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True to the Music

PowerPre™ 500

Microphone Preamp

500 Series Module

User Guide

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Radial® PowerPre™ 500 User Guide

Congratulations and thank you for purchasing the PowerPre™ 500 microphone amplifier. The PowerPre is a unique 500 series preamp module designed to deliver the warmth of fully discrete, transformer coupled electronics with the lowest possible noise.

This manual describes installing and operating your PowerPre 500 in the Radial Workhorse or other 500 series module power racks. To take full advantage of the unique features that have been incorporated, please read through this manual before using it. This will give you a broader sense of its capabilities. If you have questions that are not covered in this manual, please visit the FAQ section on our website. This is where we post answers to questions from users. If you cannot find the answer to your question please feel free to send an email to info@radialeng.com and we will do our very best to respond as quickly as possible.

The Radial PowerPre 500 is warm, accurate and noise free. Enjoy.

⚠ **WARNING NOTICE TO USER!**

Although preventative safety measures have been designed into Radial 500 series products **we strictly advise against hot-swapping modules** or plugging and unplugging them when the Workhorse or other 500 series rack is powered on. Hot swapping can cause connection sparks at the card-edge connector that could send damaging transients to other equipment. This also greatly reduces the life span of the contacts. Damage due to hot swapping is not covered under warranty. There are no user serviceable parts inside.

FEATURE SET

1. GAIN VU - 10 Segment LED bar provides visual peak signal status by simulating the natural ballistics of a VU meter. Single floating LED with peak hold lowers power demand for greater efficiency.

2. -15dB PAD - Expands the PowerPre's capabilities by allowing ultra hot signals from devices such as digital keyboards or electronic drums to be interfaced without distortion.

3. 180º - Polarity reverse used to phase-align two microphones or as a creative element when recording.

4. FILTER - 100Hz high pass filter removes low frequencies to help eliminate excessive bass that can cause rumble. This also helps clean up the recorded track by reducing 'mud'. Particularly useful when layering acoustic instruments.

5. OUTPUT - Adjustable gain control features dual taper Accustate™ drive circuit that keeps background noise down at all levels. Up to 55dB of gain adapts to all types of microphones including condenser, dynamic and low output ribbon.

6. VOX: 3-position voicing switch lets you change the tonal character of the preamp to suit. The linear setting delivers 'true clinical' response for classical instruments; the breath position adds 'air and clarity' to help vocals cut through the mix; punch adds warmth to the bottom end to fatten up a track.

7. 48V - Phantom power for condenser microphone is equipped with power-on LED and recessed to prevent accidental use that could damage ribbon microphones.

8. MIC INPUT - XLR female connector is conveniently located on the front panel and placed at the bottom to keep the cable out of the way. Wired pin-2 hot following AES standard.

9. OMNIPORT - Rear mounted ¼" connector designated as an instrument input to allow guitar and bass to be recorded direct. Available when used with the Workhorse.

10. XLR Output - Equipped with Hammond broadcast transformer for smooth, warm response while being able to handle extreme transients without choking.

11. GROUND LIFT (access at rear of module) - Disconnects pin-1 ground on the XLR input to eliminate ground loops. This special feature should only be used when interfacing the PowerPre with electrically powered instruments like a keyboard.
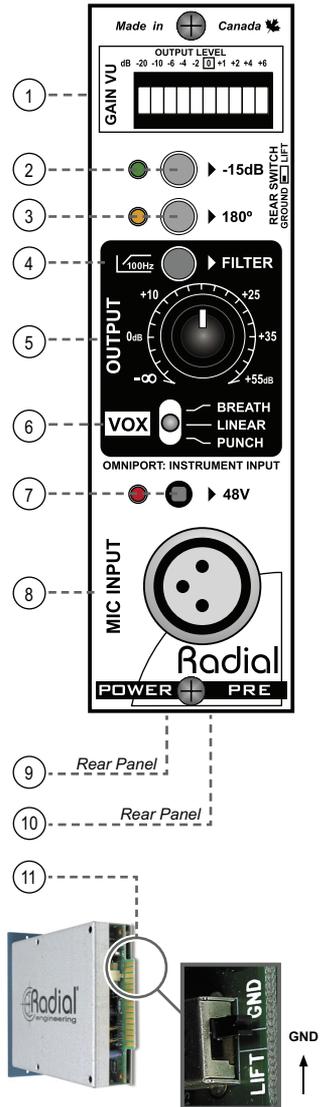
Important!: Phantom power will be interrupted if the ground lift switch is set to the "LIFT" position. If your condenser mic is not working, check to make sure this switch is in it's normal "GND" position (see photo). Note that the front panel LED for 48V phantom power will still illuminate when set to "LIFT".

OVERVIEW

The Radial PowerPre is a state of the art microphone preamp that is designed to make exquisitely detailed recordings quick and easy. You plug your mic in, adjust the level, set the voicing and hit record. Over 18 months in development and a multitude of revisions were invested in making the PowerPre this simple to use. But don't let the simplicity fool you… the PowerPre will easily outperform others that can cost much more.

On first view, you will note that the XLR connector is on the front panel. This was done so that you can have your 500 series rack right next to you and can connect a mic without having to reach in behind. As a safety measure, the 48V phantom power switch is recessed so that you do not damage your favorite ribbon mic. You will also notice that the PowerPre is equipped with a -15dB pad for high output instruments, a 180º polarity reverse that can be helpful when recording in stereo and a 100Hz high pass filter to gently eliminate unwanted low frequency resonance.

Where the PowerPre really differs is in the audio circuit. Unlike the 'attenuator' that is found on other preamps, the Accustate™ level control delivers maximum signal-to-noise at all levels. This means that you do not have to worry about background noise polluting your recording or having to auto-gate the track to remove unwanted hiss. You plug in and immediately get spectacular results. And with the Hammond broadcast transformer, you can hit the PowerPre with extreme level and it will take it without flinching.

To add even more character to our super-hero, the Vox switch lets you introduce a little extra air at the top or a little extra beef at the bottom. In other words, the effect is not mild or only noticeable by those with golden ears, nor is it exceedingly prominent. This is not a sledge hammer. This modest yet effective tool is designed to quickly let you tailor the sound of the mic so that you can capture what you want. Have fun!

Accustate™ Input Control

Most professional preamps employ a switch to adjust the 'volume level'. This is because 'volume' controls are in fact not volume controls at all… they are attenuators that reduce the input sensitivity. This poses several challenges:

First, when a normal potentiometer is used, the control tends to be very uneven whereby very little change occurs between 7 o'clock and 4 o'clock. Then all of a sudden, the last 10% of the control dramatically goes from soft to extreme. There is no graduation. This makes fine adjustments difficult. As a work-around, the circuit designer will often 'spread out' what little control he has to a wider scale for more rotation so that the range is at least usable. The trade off is that the volume control does not actually go off.

As a compromise, many preamps employ a 12 position rotary switch. So instead of a smooth continuous level control, the circuit designer will predetermine 12 graduated steps to give the user a 'sense' of scale. Because the range between switch settings is so large, some manufacturers will add a second 'fine tune' control as yet another work-around.
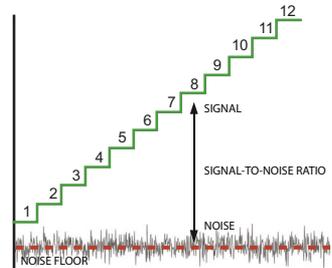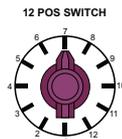
In either case you are not actually controlling the gain, only the input sensitivity. Herein lies the problem: Preamps that employ an input attenuator are basically running 'full' all the time. In other words, their signal-to-noise ratio is fixed. So when the 'volume control' (read attenuator) is turned all the way up, you enjoy maximum performance. But as you reduce the input sensitivity by 'turning down the volume' you are actually increasing the amount of noise in the recording.
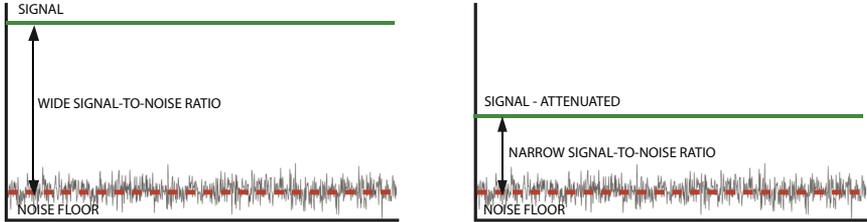

The circuit designer will 'justify' the design by saying that the noise the preamp introduces will be masked by the instrument sound. But what happens when the instrument stops playing in between notes? Back in the days of analogue tape, the preamp noise was either masked by the tape hiss or gated out during production. But today, with such amazing digital recording technology, the noise that was once masked by tape hiss is all of a sudden very noticeable.

When we began developing the PowerPre we were immediately confronted with the problem. Instead of simply accepting the status quo, our engineering team got to work. Potentiometers were taken apart, tests were done and eureka! We found a solution. We call it Accustate™. The design employs two potentiometers whereby one controls the gain while the other controls the input sensitivity.

This means that when you lower the volume you're actually lowering both the input sensitivity and the gain proportionately, accurately tracking the input while reducing the background noise.

With Accustate, you are no longer limited to 12 giants steps or a limited range potentiometer. You get precise control over the input stage and full control from zero to extreme with over 55dB of true gain. And because Accustate is so effective at controlling the signal path, you do not actually need an input PAD *(we put one in anyway just in case you need to record an atomic blast)*.
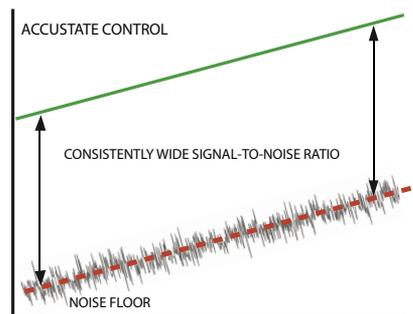
GETTING STARTED

Before making any connections, start by turning off your audio system and turning all volume levels down. This helps protect equipment from turn-on transients that could damage loudspeakers and other sensitive equipment. We recommend using a power bar with an on-off switch as this makes it easy to turn on and off the 500 series rack, monitors and so on, using a single switch. Carefully plug the PowerPre into your 500 series rack making sure to avoid exessive stress on the card edge connector. Screw the module in to ensure it does not accidentally get dislodged.

Your microphones can connect to the PowerPre at either the front panel XLR jack or at the rear panel of your 500 series rack. Connecting the PowerPre output is done at the rear panel. Most 500 series racks are equipped with XLR connectors. When you plug the PowerPre into your 500 series rack, it will automatically route the input and output to the module and connect 48V phantom power. With the Workhorse, this is augmented with ¼" TRS connectors, D-Subs and a signal to feed the Workhorse mixer. Using the PowerPre with the Workhorse also activates the Omniport. In this instance with the Power Pre, the Omniport turns into a DI input for high impedance instrument pickups.

> **Start by setting up the PowerPre panel controls as follows:**
> 1. Set -15dB pad to off (switch outward).
> 2. Make sure the 180º is off (switch outward).
> 3. Filter should be turned off (switch outward).
> 4. Gain control should be off (fully counter-clockwise).
> 5. Set Vox control to the middle 'LINEAR' position.
> 6. Turn phantom power off (LED off).

Plugging In

Connect your microphone to the PowerPre using a standard 3-pin XLR cable. You can use either the front or rear panel XLR as the input - both are wired in parallel. The PowerPre follows the AES standard with pin-1 ground and pin-2 hot. Most devices are wired this way but older vintage equipment should be checked to confirm compatibility. To ensure the lowest noise always use a high quality balanced cable from a reputable manufacturer.

FRONT PANEL
MIC INPUT

REAR PANEL INPUT
(WORKHORSE)
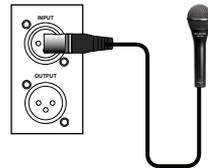
REAR PANEL INPUT
(500 SERIES RACK)

Depending on what type of microphone you are using, you may or may not need to engage the 48V phantom power. This is designed for condenser microphones. If you are using a dynamic microphone or ribbon microphone, leave the phantom power off. The switch is recessed as a means to prevent accidentally turning it on which could harm some ribbon microphones. An easy to see LED indicator tells you if phantom is on. *For more details, please read the phantom power note at the end of this manual*.

Set the -15dB pad to the out position as this will likely not be required. The PowerPre has plenty of dynamic range and is very quiet. Unlike most preamps that run 'full on' using a variable input attenuator to control the level *(and deliver a fixed noise level)*, the PowerPre is equipped with our unique AccuState™ drive circuit that sets the input gain and the attenuation so that noise is automatically kept at a minimum. This makes it super easy to set the signal chain for lowest noise. Start talking in the microphone as you increase the level. It is a good idea to always test at a low level during setup. If you notice the VU meter is going into the red, simply back off the output level control.

Adding Character To The Signal
In the world of preamps, there are many colors. One can make 'ultra-clean' sounding preamps using miniaturized electronic chips, but these tend to sound sterile and listless. On the other hand, you can produce a preamp that is loaded with personality. This is the direction we chose to go with the PowerPre. As soon as you plug it in, you will find that it is very warm sounding. This is attributed to the full size discrete electronics that are employed throughout and the Hammond output transformer.

Taking this one step further, the PowerPre is equipped with a three position switch called VOX. This control is basically a subtle equalizer that has been carefully crafted to work with all types of microphones. The linear setting removes VOX EQ from the circuit so that you hear the pure sound of the preamp going through the Hammond transformer. This 'clinical' setting is ideally suited for recording classical instruments or recording electric guitar and bass for later Reamping™. Start by setting the VOX control switch to **LINEAR** (middle position) so that you hear the natural sound of the instrument or voice.

The other two VOX settings are named **BREATH** and **PUNCH**. The Breath setting is designed to add zest to the recording by introducing a greater degree of harmonic content in the upper end. You will find that this will flatter most voices by introducing a sense of air. It is also terrific on acoustic instruments. For instance, it can add upper clarity and shimmer to a 12 string acoustic guitar. The Punch setting is designed to beef up the bottom end. This works really well on electric guitars to fatten tracks. You can also use it to warm up a female vocal track or 'enlarge' the sound of a snare. Try, listen, experiment.
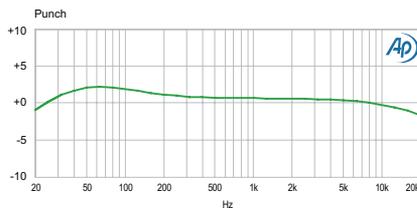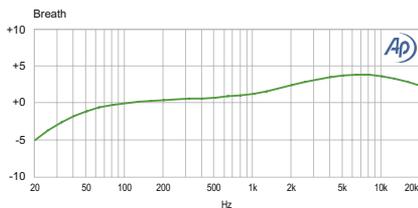
High Pass Filter

World class engineers always think in terms 'layers' when they record. In other words, they will position the bass in the lower octaves, guitars in the mid-range and cymbals in the upper registers. This allows each instrument to cut through the mix without overwhelming the others. To help focus the instruments, the PowerPre is equipped with a high-pass filter that gently rolls off bass frequencies below 100Hz. This is particularly useful with acoustic instruments that tend to resonate. With the high-pass filter engaged you can clean up the mix without affecting the overall sound of the instrument. This helps eliminate mud and will ultimately increase the dynamics of your recording.

High Pass Filter Response
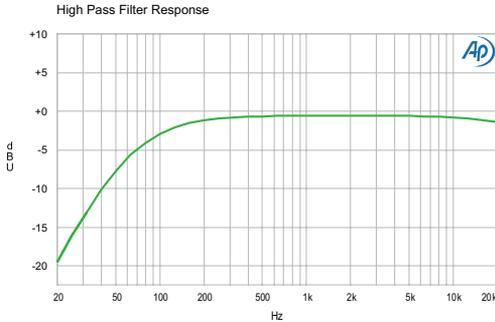
Recording In Stereo

When recording an instrument, you may want to use two microphones at the same time to create a stereo field. One may be positioned near the instrument while the second may be set further away to capture some of the room's natural ambiance. Engaging the 180º polarity reverse switch can often help focus the signal to bring certain frequencies in phase. *(Devices like the Radial Phazer take this to another level by allowing you to adjust the phase incrementally.)* The 180º polarity reverse can also be used to correct the phase of older vintage equipment that may have been made before the AES standard was established. Most equipment today employs the standard with pin-1 ground, pin-2 hot (+), and pin-3 (-). Depressing the 180º polarity reverse switch will toggle pins 2 and 3.

Direct Recording

The PowerPre is not only designed for microphones, it is also well suited for instruments of all types. The most common application in the studio is recording a bass guitar *'direct'*. When used with the Workhorse, the PowerPre is equipped with an instrument input that is accessed via the Omniport jack. This 'switching jack' automatically reroutes the signal from the front panel XLR input to the Omniport as soon as a jack is connected.


OMNIPORT INPUT
(WORKHORSE)

You can also use the PowerPre for high output devices like digital pianos, samplers or drum machines. Even though the PowerPre is capable of tremendous signal handling, a 'traditional' input pad has been added that attenuates the signal by -15dB. Simply connect your instrument, turn up the volume and check the LED bar meter. If the signal seems to be pushing the red, depress the pad.

Grounding

When you connect an AC powered device like a keyboard to the PowerPre, you can occasionally run into noise problems known as ground loops. This is generally caused by a conflict between the electrical ground and the audio ground. The PowerPre solves the problem by incorporating a ground lift switch that lifts the pin-1 audio ground at the XLR input. You will need to pull the module out of the rack to change the ground switch setting.
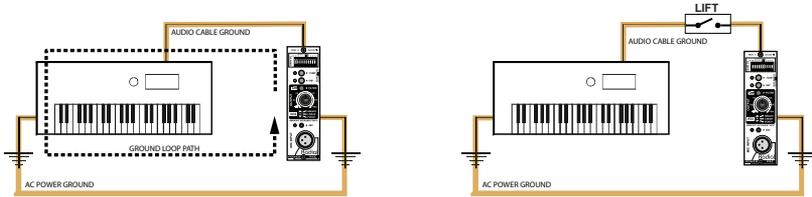
⚠️ **Important Note: INTERNAL GROUND LIFT AND PHANTOM POWER**

There is a ground lift switch inside the PowerPre that is located at the back above the card-edge connector. This switch lifts the pin-1 ground on the front panel XLR to help reduce hum and buzz caused by ground loops. This is factory set in the grounded position (GND) so that phantom power will flow to condenser mics. If your mic does not power up, check to make sure this is set correctly. Because this special ground lift is only intended for use when connecting electrically powered instruments, like keyboards, the 48V phantom LED indicator will not be affected and therefore may still illuminate if the ground is lifted. Under normal use, this internal ground lift switch should be set to the "GND" position.

RADIAL POWERPRE 500 SPECIFICATIONS*

Microphone Input

Circuit Type:	100% discrete, transformer coupled output
Microphone Input:	Accustate input fully variable gain control
Current Draw:	130mA (maximum draw)
Frequency Response:	20Hz ~ 20KHz +0dB/-1dB
Input Impedance:	2.2k Ohms (1.5k Ohms with pad)
Mic Preamp Gain:	+55dB
Maximum Gain:	+70dB when used with Workhorse**
Maximum Output:	+22dBu
Output Impedance:	75 Ohms @ 1kHz
Output Type:	Transformer isolated
Common Mode Rejection (CMRR):	>75dB
Equivalent Input Noise (EIN):	-122dBu @ maximum gain
Dynamic Range:	>97dB
Total Harmonic Distortion (THD+N):	0.03% @ mid gain with +10dBu output
Intermodulation Distortion (IMD):	0.012% @ 50dB gain with +10dBu output

Instrument Input

Omniport Input Impedance:	150k Ohms, unbalanced*
Instrument Preamp Gain:	+55dB
Equivalent Input Noise (EIN):	-95dBu
Total Harmonic Distortion (THD+N):	0.05% @ mid gain with +10dB output

Meter:	10 segment peak indicator with hold
Pad:	-15dB
Polarity:	Inverts pins 2 and 3 at XLR input*
High-pass filter:	150Hz cut off, -3dB @ 100Hz
Vox Control:	3 position preset EQ
Phantom Power:	48VDC - 10mA (as supplied by 500 frame)
XLR Configuration:	Follows AES spec: pin-1 ground, pin-2 (+), pin-3 (-)
Ground Lift (rear panel):	Lifts ground on front panel XLR input only

Size:	Standard 500 Series format
Weight:	1.5 lbs. (0.7 kg)
Compliance (API):	Yes
Compliance (WHOS-Doc):	Yes
Warranty:	3 years, transferable

** Refers to use with Radial Workhorse rack and mixer

CONNECTOR WIRING

XLR Connector   *TS ¼" Phone Connector*   *TRS ¼" Phone Connector*
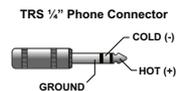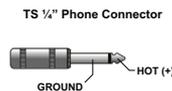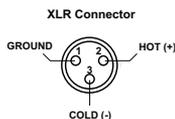
* Subject to change without notice.

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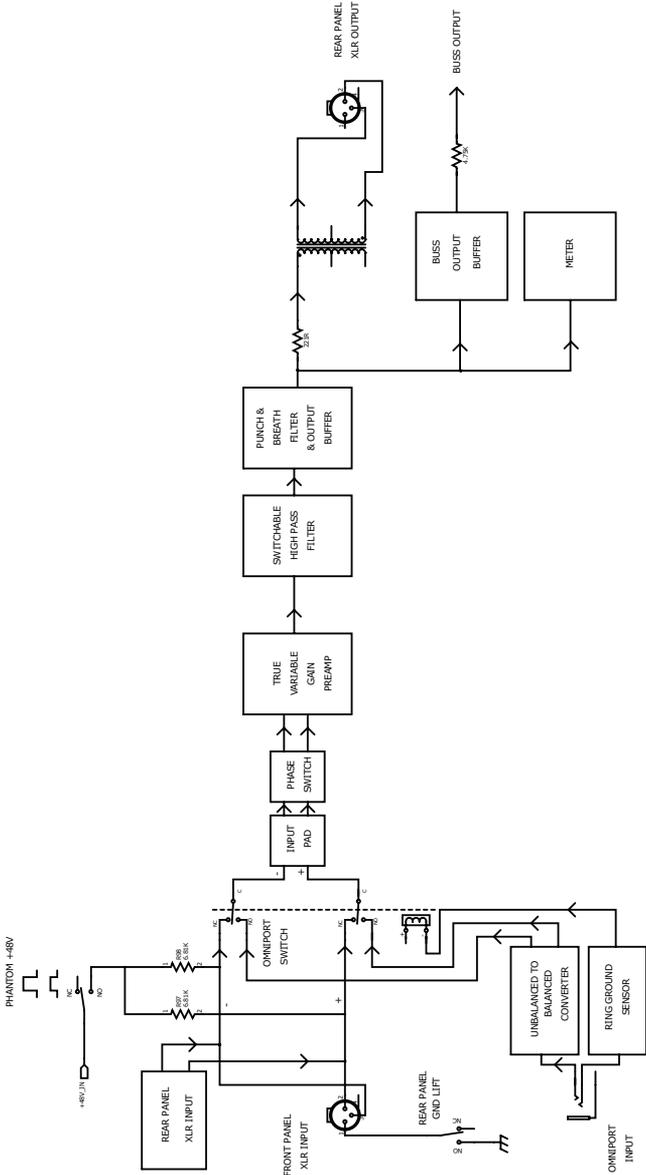
THREE YEAR TRANSFERABLE LIMITED WARRANTY

⚠ This product is intended for professional use only. The user should be familiar and experienced with the 500 series rack and module format

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