

Specifications

- Input impedance: Greater than $1M\Omega$
- Output impedance: Less than $1K\Omega$
- Controls: Peak Reduction and Gain
- Features: Limit/Compress switch
- All tube: Based on a *Sylvania* N.O.S. mil-spec subminiature triode pencil tube operating in class-A
- Photo-optical: Ultra-linear, low distortion photo-resistive attenuator
- True bypass: With 'anti-pop' or 'thump' foot-switching circuitry
- Power requirements: 12VDC @ 600mA - 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



Warning: High D.C. voltages of over 250 volts are present in the circuit; disconnect power before opening the unit. There are no user serviceable parts inside this pedal. Contact Effectrode regarding warranty or servicing issues.

Serial #

PC-2A

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PHOTO-OPTICAL TUBE

compressor

MODEL PC-2A

Owner's Manual



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Introduction

The PC-2A is an exceptionally musical and smooth sounding compressor pedal. This is achieved by using the same thermionic technology found in the *Teletronix LA-2A* studio compressor. The signal path is 100% analogue, class A, based on a vintage *Sylvania*, U.S.A. made vacuum tube and a special design photo-resistive gain attenuator. This gain attenuator has essentially instantaneous gain reduction with no waveform or harmonic distortion for musical, 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: 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 transistor VCA (Voltage Controlled Amplifier) or digital modelling pedals.

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



Phil Taylor — Designer

Tubes

The PC-2A signal path is based on a *Sylvania* 6111 N.O.S. subminiature twin triode pencil tube. These tiny tubes were specially developed by *Sylvania Electric* in the 1940s for military and aerospace applications to meet their stringent Mil-E-1 specifications for reliability and long service life under conditions of severe shock, vibration (20,000G!), high temperature and high altitude. *Sylvania* subminiature tubes represent the absolute pinnacle of thermionic technology and are unquestionably the finest tubes ever made by any company, ever—we will certainly never see the likes of them again.



To extend tube life, it is recommended that the unit be allowed to warm-up for at least one minute after being switched on. This is to allow 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: that's well over 11 years of continuous use. 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 photocell exhibits a memory effect where the time it takes to recover depends on light duration and intensity. In use this results in a faster release time for short signal bursts and a slower release when the signal remains continuously above the compression threshold. This is analogous to how the human ear recovers from high sound pressure levels and is the reason why the PC-2A sounds so natural and transparent.

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 minimise '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.

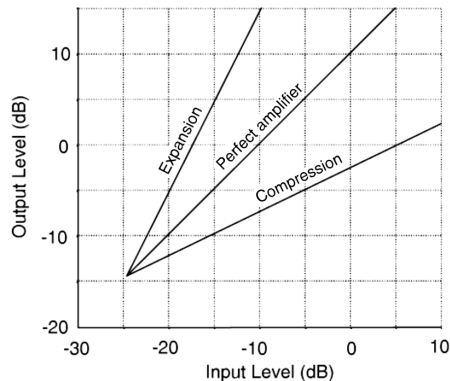
Limit/Compress toggle switch alters the transfer characteristic of the compressor input/output curve, enabling PC-2A to operate as a compressor and limiter. When is in the 'up' position (compressor mode) the curve is shallower, presenting a low compression ratio which sounds subjectively more transparent. In the 'down' position (limiter mode) the curve is steeper resulting in a higher compression ratio, creating a fatter more squashed sound.

Footswitch utilises quiet true bypass switching to reduce 'pops' or 'thump' when engaging the pedal and ensure there is no loss of guitar tone when the pedal is bypassed.

Internal Knee and Attack Trimpots These are factory set, however can be adjusted by the user to tailor the compression characteristic to suit instruments that are challenging to amplify or record such as bass guitars with active high output pickups or acoustic instruments fitted with piezo pickups.

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-optical gain attenuator is the heart of the LA-2A and determines the attack/release characteristics. A *Clairex* photocell is specially selected for fast attack of less than 1ms. This is important for achieving transparent operation during gain reduction and minimising 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 photocell. 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.