

# Specifications

- Input impedance: Greater than 1M $\Omega$
- Output impedance: Less than 10K $\Omega$
- Controls: Peak Reduction and Gain
- Features: Limit/Compress switch
- All tube: Based on NOS mil-spec Raytheon subminiature twin triode tube
- Photo-optical: Ultra-linear, low distortion photo-resistive attenuator
- True bypass: With 'anti-pop' or 'thump' foot-switching circuitry
- Power requirements: 12VDC @ 400mA - Centre positive 2.1mm barrel connector
- Dimensions: Width 4.75"; Depth 3.75"
- Weight: 12oz (on Earth); 1.5oz (Callisto)
- Construction: Solid die-cast aluminum box
- Finish: Tough light-grey powder coat



**Caution!** The PC-2A utilizes vacuum tubes. Voltages as high as 300V are present in the circuit. Effectrode assumes no responsibility for possible injury from electric shock while servicing this pedal or operating it without the back-panel. There are no user serviceable parts inside this pedal. Contact Effectrode regarding warranty or servicing.

Serial #

PC-2A

Copyright © 2010 Effectrode<sup>®</sup> Audiophile Pedals

PHOTO-OPTICAL TUBE

*compressor*

MODEL PC-2A

## Owner's Manual



33866 SE Eastgate Circle, Corvallis, OR 97333

[www.effectrode.com](http://www.effectrode.com)

## Introduction

Thank you for purchasing the PC-2A compressor. The PC-2A is uniquely different to other compressor pedals in that it utilizes the same technology used in high-end, vintage studio compressors. The signal path is 100% analog, class A, based on a new old stock (NOS) mil-spec tube and a special design custom photo-resistive attenuator. The attenuator has essentially instantaneous gain reduction with no waveform or harmonic distortion for smooth, unobtrusive and transparent compression.

The PC-2A is designed for flexibility, simplicity and outstanding sound quality. Audiophile grade components and silver solder are used throughout the circuit with precision metal-film resistors for low-noise and stability, polyester coupling capacitors for their ability to resolve fine signal detail and ground-plane layout. The result is a compressor that exhibits a level of purity and natural tone not found in solid-state VCA (voltage controlled amplifier) or variable bias designs.

Thank you for trusting Effectrode to be your effects company. We wish you many years of musical enjoyment from this hand-built, all-tube pedal.

*Phil Taylor — Effects Scientist*



## Tubes

The PC-2A signal path is based on a NOS mil-spec 6021 subminiature triode tube. Raytheon (meaning, “light of the Gods”) developed subminiature tubes for military applications in the 1950s. The 6021 is manufactured to meet stringent Mil-E-1 specification for reliability and designed for long service life under conditions of severe shock, vibration (20,000G!), high temperature and high altitude. Subminiature tubes represent the pinnacle of tube technology and offer more consistent musical performance than early germanium transistors.



To maximize tube life, we recommend that you let the PC-2A warm-up for at least one minute after being switched on. This allows the heater filament in the tube to heat the cathode, which is coated with a layer of barium and strontium oxide. This oxide layer gets torn off the cathode, a process known as cathode stripping, if the cathode has not reached its correct operating temperature. If operated well within their ratings, good quality signal tubes can last 100,000 hours or more. If you use your pedal for only 4 hours a day, they should last over 25 years. (We can't warranty tubes for this period, however experience shows that such lifetimes are probable).

Additionally, the cell exhibits a memory effect where the time it takes to recover depends on light duration and intensity. In use this results in a release time that is slower when the pedal has been in compression for a while or the compression is heavy. This is analogous to how the human ear recovers from high sound pressure levels and is another important characteristic for transparency in a good compressor.

The “Peak Reduction” potentiometer sets the gain in the side-chain — the higher the gain the lower the threshold and the greater the compression will be. There are many compressor pedals that allow for direct adjustment of threshold, in contrast the PC-2A controls the side-chain gain and does not affect the signal in the audio path.

**Side-Chain Circuit** the PC-2A is based on feedback control circuit like the LA-2A studio compressor. With this circuit topology the signal that is used to drive the side-chain is affected by the gain-reduced signal. This type of topology seems to be preferred over feed-forward for its more musical characteristics.

There is also some pre-emphasis on the side-chain similar to an “A” weighted filter curve. This curve characteristic approximates the response of the human ear. Here it works to minimize ‘pumping’ normally associated when a compressor is processing low-frequency material.

## Controls

**Peak Reduction** knob controls both the threshold and the amount of compression. This knob should be set so that the PC-2A exhibits the desired amount of compression or sustain. A good starting point is at the 9 o'clock position, where the subtle compression enhances note detail and creates a fuller, warmer tone. Rotating this knob further clockwise progressively levels out playing dynamics to compress notes that are too loud and boosting quieter notes. This is particularly appropriate for country and funk-style licks.

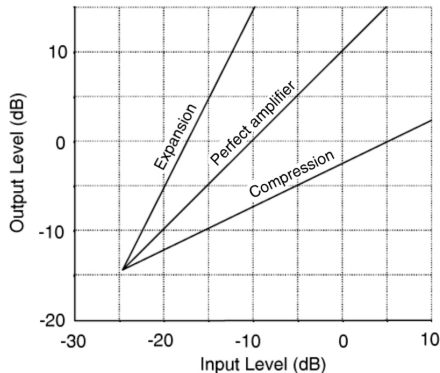
**Gain** knob should be used to match the relative levels of bypassed and effected signal. It also provides the capability to boost your guitar signal for solos and even overdrive your amp. To use the PC-2A as a tube booster and push your amp into smooth overdrive, simply turn the “Peak Reduction” knob fully anti-clockwise.

**Limit/Compress** toggle switch changes the characteristics of the compressor input/output curve. When in the “Compress” position the curve is shallower, presenting a low compression ratio which sounds subjectively more transparent. In the “Limit” position the curve is steeper resulting in a higher compression ratio for a deeper/thicker sound.

**Footswitch** allows selection between effectified (compressed) and non-effectified (dry) signal. Silent true bypass switching ensures there are no 'pops' or 'thump' when engaging the effect and that there is absolutely no loss of tone from your guitar to your amp when the effect is disengaged. Additionally, the tube signal path in this pedal is built to demanding audiophile specification to ensure hi-fidelity and signal integrity at all times - the benefit that your guitar tone always remains pure and intact.

## Theory of Operation

The graph below compares the input/output characteristics of a compressor, perfect amplifier and expander. It can be seen that an amplifier provides a fixed gain independent of the signal level, whereas a compressor adjusts gain in response to changes in input level.



The larger the input signal, the lower the gain, resulting in a reduction of dynamic range or compression of the signal. Conversely, an expander increases the dynamic range of a signal.

**Gain Reduction Circuit.** The photo-resistive attenuator is the heart of the compressor and determines the attack and release characteristics. The photo-resistive device is specially selected for fast attack of less than 1ms. This is important for achieving transparent operation during gain reduction and minimizing undesirable artifacts such as 'pumping'. The electrical performance of the attenuator is a close match to the electro-luminescent (EL) panel used in the Teletronix LA-2A studio compressor. The EL panel was developed in the early 1960s to eliminate attack speed shortcomings of neon and filament photo-optical attenuators.



The release time of the compressor is entirely determined by the cadmium-sulfide photocell in the attenuator. The cell has a desirable two-stage decay characteristic where it releases within 40 to 80ms to approximately half its off resistance when light is absent. The remainder of the release then takes place over as much as several seconds.