Op-2 Comp By **Lightning Boy Audio**

Rev. B.1 User's Guide (11/2018)

Congratulations on your purchase of this exquisite piece of hand crafted vacuum tube technology from Lightning Boy Audio! It was my great pleasure building it for you. Please carefully read this guide before using your new compressor pedal.

GETTING STARTED:

Included is a 24V DC power adapter, which you should definitely use. The Op-2 Comp revision B requires 24v DC at 170mA (minimum amperage required for normal operation). It will not work with less voltage and could damage the tubes if the voltage is exceeded. The tip/center is wired positive, which is not standard for most FX pedals on the market.

Powering up: The pedal will turn on as soon as a power supply is connected. Blue LED under lights will illuminate the vacuum tubes to indicate power-on status. The vacuum tubes need to warm up before they will transmit any signal. It may take about 10 seconds before you will hear anything. It may take several minutes after initial power up for the pedal to sound its best. To ensure long life of the vacuum tubes it is advised to turn off or unplug your power supply when not in use.

Controls: The **active/bypass stomp switch** is true bypass. When the Lightning Boy logo lights up, the pedal is activated. When the logo light turns off, the pedal is bypassed. Next, there are two (update: 3) controls for the compression. The **compression knob** is simple to understand. It's basically a blend control. Turning this knob clockwise will give you more compression. Fully clockwise is obviously max compression. When the knob is fully counter clockwise your signal will path through the audio tube with no compression occurring. The other control is the "Knee" switch. This toggles between a soft knee compression slope in the downward position (towards the foot switch) and hard knee compression slope in the upward position. The sonic effects of each can be more easily heard with the compression knob turned all the way up. Basically, hard knee is a more aggressive/snappy sounding compression and soft knee is a more musical/smooth sound. The **volume knob** should be pretty self-explanatory. It can take you from zero to a significant boost. Finally, there is a toggle switch located to the left of the vacuum tubes. This is the "Turbo" switch. (Update: now "Ratio" switch). The new update makes "Turbo" always on, since practically everyone prefers it on. What was the turbo switch is now a ratio switch. After my inventory of pedal cases run out, which could be a while, I'll start labeling this switch as Limit/Compress. So, in the up position where it was "turbo," the pedal now operates in limiter mode. The down position is compressor mode, which is more like what the pedal used to only do. This new limiter mode is a pretty cool development, which I will explain more at the tail end of this guide.

Tubes: Op-2 Comp requires two 12AU7 type vacuum tubes, which are supplied with the pedal. One tube is directly responsible for audio amplification. This tube is the one directly in line with the input jack. The other tube is responsible for limiting and for driving the optical attenuator circuitry. That's the tube in line with the output jack. The Op-2 Comp has been specifically designed around the 12AU7. It will be very difficult to remove the stock tubes because of the intense gripping strength of the high quality tube sockets used in the pedal. Taking tubes out and putting in new tubes requires delicate care to not damage the internal wiring. If a tube replacement is needed it is recommended that you return the pedal to Lightning Boy Audio for servicing. If you want to perform this work on your own or by a tech please follow the succeeding guidelines. If you damage the pedal performing this work, you will in effect void the warranty of the pedal.

Replacing vacuum tubes: This is not recommended. If you must, the first step is to make sure the pedal is unplugged. Remove tube dampers if installed. Then, get a firm grip on the tube to be

replaced. Pull with force while slightly wiggling the tube back and forth. DO NOT get wild with the wiggle. You do not want to damage the internal wiring. By taking off the back cover you will see what you're up against. Take your time. It can take several minutes to unseat the tube. To install the new tube you will now need to remove the back cover. Place a finger on the back of the tube socket, directly on the LED backlight to provide support. Inserting the new tube will require some strength to overcome the tight socket. Be VERY CAREFUL to make sure the pins are lined up with the socket. After you have seated the tube on the socket, you can peek through underneath from the backside to confirm the tube is fully seated on the socket. Replace the cover, plug in, rock!

TROUBLE SHOOTING:

- Pedal has become excessively noisy. First consider replacing the tubes. If this doesn't fix it, try a new power adapter. If that still doesn't work, send it back to LBA for repair.
- Broken tube. Tricky business to replace, my friend. I usually pop off the back cover and using a long, finely spiked tool (much like a dentists tool) I pry the tube base away from the socket a little, then rotate and repeat until the tube comes free from the socket. If you do not have similar tools you may want to send the pedal back to LBA for a retube.

For tube replacements and/or servicing please contact lightning boy audio by email at sales@lightningboyaudio.com or by phone at 1+716-472-6739. More information about the Op-2 Comp can be found on its product page at www.lightningboyaudio.com.

UPDATE REV B.1 designer notes:

This new limiter mode might be a unique approach to limiting. The compression tube is a 12AU7 dual triode... basically, two vacuum tube triodes in one glass envelope. One triode drives the optical attenuator electronics, which have within them a section that determines a prefixed threshold. That same triode also drives the compression indicator light. Now here's where it gets real interesting. That same triode just mentioned comes last in the chain of events. Feeding it is another triode, which boosts the signal enough to cross the threshold. When engaging limiter mode it forces this triode to boost the signal so much it saturates the triode, basically clipping the signal (tube distortion). You then have a clipped and boosted signal feeding into the optical attenuator driver. That is to say more of your signal will cross the threshold and the ratio will be more extreme. So, when in limiter mode there are actually two layers of compression occurring. One directly from the optical attenuator and one indirectly from true vacuum tube compression.

Now for some less interesting stuff. What was the power indicator light, is now the compression indicator light. Located between the tubes is a red LED. This light will illuminate when your signal crosses the threshold. The light will be more intense when compressing more. The compression knob has no effect on the light (or visa versa) because the knob is actually a blend knob. In the future when I do another pedal case run I'll print "Blend" on the cases instead of compression.

Lastly, the design used to use both tubes for audio amplification and tapped off some of the gain to drive the optical section. Not so with the new configuration. There is a dedicated audio tube and a dedicated compression tube. Changing the audio tube for different brands may result in tonal changes. It's recommended to stick with 12AU7/ECC82 tubes if you want to try this. I'll include a NOS tube for the audio tube for as long as the market price is reasonable. For the compression tube, it matters much less what brand is involved, so I installed a current production tube in this position. HINT: not all 12AU7 tubes create the exact same amount of gain. There is variation even within the same brand. I select high gain 12AU7 tubes for this pedal.