

METALFE(S)T KIT MOUNTING INSTRUCTIONS



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Important notice.

This DIY kit is not that easy and require a bit of knowledge. If you're a beginner, you're likely to go into some hardcore problems and should try easier kits before. There's a debugging chapter that you can check in case of emergency, but:

- I cannot be held responsible of any malfunction or a component burning. This board has been tested and I use it in when I build pedals myself. It's 100% functioning when everything is done correctly.
- The debugging chapter cannot take in account all the problems you may reach. (Murphy's law you know....)
- I won't refund any malfunctioning kit that has been mounted.
- Here's what you should do in case of problems:
 - 1- Keep calm.
 - 2- Check another time that each component is at it's right place and all the solders are ok.
 - 3- Check the debugging chapter at the end of this document.
 - 4- Ask for help in your surrounding family or friends. Someone who can see, plug, check and test your board is more valuable than someone on a forum or mail 10000km far.
 - 5- Check the freestombox forum, and ask for help if needed. When asking for help be sure to give the maximum of informations:
I may reply to you on freestombox, I check it sometimes.
 - 6- Mailing me is the very last thing you will do. And if you do, be sure to write the maximum of informations I need to answer you. Yes you may add pictures if you think it's relevant. Mails with only "My kit is not working" will be either ignored, either replied with a kind of passive aggressive tone, if not clearly aggressive... After all this is "Do it YOURSELF" and not "Zorg, can you do it for me please?", and I'm always under a heavy load of work, so please spare me at the maximum!!!
- Any feedback on this document is welcome. If there's something missing, something you don't understand, something you're not sure, if you reworked the document with better explanations, pics and pink elephants, grammatic or ortografik faults, please feel free to mail me.

What's in the kit?

This is all you must find in your Metalfe(s)t kit:

C11 C20 C23 C29 C34	470pF	5
C1	2.2nF	1
C18	3.3nF	1
C15 C17 C27 C32	10nF	4
C25 C26	15nF	2
C19 C22	39nF	2
C7	68nF	1
C12 C13 C28 C30 C31 C33	100nF ceramic	6
C21	120nF	1
C5	220nF	1
C14	4.7uF	1
C4 C8 C3 C10 C14 C16	10uF	6
C6	33uF	1
D1	DIODE	1
GAIN2 GAIN3	Potentiometer A100k (log)	2
GND1 GND2 GND3 GND4 IN1 LED1 LED2 OUT1 OUT1_SW1 OUT2_SW1 9Vin1 IN_SW1	Connector SIL 12 pins	12
P1	ICL7660S	1
Q1 Q2 Q3 Q4 Q5	J201	5
R2 R6 R10 R13 R17 R25 R26 R28 R29 R31 R32 R35	1k	12
R7 R39	1.5k	2
R30 R33 R37 R38	2k	4
R20 R24 R27 R34 R36	4.7k	5
R8 R11	470k	2
R5 R22	10k	2
R14 R16 R21 R23	15k	4
R3	100k	1
R19	200k	1
R1 R9 R12 R15 R18	1M	5
MID_FREQ	Potentiometer A100k stereo (log)	1
BASS TREBLE MID	Potentiometer 10kB (lin)	3
SMOOTH1	Potentiometer A50k	1
TRIM1 TRIM2 TRIM3 TRIM4	B100k	4
U1	TL072	1
U2 U3	TL074	2
VOLUME1	Potentiometer A25k (log)	1
Jacks Mono, unswitched		2
DC jack		1
Led socket		2
Leds (green and blue)		2
3PDT footswitch		2
Enclosure		1
PCB		1
Knobs (Black)		8
Câble, heat shrink tube, window insulator.		1

Components numbers in the left column, C1, R1 etc. are tied to the PCB's marks.

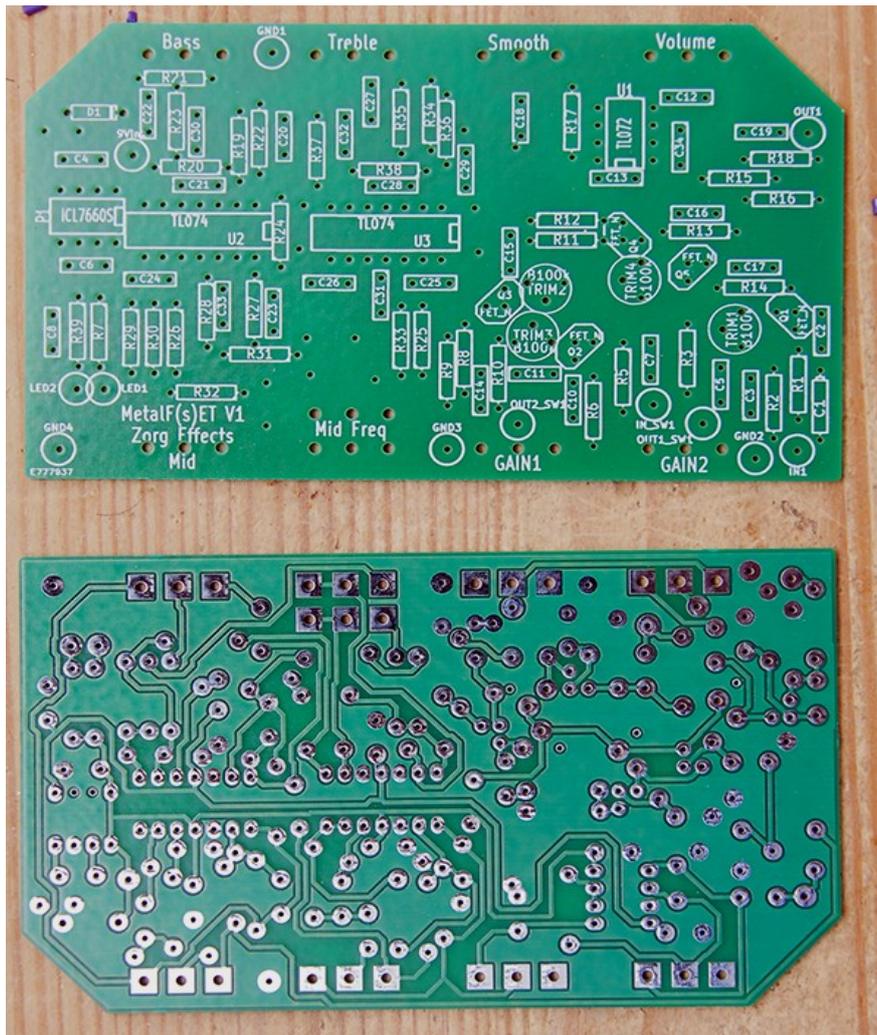
What you'll need.

The following tools are needed to build your Metalfe(s)t pedal:

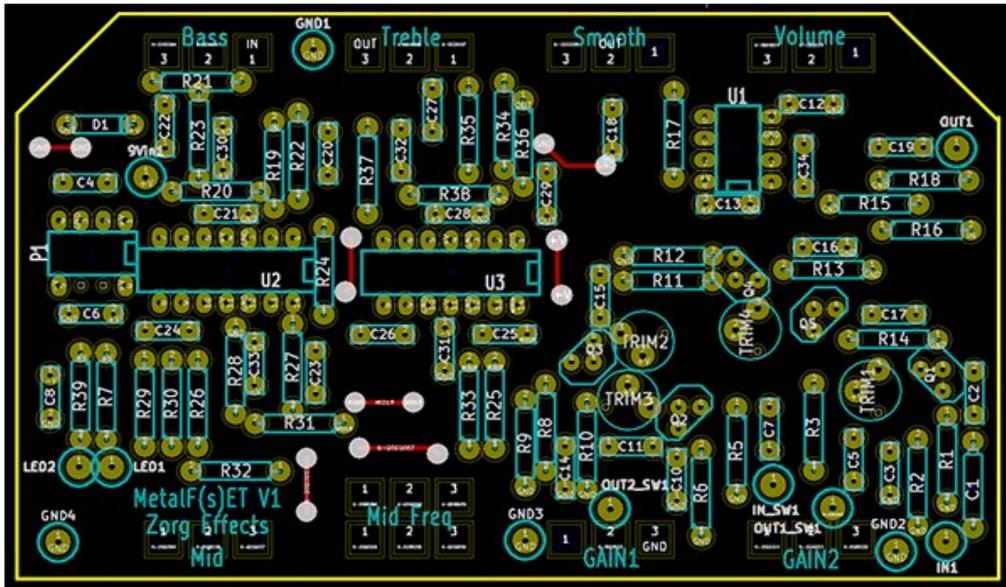
- A soldering iron.
- A un-soldering pump.
- A voltmeter/ohmmeter.
- Pliers to cut wire and remove the wire sheath.
- Pliers to screw nuts.
- A cruciform screw driver.
- And eventually wrenches.
- A 9v dc power unit, center negative.
- An oscilloscope, and a frequency generator.

Soldering on the pcb.

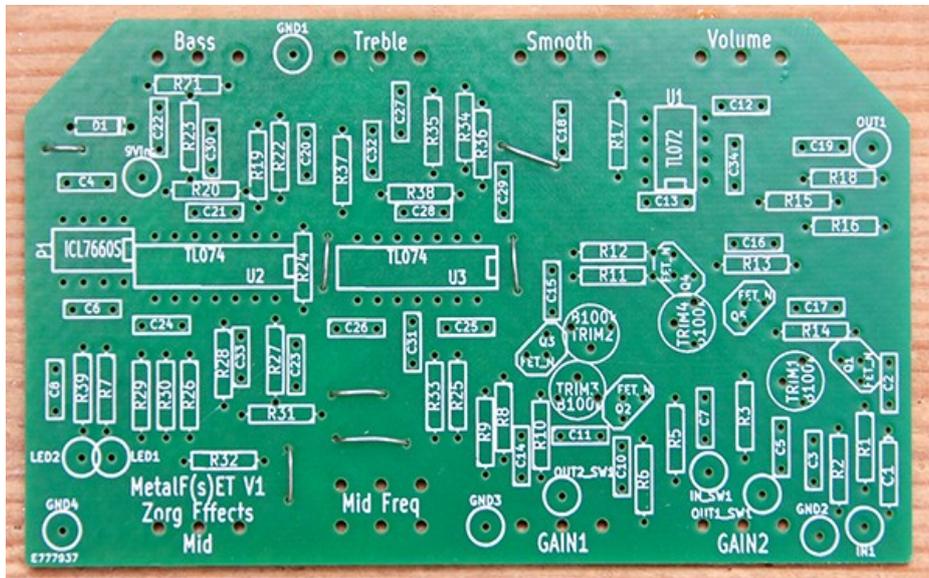
This is the PCB (Top/Bottom):



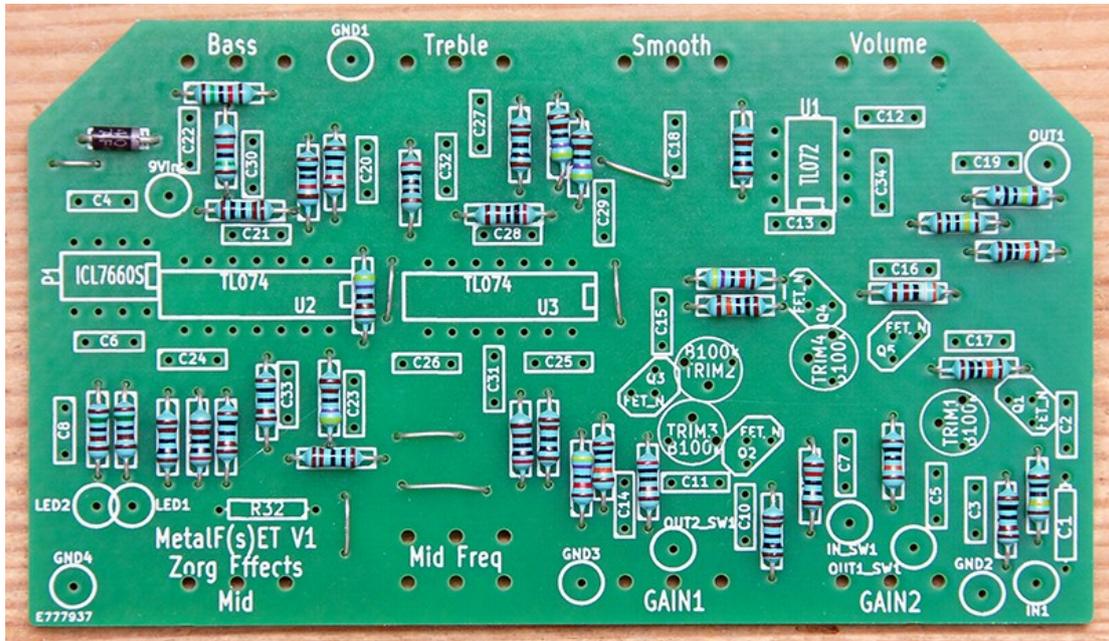
First let's solder wire jumpers. You wanna cut part of resistances legs to make them. There are 7 of them, as you can see in red lines with white dots here :



And on the picture:

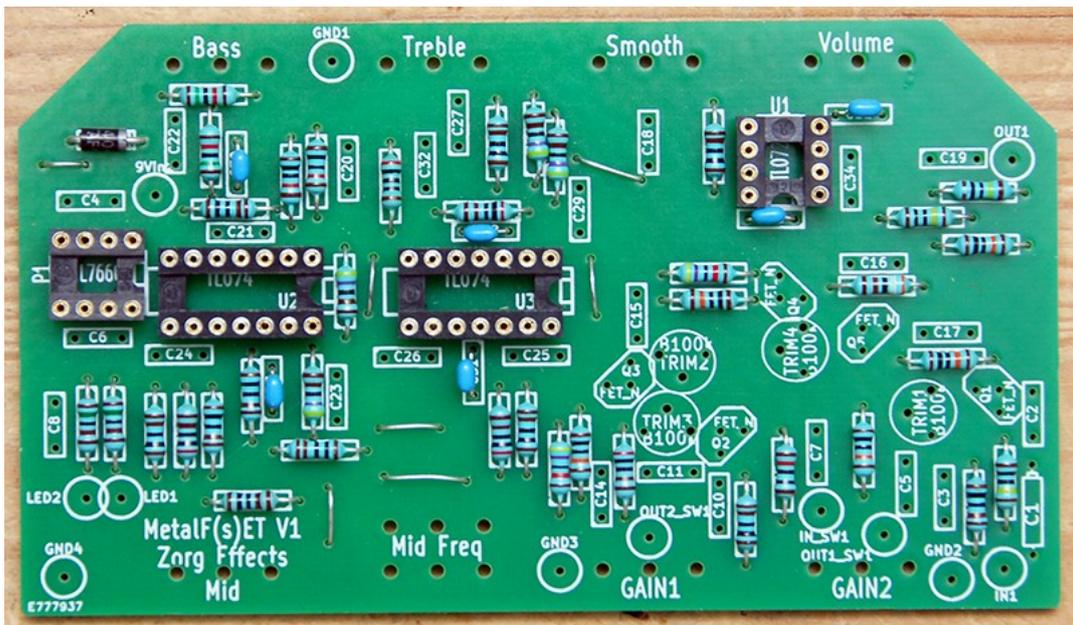


Then we're going to solder components from the smaller to the taller. First, diodes and resistances. You shall take care of the diodes positions. They MUST be on the same direction as on this picture :

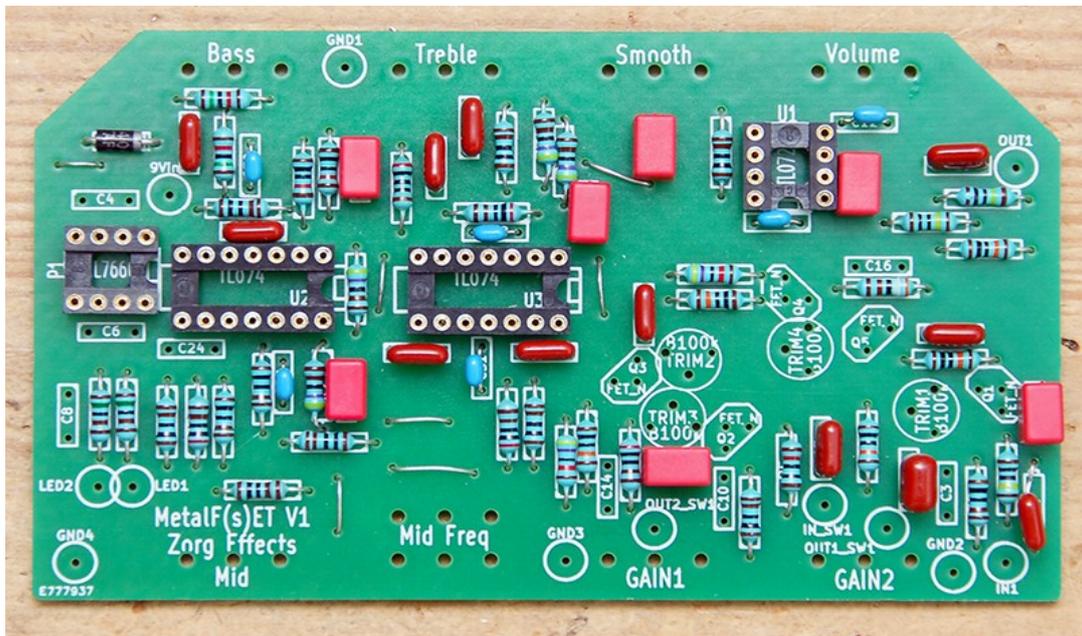


Then by order :

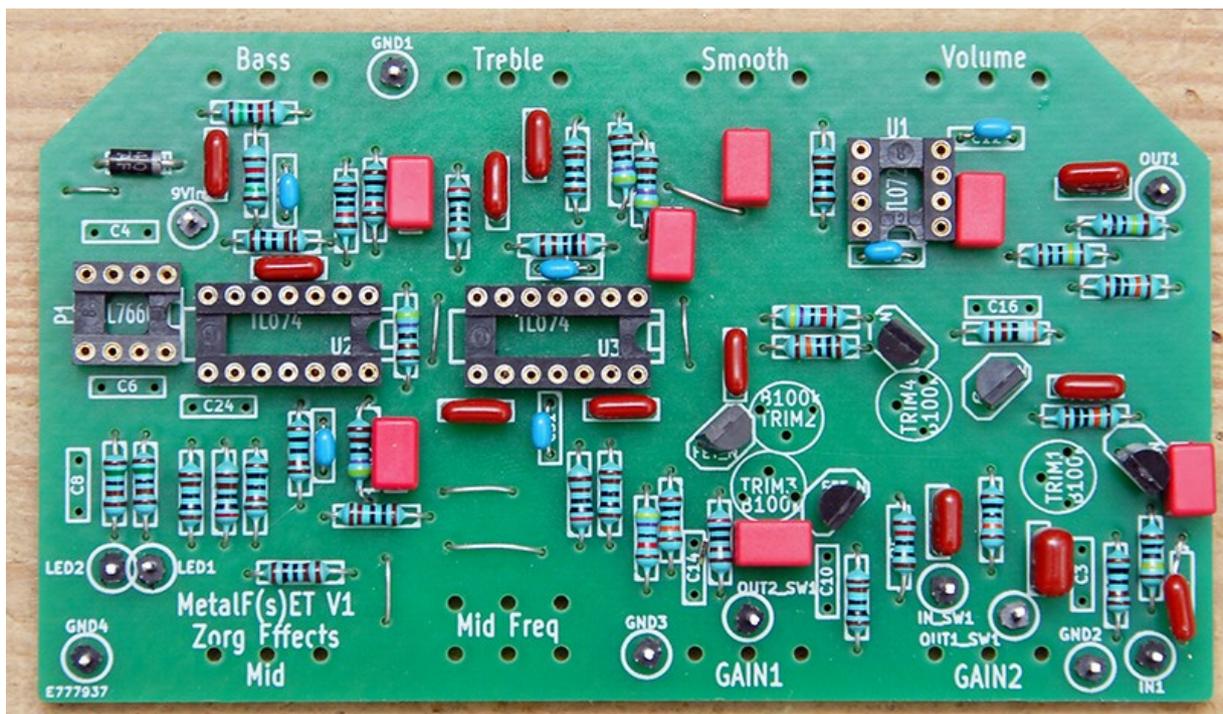
- IC sockets and blue 100nF capacitances which are decoupling caps.



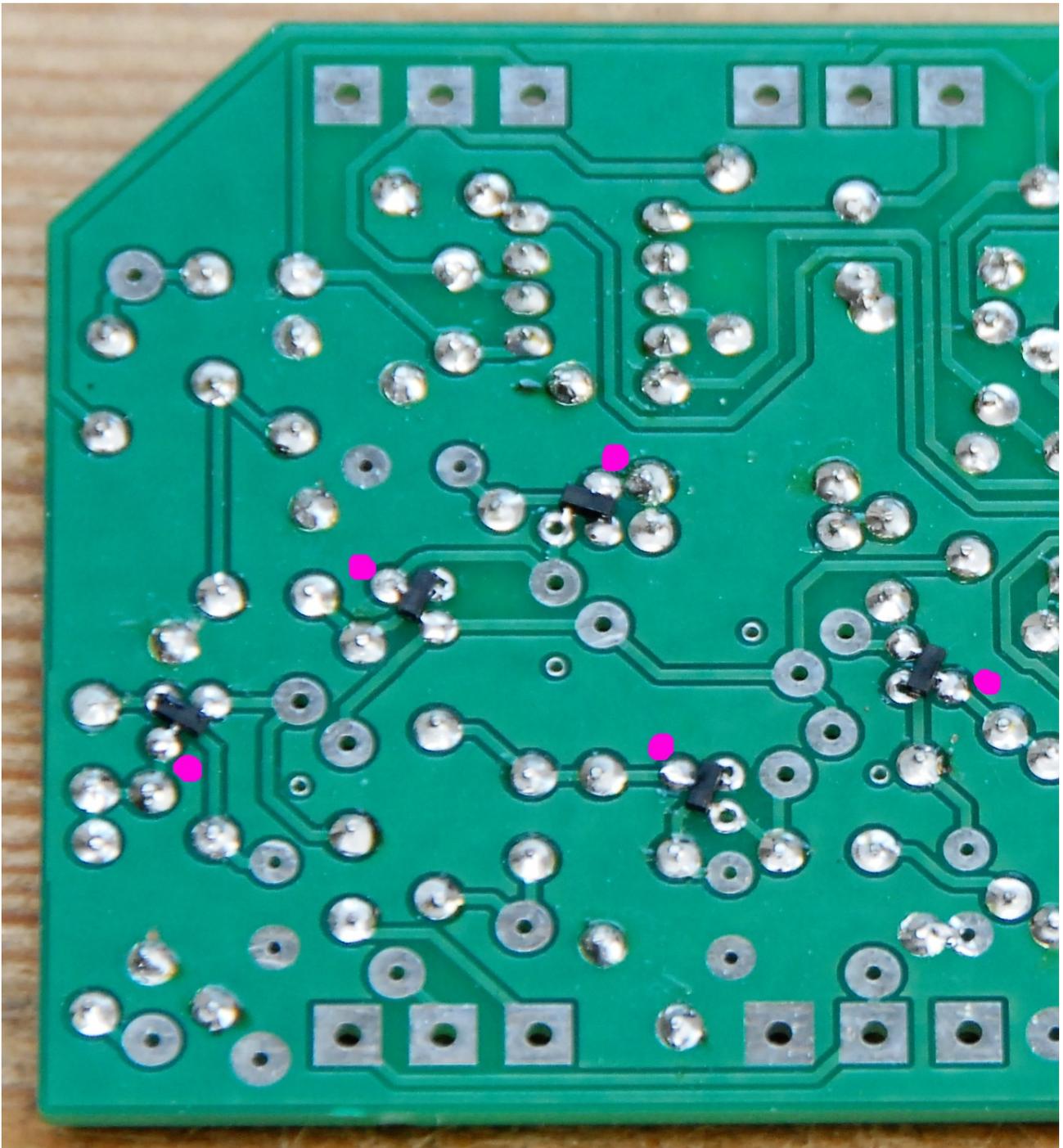
- Panasonic and red Wima caps. (There's not component in C24. That's normal)



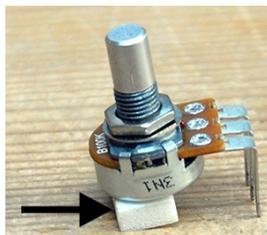
Cut the SIL12 in line socket to make soldering terminals for inputs/outputs (GND1,2,3, IN1 etc...). And put the transistors, if they are through hole, check out their directions, as on the picture below:



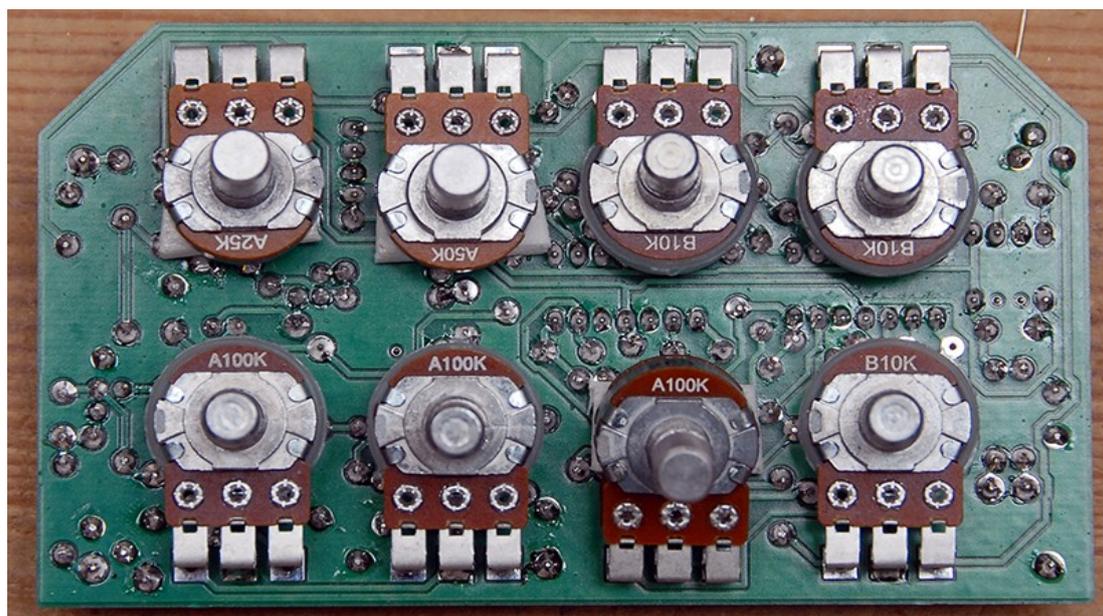
If the transistors are CMS, they should be soldered on the copper side. Picture below shows their directions. Purple dot is next to the the transistor's Grid soldering point:



Then add electrolytic caps and cermet trimpots. Lean the trim2 and trim3 pots a bit so that you can turn the blue part (see image below). Beware of the direction of electrolytic caps, they must be with the white negative (-) stripe as shown by the red arrows :



Now you are ready to solder them on the board. But don't go too quick! First put one of them and solder ONLY the middle leg. Then try to fit the card in the enclosure. It can happen that the pot is not in right the middle of the hole in the enclosure. If it's the case, you have only one solder to heat to move it a bit and rectify the position. Then add them one by one, soldering only the middle leg, and adjusting after each one to have them in front of their holes. At the end it should enter the enclosure without to much force (sometime a bit though).



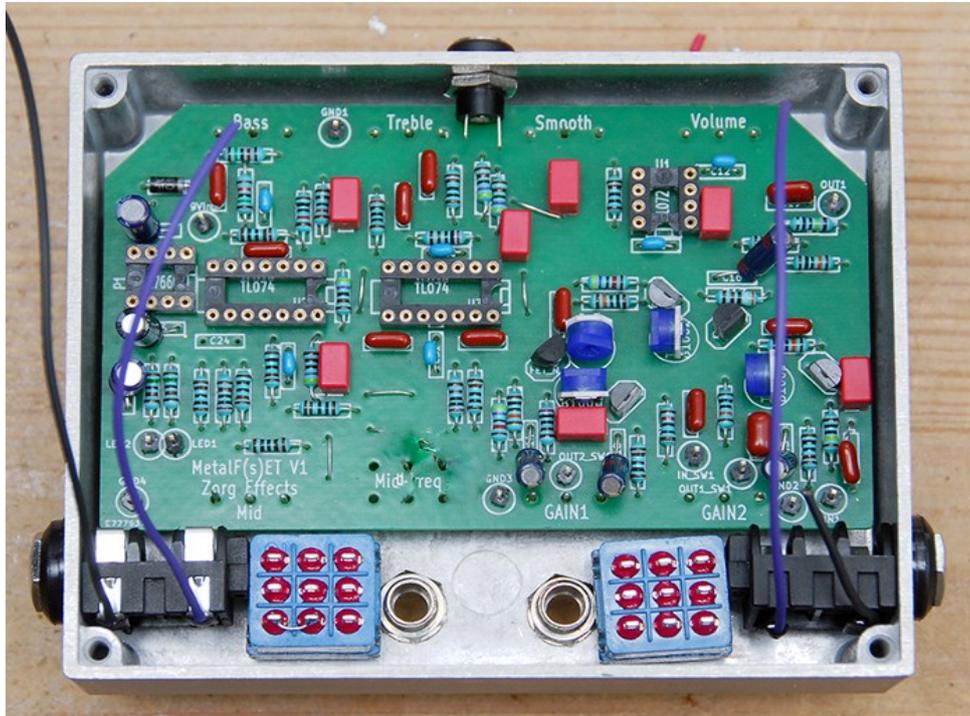
When it's fitting well in the enclosure with all pots, solder the remaining legs. You should now be proud to have that:

Now insert the card in the enclosure a screw the switch on the enclosure. We're going to...

Wiring the pedal.

Before putting the card in the box, you might have to remove the top corners with a plier if I didn't do it before sending it.

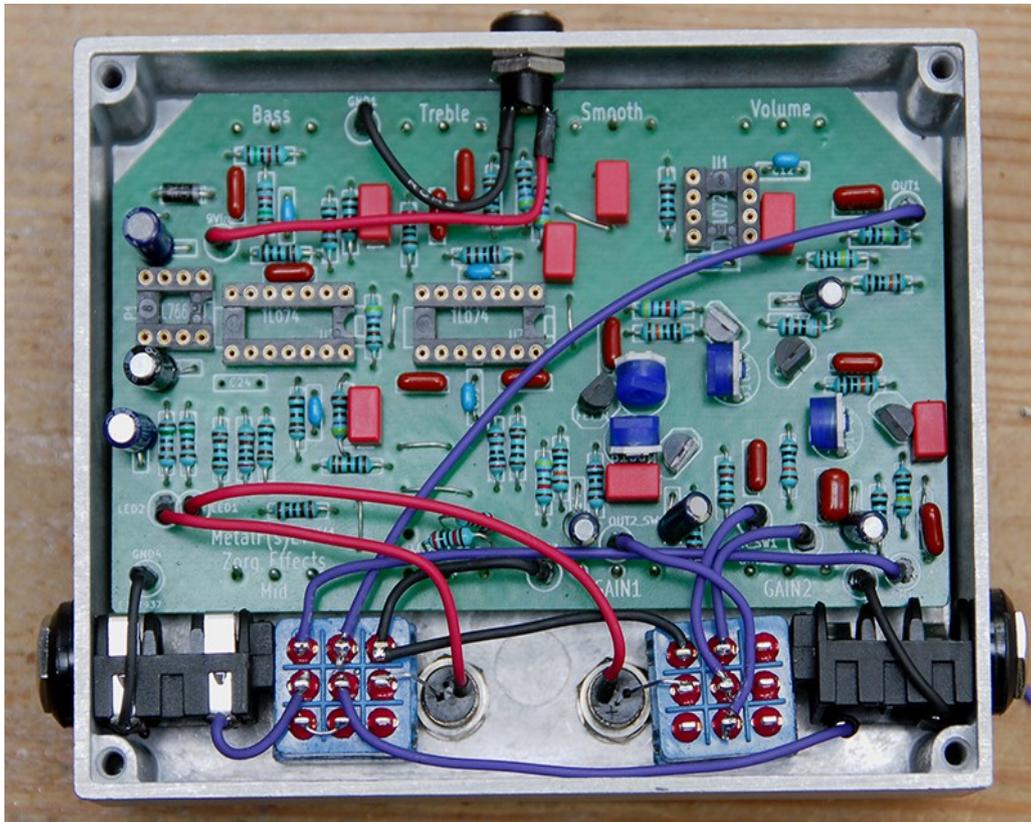
So there you go with the card in the box:



Prepare the audio jacks by removing 2-3mm of the rounded part on top of them, so that they can fit in the box. Use pliers for that. Then solder wire and heat shrink tube to the jack's legs. When it's ready, put your jacks in the box.

Then add the led socket, footswitches and DC jack. Take care that the jacks legs do not touch components on the board or the box.

We're going to wire that, like this:



Lets assume the footswitches have the following legs numbers:

1 2 3

4 5 6

7 8 9

And when we're switching it, 4 connects to 1 or 7, 5 to 2 or 8 and 6 to 9 and 3.

The connections are thus the following for the **bypass switch**:

7 and 8 must be soldered together.

4 is connected to audio jack input.

5 is connected to audio jack output.

1 is connected to IN1

2 is connected to OUT1

6 is connected to bypass blue led negative leg (flat side, short leg)

3 is connected to GND3

LED2 is connected to blue led positive leg (long leg)

For the **more switch**:

3,6,7,9 are not connected

1 is connected to bypass switch leg 3.

4 is connected to green led negative leg (flat side, short leg)

2 is connected to OUT1_SW1

5 is connected to IN_SW1

8 is connected to OUT2_SW1

LED1 is connected to green led positive leg (long leg)

GND1 is connected to DC jack short leg (Assuming you want a center negative alim)

9V1 is connected to DC jack long leg (Assuming you want a center negative alim)

GND2 is connected to output jack ground.

GND4 is connected to input jack ground.

Important: Use the eat shrink tube to strengthen and protect all your wire connections (on the board and on the connectors).

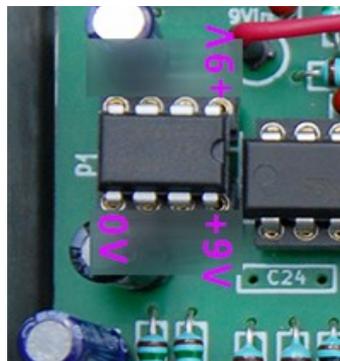
You're ready to plug your Metalfe(s)t and...

Test the board.

Now don't put the ICs on their sockets. First we're going to test the power supply.

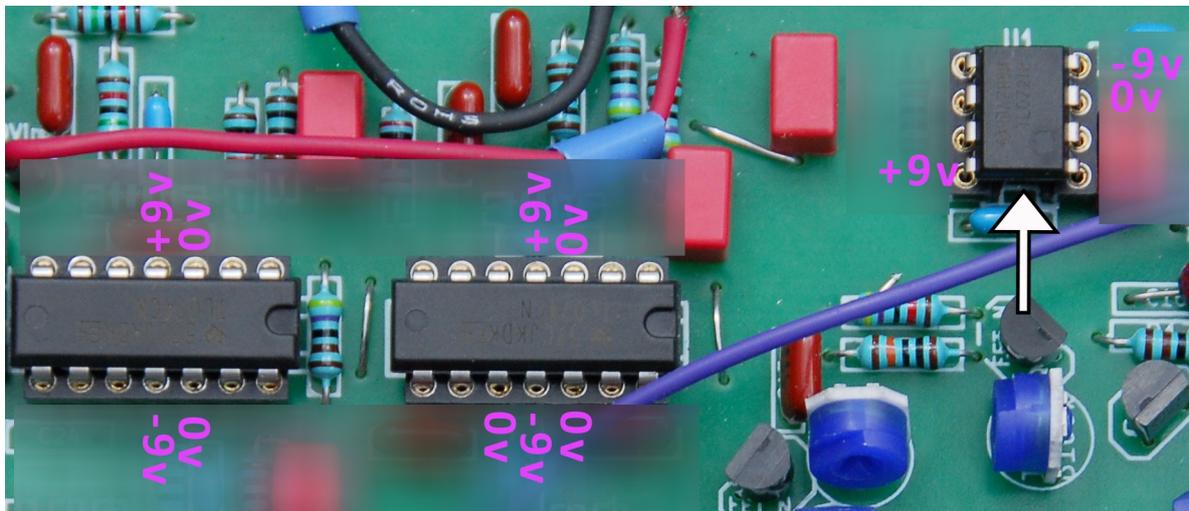
Step 1: connect your 9v DC power unit to the DC jack. Switch on/off your footswitch. The bypass led MUST also switch on and off. If not there's likely to be a bad connection somewhere... (See "debug" paragraph)

Step 2: check the voltages with a voltmeter on the ICL7660s socket:



Step3: if step 2 is ok, add the ICL 7660scpa in his socket. Be careful of the orientation (see image above) or you'll blow it up.

Then check the voltages on U1 to U3 (-9v values might be a bit lower, -8v will be ok too):



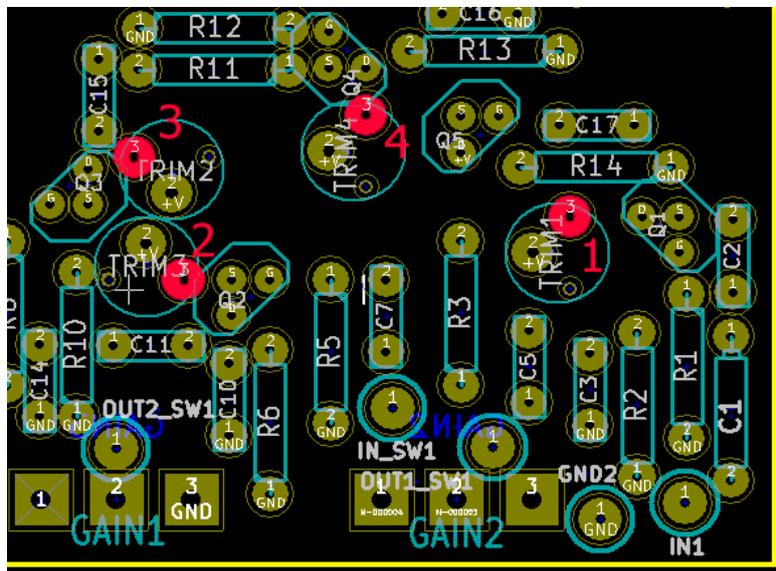
Step 4: insert the TL074s and TL072 in their sockets. Be careful of their orientation (See image above, white arrow shows TL072 dot side).

Now we'll...

Bias the JFETs.

For this step, you'll need a voltmeter, an oscilloscope and a frequency generator.

You can first make a simple bias with a voltmeter. Put the black probe on the ground and the red on the following 4 measurement points on the trimpots legs, in red in this image:



For each point, trim the pots to get a 4,5v tension on them.

This could be enough and your Metalfe(s)t should somehow be working now.

But we can make a more accurate bias. Plug in your frequency generator at the Metalfe(s)t's input and send a 1kHz sine.

Then, with your oscilloscope probe, check for the signal on test point 1. And rotate the trimpot trim1 to get the maximum of gain from this stage.

Then set the gain pot a bit upper than the minimum and do the same to test points 2 to 4 with trim pots trim2, trim3 and trim4. At each stage, lower the gain or your input signal so that you can work with an unsaturated signal (specially at the last stage).

Note that for each stage you should get between x10 to x15 gain... If you didn't get the components from me and don't get that much gain, like x1 to x3, well you should know that some counterfeit JFETs are on the market. If you get components from me I test them and should be working.

If you made everything fine, Metalfe(s)t should be working now. Plug in your favorite instrument and rock it! (And then screw all the pots screws as well as the knobs).

If this is not working you're good to read the...

Debugging chapter.

First, voltages!

If at step 2 of tests chapter you don't have 9v voltages on the 7660 socket, check:

- That your DC power unit is working.
- That the connections between the plug and the board are ok.

If at step 3 of tests chapter you don't have -9v voltages on the TL074s or TL072 sockets, remove the DC power immediately. Check the temperature of the ICL7660s.

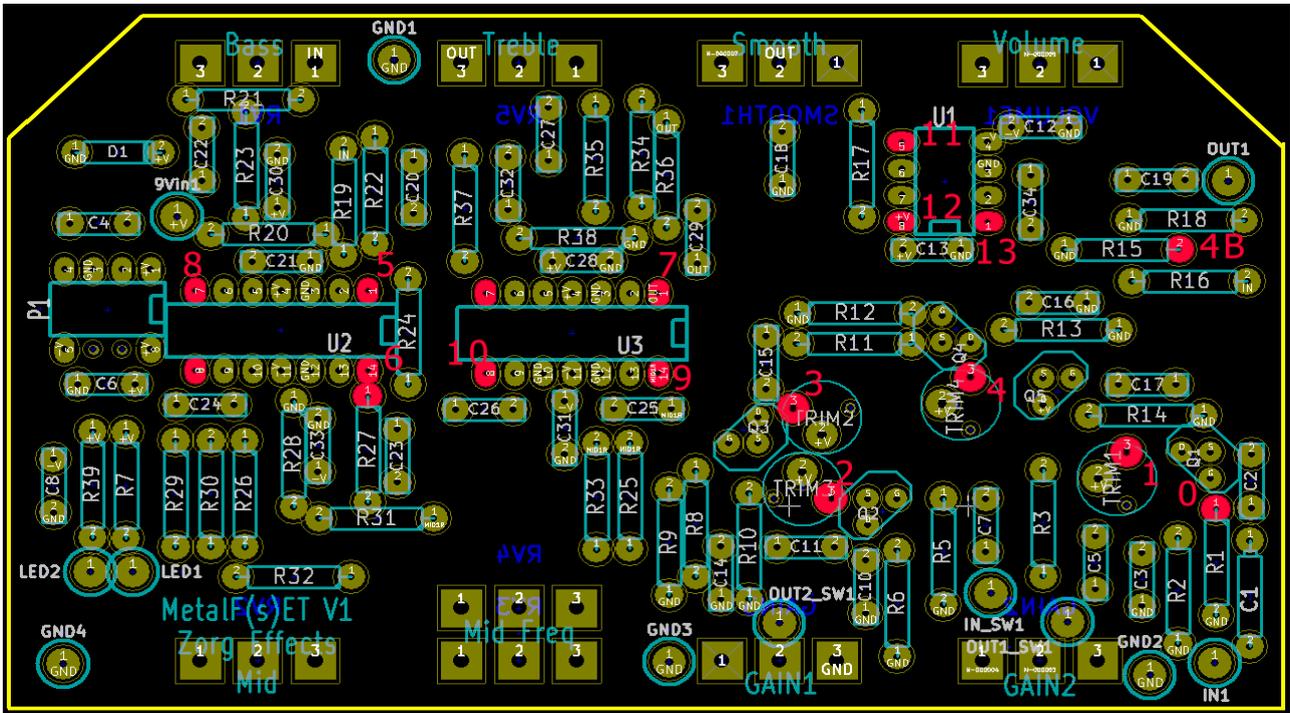
- If it's hot, check the IC and electrolytic caps directions.
- If it's cold, check that you've around -9v on pin 5 of the ICL7660, if not, it's likely to be dead. If there's between -7v and -9v it's ok. If there's between -2v and -7v it's strange, check that all components are at their right place and without shortcuts in between.

No or poor audio? (Even with all volume pots at 100%?).

First, check your solders, then, check your solders. After that check your solders.

The following debug statements assume you tried (And maybe succeed) to bias the JFETs.

Then you'll need an oscilloscope and a frequency generator. Send a 400Hz sin wave in the pedal input. Set all the EQ pots in the middle of their courses. Then check the tests points below for the sin wave. They are in order of signal flow:



0- Input of the Metalfe(s)t. No signal here : check your wirings.

1- Output of 1st gain stage. If no signal here, check your solders, check that Trim1 allows to change a continuous tension from +9v to +2v, if everything seems good and you transistor is in the right direction, and you cannot achieve to get a x10 to x13 gain you might suspect you JFET to be either dead or fake (Which should not be the case if you got them from me because I check them all for consistency).

2- Output of the 2nd gain stage. If no signal here, check your solders on the More and Gain pots, and also check your wiring on the more switch. Check that Trim3 allows to change a continuous tension from +9v to +2v, if everything seems good and you transistor is in the right direction, and you cannot achieve to get a x10 to x13 gain you might suspect you JFET to be either dead or fake.

3 and 4- Output of the 3rd and 4th gain stages. If no signal here, check your solders. Check that Trim2 and Trim4 allows to change a continuous tension from +9v to +2v, if everything seems good and you cannot achieve to get a x10 to x13 gain you might suspect you JFET to be either dead or fake.

4B- Buffered output of the whole gain section. Signal should be the same as in test point 4. If no signal here, check your solders. If everything seems good you might suspect you JFET to be either dead or fake (Which should not be the case if you got them from me because I check them all for consistency).

5- Output of the bass mixing stage. If no signal here check you solders on Bass pot. Then check point 8.

6- Output of the Mid mixing stage. If no signal here check you solders on Mid pot. Then check point 9.

7- Output of the Treble mixing stage. If no signal here check you solders on Treble pot. Then check point 10,

8- Bass filter output. If no signal here and solders ok, your TL074 may be dead.

9- Mid filter output. If no signal here and solders ok, special on the stereo pot for mid frequency, your TL074 may be dead.

10- Treble filter output. If no signal here and solders ok, your TL074 may be dead.

11- Output of Eq. Check Smooth pot solders if no signal here.

12- Output of Eq buffer. If no signal here and solders ok, your TL072 may be dead.

12- Output. Check Volume pot solders if no signal here.