

# ZORGVERDRIVE MOSFET 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: [TBD]  
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 Zorgverdrive Mosfet kit:

Name	Value	Units
BASS1	Potentiometer A5k (log)	1
C1	3,3n	1
C2, C7	10uF	2
C3	100uF	1
C4	1uF	1
C5	820nF	1
C8	22pF	1
C13	10nF	1
C14,C15, C11,C12	100nF ceramic	4
D1	DIODE	1
GAIN1	Potentiometer A250k (log)	1
GND1,GND2,GND3,IN 1,OUT1, P1, LED1	Socket SIL 8 pins	8
P5	ICL7660S	1
P5,U1,U2	Socket DIP 8	3
Q1,Q2	2N7000	2
R1	1M	1
R2	1.5k	1
R6	100ohms	1
R5, R7..R12	1k	4
SW2,SW4	Switch DPDT on on	1
TREBLE1	Potentiometer A50k (log)	1
U1	TL072	1
U2	OPA2604	1
VOLUME1	Potentiometer A10k (log)	1
Jacks		2
DC jack		1
Led socket		1
Bypass led Green		1
Knobs		4
PCB		1
Enclosure		1
3PDT Footswitch		1
Wire, 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.

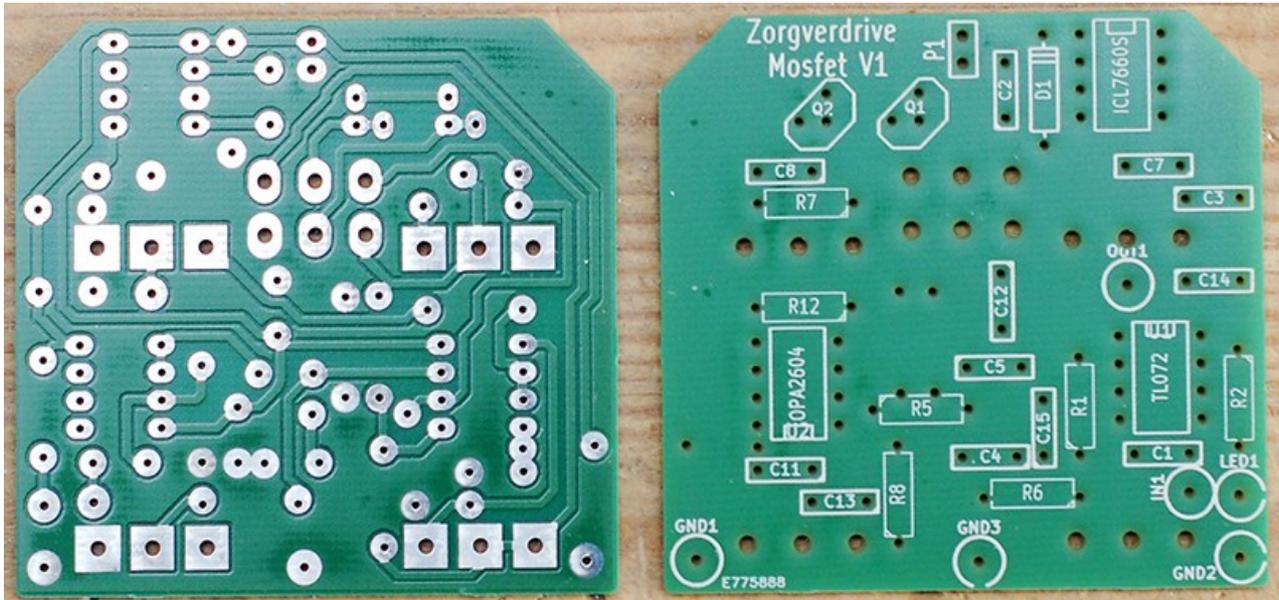
The following tools are needed to build your Zorgverdrive Mosfet pedal:

- A soldering iron.
- A un-soldering pump.
- A voltmeter/ohmmeter.
- Pliers to cut wire and remove the wire sheath.
- Pliers to screw nuts.

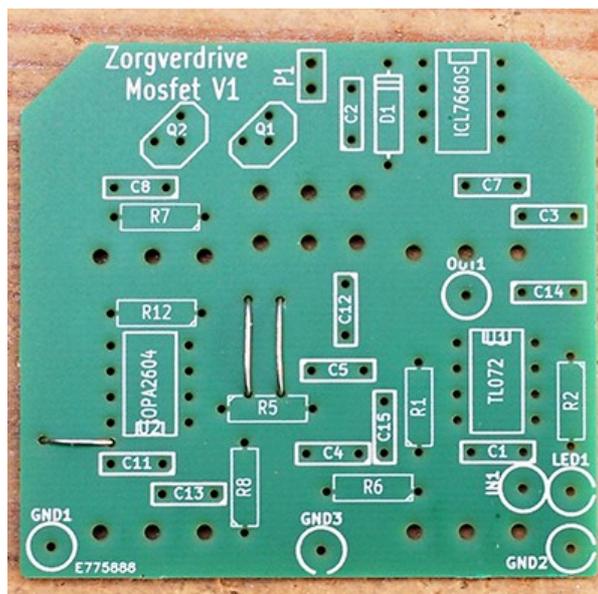
- A cruciform screw driver.
- And eventually wrenches.
- A 9v dc power unit, center negative.
- It's best to have an oscilloscope, and a frequency generator but not mandatory.

### Soldering on the pcb.

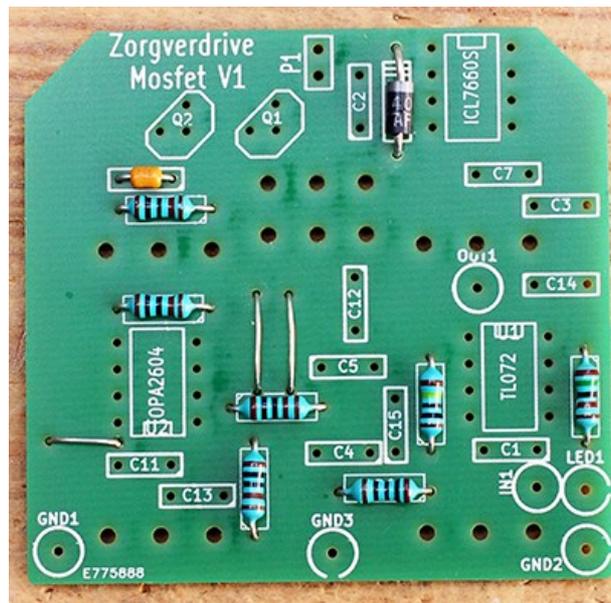
This is the PCB (Top/Bottom):



First let's solder wire jumpers. You wanna cut part of resistances legs to make them. There are 3 of them, as you can see here :

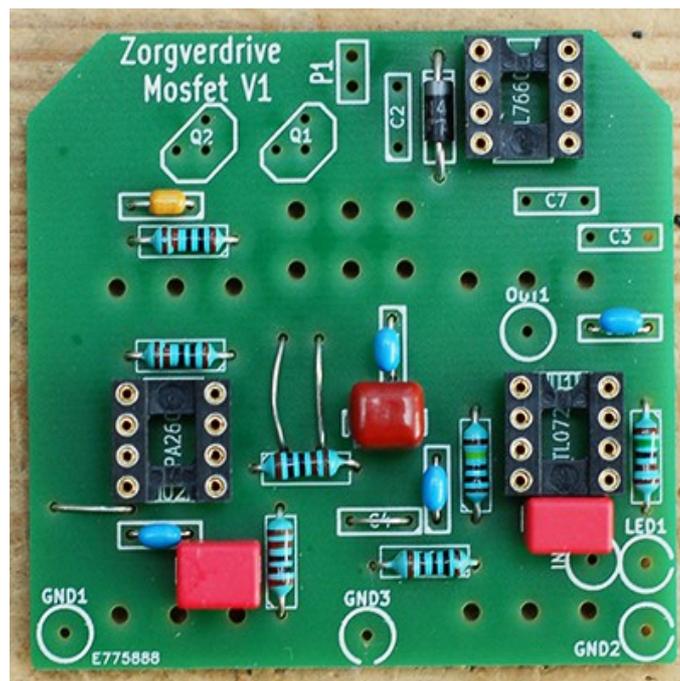


Then we're going to solder components from the smaller to the taller. First, diodes and resistances. You shall take care of the diode position. It MUST be on the same direction as on this picture :

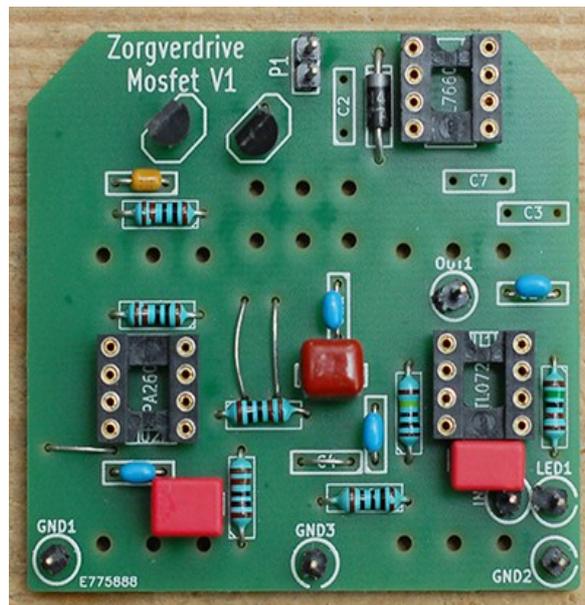


Then by order :

- The blue ceramics caps and the IC sockets.
- Panasonic and red Wima caps:

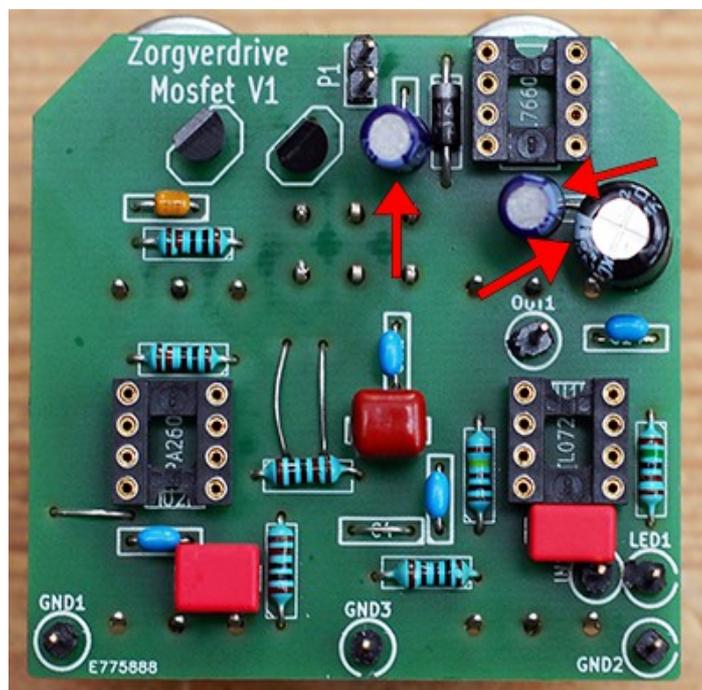


Cut the DIP14 in line socket to make soldering terminals for inputs/outputs (GND1,2,3, IN1 etc...). Then put the transistors:

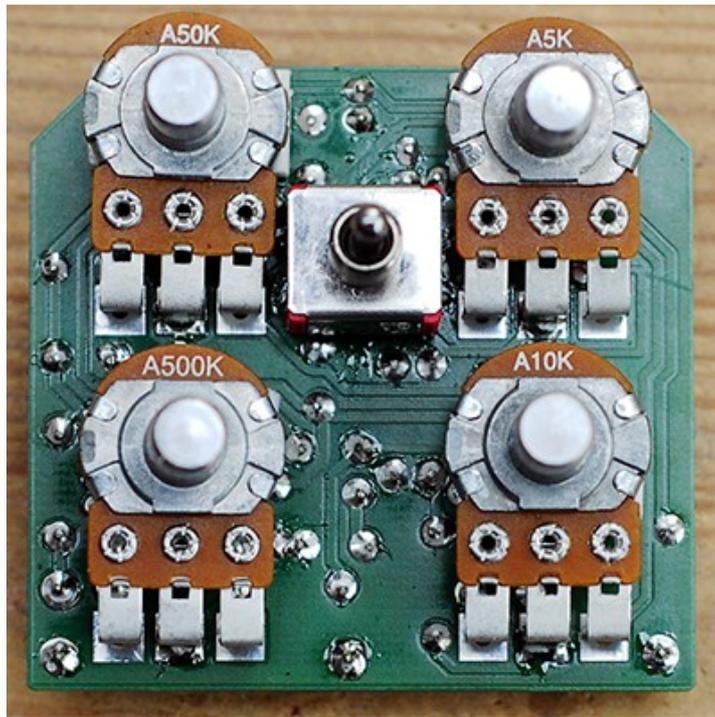


Beware of transistors directions!

We now can add electrolytic caps. Beware of the direction of electrolytic caps, they must be with the white negative (-) stripe as shown by the arrows on the picture below.



Now flip the board. We're going to solder the switch and pots on the other side. Begin with the DPDT switch and pots at the end.

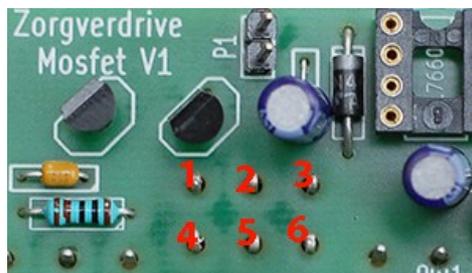


*This picture shows a 500k pot and a 3 positions switch. This is a mod you can do to get more gain and the middle position of the switch removes the clipper to use the pedal as a booster.*

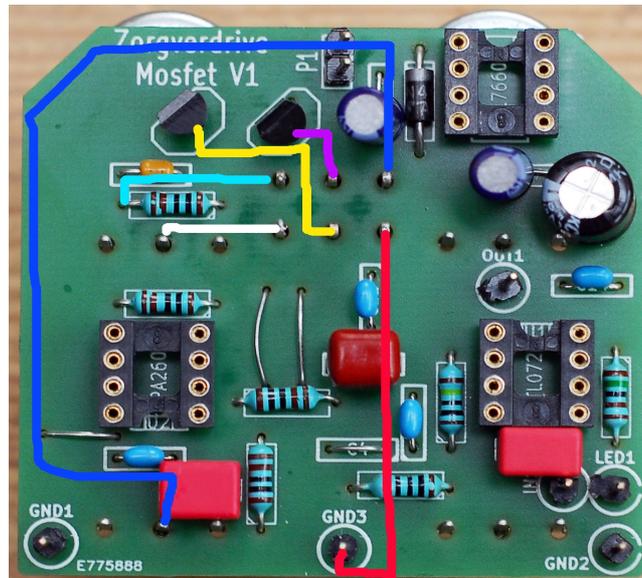
Soldering the switch is a bit shitty. First you should push it all the way into the board. If you let some space between the board and the switch, the problem will be that the height of the switch will be a bit higher than the pots height and this can somewhat be a problem when screwing the pots on the enclosure...

But doing so, there's little place left between the switch and the PCB to solder his legs. You'll need a fine soldering iron.

Then just after soldering, you must test that your solders are ok. To do so, use your ohmmeter and check that the following path are not opened, assuming we have:



- 1 must be connected to R17 left leg. (Light blue path)
- 2 must be connected to Q1 middle leg. (Purple path)
- 3 must be connected to Treble pot middle leg. (Dark blue path)
- 4 must be connected to Gain pot middle leg (White path)
- 5 must be connected to Q2 middle leg. (Yellow path)
- 6 must be connected to ground. (Red path)

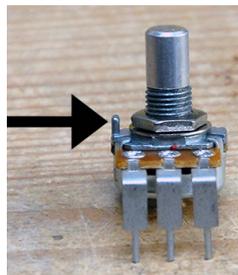


Many of the problems with this board can come from a bad soldering on the DPDT switch.

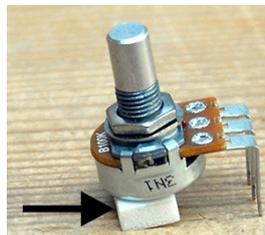
Now we're going to solder the pots on the same side of the switch.

First you'll need to prepare the pots:

Cut the little rectangular shaft next to the axis, you won't need it.



Stick 16mm length of window insulator under each pot. It's in order to prevent solders on the board to connect with the body of the pot and shortcut some circuits.



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).

## Wiring the pedal.

So there you go with the card in the box.

Now you can screw the audio jacks, led socket, footswitches and DC jack. We're going to wire it like this:

Here's a list of the wirings:

P1 upper leg goes +9v of DC jack (long leg if you wish to wire it center negative)

P1 lower leg goes to gnd of the DC jack (short leg if you wish to wire it center negative)

GND1 and GND2 go to audio jacks grounds.

GND3 goes on the negative leg of the LED (Flat side, shorter of both leg).

If we number the legs of the footswitch :

**1 2 3**  
**4 5 6**  
**7 8 9**

Then :

4 Is connected to input jack

5 Is connected to output jack

6 Is connected to LED1 on the board

7 and 8 are soldered together. 9 is not connected

1 Is connected to IN1 on the board

2 Is connected to OUT1 on the board

3 Is connected to the the positive leg of the LED (longest leg)

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

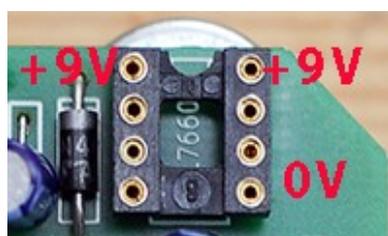
Now, there's only left to...

## Test the board.

Now don't put the ICs in the box. First we're going to test the power supply.

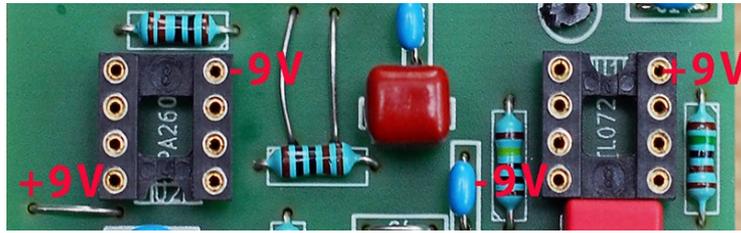
Step 1: connect your 9v DC power unit to the DC jack. Switch on/off your footswitch. The led MUST also switch on and off. If not there's likely to be a bad connection somewhere... (See "debug" paragraph)

Step 2: check the following 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 or you'll blow it up.

Then check the following voltages on the TL072 and OPA socket (-9v values might be a bit lower, -8v will be ok too):



Step 4: insert the TL072 and OPA2604 in their sockets. Be careful of the orientation.

If you made everything fine, the Zorgverdrive should be working now. Plug in your favorite instrument an 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:

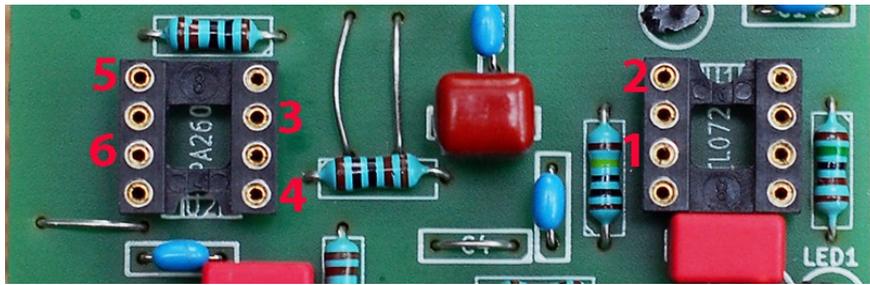
- That your DC power unit is working.
- That the connections between the plug and the board are ok.

If at step 3 of tests chapter you don't have -9v voltages on the TL072 or OPA socket, 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%?)

You'll need an oscilloscope and a frequency generator. Send a 400Hz sin wave in the pedal input. Then check the tests points below for the sin wave. They are in order of signal flow:



- 1- This is the input. If you have no signal here, there's certainly a bad connexion on your wiring.
- 2- output of the input buffer. No signal at that location means your TL072 may be dead.
- 3- Output of the high pass filter. If there is no signal at this location there is a trouble with your high pass filter.
- 4- Output of the gain stage. No signal at this point: check your solders of the switch on the card or the OPA2604 may be dead.
5. Input of the output buffer. If there is no signal at this location there is a problem with your low pass filter.
- 6- Output of the output buffer. No signal at that location means your OPA2604 may be dead.

## Hacks!!!

Three hacks are possible easily:

- Change the DPDT on on switch for a ON-OFF-ON, the middle position will get you a booster with treble and bass parameters. There's such a gain that at some point the OPA2604 will clip, making a pretty cool saturation.
- Change gain pot value to 500k or 1M to get even more gain.
- Sick of the mosfet midrange voicing? Replace the 2N7000 mosfets for leds, 1N4001 (PCB will need bigger holes), 1N4148, etc... Here's of to wire it with a pair of diodes:



Wire Q2 drain and source together.

Setup one (or two or more!) diode between Q2 grid and Q1 drain.

Setup the other one between Q1 grid and Q1 source.