

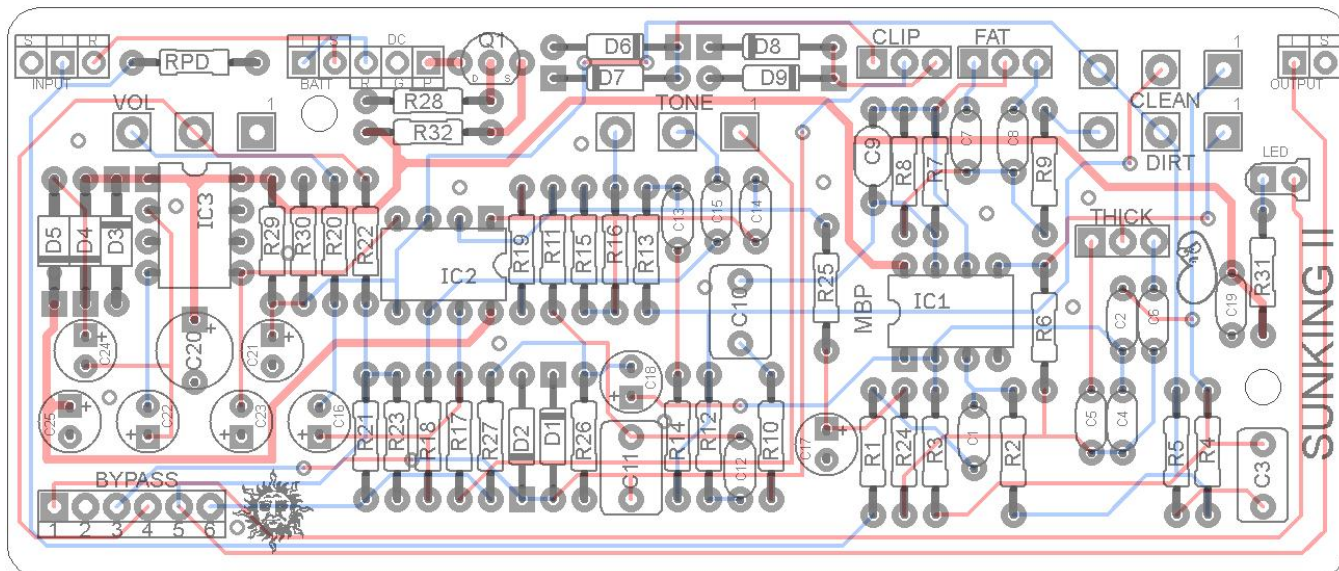
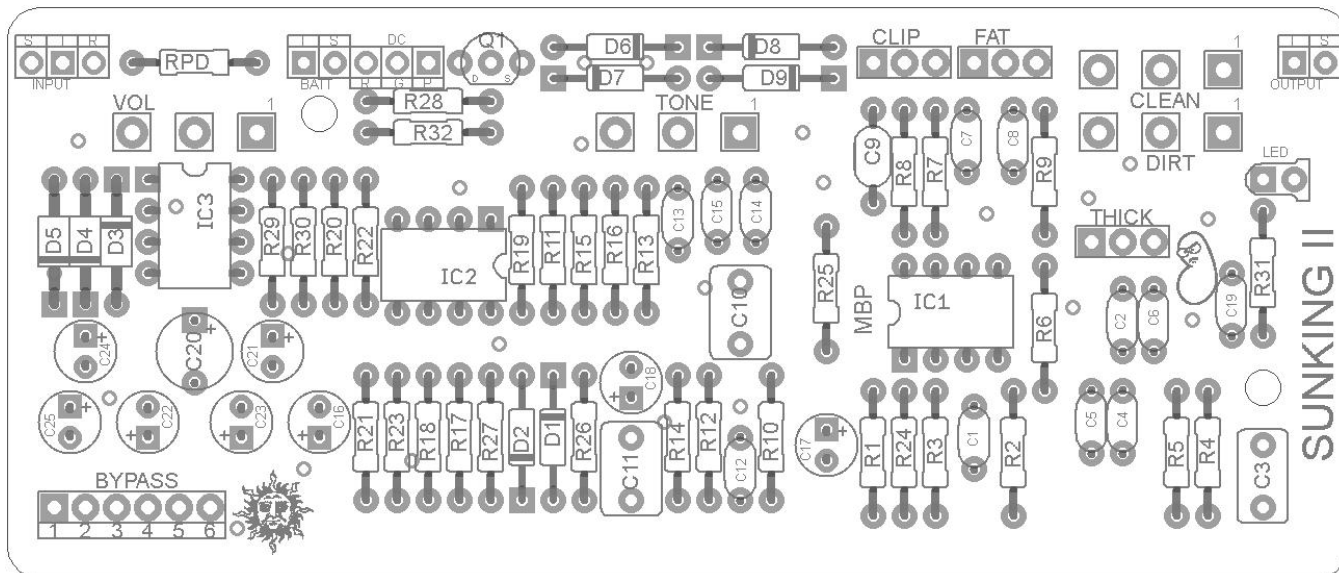
Sunking 2

FX Type: Boost/Overdrive

Based on the Klon Centaur™

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4.3" W x 1.825" H



Caveat: When mentioning the Klon™ in this document, I am referring to both the circuit design and product itself as a basis of comparison. The Sunking2 is not a duplicate or clone of the Klon™. Rather, it is a circuit board that lets one build a reasonable facsimile of a the Klon™, which is no longer in production. There are several differences in the electronic design of the Sunking2 and the Klon™ both in the power section and the included mods. This means that it is not a direct copy of the Klon™ and I do not represent it as such.

Resistors		Caps		Diodes	
R1	10k	C1	100n	D1	1n34a
R2	1M	C2	68n	D2	1n34a
R3	5k1	C3	390n	D3	1n4742
R4	1k5	C4	100n	D4	1N5817
R5	1k	C5	68n	D5	1N5817
R6	10k	C6	150n	D6	*your choice
R7	422k	C7	82n	D7	*your choice
R8	15k	C8	150n	D8	*your choice
R9	2k	C9	390pF	D9	*your choice
R10	1k	C10	1uF	Transistors	
R11	47k	C11	1uF	Q1	BS250
R12	22k	C12	2n2	IC	
R13	27k	C13	27n	IC1	TL072
R14	12k	C14	820pF	IC2	TL072
R15	392k	C15	3n9	IC3	ICL7660SCPA
R16	1k8	C16	4u7	Switches	
R17	4k7	C17	1uF	CLIP	SPDT
R18	100k	C18	4u7	FAT	SPDT
R19	100k	C19	100n	THICK	SPDT
R20	560R	C20	220uF	Pots	
R21	68k	C21	47uF	TONE	10kB
R22	68k	C22	10uF	VOL	10kB
R23	100k	C23	10uF	GAIN	100kB Dual-Gang
R24	1k5	C24	10uF		
R25	15k	C25	47uF		
R26	100k				
R27	560R				
R28	1M				
R29	27k				
R30	27k				
R31	3k9				
R32	10R 1/2W				
RPD	2M2				

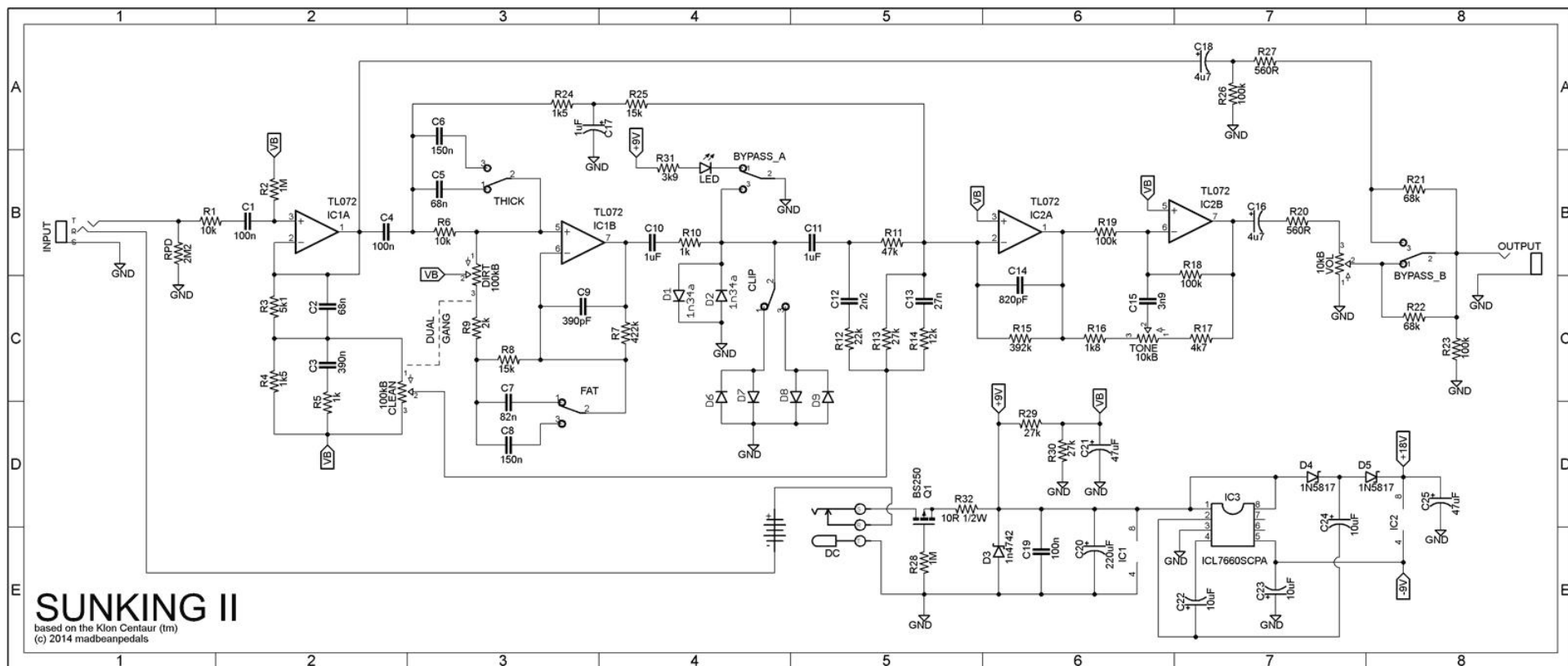
Terms of Use: You are free to use purchased **Sunking 2** circuit boards for both DIY and small commercial operations. You may not offer **Sunking 2** boards for resale or as part of a “kit” in a commercial fashion. Peer to peer re-sale is, of course, okay.

Shopping List			
Value	QTY	Type / Subs	Rating
10R	1	Carbon / Metal	1/2W
560R	2	Carbon / Metal	1/4W
1k	2	Carbon / Metal	1/4W
1k5	2	Carbon / Metal	1/4W
1k8	1	Carbon / Metal	1/4W
2k	1	Carbon / Metal	1/4W
3k9	1	Carbon / Metal	1/4W
4k7	1	Carbon / Metal	1/4W
5k1	1	Carbon / Metal	1/4W
10k	2	Carbon / Metal	1/4W
12k	1	Carbon / Metal	1/4W
15k	2	Carbon / Metal	1/4W
22k	1	Carbon / Metal	1/4W
27k	3	Carbon / Metal	1/4W
47k	1	Carbon / Metal	1/4W
68k	2	Carbon / Metal	1/4W
100k	4	Carbon / Metal	1/4W
392k	1	Carbon / Metal	1/4W
422k	1	Carbon / Metal	1/4W
1M	2	Carbon / Metal	1/4W
2M2	1	Carbon / Metal	1/4W
390pF	1	Ceramic / Film / Mica	35v or more
820pF	1	Ceramic / Film / Mica	35v or more
2n2	1	Film	35v or more
3n9	1	Film	35v or more
27n	1	Film	35v or more
68n	2	Film	35v or more
82n	1	Film	35v or more
100n	3	Film	35v or more
150n	2	Film	35v or more
390n	1	Film	35v or more
1uF	2	Film	35v or more
1uF	1	Tantalum	35v or more
4u7	2	Electrolytic	24v or more
10uF	3	Electrolytic	24v or more
47uF	2	Electrolytic	24v or more
220uF	1	Electrolytic	24v or more
1n34a	2	Germanium	
1n4742	1	12v Zener	
1N5817	2		
diodes	4	1n914, 1N4001, LED, etc.	
BS250	1	T0-92	
TL072	2	DIP	
ICL7660SCPA	1	TC1044 SCPA , MAX1044 CPA	
SPDT	3	Solder Lug On/On	
10kB	2	PCB Mounted	16mm
100kB	1	Dual-Gang PCB Mounted	16mm

If you plan on doing all three “switch mods” you should use sub-mini switches to allow room for the input and output jacks. I recommend using open-frame Switchcraft jacks for this build.

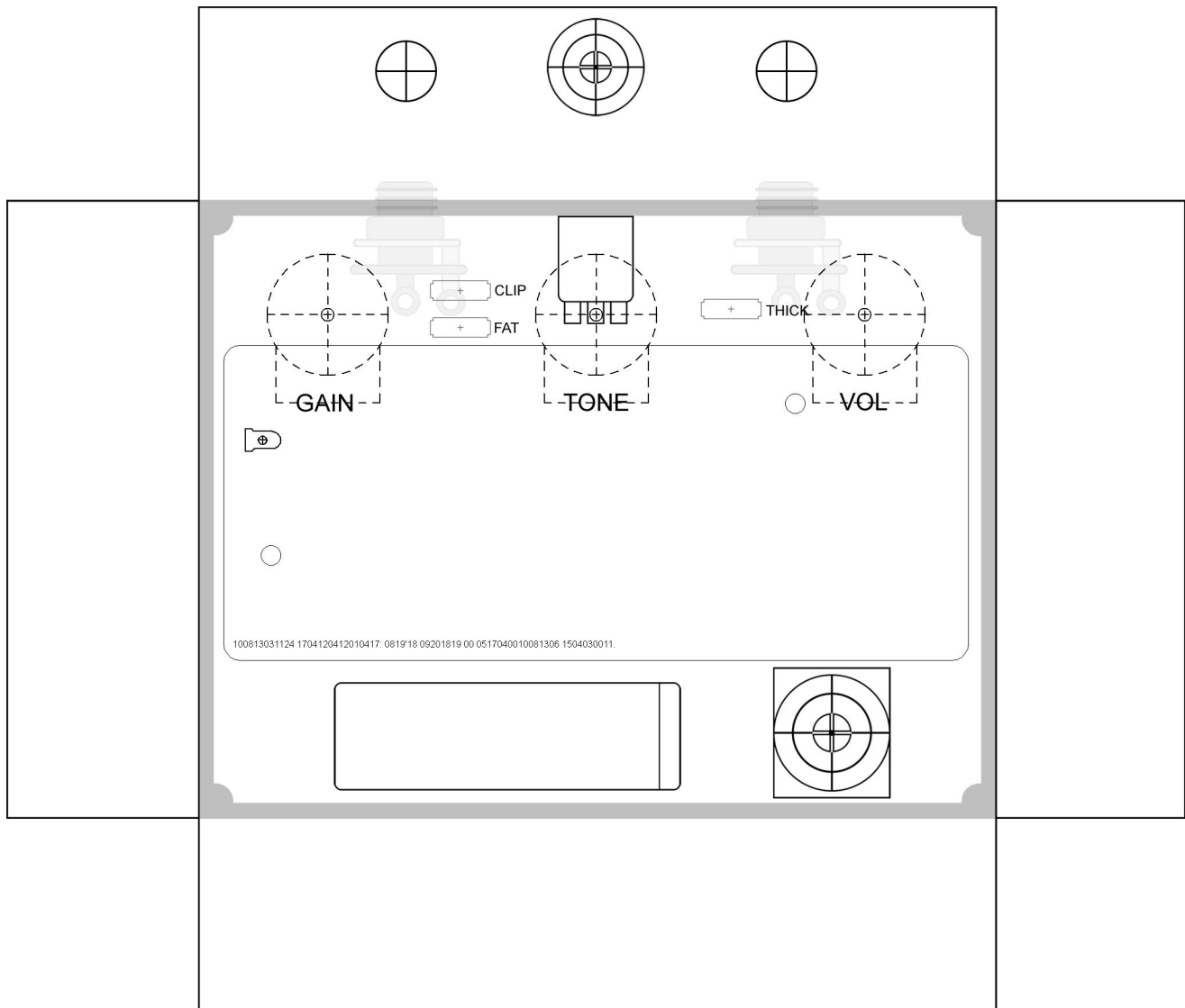
<http://www.smallbearelec.com/servlet/Detail?no=42>

<http://www.mouser.com/ProductDetail/Mountain-Switch/10TC410/?qs=%2fha2pyFadujNkpWInYvF9jNUIsb2puRLLSVuSt44axA%3d>



6.8" W x 5.8" H

This template is approximate. Take special care with the In/Out/DC jacks to ensure a good fit.



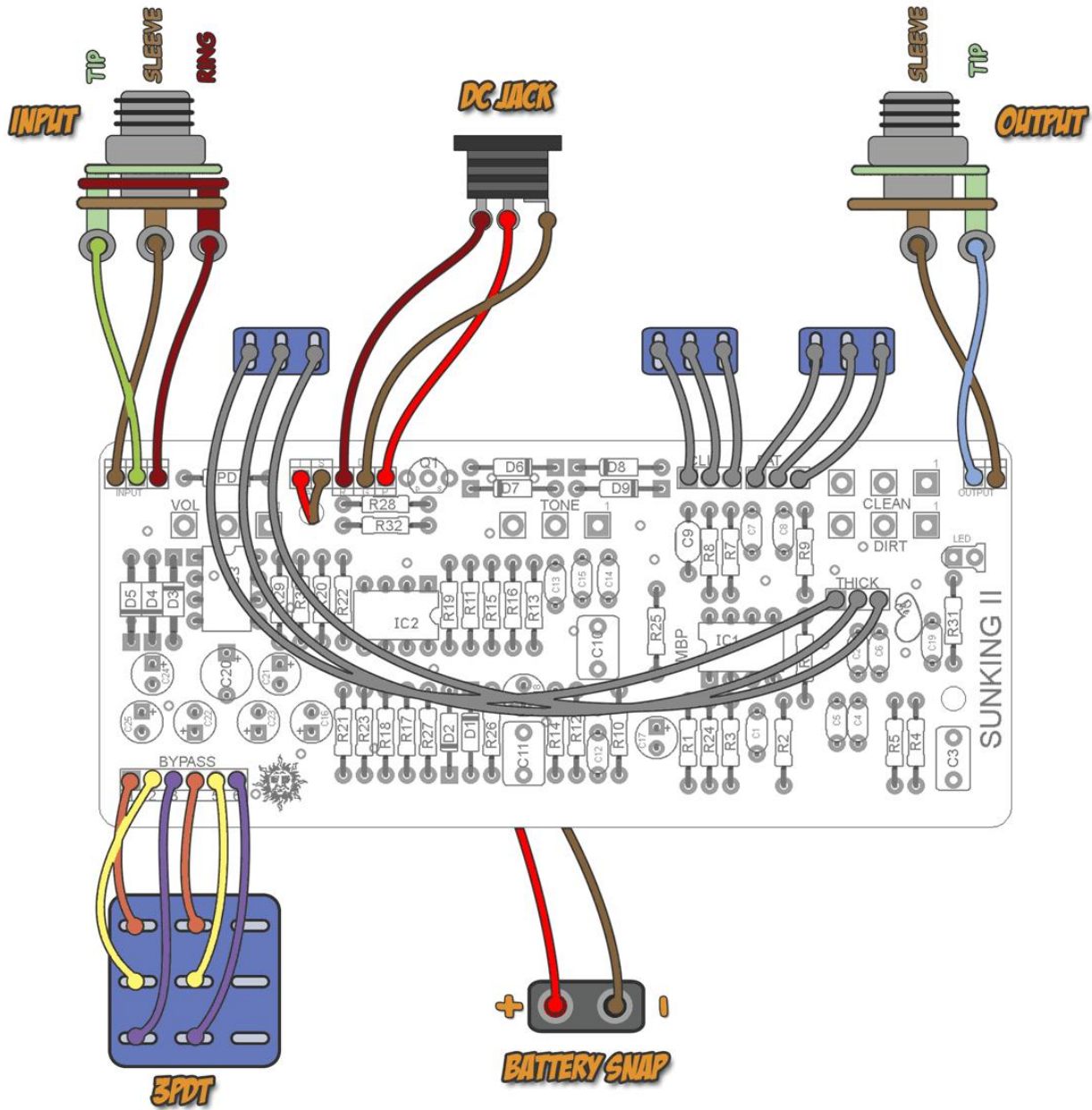
This is just one possible way to lay out the three mod switches. If you are using the sub-mini ones suggested you might be able to get all three in one column. Or, do one on the left of the Gain pot and another on the right of the Vol pot. If you have Photoshop, download the file I used to make this template and experiment:

http://www.madbeanpedals.com/projects/Sunking2/Sunking2_DRILL.zip

The hole on the upper right is for routing the battery wires under the PCB. The hole on the lower left is for a screw stand-off if you want to add extra support to the PCB. Smallbear has them under the “Hardware” section.

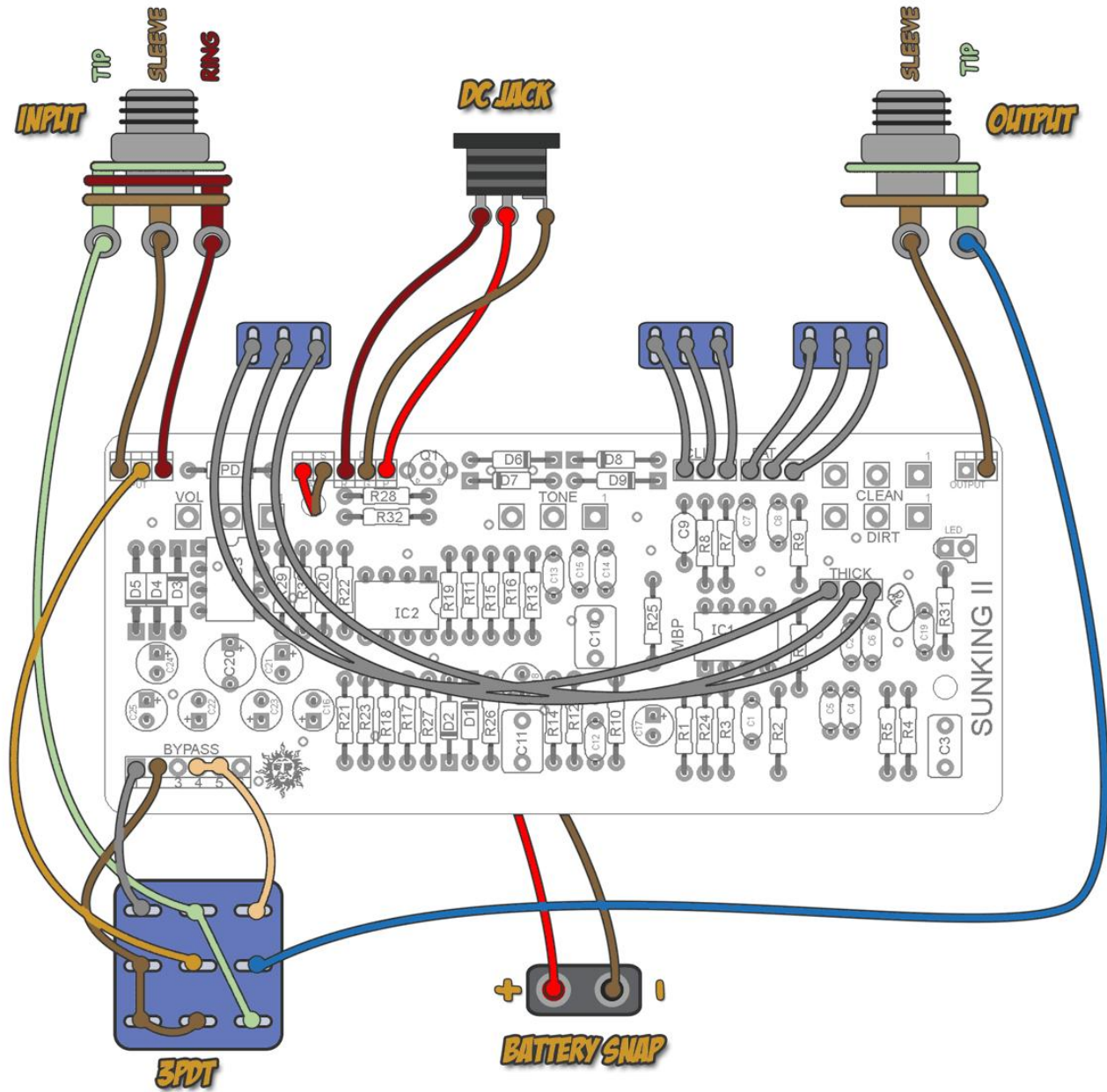
Remember: this is the top down view of the enclosure so you are seeing the circuit board flipped on its horizontal axis.

Buffered Bypass Wiring



- Omit the RPD resistor for buffered bypass

True Bypass Wiring



- Omit R21, R22, C18, R26 and R27 for true bypass
- Connect pads 4 and 5 on the bypass portion of the PCB and wire it to the 3PDT as shown.

An ode to an old friend...

What is Klon™?

Klon™ is good.
Klon™ is right.
Klon™ is just.

Klon™ is the father and mother
Before time, there was Klon™
After death, Klon™ lives still

Klon™ brings life
Klon™ is the bounty
Which you desire

Klon™ is merciful
And, forgiving
Klon™ loves you
And you love Klon™

Do not mock Klon™
For Klon™ will become angry
And lay to waste your fat riffs
And endless noodling

What is Klon™?
We are Klon™!

Klon™ is legion

OMFG! Sunking 2? It was never going to happen. Or, so I thought. But, when EHX is cloning your pedal (the Klon™, I mean) and *another company* is modding that clone to make it like the second version of the original pedal which is not being produced erratically and the first version is long gone and costs as much as a high-end boutique amplifier then it's time to throw down the gauntlet. The Klon™ is now part of the lexicon of classic overdrive circuits. It will be used, re-used, modified, unmodified, lauded, mocked and loved by generations of players and mojo-minded musical machine manufacturers.

But, this is DIY so we can put aside any politics around that situation and concentrate on having fun building something.

The **Sunking2** has three design objectives: make a large PCB with the components well-spaced and easy to populate, include some additional tone shaping mods, and make it as close to building a “production-oriented” pedal as possible. The last part meant putting in some slick reverse polarity protection (thanks, RG Keen!), and locating the I/O pads as close as possible to their hardware hook-ups. All three objectives were met pretty easily, although the end build will be a little tight with the switches. But, nothing the average builder can't handle.

VOL – Passive output control. Turn this up when the GAIN is down to make the Sunking2 a boost.

TONE – An active tone control. Stock it is mostly a treble boost, but if you use my suggested parts subs, it opens up the tone control further by having less extreme treble boost and a fair amount of tone cut over the range of the pot.

GAIN – The dual-ganged gain pot blends between the overdrive and clean signal paths. The overdrive section is done via germanium diodes set up as hard clippers.

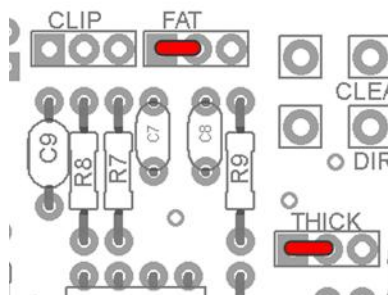
CLIP – This optional mod lets you switch between two sets of clipping diodes. When using this option, D1 and D2 are left empty.

THICK – This optional mod increases the bass frequencies in the overdrive portion of the circuit.

FAT – This optional mod decreases the corner frequency of the clipped signal to create a warmer, fatter overdrive.

Building the “stock” and un-modded version

Omit C6, C8, D6-D9. Put the 1n34a diodes in D1 and D2. Jumper pads 1 and 2 of both the FAT and THICK switches. Do not wire any of the toggle switches to the PCB.



Tone Control Mod

R16: 6k8, C15: 5n6

I *highly recommend* doing this mod. It pushes the neutral position of the Tone control more toward the center, has less shrill treble boost and more treble cut when turned down. I would not build it any other way at this point, FWIW.

Thick and Fat mods

I chose 150n for both the Thick and Fat caps based on what felt right to me. If you find yourself wanting more bass, I suggest going up to 220n on one or both caps. Obviously, socketing these is a good idea.

Clip Mod

If you are doing the clip mod, put your 1n34a diodes in D6 and D7 and leave D1 and D2 empty. D8 and D9 are for putting in your choice of diodes. There are tons of things you can try here: symmetrical, asymmetrical, 1n914, 1N4001, BAT41 (maybe two in series on each side), FETs, and LEDs. There is no single “best” choice...it’s just a matter of experimentation.

Bonus: If you use an On/Off/On switch instead, the middle position will have no clipping diodes. The result is additional volume gain from the overdrive section that actually sounds pretty good. However, it will only work for about the first half of the Gain pot. **After that, the pedal will start to whine and oscillate. Keep that in mind if you are doing this.**

Bass Players

If you want to try and adopt the Sunking2 for a more bass-friendly overdrive, try the following:

C4: 220n
C5: 100n
C6: 220n
C9: 1n
C7: 100n
C8: 270n
C12: 6n8
C13: 56n
C14: 1n
R16: 6k8
C15: 10n – 15n
C2: 220n
C3: 1uF

Caveat: I have not verified or even tried this. These are the values I would start with based on the math involved.

The “I’m A Glutton for Punishment” Mod

Here’s one for the big boys (and gals): adding a switch to allow either true-bypass or buffered bypass in the same pedal. I’ve already typed up a manifesto on this in the **Kingslayer 2** doc, so I’m going to copypasta that here.

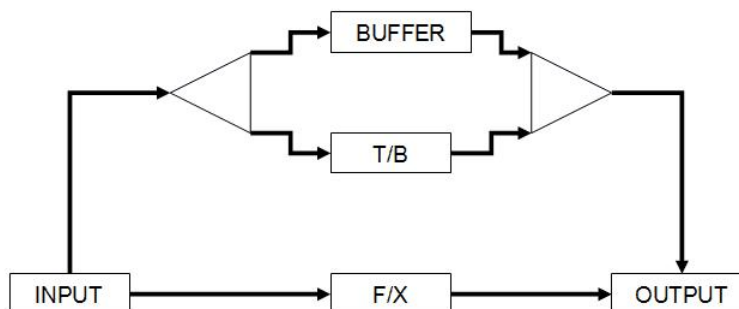
The **[Sunking 2]** can be built in either buffered or true bypass modes. With the True Bypass wiring, the circuit is completely removed when bypassed and the circuit input is grounded. The Buffered wiring buffers your bypass guitar signal when the effect is off.

Why choose buffered over true bypass? True bypass, despite what you may have read, is not the be-all end-all of guitar effects. There is one supposed advantage to true bypass: no loading down or tone alteration of your guitar signal. However, this is not always the case. Capacitance on your guitar cables over long distances will load your guitar signal and thus create some signal loss in the high frequency range. Even low-capacitance cable can affect tone *if* you use enough of it or your pedal junkie pedalboard has tons of true bypass effects in series. So, it’s best not to assume that true bypass automatically means your guitar signal is completely un-affected because if the other factors are in play it might make your tone *worse*.

Buffered bypass offers a different advantage. It guarantees no signal loss due to cable capacitance or excessive cable lengths. It takes a high impedance input and through just a few parts gives you an extremely low impedance output thus removing any loading down of the signal. People mistakenly think that a buffer brightens your guitar signal, but this is not the case. When you run your guitar through a buffer, you are hearing what the guitar actually sounds like without any (significant) loading. IOW, it’s the true sound of your guitar through your amp. Of course, this assumes that you are using a quality buffer that is low noise and well-designed electronically. Luckily, this is the case with the **[Sunking 2]** (or, Klon™ since that’s what it derives from). My personal preference is buffered bypass for the **[Sunking 2]**, but don’t take my word for it. Try experimenting with buffers on your own rig and see what you find. You might like it!

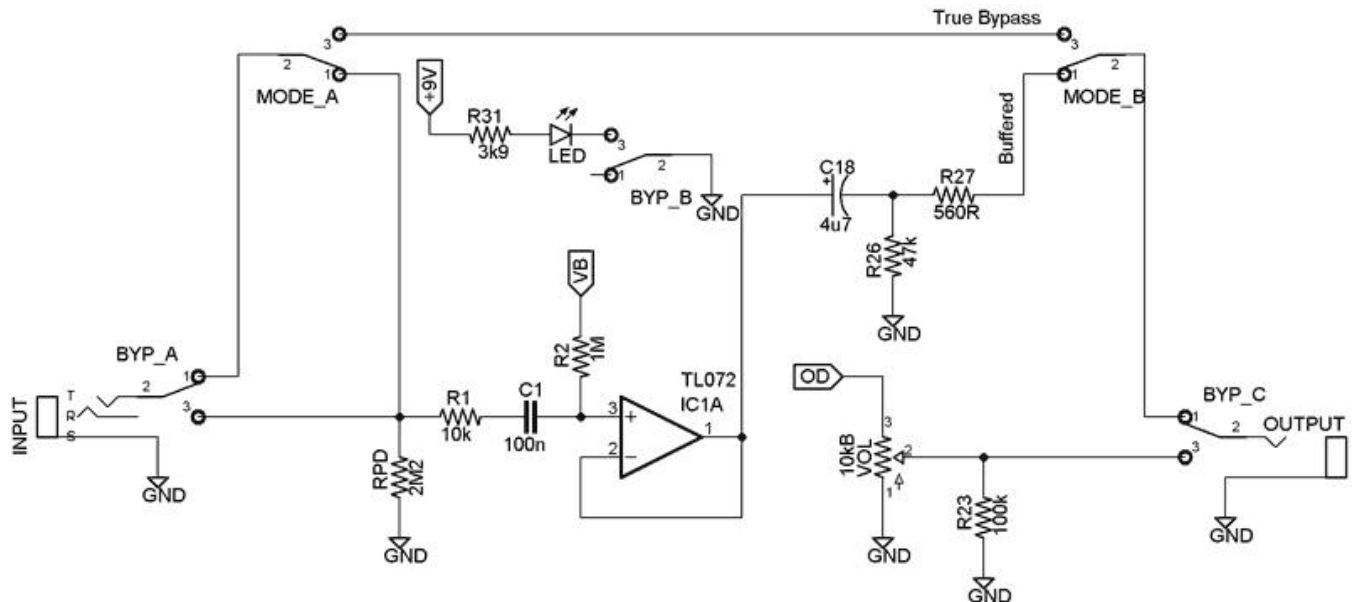
So, how about having both options in one pedal, like the KTR™? Frankly, I’m unsure of how the KTR™ does its buffered/TB switching but I suspect that it does not fully switch between both modes because it requires lifting several components and re-routing I/O simultaneously. Given that the KTR™ bypass toggle was designed by PaulC. I bet it is very clever. Anyway, we can get pretty close to the “ideal method” by using a DPDT toggle.

Here is a visualization of what we need to accomplish



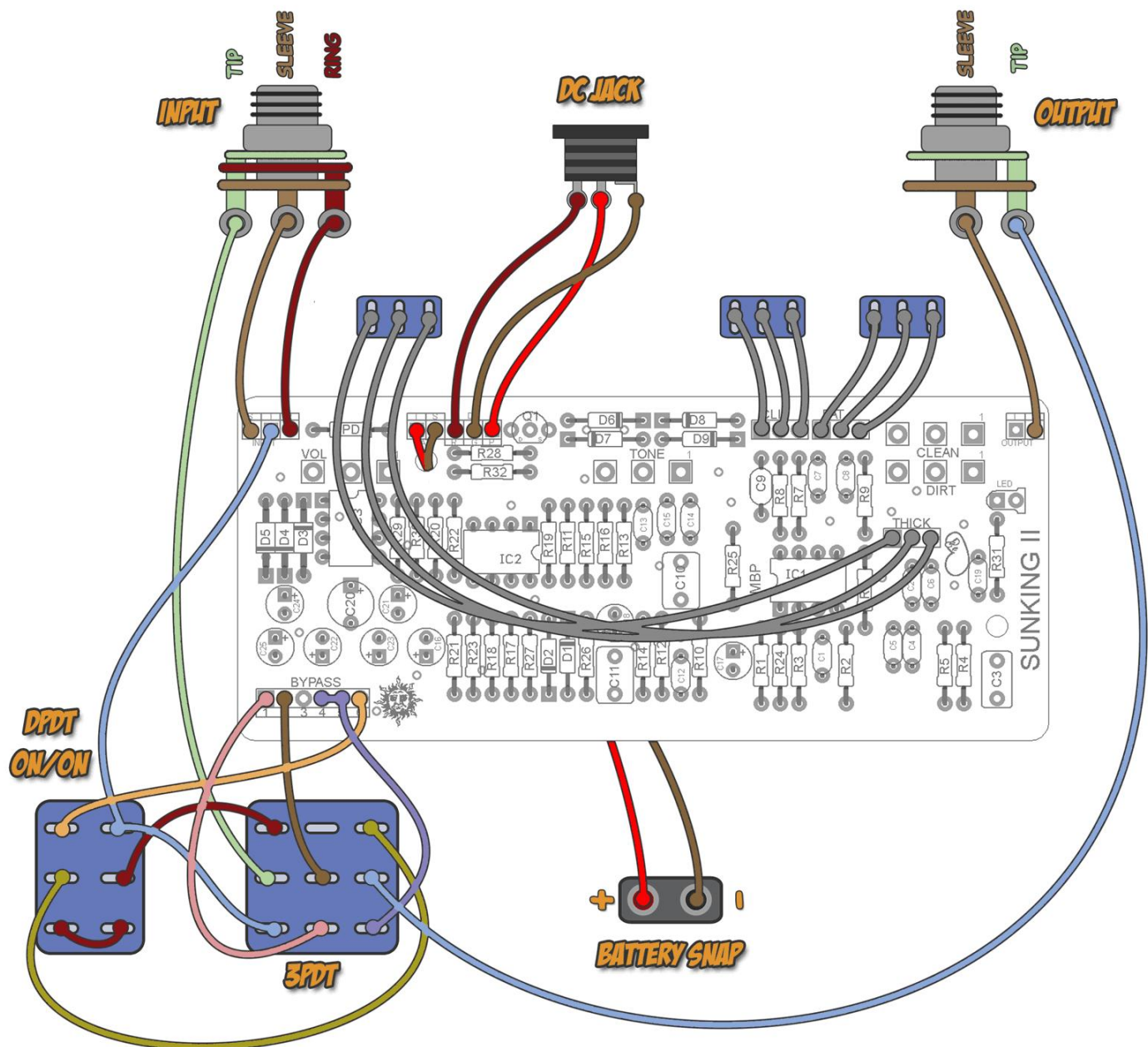
There are three “states” we have to switch through: the effect, true bypass and buffer bypass. Obviously, this is not possible with a single DPDT or 3PDT so we will introduce a second DPDT switch that allows us to choose what bypass mode we want. We’ll call it “Mode”. Or, if you are a purest you can call it “AABAAW” (figure it out).

Here is the translation to the abbreviated schematic



Note that I have removed R21 and R22 to accomplish this particular switching. That’s okay: we don’t need them. However, you’ll also see that I have changed R26 from 100k to 47k. Why do this? In the stock version R26 and R23 are both tied to ground when in buffered mode. With R23 no longer tied to the buffered output, we will lower R26 to get the same approximate result of having the two 100k resistors in parallel on the output. Nifty!

Buffered / True Bypass Switching



Remember: you must omit R21 and R22 from the PCB to do this wiring.....!!
Solder pads 4 and 5 together on the PCB bypass and wire it to the 3PDT as shown.

Enjoy! And, good luck, too.

