

PreComp[™]

500 Series Preamp and Compressor



User Guide



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 racks are powered on. Hot swapping can cause connection sparks at the card-edge connector that could send damaging transients to other equipment. This also reduces the life span of the contacts. Damage due to hot swapping is not covered under warranty. There are no user serviceable parts inside.

Radial® PreComp™

500 Series Preamp and VCA Compressor Channel Strip

Table of Contents	Page
Overview.....	1
Features	2
Making Connections.....	3
Getting Started	4
Using the preamp functions.....	4
Using the compressor functions	5
Ominiport.....	7
Specifications	8
Block Diagram	8
Radial Limited Warranty	Back Cover

INTRODUCTION

Thank you for purchasing the Radial PreComp, a combination microphone preamp and compressor designed to fit the more advanced Radial 500 series power racks and earlier designs made by others. We invested a ton of effort during the development stage to make the PreComp quick to set up and easy to use so that you can enjoy superb results each and every time you put it to work. Plug in your favorite microphone, set the Accustate gain control for maximum signal-to-noise and then engage the compressor for the most effective dynamic control you have ever encountered!

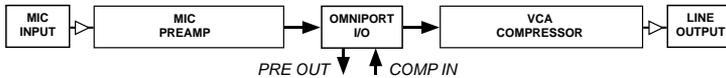
There are lots of little extras that are built into these fabulous devices. This is where reading the manual is essential. Please take a few minutes to read through so that you can take full advantage of the feature set and maximize the performance.

If afterwards you have a question that is not covered herein, please take a minute to consult the PreComp’s FAQ section on the Radial website. This is where we post questions and answers from users along with updates. If you still have a question, feel free to send us an email at info@radialeng.com and we will do our best to answer in short order.

Now get ready to start working faster and smarter than ever before.

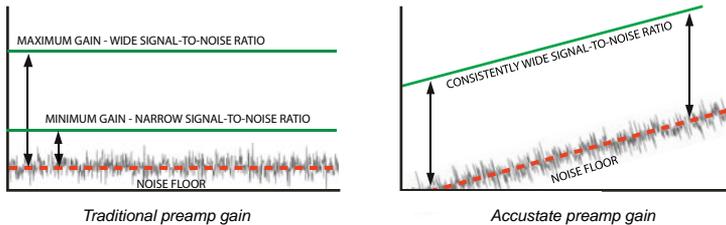
OVERVIEW

As the name implies, the PreComp is a combination preamp and compressor jammed into a single wide 500 series module. By housing both processors together we can optimize each gain stage so that it works with minimal fuss. This accelerates setup times and eliminates many of the challenges that make getting compression to sound right.

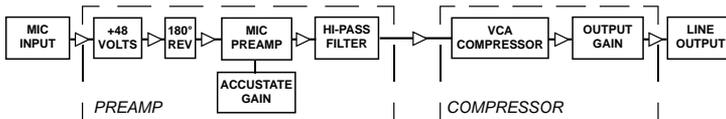


The Preamp

The design begins with a state-of-the-art microphone preamp coupled with Radial's unique Accustate gain control. Unlike traditional preamps that only achieve their optimal signal-to-noise when pushed to maximum, Accustate employs a dual wafer potentiometer that simultaneously sets the input sensitivity and preamp gain so that the signal-to-noise ratio remains constant at all levels. This is particularly important when recording in the digital domain where even the slightest bit of noise can be audible.



The preamp is equipped with +48V phantom power for condenser microphones and active direct boxes, a 180° polarity reverse to help phase align two mics when recording an instrument in stereo and a handy high-pass filter that eliminates low frequency rumble to help clean up your tracks. Visual monitoring is provided by two LEDs that show below or above threshold and a third that lets you know when clipping.



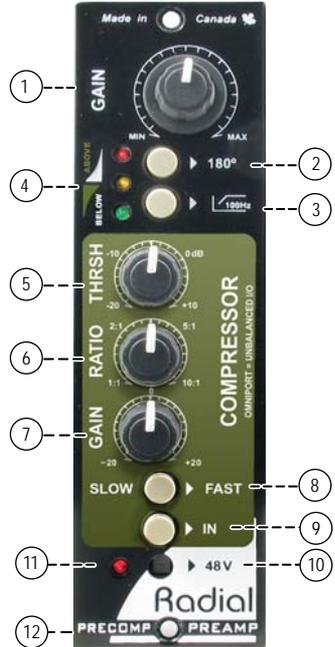
The Compressor

The preamp section feeds a full-featured VCA compressor with adjustable threshold, compression ratio and gain make-up controls. The advanced feed-forward compression algorithm reads the incoming program material and automatically transitions from soft-knee to hard-knee as the signal rises above the threshold. A simple slow-fast switch makes it easy to set the compressor's response to suit vocals, instruments or percussion.

When using the PreComp in a Radial 500 series power rack the Omniport™ is available and functions as a signal insert and access point. Using a standard ¼" TRS insert cable you can access the preamp and compressor sections independently or insert another processor, such as an equalizer in between. For more information please refer to the Omniport descriptions later in this user guide.

FEATURE SET

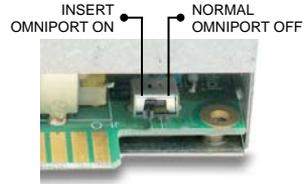
1. **GAIN:** Used to set the gain of the mic preamp. Accustate gain control sets the input sensitivity and gain at the same time to optimize signal to noise at all settings.
2. **180° REVERSE:** Inverts the polarity to help phase align two microphones when recording in stereo.
3. **HIGH-PASS FILTER:** Gently rolls-off low frequencies below 100Hz to reduce rumble which can muddy up a recording.
4. **LED METERING:** The green and yellow LEDs let you know when the signal is below or above the threshold and compression is being applied. The red LED illuminates when the signal is near clipping.
5. **THRESH:** Variable threshold control is used to set the point when compression will take effect.
6. **RATIO:** Sets the compression ratio from 1:1 (off) to 10:1 where a 10dB input produces 1dB at the output.
7. **GAIN:** Sets the output level of the compressor and used to compensate for the gain reduction.
8. **SLOW-FAST:** Sets the speed at which the compressor will take effect. Set to slow, the initial transient such as a snap from a snare will pass without compression.
9. **IN:** Turns the compressor on or off to compare the dry signal with the compressed results.
10. **48V SWITCH:** Activates phantom power for condenser mics and active direct boxes. Recessed to prevent accidental turn-on.
11. **PHANTOM LED:** Indicator illuminates when +48V phantom power is active
12. **OMNIPOINT™:** Functions as a signal access point allowing the preamp and compressor sections to be used independently or to insert another processor like an EQ in between the two sections.
13. **OMNIPOINT™ SWITCH:** Turns the Omnipoint on and off. When off, the preamp and compressor sections work in series. When on, the Omnipoint TRS insert jack is switched into the signal path between the two sections.



MAKING CONNECTIONS

Although the PreComp is easy to use, we suggest you follow these simple instructions before getting started. As with all audio equipment, always ensure levels are turned down and equipment is turned off before making any connections or inserting the PreComp into a 500 series power rack. This common practice ensures turn-on transients will not damage more sensitive components such as tweeters.

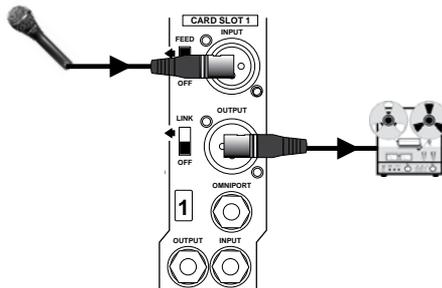
Before inserting the PreComp into your 500 series power rack observe the setting of the mini-toggle switch located next to the 15-pin card-edge. This switch turns the Omniport™ function on and off. During initial set up use the 'NORMAL' setting. This will turn the Omniport function off and simplify setup and testing.



After inserting the PreComp into your 500 series rack, secure it using the supplied machine screws to ensure it does not accidentally become dislodged during use. To prevent damage to the power rack, do not over-tighten the mounting screws.

Most 500 series racks are equipped with balanced XLR connectors. When you insert the PreComp into your 500 series rack it will automatically route the rear panel XLR connections to the module's input and output. This is augmented with 1/4" TRS connectors if using the PreComp in a Radial Workhorse 500 series power rack. The PreComp follows the AES standard with pin-2 (+) hot, pin-3 (-) cold. Most devices are wired this way but older vintage equipment should be checked to confirm compatibility with AES standards.

Connect a microphone or direct box to the input of the PreComp input using a standard XLR patch cable. If you are using a condenser microphone or active direct box, turn on the 48V phantom power. The switch is recessed to prevent accidental turn on. Use a small screw driver or paper clip to push in the switch. A red LED will illuminate when phantom power is active.



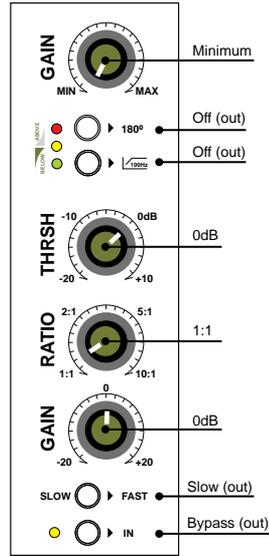
REAR PANEL MIC INPUT AND LINE OUTPUT

Connect the line-level output of the PreComp to your audio system so that you can audition the PreComp. We recommend that you first listen to the PreComp on its own before combining with effects or other signal processors until you have had a chance to familiarize yourself with the preamp and compressor functions. Using your own voice to test is best as it gives you a familiar starting place.

GETTING STARTED WITH THE PREAMP

Once you have the PreComp safely mounted in your rack and patched into your recording system, set the controls on the front panel as shown here on the right. This 'starting position' removes the compressor from the signal chain to enable you to first set the preamp to optimize signal-to-noise.

Power on the audio system and turn up the volume on your monitors. Plug in your mic and slowly turn up the preamp gain control while observing the LED meter. The top red LED illuminates when the signal is clipping. If it flashes on signal peaks, turn the gain down by about 10% to ensure a strong signal level is maintained without clipping. Always test at a low volume to ensure the PreComp is patched in and working correctly. If you do not hear any sound, check that your 500 series rack is patched correctly. If you are using a condenser microphone, ensure the 48V phantom power is turned on by checking the red LED at the bottom of the front panel.



STARTING POSITION

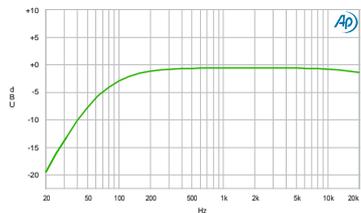
Using The 180° Polarity Reverse

When recording an instrument, you may want to use two microphones and two PreComps at the same time to capture the sound. Together, the mics can create a timbre that a single mic cannot. One may be positioned near the instrument while the second may be set further away to capture the room's natural ambience. Engaging the 180° polarity reverse on one PreComp can sometimes achieve a fuller sound by aligning the low frequency phase response of the two mics. *(Devices like the Radial Phazer take this to another level by allowing you to adjust the phase incrementally.)*

The 180° 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 cold (-). Depressing the 180° polarity reverse switch will toggle pins 2 and 3 at the XLR input to compensate for non-standard or vintage equipment.

Using The High-Pass Filter

The PreComp's microphone preamp section is equipped with a high-pass filter that gently rolls off bass frequencies below 100Hz. This is particularly useful for acoustic instruments that can produce excessive low frequency resonance like acoustic guitar. With the high-pass filter engaged you can reduce low frequency rumble without affecting the overall sound of the instrument. This helps eliminate excess bass in the mix and will increase the dynamic range of your recording.

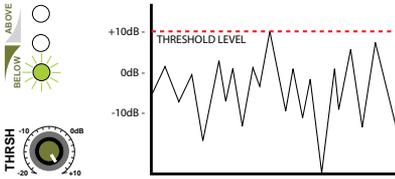


High-pass filter response

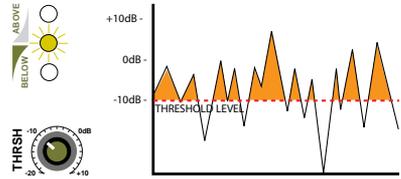
ADDING COMPRESSION

From the starting position, as described on page four, activate the compressor by depressing the IN switch. There should be little or no difference in the sound with these settings.

Threshold: This control is used to set the signal level where compression will occur. The middle and bottom LEDs on the three stage meter are used to help set the threshold level. The bottom green LED illuminates when the signal is below the set threshold and no compression is occurring. The middle yellow LED illuminates when the signal crosses above the threshold and indicates the compressor is working.



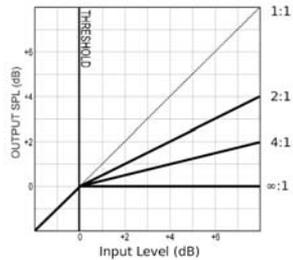
When the input signal is below the threshold level the green LED indicator illuminates.



When the input signal is above the threshold level the yellow LED indicator illuminates.

Speak into the mic and turn the threshold control counter clockwise until the center yellow LED starts to flash. Lowering the threshold further will compress most of the audio signal and severely reduce the dynamic range. Raising the threshold leaves most of the dynamics unchanged and only compresses the loudest peaks.

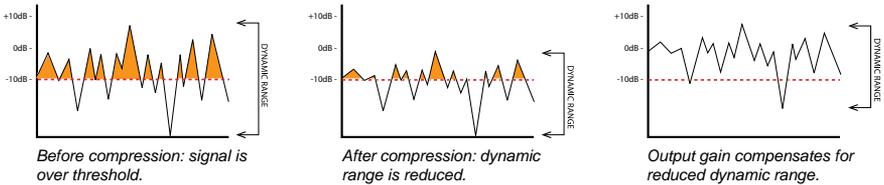
Ratio: The ratio control is used to set the amount of gain reduction applied when the signal goes over the threshold setting. For each decibel the signal rises above the threshold the compressor reduces the output by the ratio factor. For instance, with a ratio setting of 4:1 a 4dB signal peak above the threshold will produce a 1dB increase at the output. The table below outlines the general effect of different compression ratios and examples of their use.



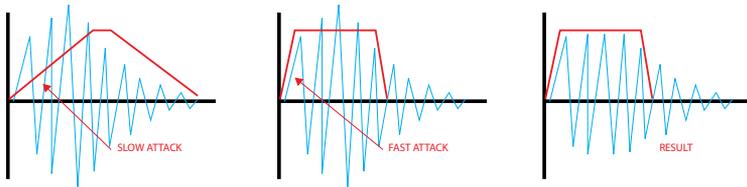
1.2:1	2:1	5:1	10:1
Slight	Moderate	Significant	Heavy
Mostly unnoticed	Smooth dynamics	Controlled dynamics	No dynamics
Used for master bus compression and music	Used to smooth out vocals and instruments	Used for instruments with wide dynamics	Highly compressed with narrow or no dynamics
Music program playback	Ballad vocals & strings	Slap bass & percussion	Sound effects, Announce

Set the control to a moderate ratio of 2:1 and speak into the mic. Each time the yellow threshold LED lights the output is compressed. If the yellow threshold LED is not flashing on the signal peaks, turn the threshold level down until it does. Now increase the ratio control to 5:1 and then 10:1 and observe how the dynamic range is reduced at each setting.

Gain: As you increase the amount of compression by lowering the threshold or raising the ratio, the dynamic range is reduced and less output is produced. The compressor gain control is used to compensate for this and is sometimes called a 'make-up' gain because it replaces the gain lost in compression. Simply adjust the gain control to bring the output level back to where it was before adding compression. Try comparing the pre and post compressed effect by using the in/out switch.



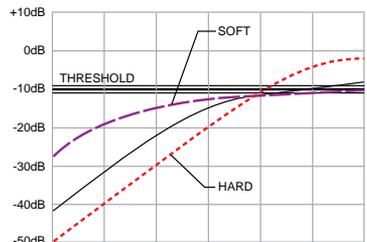
Fast/Slow: The compressor's attack and release settings are automatically adjusted in real time based on the dynamics of the input signal. The FAST/SLOW switch allows you to choose how the compressor responds to the input signal. When set to slow, the compressor will allow the initial transient to pass before the compression effect kicks in. This is often used with singers for a natural vocal sound with smooth dynamics.



Setting the speed control to fast will cause compression to occur the instant the signal goes over the threshold. A fast setting is often used with percussion to make sure the initial transient does not cause digital clipping at the recorder. Set the speed control to suit.

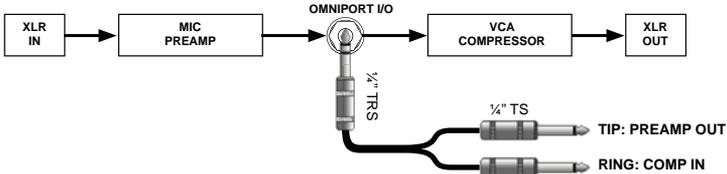
Soft/Hard-Knee: For the most part, there are two fundamental compression curves known as hard-knee and soft-knee. The knee is the pivot point where compression begins. Hard-knee compression abruptly affects transients above the threshold while soft-knee sets in before the threshold and does so in a smoother fashion.

The PreComp dynamically adjusts the compression curve from soft-knee to hard-knee based on the incoming program material. At lower levels the compressor automatically uses a soft-knee curve for a natural rendering but as peaks are encountered and dynamics increase, the compression curve pivots toward a hard-knee curve ensuring the output stays within the predetermined range. In the chart to the right the soft-knee curve is represented by the long dashed line, the hard-knee by the short dashed line. You can see how the soft-knee applies gradual compression as the signal approaches the threshold while the hard-knee curve reduces the gain once the signal has gone above the threshold.



USING THE OMNIPORT™

If you are using the PreComp in a Radial 500 series power rack you can use the Omniport function. The Omniport is configured as an unbalanced insert point that gives you access to the signal between the preamp and compressor. It allows you to insert an audio processor, like an equalizer, in between the preamp and compressor or use the preamp and compressor independently, as if two separate modules. The Omniport is used with a standard ¼" TRS insert type cable to connect the preamp output and compressor input. The TIP carries the output signal from the preamp section and the RING is the input to the compressor.



Standard unbalanced studio INSERT cable used with PreComp Omniport.

Before you can use the Omniport it must be turned on. Power down the rack and remove the module. Set the mini-toggle switch located next to the 15-pin card-edge to 'INSERT'. Re-install the module and power up the rack.

Using the Omniport as an insert

Inserting another 500 series module is quick and easy as Radial Workhorse power racks provide ¼" jacks for cross patching modules. Using your insert cable, simply connect the TIP and RING to the ¼" input and output provided on each module card slot I/O. It is common to insert an equalizer module like the Radial Q4 but you can also insert guitar effect pedals using the Radial EXTC 500 modules or even a spring reverb using the Radial TankDriver module.

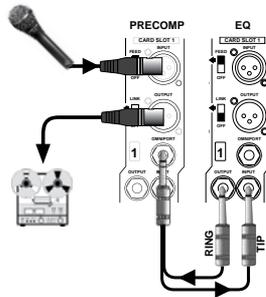


Fig-a: Using the Omniport as an insert

Using as two independent processors

The Omniport allows you to use the preamp and compressor independently. For instance, you can patch the output of another mic preamp into the PreComp's compressor section and output a balanced signal to the recorder (fig-b). You could also use the PreComp's mic preamp to start another signal chain by patching the Omniport TIP into another module.

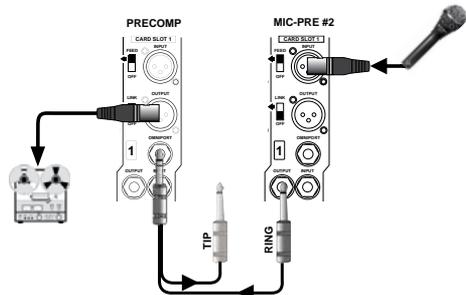
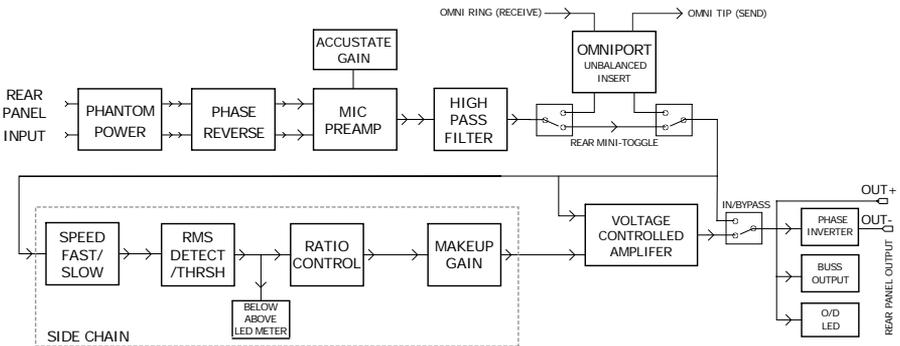


Fig-b: Using the compressor section with another mic preamp.

RADIAL PRECOMP 500 SPECIFICATIONS*

- Preamp circuit type:.....Accustate input with variable gain front end.
- Compressor circuit type:.....Feed forward VCA compressor with true RMS sidechain.
- Frequency response:.....20Hz - 20kHz (-1.5dB @ 20Hz)
- Total harmonic distortion:.....<0.003%
- Dynamic range:112dB
- Input impedance:3.3kOhms
- Maximum input:+24dBu
- Maximum gain:55dB
- Make up gain:.....Up to +25dB
- Output impedance:300 Ohms
- Equivalent input noise:-120dBu
- Noise floor:-85dB @ +40dB of gain
- Intermodulation distortion:0.03%
- LED Meter:Below threshold (green), above threshold (amber), over load (red)
- Omniport Function:.....Insert point - Tip: Preamp output / Ring: Compressor input
- Power requirement:56mA
- XLR Configuration:Follows AES spec: pin-1 ground, pin-2 (+), pin-3 (-)
- Size:.....5.25" x 1.5" x 6.6" (13.34 x 3.81 x 16.75cm)
Standard 500 series rack format
- Weight:1.5lbs (0.7Kg)
- Warranty:3 Years, transferable

BLOCK DIAGRAM



THREE YEAR TRANSFERABLE LIMITED WARRANTY

RADIAL ENGINEERING LTD. ("Radial") warrants this product to be free from defects in material and workmanship 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 finish and 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. In the unlikely event that a defect is uncovered, please call 604-942-1001 or email service@radialeng.com to obtain an RA number (Return Authorization number) before the 3 year warranty period expires. The product must be returned prepaid in the original shipping container (or equivalent) to Radial or to an authorized Radial repair center 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 and transferable warranty. This 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 center.

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, 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 DEPENDING ON WHERE YOU LIVE AND WHERE THE PRODUCT WAS PURCHASED.



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



www.radialeng.com

Radial Engineering Ltd.
1588 Kebet Way, Port Coquitlam BC V3C 5M5
tel: 604-942-1001 • fax: 604-942-1010
info@radialeng.com • www.radialeng.com

