

*mwk*

*Ceriatone*

# **KLEIN-ULATOR**

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**SOLID-STATE EFFECTS LOOP BUFFER**

**DESIGNED BY MWK - BUILT BY CERIATONE**

**MANUAL VERSION 1.0**

Thank you for the purchase of your Ceriatone Klein-ulator effects loop buffer!

Here, we hope to explain how best to use your new unit.

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### **1) About the Klein-ulator**

In early spring of 2007, I decided I wanted to build a certain rare, expensive, and Californian amplifier, and I began to go through the previous years of research I had done. Pictures, schematics, even conversations I had read became fair game. Keep in mind, this was before I discovered some of the great internet forums dedicated to building these types of amplifiers. In any case, I came across a design for tube-driven effects loop interface. It was designed for use with the passive serial effects loops in these incredible amplifiers. I quickly decided that I too needed to build one of these tube effects loop buffers. Unfortunately, design parameters plagued the process. I couldn't find a transformer of the same size and mounting, and the unit's power supply was still a mystery. About a month after I decided I HAD to have one, the project was temporarily shelved.

A few weeks later, I realized that I might be able to come up with a solid-state version that performed similarly, but was much easier and inexpensive to build. After some brain-storming, I posted a schematic and layout of a working Klein-ulator in the public domain. While the freeware unit works great, I knew I could make it better.

I redesigned and tested new ideas over the next year, and even had the opportunity to compare it to a D\*\*\*\*\*-based tube effects loop buffer I built (thanks to various individuals who helped me procure parts). Once I was able to compare it to an "actual" unit, I was able to change a few things to improve the design further. Upon careful testing, it became clear that the two

designs (one tube and one solid-state) performed shockingly similarly. Both units smoothed the tone in a very pleasing manner, and added a perceived “3D” effect to single note lines. Both could be used to overdrive an amplifier’s phase inverter for lush and very complex tones. I was also able craft the solid-state unit’s frequency response to the same as the tube unit. Most importantly, both units allowed the successful use of effects in an amplifier’s passive effects loop.

While the Klein-ulator is not meant as a “replacement” for the tube-driven units, I think you’ll find it performs quite well. I hope you enjoy it!

- *mark* 7/08

## 2) Connecting the Klein-ulator to your amplifier

On the rear panel of the Klein-ulator, you will see six items

- INPUT (1/4” jack)
- SEND (1/4” jack)
- RETURN (1/4” jack)
- OUTPUT (1/4” jack)
- 9V (2.1mm jack, center negative. “Boss-style”)
- ON (2-way toggle switch)

First, connect a suitable 9V power supply to the Klein-ulator “9V” jack. The proper size and orientation is 2.1mm, center negative. This is the standard pedal power jack format.

Second, connect a cable from your amplifier’s EFFECT LOOP SEND / PREAMP OUT to the Klein-ulator’s INPUT.

Third, connect a cable from the Klein-ulator’s SEND to your effect unit’s INPUT.

Fourth, connect a cable from your effect unit’s OUTPUT to the Klein-ulator’s RETURN.

Finally, connect a cable from the Klein-ulator's OUTPUT to your amplifier's EFFECTS LOOP RETURN / POWERAMP IN.

NOTE – you can run the Klein-ulator without any effects and still get its nice tone-shaping impact. Just don't plug a cable into either SEND or RETURN on the Klein-ulator, and follow the instructions above. The jacks and wiring method employed will internally switch the two jacks together if nothing is plugged into them.

### 3) Controls

On the top face of the Klein-ulator, there are five items

- SEND
- BRIGHT I
- RETURN
- RECOVERY
- BRIGHT II

SEND adjusts the volume sent from your amplifier's preamp to your effects. With SEND turned all the way up, the control is at unity gain. In many cases, this is too high and will cause your effects to overload. Try setting SEND between 12:00 and 3:00.

BRIGHT I is a high-frequency boost that can be used to add sparkle to your tone coming from the preamp, or compensate for an overly dark amplifier or long, low quality interconnect cables. This high frequency boost is more prominent as SEND is turned down.

RETURN adjusts the volume sent from your effects coming back into the Klein-ulator. Unless your effect unit produces an extremely hot signal, set this control at maximum (approximately 5:00).

RECOVERY is a gain stage that is used to make up any lost volume from turning down the volume at SEND or RETURN. It "recovers" volume, hence the name. You can also turn this control up to overdrive your amp's PI for pleasing harmonic grit. With the previous settings, try setting RECOVERY at 12:00-3:00.

BRIGHT II is a high-frequency boost that can be used to add sparkle to your tone coming from your effects unit, or compensate for long, low quality interconnect cables. This frequency boost is purposefully subtle, and will become less subtle as RECOVERY is turned down.

#### 4) Frequently Asked Questions

*Can I play with the internal trimpot? I like to tweak my tone!*

- NO! This trimpot is factory-set for optimal performance out of your Klein-ulator. Do not adjust this trimmer – it augments a critical function point of the Klein-ulator.

*My rack-mounted effect unit seems to work okay without a buffer, but my pedals sound bad without one. What's the deal?*

- Generally, what you're hearing is a significant mismatching of impedances, and/or an overloading of the effect unit itself. Most rack-mount units have different input impedance than pedals, and thus can *sometimes* function fine without a buffer before them. In addition, *some* of these rack-mounted effects can pad the volume they receive, preventing it from overloading. Pedals do not have proper input impedance or padding ability, and therefore do not play nicely. For best results, an effects loop unit like the Klein-ulator or D\*\*\*\*\*-ator should be used in a passive, serial effects loop when any effects (rack-mounted or pedal) are desired. It prevents impedance mismatching, as well as provides the ability to pad down the volume sent to the effects units hence preventing any overloading.

*What power supply do I need?*

- There are many great power supplies on the market, but I highly recommend the Boss PSA-120. Just be sure to get one with a 2.1mm and center negative tip. This is the “standard” pedal power supply topology. 200mA is more than sufficient current supply. 9V only!

*What settings do you recommend?*

- Start with nothing in the SEND and RETURN jacks on the Klein-ulator. Set the SEND control @ 3:00, RETURN control @ 5:00 (max), and RECOVERY control @ 2:30. Plug in your effect unit, and adjust the controls as necessary.

*My amplifier sounds slightly darker with the Klein-ulator. What's the deal?*

- The original D\*\*\*\*\*-ator imparted a natural smoothing of the high-end, and it became highly sought-after for that characteristic. The Klein-ulator is not intended to be transparent, rather mimic the frequency response of the original D\*\*\*\*\*-ator. If you miss that high end, you can experiment with the Bright switches, but that's no fun.

*Why isn't there a battery jack if it can run off 9V?*

- Imagine having your entire signal from your preamp disappear because a 9V battery withered away mid-song. This choice is an issue of pragmatics more than feasibility.

*Why solid-state and not tube?*

- Really, why not? Keep in mind, the tube in the D\*\*\*\*\*-ator serves two purposes: 1) cathode follower, and 2) recovery gain stage. I encourage anyone to weigh the benefits of a tube-based design in this context. I am the first to admit that tubes work great in this application, but I also think there are other viable alternatives. I honestly feel like each has its own pros and cons in this situation, and I tried to maximize the pros and minimize the cons of a solid-state design. For the naysayers/as a fun-fact...if you doubt the performance of a JFET as a buffer, you might ask yourself why D\*\*\*\*\* built a JFET buffer into Larry Carlton's Sho-Bud volume pedal.