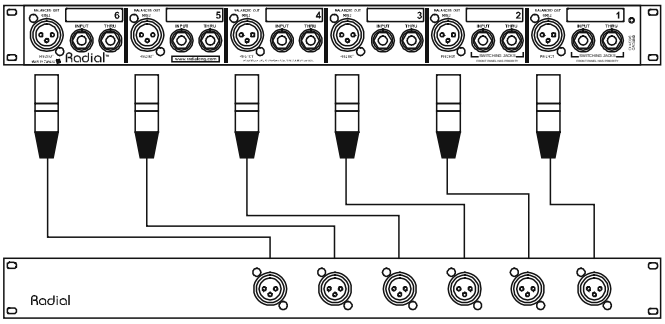
7. TYPICAL STAGE SET-UP USING THE RADIAL JD6

The Radial JD6 may be used in a variety of configurations. This common set-up for stage use shows a computer sound card being connected to channels 1 & 2, keyboards to channels 3 & 4 and sound modules to channels 5 & 6. Note that the computer could be connected to the front panel ¼" jacks or the RCA jacks should this be more convenient.



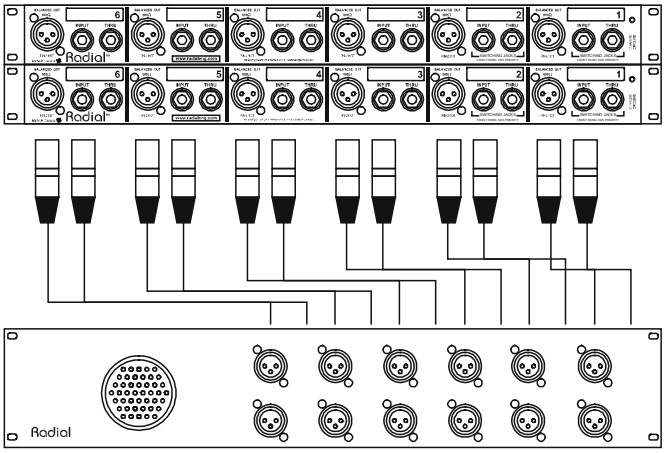
8. OPTIONAL OUTPUT PANELS

For the hectic life of pro-touring, a choice of hook-up panels is offered to extend the outputs from the Radial JD6 to the house sound system.



This top figure shows the JD6 with a simple XLR breakout panel called the JD6-X6. This comes standard with 3 feet and 6 feet extensions allowing the breakout panel to be mounted on the back or the front of the keyboard rack.

This provides the benefit of making the connections wherever convenient while reducing the clutter of cables.



The second JD6-X12 panel is designed for use when using 12 channels or two JD6's together in a rack. A 37-pin multi connector is used in conjunction with a multi-pin to XLR male breakout or multi-to-multi. This handy quick-disconnect option accelerates system set-ups and tear-downs by allowing 12 keyboards connections to be made with a simple ¼" twist!

The real benefit here is the total elimination of errors during set-up thus saving tremendous time on multi-date tours.

9. THE ADVANTAGE OF GOING PASSIVE!

The Radial JD6 is completely passive. This means that it does not require any AC or DC to power the unit to make it work. You plug in and you are ready to go. High quality Radial Eclipse™ ET-DB1 audio transformers are used to bridge the input to the XLR output. Being 100% passive has many advantages over active devices.

To begin, one must understand how a transformer works. A transformer is made up of a primary coil of wire and a secondary coil. These are wound around the transformer core. When current is sent through the first coil, a magnetic field is generated. The magnetic field passes through the core, into the secondary coil where it 'works backwards' and reconverts the magnetic field into current. Because the input (primary) and the output (secondary) are not electrically connected, problems such as noise, ground loops, and stray voltages are eliminated. This makes hookup easy and trouble free.

Of course it must be noted that not all transformers are created equal. Just as a good dynamic microphone is only as good as the capsule, a passive direct box is only as good as the transformer inside. The JD6 employs the Radial's Eclipse™ audio transformers to ensure the transition from the unbalanced signal to the balanced output is both smooth and distortion-free. Radial Eclipse™ transformers have a warm sounding Bessel response curve and the ability to transfer all frequencies from 10Hz to 40kHz without introducing harmonic distortion.

10. RADIAL JD6 - QUESTIONS & ANSWERS

Can I also use the JD6 with guitars and basses?
Of course! The JD6 uses the exact same audio circuit as our popular Radial JDI direct box and it is perfectly suited for guitars, basses and just about any instrument you can think of.

Can I use the JD6 backwards like a re-amping device?
Yes. You will need to find a female to female XLR turn around. You would start by pre-recording a dry track using a guitar with the JD6 to your pre-amp and audio recorder. Send the recorded track (at mic level) back to the JD6 using the XLR output (as an input) and then the guitar input (as an output) to your guitar amplifier.

I have heard that when you combine left and right outputs from a keyboard it can be a problem.
When two signals such as the left and right from a keyboard are simply 'Y-jack'd' together, the signals are both trying to feed the output while also trying to feed their own inputs. This can cause damage to the keyboard and phase cancellation to the sound. The Radial JD6 is equipped with a merge function which is in fact a resistive mixer that is designed to avoid this problem.

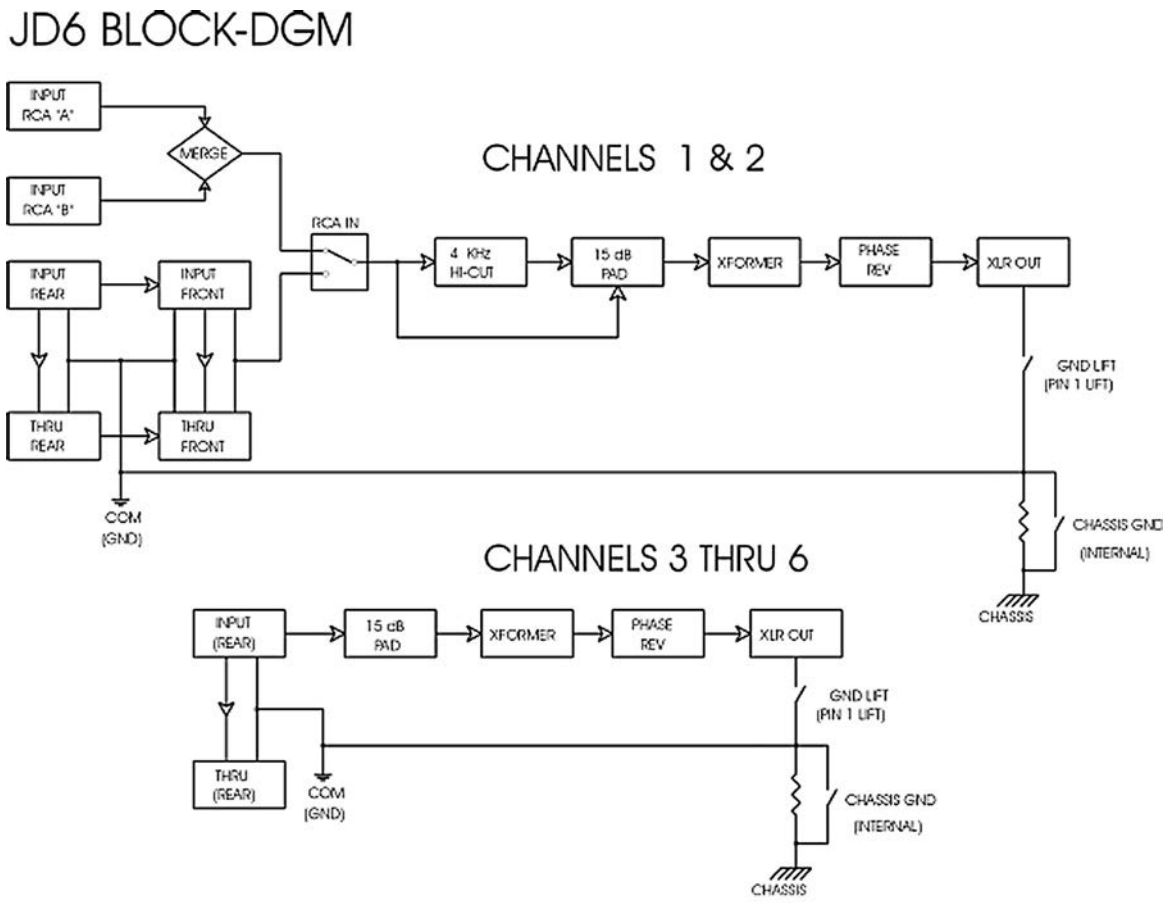
If I use the front panel input on channel-1, will both the front panel thru-put and rear panel thru-put still work?
No. The JD6 input and thru put jacks on channels 1 and 2 are switching jacks with front panel priority. This means that when you connect a plug in the back, the signal goes to the back connector. If a second plug is connected to the front jack, the signal is diverted to that connector until the front plug is removed.

How many keyboard players does it take to change a light bulb?
Just hit auto transpose and it makes the changes for you!

I heard that active direct boxes sound better than passive DIs. Is this true?
It depends. This is the same as stating that a condenser mic sounds better than a dynamic. A good passive direct box will eliminate noise, hum and buzz and still sound amazing. The magic to a great sounding passive DI is the transformer. A good transformer will cost upwards to $100 per channel. Active DI's are best suited for passive instruments or devices that do not connect the power grid. For devices such as keyboards, a good passive is definitely the way to go!

Why is a passive direct box a better choice for keyboards?
The problem with keyboards, computers and audio-visual equipment is noise or 60-cycle hum caused by so called 'ground loops'. Equipment that is electrically powered or connected to a wall socket is designed with a reference voltage to ground or the return electrical path. As such these are charged with an electrical field, connecting two of these pieces together such as a keyboard and a mixer opens the door to stray fields or voltage differentials from interacting with each other. A good passive direct box like the JD6 employs an isolation transformer to keep stray fields away from each other, thus avoiding interaction, which can cause system noise.

Will phantom power hurt the JD6?
No. Phantom power is 48-Volt DC and will not harm the JD6.


JD6 BLOCK-DGM
CHANNELS 1 & 2
INPUT RCA "A"
INPUT RCA "B"
MERGE
RCA IN
4 KHz HI-CUT
15 dB PAD
XFORMER
PHASE REV
XLR OUT
INPUT REAR
INPUT FRONT
THRU REAR
THRU FRONT
GND LIFT (PIN 1 LIFT)
COM (GND)
CHASSIS GND (INTERNAL)
CHASSIS
CHANNELS 3 THRU 6
INPUT (REAR)
15 dB PAD
XFORMER
PHASE REV
XLR OUT
GND LIFT (PIN 1 LIFT)
THRU (REAR)
COM (GND)
CHASSIS GND (INTERNAL)
CHASSIS

RADIAL LIMITED THREE YEAR WARRANTY

Radial Engineering - a division of JP CableTek Electronics Ltd. ("Radial") warrants this product to be free from defects in material and workmanship to the original owner and will remedy any such defects free of charge according to the terms of this warranty. Radial will repair or replace at its option any defective component(s) of this product, excluding the finish, wear and tear on components under normal use for a period of three (3) years from the original date of purchase. In the event that a particular product is no longer available, Radial reserves the right to replace the product with a similar product of equal or greater value. To make a request or claim under this limited warranty, the product must be returned prepaid in the original shipping container (or equivalent) to Radial or to an authorized Radial repair centre and you must assume the risk of loss or damage. A copy of the original invoice showing date of purchase and the dealer name must accompany any request for work to be performed under this limited warranty. This limited warranty shall not apply if the product has been damaged due to abuse, misuse, misapplication, accident or as a result of service or modification by any other than an authorized Radial repair centre.

THERE ARE NO EXPRESSED WARRANTIES OTHER THAN THOSE ON THE FACE HEREOF AND DESCRIBED ABOVE. NO WARRANTIES WHETHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL EXTEND BEYOND THE RESPECTIVE WARRANTY PERIOD DESCRIBED ABOVE OF THREE YEARS.

RADIAL SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY SPECIAL OR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSS ARISING FROM THE USE OF THIS PRODUCT. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH MAY VARY, FROM STATE/PROVINCE TO STATE/PROVINCE.

Radial™ engineering

Radial Engineering Ltd.
1638 Kebet Way, Port Coquitlam BC V3C 5W9
tel: 604-942-1001 fax: 604-942-1010
email: info@radialeng.com web: www.radialeng.com

Radial JD6 user guide part # R800 9647 00

www.radialeng.com