Grind Customs FX

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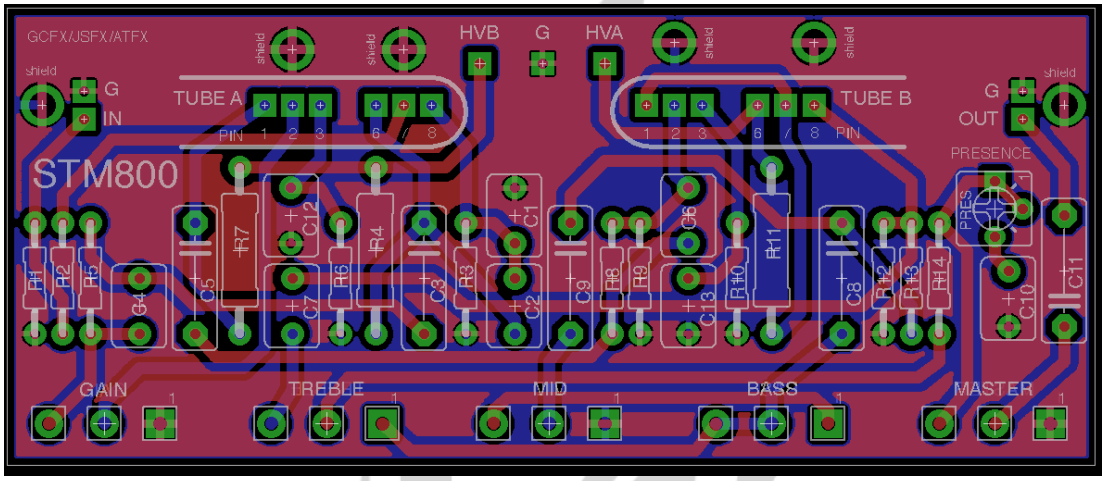
STM800



JCM800 (parts supplied in the kit except valves & pots)

R1	1M	C1	680nF	V1	12AX7
R2	68K	C2	100pF	V2	12AX7
R3	2K7	C3	22nF		
R4	100K (1W)	C4	470pF	Gain	A1M
R5	470K	C5	22nF	Treble	B250K
R6	10K	C6	470pF	Bass	A1M
R7	100K (1W)	C7	470pF	Mid	B25K
R8	470K	C8	22nF	Master	A1M
R9	470K	C9	22nF	Presence	25K (trim)
R10	820R	C10	2n2		
R11	100K (1W)	C11	22nF		
R12	100K	C12	Omit		
R13	33K	C13	Omit		
R14	1K5				

If using this effect purely as a stomp-box and not as a pre-amp, then you may wish to substitute the A1M master pot for an A100K. It'll make it a little less in your face. Or you could just turn it down. Because if you buy an amp later with a loop in it, you might want to run it as a pre into its return. It's DIY baby, build it how you want it.

GROUP HUG

Brainchild of the northern English hermit Cleggy. An elusive creature that seems strangely enchanted by thermionic valves (tooobs to our cousins over the Atlantic ocean). The boards are by PCB elf Jason. Rej has been the project leader of this one steering the whole thing into one damned impressive kit for others to build. I, Juan, have mainly been an enthusiastic solder jockey and documentarian.

HISTORY

Where to start…? Many moons ago, Cleggy and myself got interested in building pedals. Or rather I built a BYOC Tube Screamer, got a little bit obsessed with it, and Cleggy tagged along for the ride. About three kits in we decided to have a go at a scratch build and made a rats nest of a Valvecaster. Which sparked a bit of a running obsession with valve effects. We built many of them over the years and this project is a bit of an amalgamation of all that experimentation and experience.

THIS IS NOT AN EASY BUILD…

This is not an understatement*

This build involves big voltages and some more obscure components. Thankfully Rej decided to do this project in kit form. Mainly after learning that substituting any of the parts in the PSU can be bad** So to be safe everything (except the valves & pots) comes in the kit.

The project consists of three distinct parts. The Cleggster PSU, The STM800 board and the OptoShield stomp board. All are designed specifically for this project for it to work as well as possible. The separate docs I'll not re-iterate here, but I will refer to them, and how they connect together.

BEEFY BOARD

Unlike the prototype in the following pics, the kit board is very beefy. It's 2mm thick with 2oz copper. Pretty much amp specs. So should you wish to experiment with that sort of thing, you can. Though bear in mind we've only ever built tested them built as per this doc, so doing so would be at your own risk.

* Though it is under that statement…

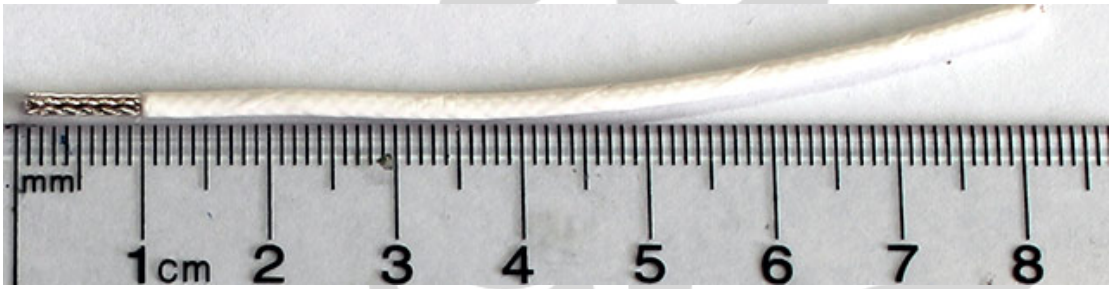
** Bad (/bad/) adjective: Try to imagine all life as you know it stopping instantaneously, and every molecule in your body exploding at the speed of light. See also: Total protonic reversal.

Shielding – Mini Tutorial

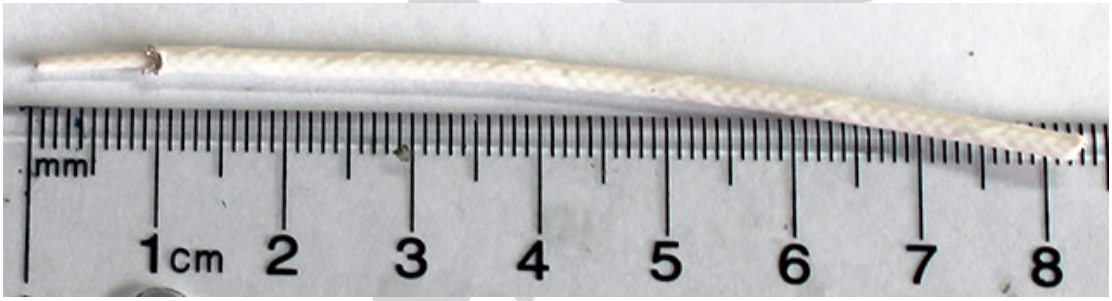
The OptoShield and STM800 board are designed with ground pads on them specifically for the shielded wire provided in the kit.

It is strongly recommended to shield the input and output of the Optoshield. Also the line from the Optoshield to the STM800. Finally the line from the STM800 to the tube. I consider this to be the bare minimum of shielding required. However if you like, you can go to town and simply shield all signal wires. It won't hurt doing so.

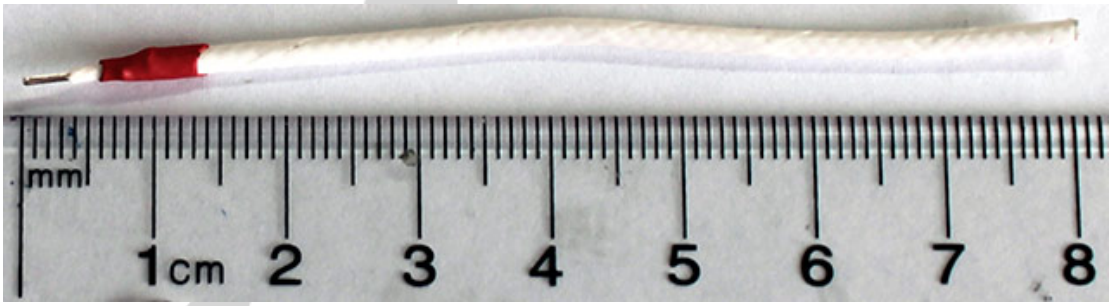
You shield only one end of the line. It's best to strip the other end back and heat-shrink it so only the signal line is available. Over to Rej now for pics and detailed instructions. You need to speak all the following in your head with a French-Canadian accent:



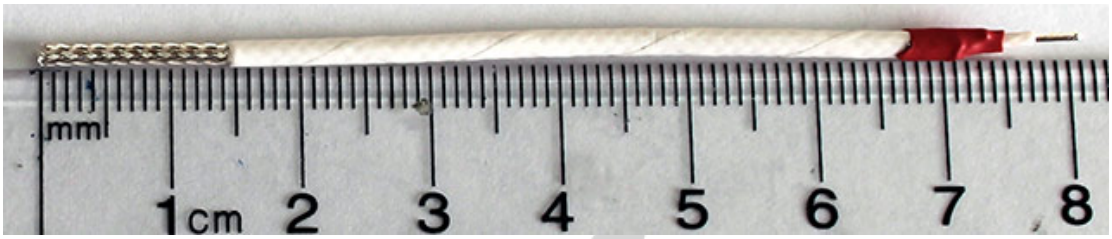
Hot End: Strip 1cm from the outer sleeve. The Telflon sleeve is very durable and slippery when stripping, you can pull off the sleeve if you're not careful.



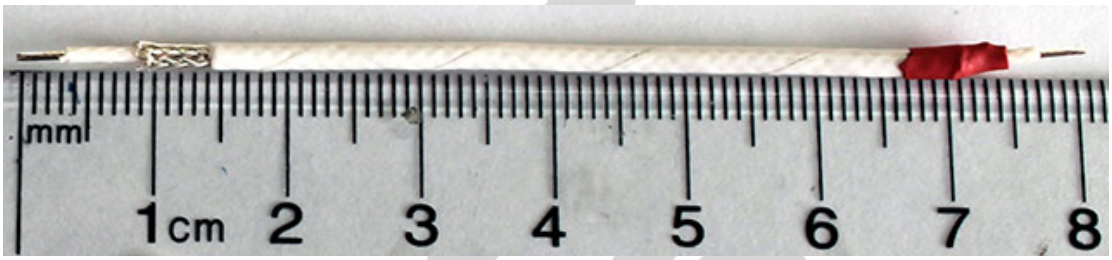
Hot End: Cut the braided shield so it is flush with the outer sleeve.



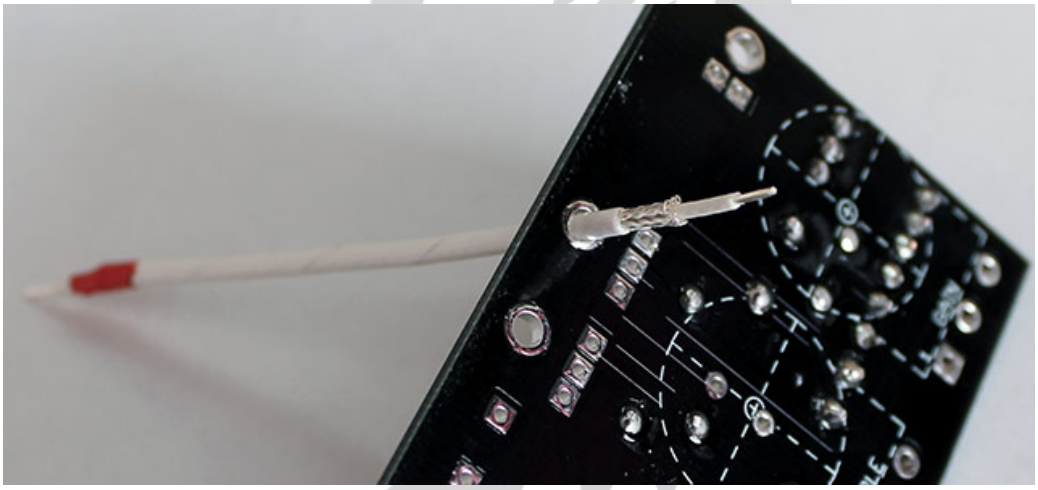
Hot End: Cut a 1cm piece of heat shrink tubing. Put it half & half on the core sleeve and outer sleeve and shrink it in place. The hot end is now complete.



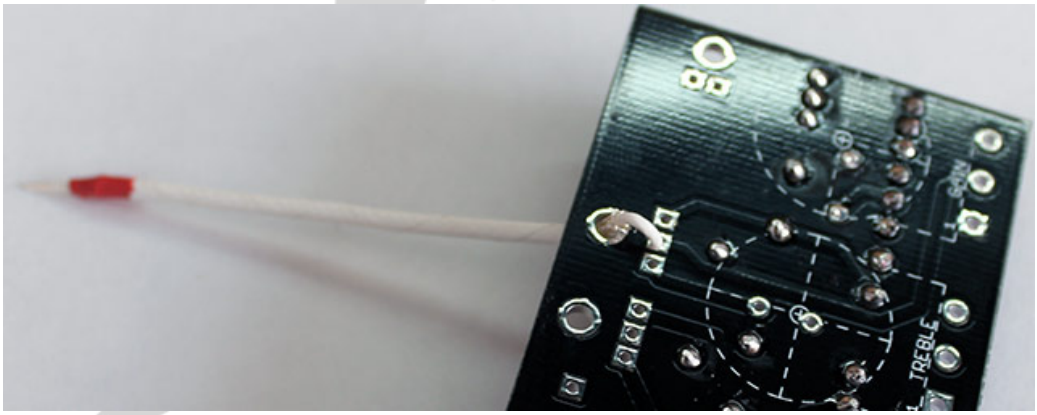
Shield End: Strip 15mm from the outer sleeve.



Shield End: Trim 10mm off the braided shield. Strip 3-4mm of core sleeve



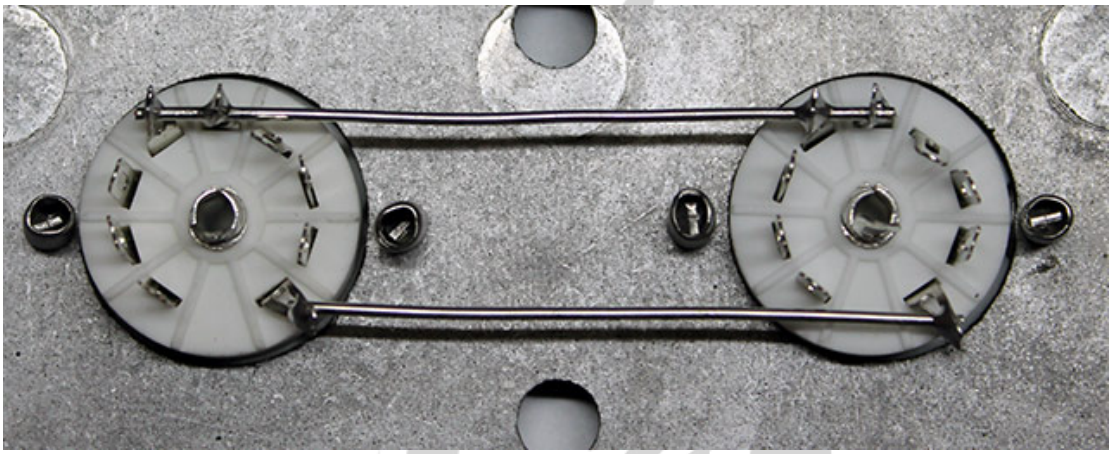
Installation: From component side of PCB; push the cable through the shield hole further than it needs, to give a smooth rounded shape to the Hot core.



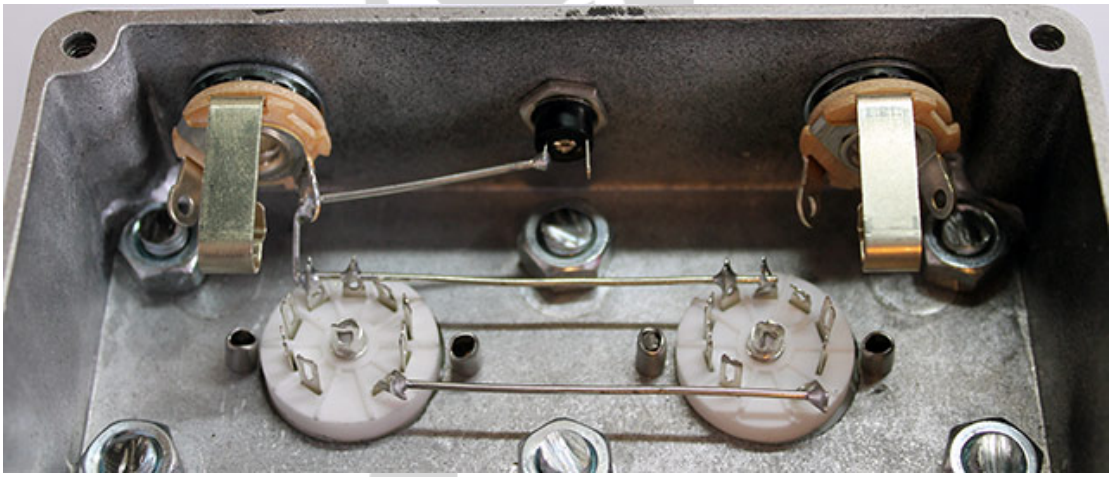
Pull back the cable, insert the hot in it's pad, make sure the shield sits nicely in the shield pad. From the solder side of the PCB, simply put your iron in the gap between shield pad and braided wire and flow the solder in. Don't worry about the shield melting it won't. Hot is soldered on the component side, so flip that biatch over!

CONSTRUCTION

Now this is open to interpretation, so you don't have to do it this way. But Rej's way is quite neat and you can see what's going on. Over once again to the man of the frozen northlands.

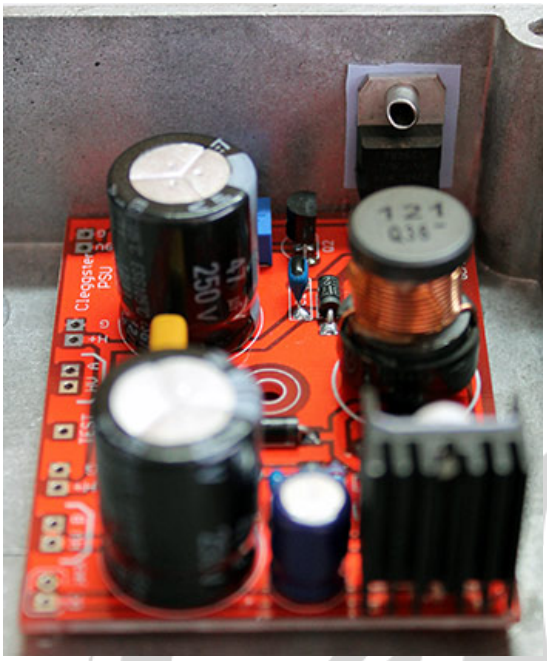


Heater & Ground Rails: Using Bus wire for a neater install, twist and bend tube socket tabs so they align and don't short with the other, work them gently but firmly. Like you would a woman.



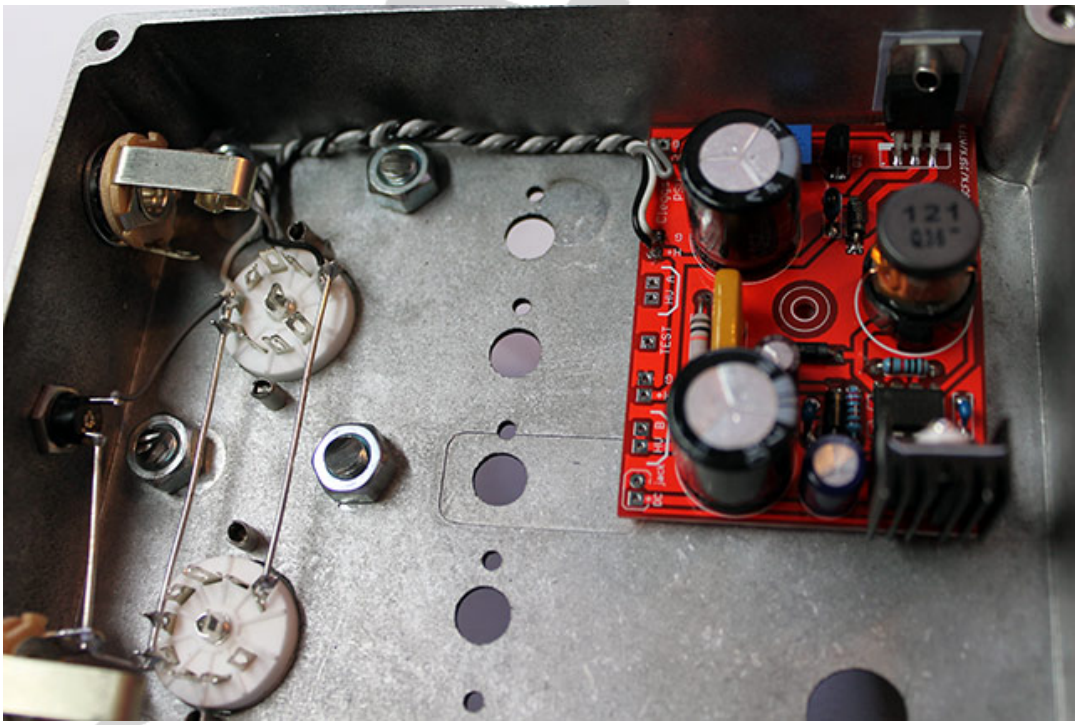
DC Input Ground: Connect DC jack negative tab to input jack sleeve then to the ground rail.

Side note for the Ground and Heater rails: When sliding the bus wire in, just solder tab 5 of V1 and tab 4 of V2, will make it easier to later connect the ground rail to the input jack and connect ground rail to PSU. For the heater rail just solder pin 9 of V1 for now. Pin9 of V2 will be soldered once you bring the heater V+

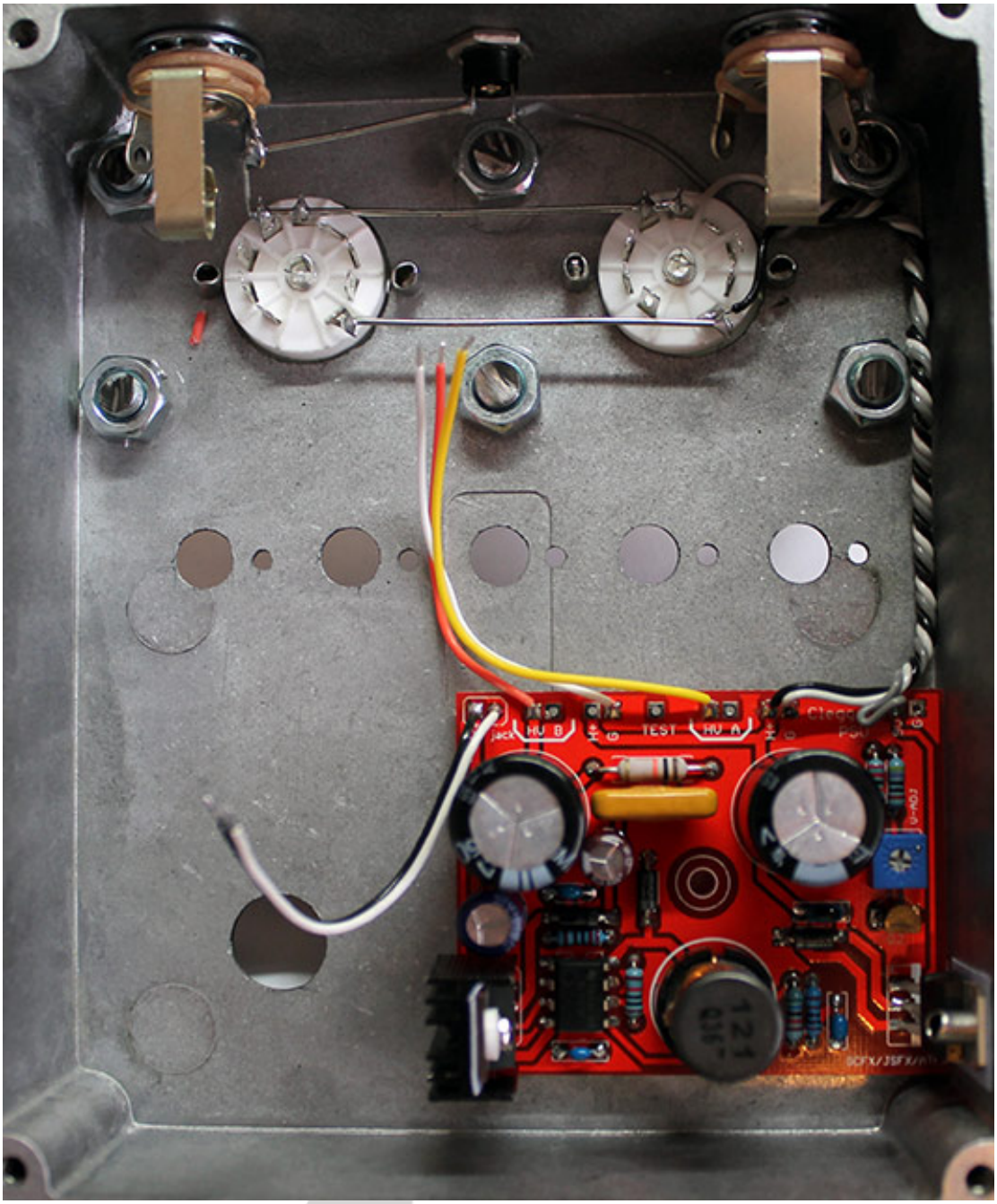


PSU: Keep a safe gap (2-3mm) between PSU pcb and enclosure, I used 2 strip thick of double sided tape to secure it. But you could also use a standoff.

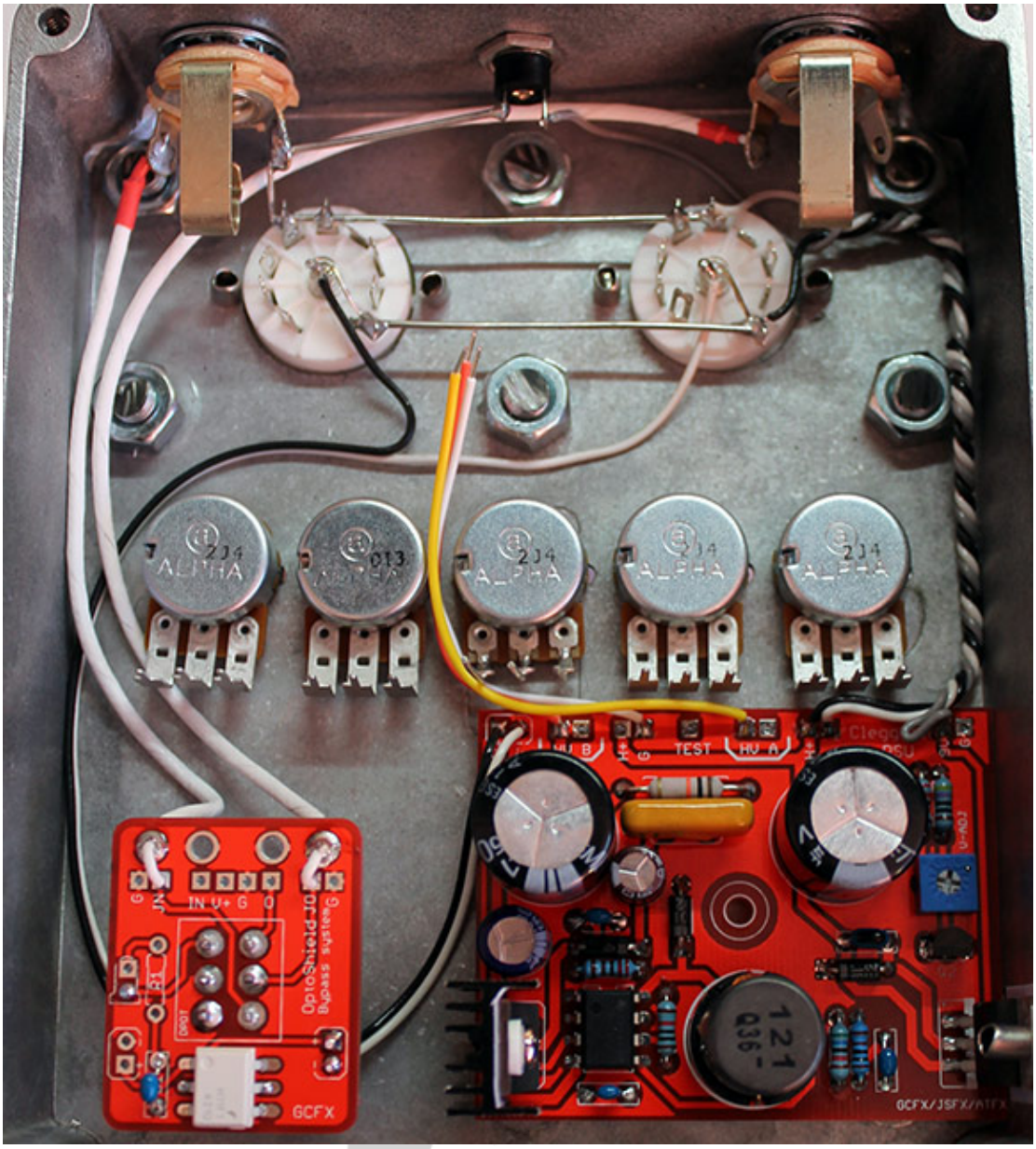
You can either use the heat sink on the VReg or fix the L7806 to the enclosure. It requires a bit of bendage to get it sitting nicely on the enclosure sidewall. Use the thermal pad between the VReg and enclosure, it offers better contact. Riveted or bolted... you the boss



Heater, Ground & 9V wiring: Connect as above. You can twist these for neatness should you feel so inclined. Heater goes to the bottom rail. Ground to the top and 9V to the power jack.



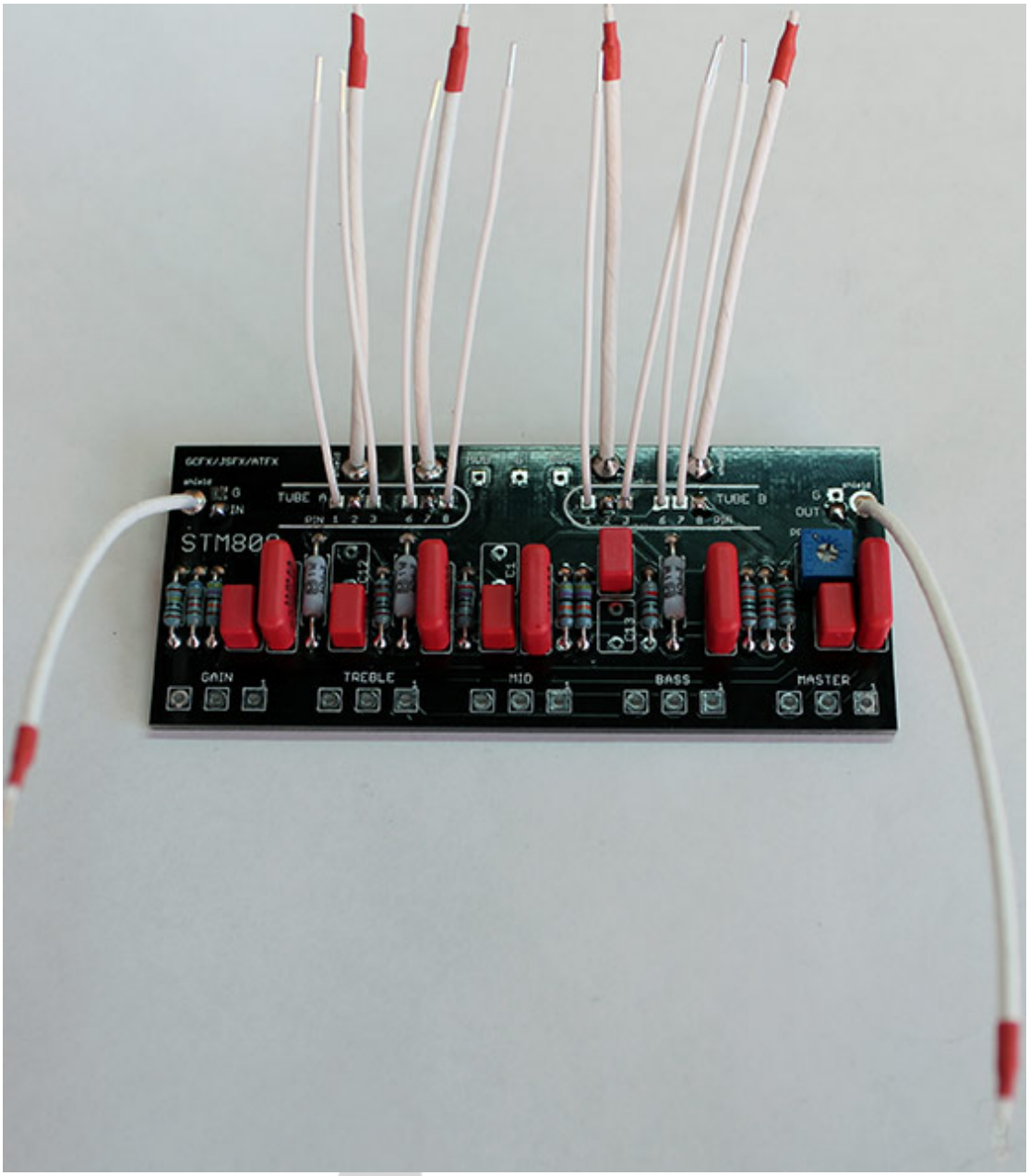
Pre cut the HVA-HVB and Ground going to preamp board, they will slide between two pots. Also prepare the wires to hook the OptoShield.



Install your OptoShield bypass system. Approximately 13cm of shielded cable for the input, and 20cm for the output.

There are different ways to have an indicator LED. You can do it traditionally straight from the OptoShield. Or you could do it as Rej has here by: omitting CLR on OptoShield. Connecting the LED positive to Pin9 of their respective tube. Then using 2 wires from the LED negatives to a 1K resistor that's then soldered to negative LED pad of OptoShield. Light up tubes baby!

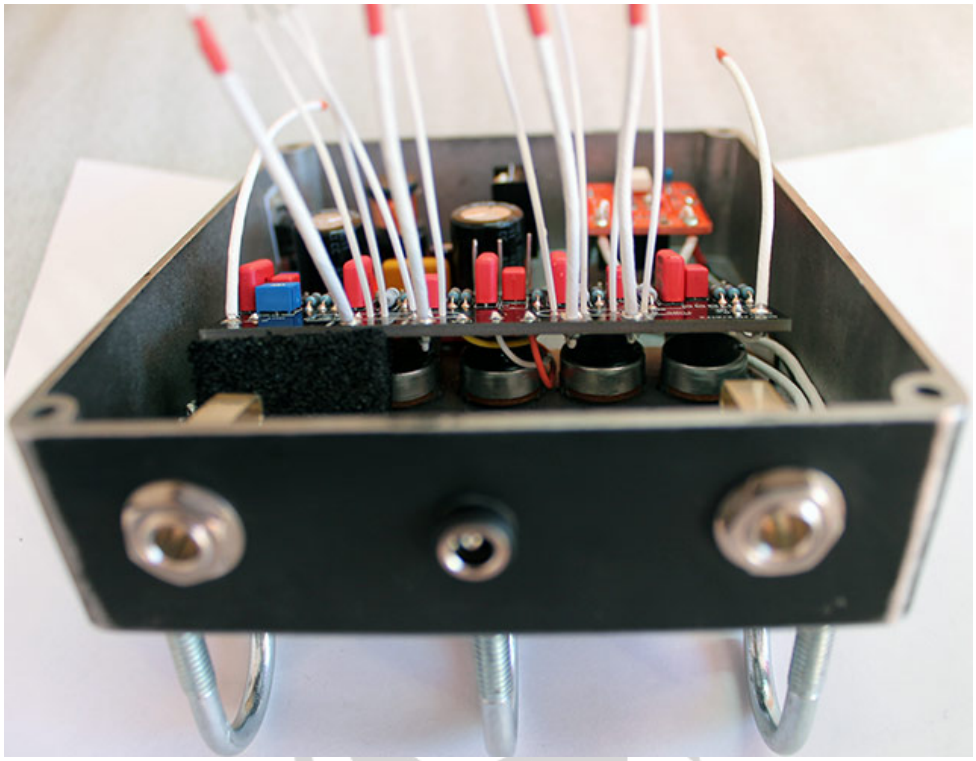
Install the pots in the enclosure. Align them so the PCB drops right in, do that before you hook the wires to the PCB.



Connect all the off-board wires.

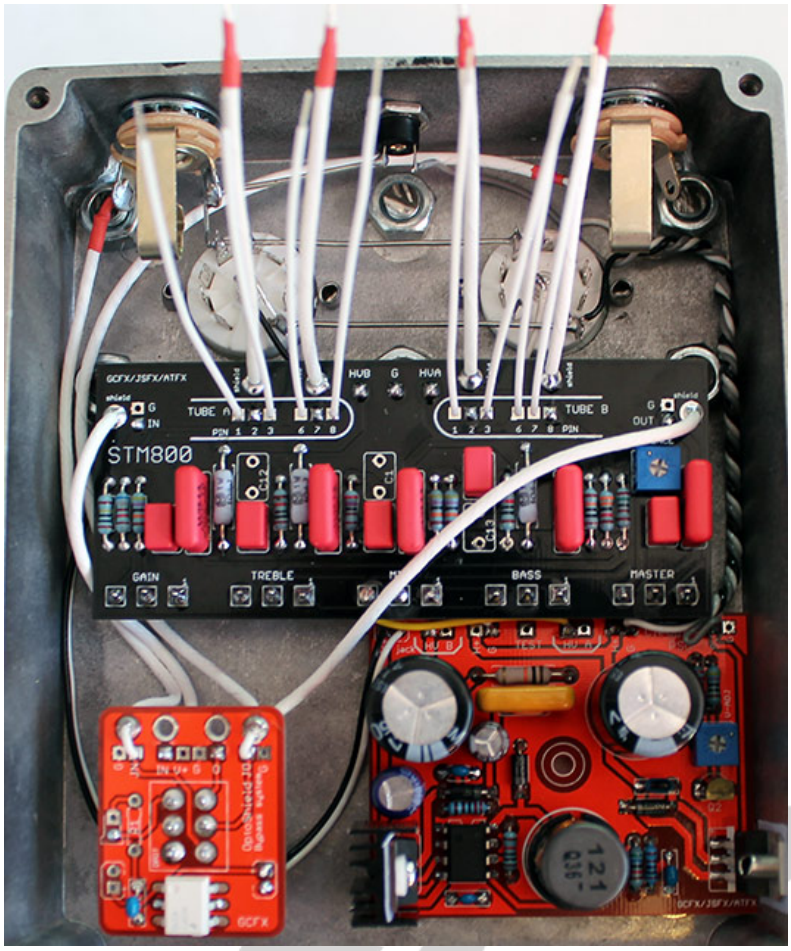
Wires to tubes: 7cm.
Shielded cable to tube: 8cm.
Shielded preamp in: 10cm.
Shielded preamp out: 14cm.

The preamp in and out are shielded from the preamp PCB end only. Do not connect the shield at both ends.

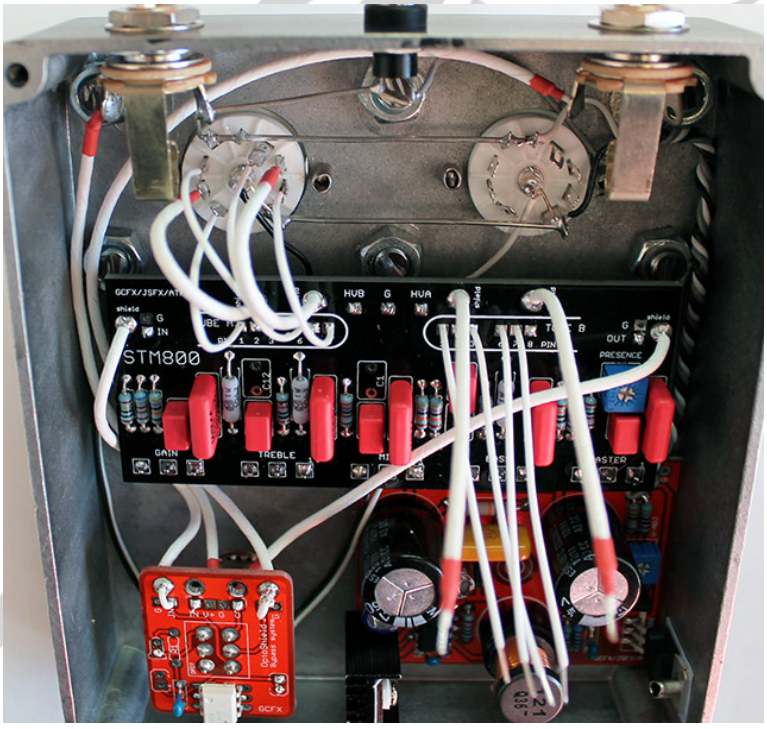


Install preamp on pots, but don't solder that yet. Tilt up the tube side of PCB, put something under so it holds and don't pops it from the pots. I used a piece of IC foam that comes handy for many other thing in my building habits... Put HVA-HVB and Ground in their respective pads, using a little color coding with the wires here, comes in handy

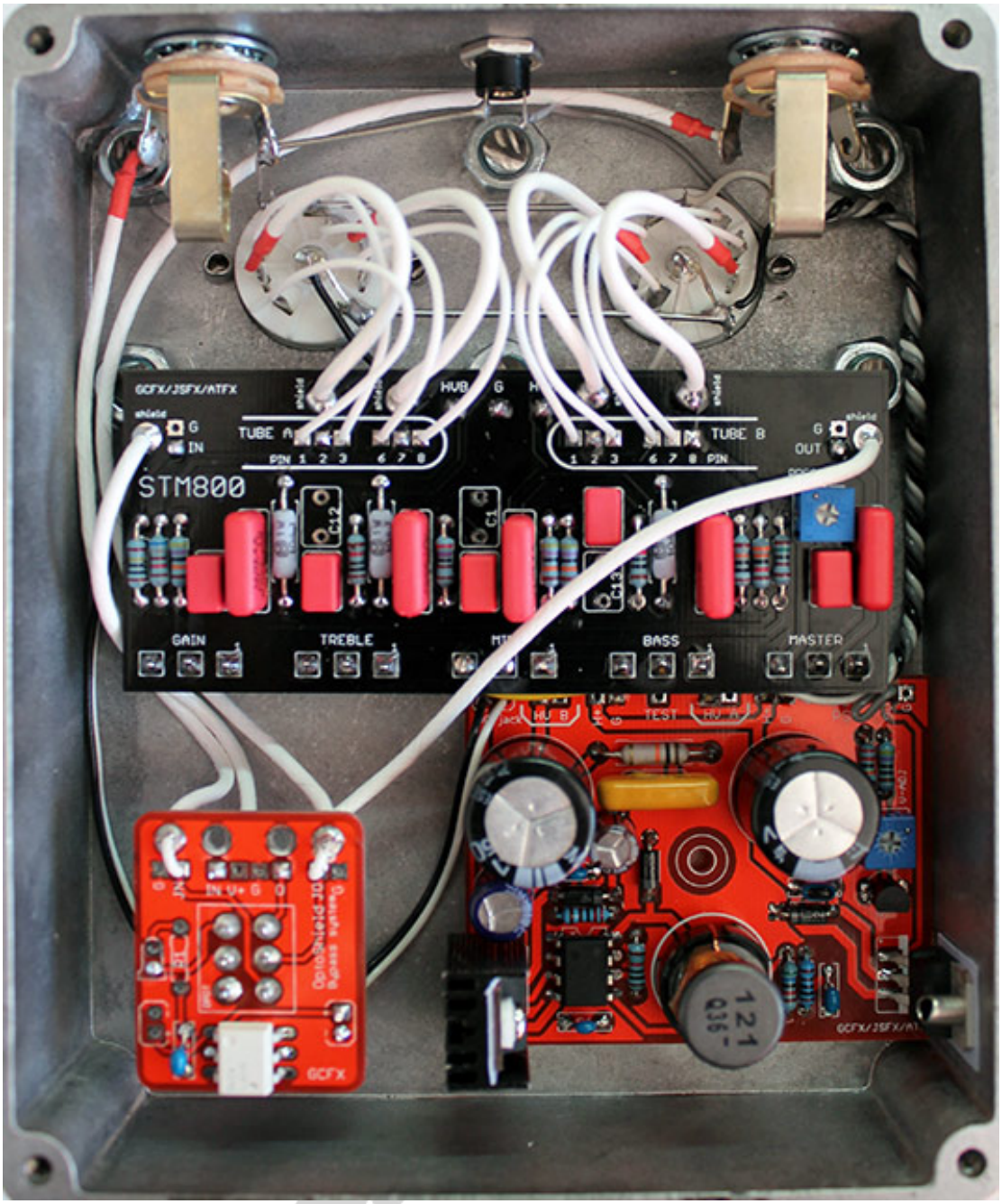
Long Nose and O-ring pick (there's probably another name for that?). These come very handy in this build, the longer and finer reach of the pliers is much appreciated and the O-ring tool is very handy to re-route wires in tight places. You should be able to find that tool for cheap in any automotive parts store, usually comes in a kit of 3, straight, 90degree and angled. Note from Juan: I use tweezers for this sort of thing.



Connect the preamp in and out cables on the Opto so they're out of your way.



Solder wire and cable going from Pin1 up to Pin8 for V1



Solder wire and cable from pin8 to pin1 for V2, you will likely want to solder Pin2 before Pin1, goes better

AND YOU'RE DONE!

But, before you continue, first you must test.

TESTING

At this point it is assumed that you'd already tested and set up the Cleggster PSU prior to installation, so I'll not cover that here. As it is you have everything connected and are ready to power up. Do so with no valves in the effect.

With your multi meter CAREFULLY check the voltages for the heaters (pin 9 of each tube socket), which should read around 6v. Next check the plate voltages (pins 1 and 6 of each socket), which should read around 190v. This will drop with the valves in, which is normal.

Un-power the circuit and WAIT. Without any load it will take some time for the caps to discharge. During this time there will still be a lot of voltage kicking around. Test again with the meter to make sure it's all gone before you go poking around in there. Close it up, stick some valves in and you should be ready to rock!

ROCKING (SETTING THE PRESENCE TRIMMER)

When it comes to rocking out with this stomp there's a couple of things to bear in mind. It's essentially a pre-amp in a stomp that you're putting in front of the pre-amp of your amp. This is going to add three gain stages in front of however many gain stages you have in your amp. It's going to be LOUD. Back the master well off and don't be surprised if you don't need to turn it up very much.

Where it works best however is plugged into a power amp or into the return of your amp's loop (bypassing the internal pre). Where you essentially strap a Marshall front end to whatever power amp you may have. Which let's face it, is awesome.

This is where the presence control comes into play. You might find it's a bit bright when used as a stomp. Use the presence trimmer to dial this back. As a pre the power stage is likely going to deal with the brightness of the pre so you can turn it up. Tweak to taste.

STEP BITS (THINGS OF MUCH USEFULNESS)

We highly recommend using these for drilling the tube holes. Drill as big as you can with the smaller step bit and finish the bore out to size with the bigger one. If you don't have a drill press, brace yourself!

Alternate Builds

JTM45/Bassman 5F6A (parts supplied for JTM45 only except valves & pots)

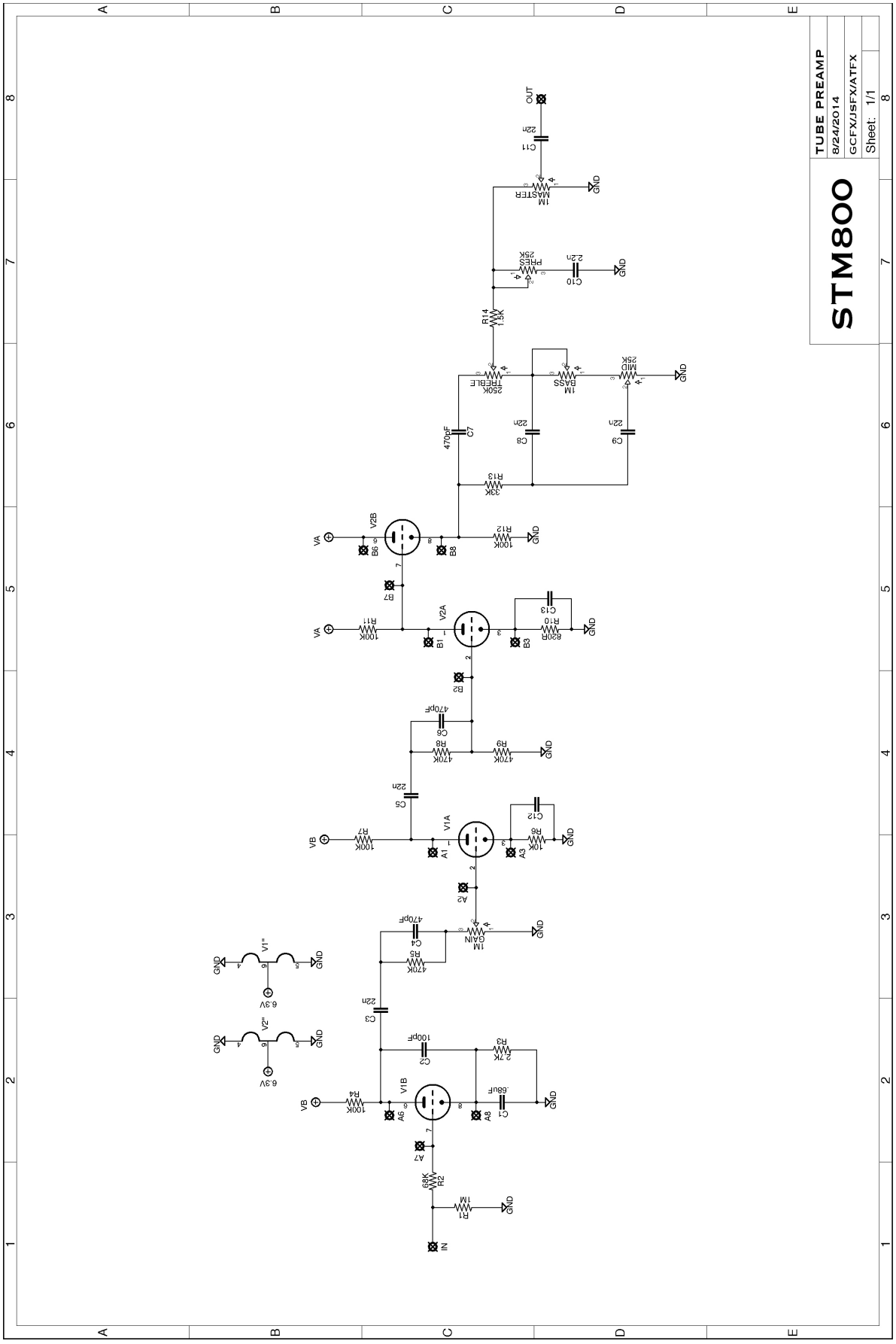
R1	1M	C1	220uF	V1	12AX7
R2	68K	C2	Omit**	V2	12AX7
R3	1K6	C3	22/20nF		
R4	100K (1W)	C4	Omit	Gain	A1M
R5	Jumper	C5	Jumper	Treble	B250K
R6	Omit	C6	Omit	Bass	A1M
R7	Omit	C7	270/250pF	Mid	B25K
R8	Jumper	C8	22/20nF	Master	A1M
R9	Omit	C9	22/20nF	Presence	25K (trim)
R10	820R	C10	10nF		
R11	100K (1W)	C11	22/20nF		
R12	100K	C12	Omit		
R13	56K	C13			
R14	1K5				
RY	270K*				

* B2 to Pin 2 ** unless radio/oscillation noise Link A1 & A2

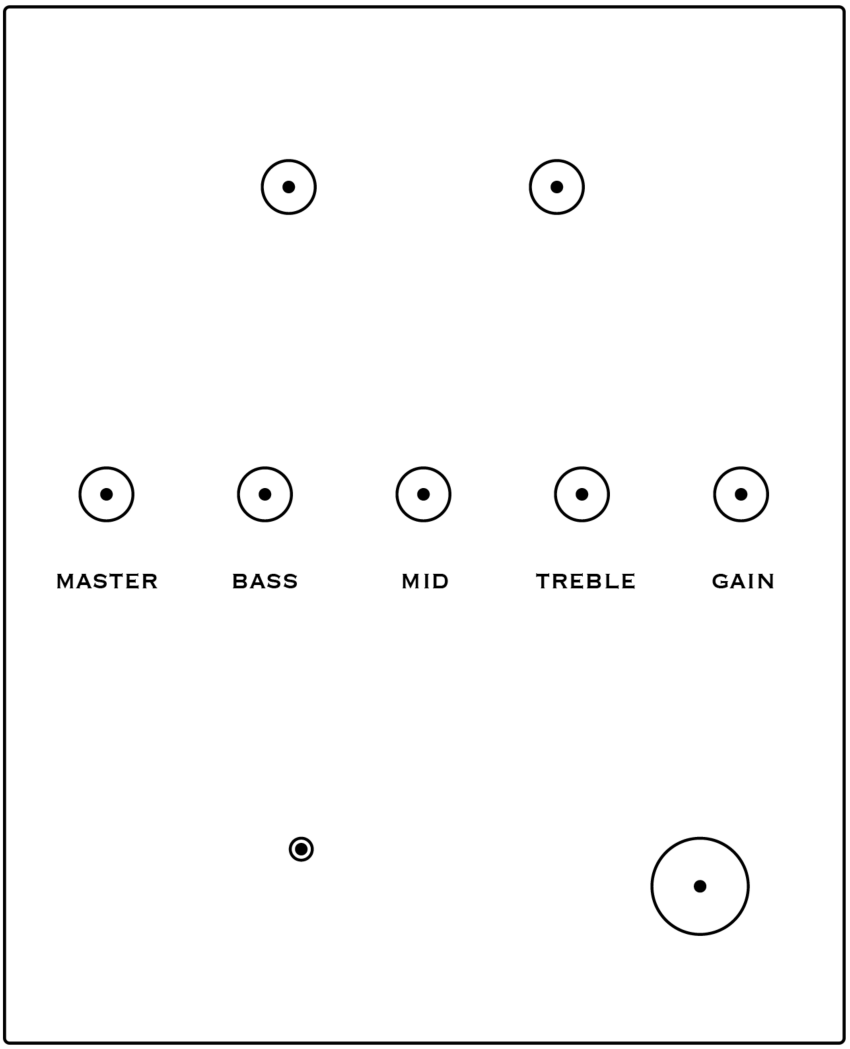
Soldano Atomic 16 (parts not supplied)

R1	1M	C1	1uF	V1	12AX7
R2	68K	C2	Omit**	V2	12AX7
R3	1K	C3	22nF		
R4	220K (1W)	C4	Omit	Gain	A1M
R5	1M	C5	22nF	Treble	B250K
R6	2K2	C6	470pF	Bass	A1M
R7	100K	C7	470pF	Mid	B25K
R8	1M	C8	22nF	Master	A1M
R9	330K	C9	22nF	Presence	25K (trim)
R10	1K8	C10	10nF		
R11	100K (1W)	C11	Jumper		
R12	100K	C12	Omit		
R13	47K	C13	1uF		
R14	1K5				
RY	220K*				

* B2 to Pin 2 **unless needed/microphonic


TUBE PREAMP
8/24/2014
GCFX/JSFX/ATFX
Sheet: 1/1
STM800
OUT
C11
22n
1M
MASTER
GND
25K
PRES
2.2n
C10
R14
1.5K
250K
TREBLE
1M
BASS
25K
MID
470pF
C7
C8
22n
C9
22n
R13
33K
V2B
VA
B6
B8
R12
100K
B7
V2A
R11
100K
B1
B3
820R
R10
C13
B2
470pF
C6
R8
470K
R9
470K
C5
22n
V1A
VB
R7
100K
A1
A3
R6
10K
C12
A2
470pF
C4
R5
470K
1M
GAIN
V1"
6.3V
C3
22n
V2"
6.3V
100pF
C2
R3
2.7K
V1B
R4
100K
A6
A8
.68UF
C1
A7
68K
R2
1M
R1
IN

1590XX/1790NS DRILLING TEMPLATE



Bottom left hole is for PSU standoff, if used.

THE MONEY SHOT

You made it to the end of the doc and the end of the build. Your creation should look something like this and of course, be awesome.