Love Philter Mounting instructions.

Zorg Effects

Summary

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: http://freestompboxes.org/viewtopic.php?f=13&t=27442

  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 Love Philter kit:

Name	Value	Units
C18	1nF	1
C1	100nF	1
C16	1uF	1
9V1 GND1 GND2 GND3 GND4 IN1 Led1 OUT1 EXP_TIP1 CV_IN1 EXP_GND1 EXP_RING1	12 pins	12
C5	4.7nF	1
C8 C12	47nF	2
C6 C7 C9 C10 C11 C13	100nF Ceramic	6
C3 C4 C15	10uF	3
C2 C14	33uF	2
D1	1N4001	1
D2 D3 D4	1N4148	3
LOWF1	A100K (log) Potentiometer	1
MIX1	B10K (lin) Potentiometer	1
P2	76660s	1
Q1	A10k (log) Potentiometer	1
Q2	NPN	1
R3 R9 R10 R11 R12 R18 R21 R22 R26	1k	9
R14 R27	6k8	2
R7	20k	2
Spare	1k 2k 4k7	3
R15 R17 R25	68k	3
R2 R13 R20	100k	3
R5 R6 R8	220k	3
R1	1M	1
R16		1
R24		1
Sensitivity1	A100K (log) Potentiometer	1
SW1	Switch SPDT on off on	1
SW2	Switch SPDT on on	1
U1	TL072	1
U2 U5	TL074	2
U3 U4	PHOTORESISTOR NSL-32	2
Jacks Mono		3
Jack stereo		1
DC jack		1
Led socket		1
Bypass led Pink		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. Resistances R16 and R24 are carefully selected and paired with the NSL-32s. If you didn’t get the components from me, R16=150kohms and R24=15kOhms should be a start, but NSLs are so inconsistent that the values

might change of more than 100% from one pair of NSLs to another...

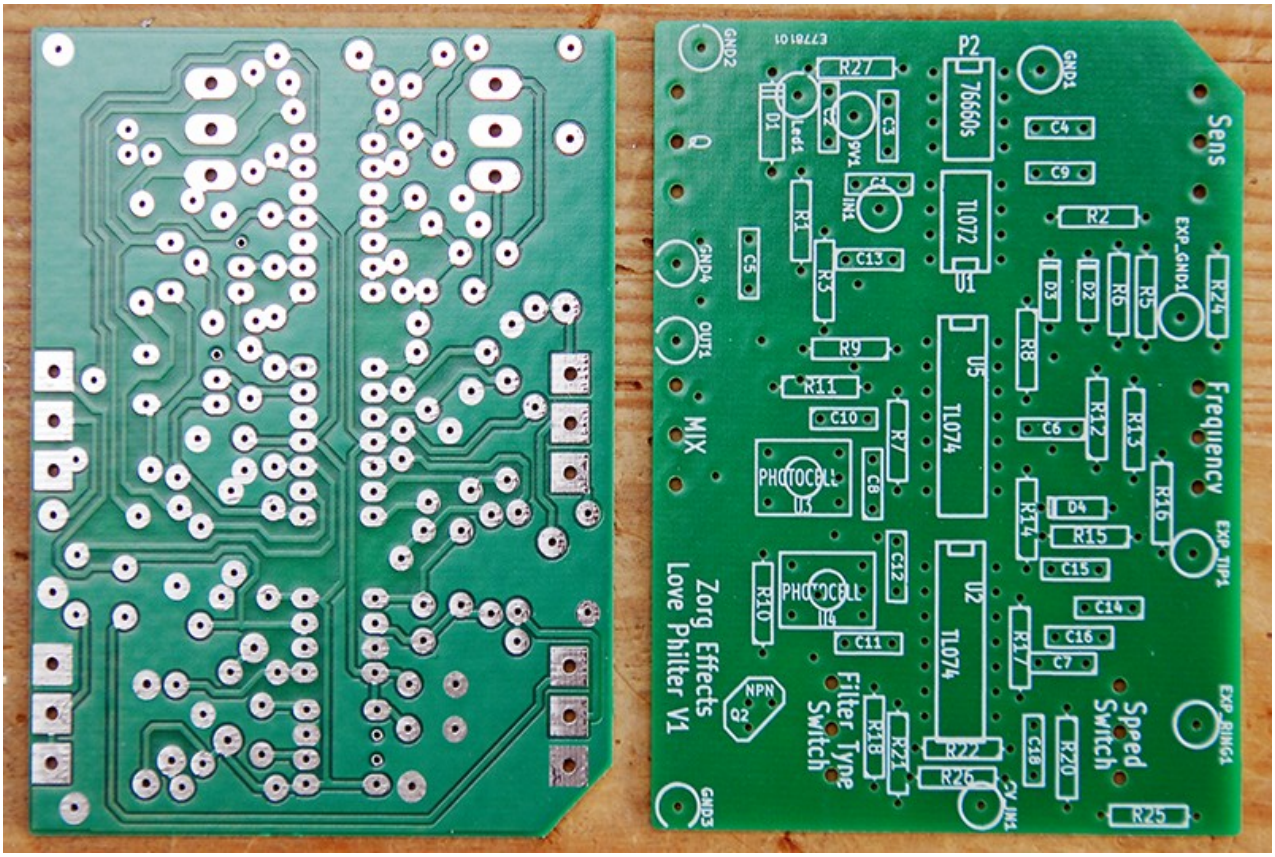
What you'll need.

The following tools are needed to build your Love Philter pedal:

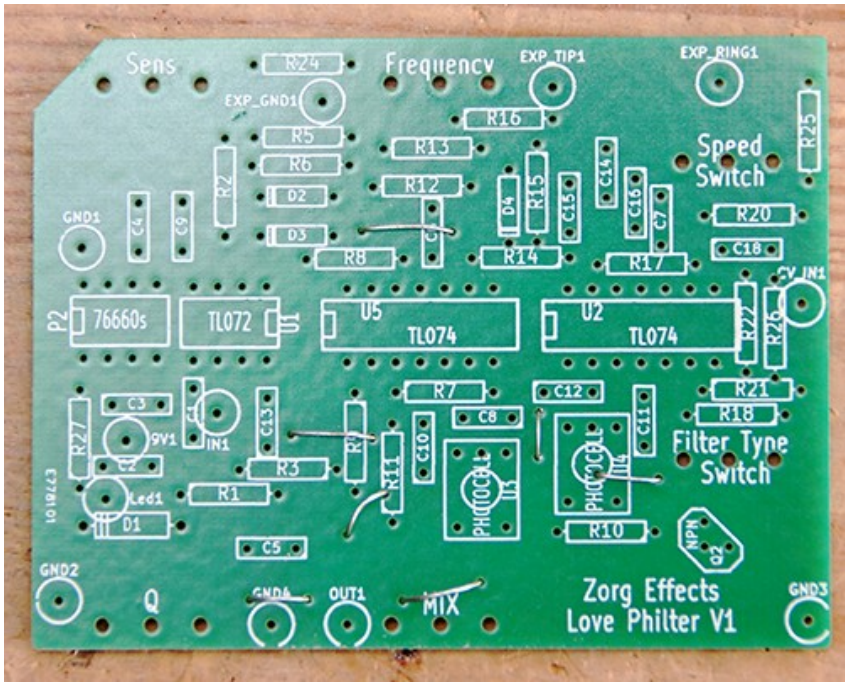
- A soldering iron.
- A un-soldering pump.
- A voltmeter/ohmmeter.
- Pliers to cut wire and remove the wire sheath.
- Pliers to screw nuts.
- A cruciform screw driver.
- And eventually wrenches.
- A 9v dc power unit, center negative.
- It's best to have an oscilloscope, and a frequency generator but not mandatory.

Soldering on the pcb.

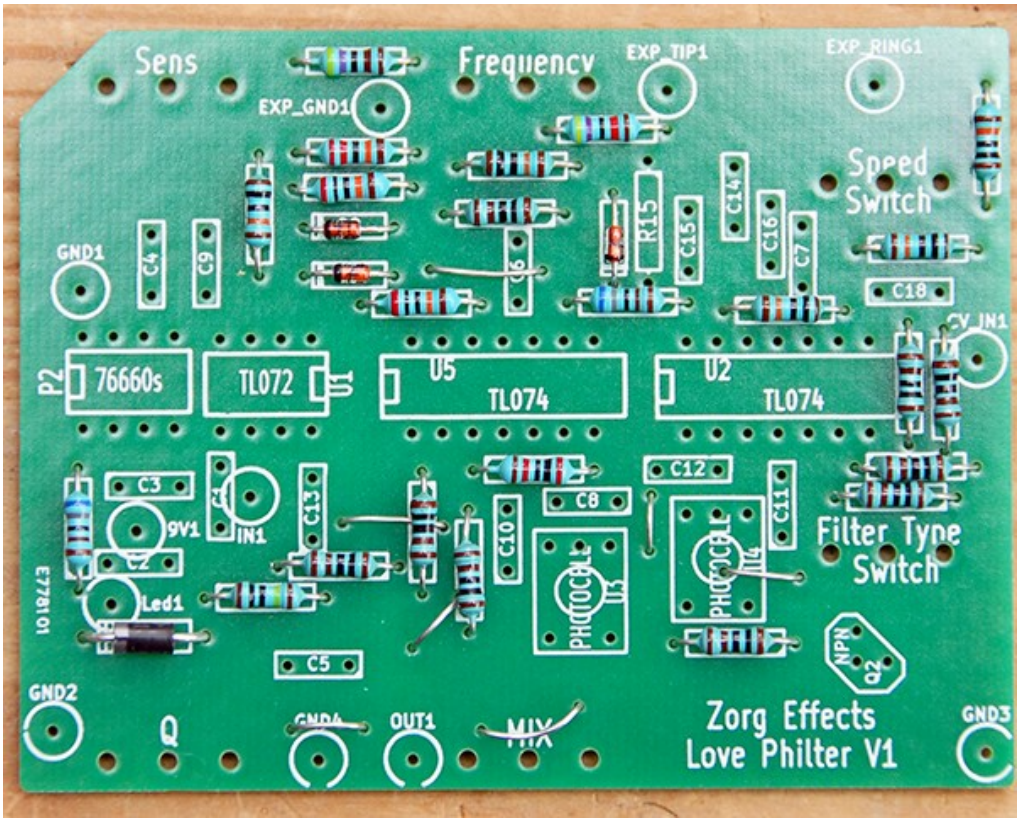
This is the PCB (Top/Bottom):



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

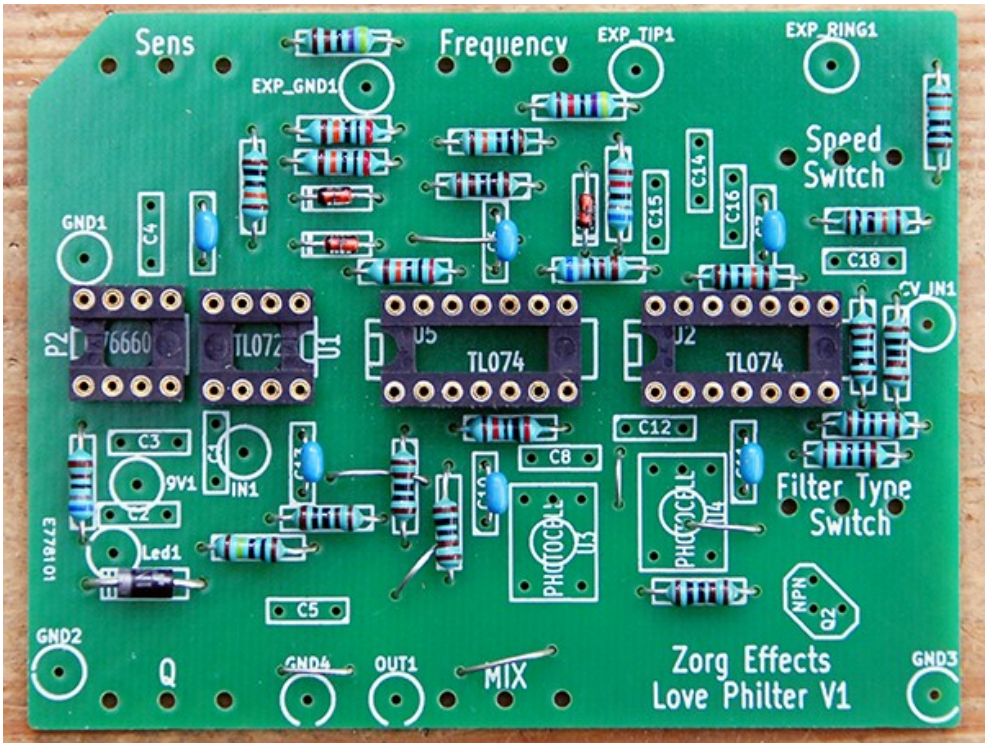


Then we're going to solder components from the smaller to the taller. First, diodes and resistances. You shall take care of the diodes positions. They MUST be on the same direction as on this picture :



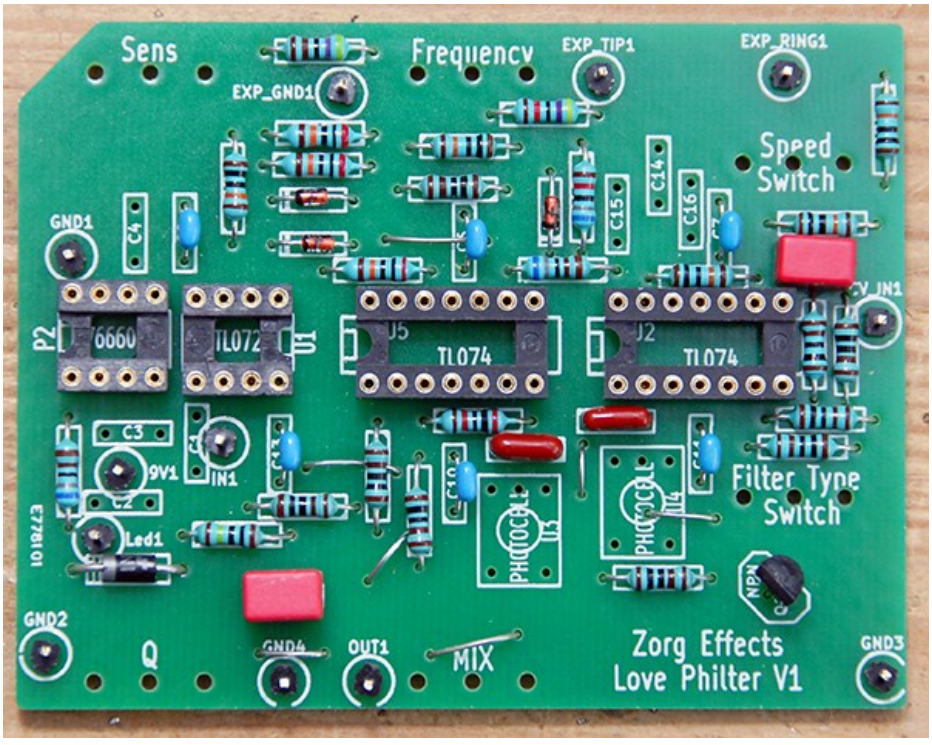
Then by order :

– The blue ceramics caps and the IC sockets:



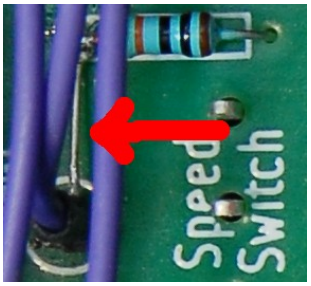
– Panasonic and red Wima caps.
– Cut the DIP14 in line socket to make soldering terminals for inputs/outputs (GND1,2,3, IN1 etc...). Then put the transistor:

BEWARE of the transistor direction! It **MUST** be placed as shown on the board (**Reversed** as the picture below)

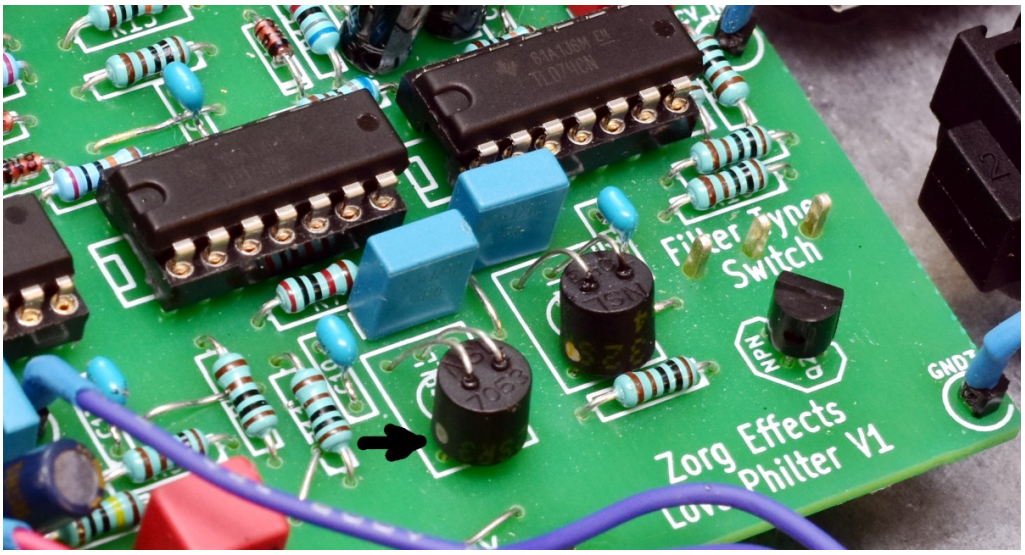


Important: on the V1 card there's an error that must be corrected. You just need to wire with a resistance leg or a bit of cable the top of R25

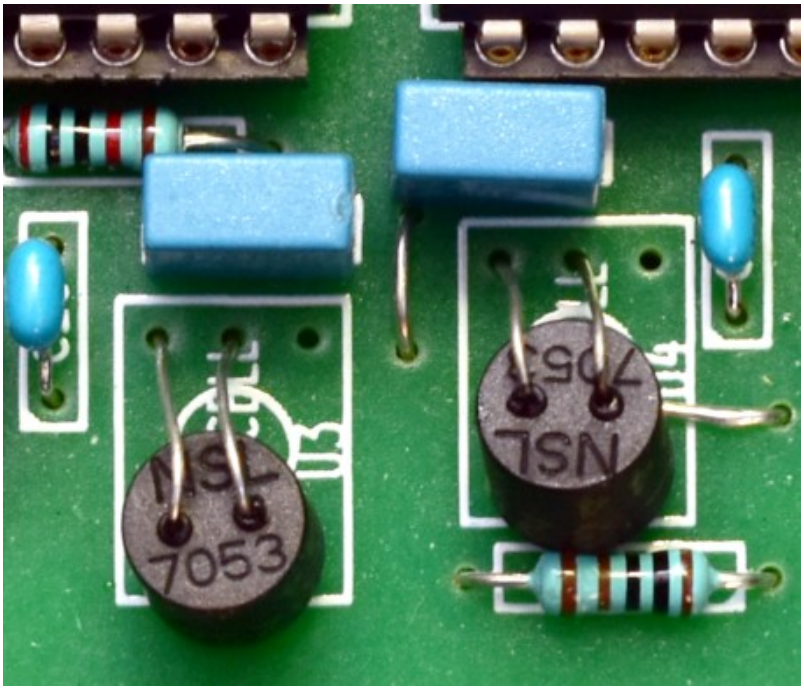
with terminal EXP_RING1. If you use a resistance leg on copper side, add some heat shrink tube to prevent short circuits:



Add the NSL-32. Be careful for the directions too. The white dot must be placed left side and down. Do not fold the LED lugs of the NSL (short ones).

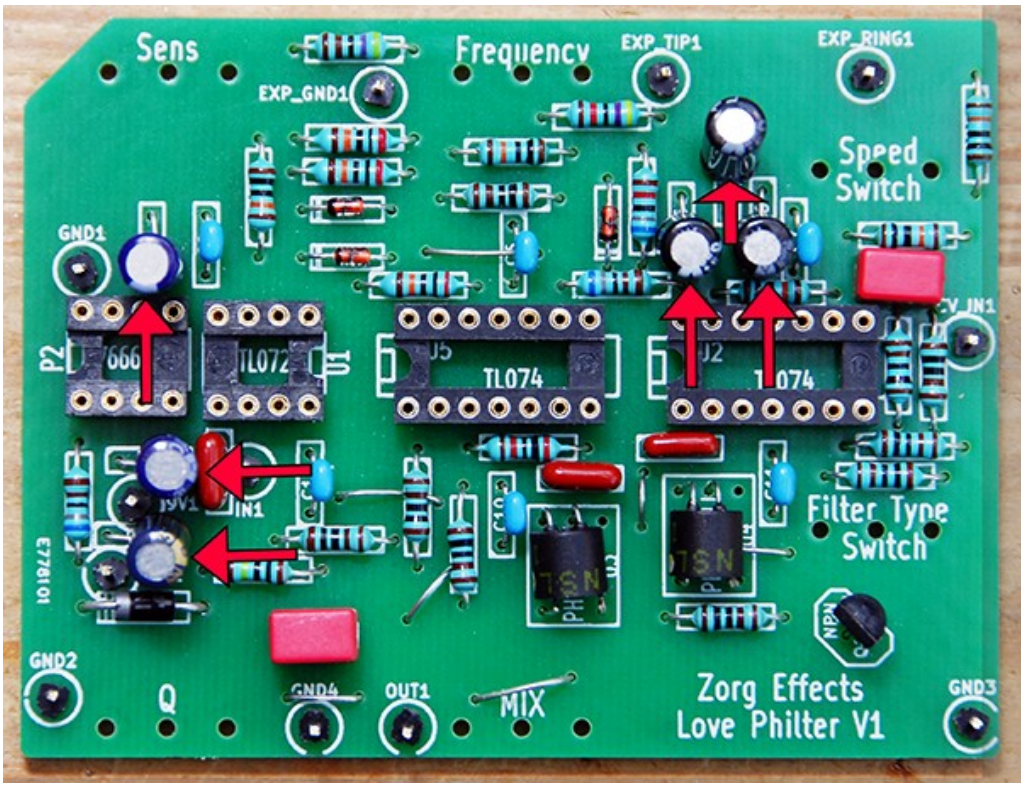


And the resistance (up) side of the NSLs must be placed in these holes:



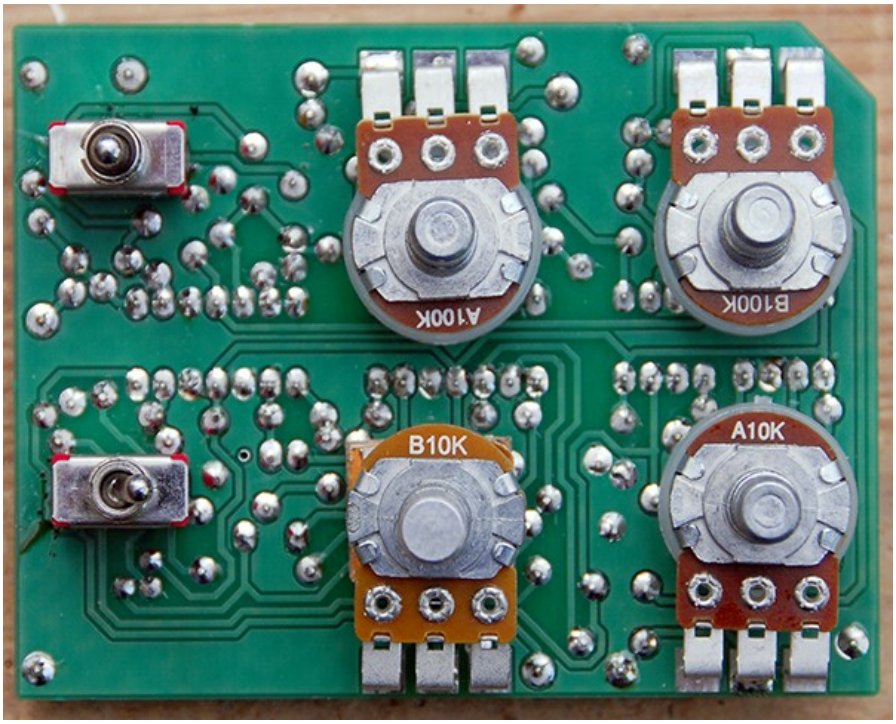
Note: All next pictures show the NSL32 LED side legs folded, it's **wrong!**

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 SPDT switches and pots at the end.



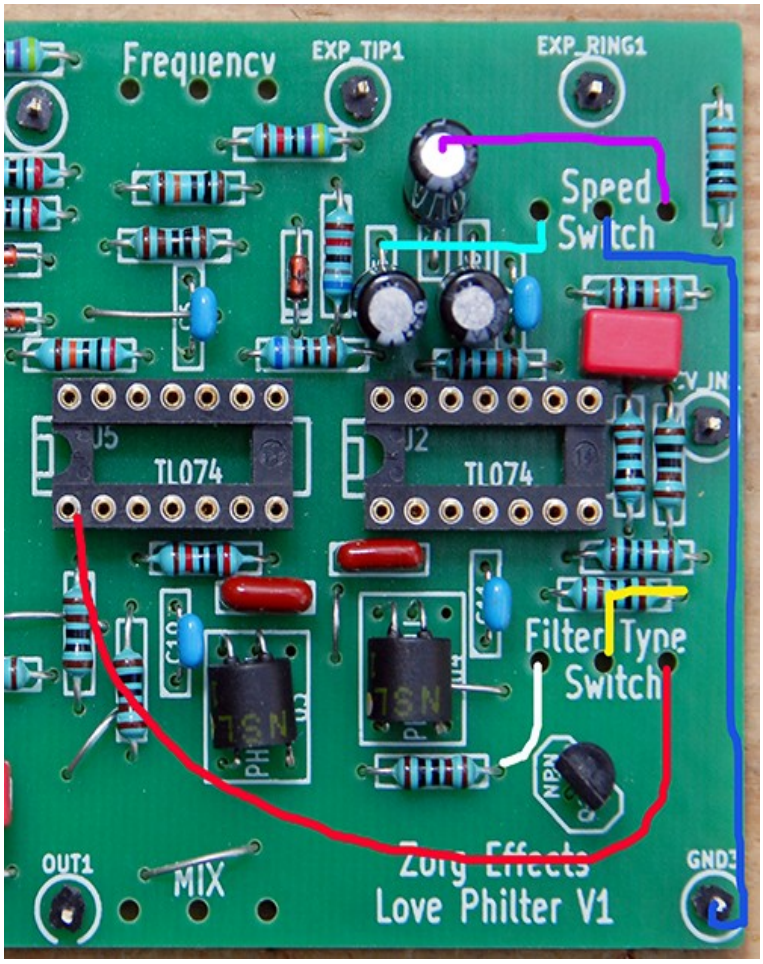
Soldering the switches is a bit shitty. First you should push it all the way into

the board. Then add a little space so that the height of the switch will be as high as the pots's height. You can also choose to push them all the way in and use a washer to level it as the pots...

But doing so, there's little place left between the switches 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:

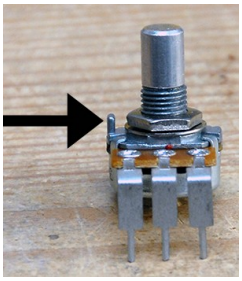
- Speed switch left leg must be connected to C15 upper leg. (Light blue path)
- Speed switch right leg must be connected to C14 upper leg. (Purple path)
- Speed switch middle leg must be connected to ground. (Dark blue path)
- Filter type switch left leg must be connected to R10 right leg (White path)
- Filter type switch middle leg must be connected to R18 right leg. (Yellow path)
- Filter type switch right leg must be connected to U5 pin 1. (Red path)



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

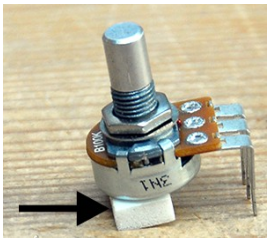
Now we're going to solder the pots on the same side of the switch.

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.

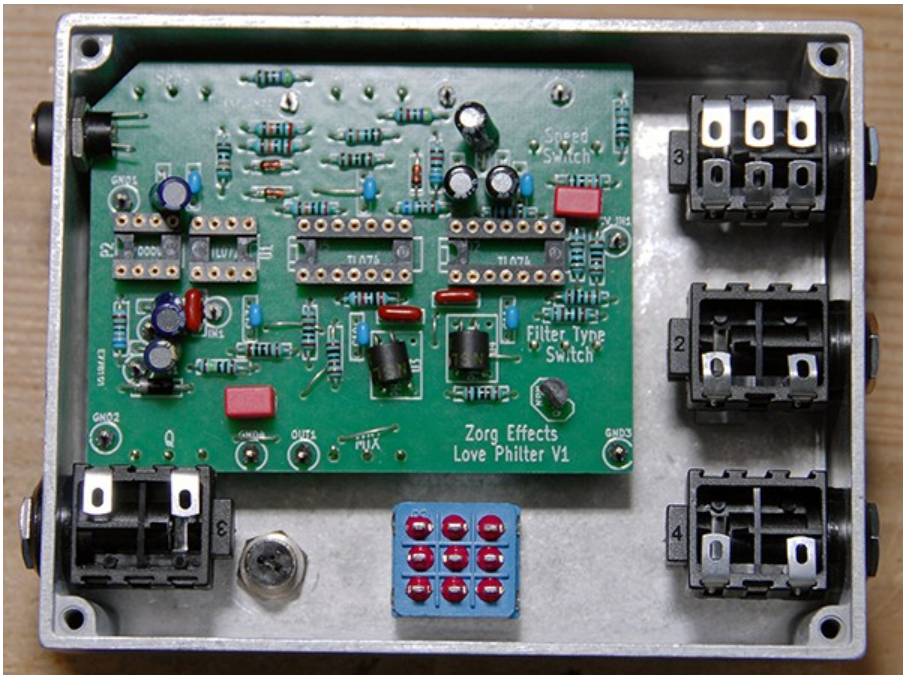


Now you are ready to solder them on the board. But don't go too quick! First put one of them and solder ONLY the middle leg. Then try to fit the card in the enclosure. It can happen that the pot is not in right the middle of the hole in the enclosure. If it's the case, you have only one solder to heat 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).

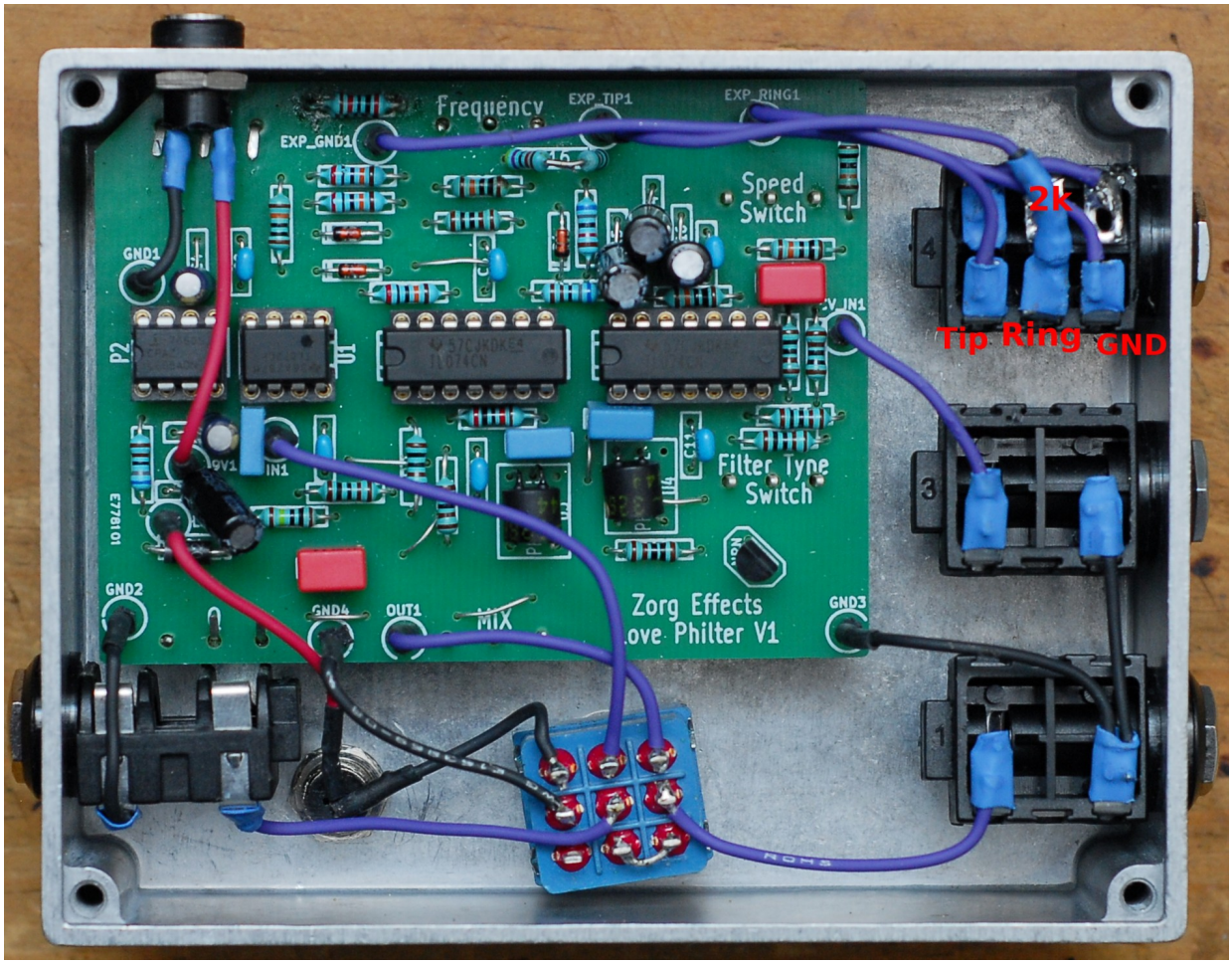
Important: you'll also need to put the enclosure to the ground. To do so, on the Q pot, left leg, solder a leg of resistance and let it lay between the pot's body near the axis and the enclosure.

Wiring the pedal.

So there you go with the card in the box:



Now you can screw the audio jacks (The stere jack is for the EXP input), led socket, footswitches and DC jack. We're going to wire it like this:



Here's a list of the wirings:

9V1 goes to +9v of DC jack (long leg if you wish to wire it center negative)

GND1 goes to gnd of the DC jack (short leg if you wish to wire it center negative)

GND3 and GND2 go to audio jacks grounds.

If we number the legs of the footswitch :

1 2 3

4 5 6

7 8 9

Then :

5 Is connected to input jack

6 Is connected to output jack

4 Is connected to GND4

9 and 8 are soldered together. 7 is not connected

2 Is connected to IN1 on the board

3 Is connected to OUT1 on the board

1 Is connected to the the negative leg of the LED (shortest leg, flat side)

On the EXP stereo jack GND and RING legs on switching side of the jack (up side) must be connected together.

EXP_GND1 is connected to EXP jack ground.

EXP_TIP1 is connected to EXP jack RING leg with a 2k spare resistance in between.

EXP_RING1 is connected to EXP jack TIP leg.

CV_IN1 is connected to CV jack TIP leg.

CV jack ground is connected to output jack ground.

LED1 is connected to led positive leg (longest leg).

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

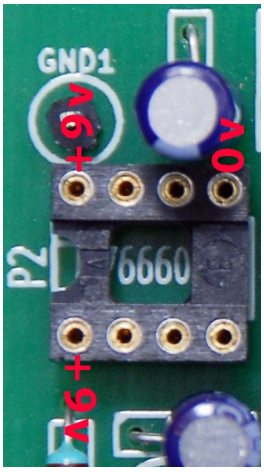
Now, there's only left to...

Test the board.

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

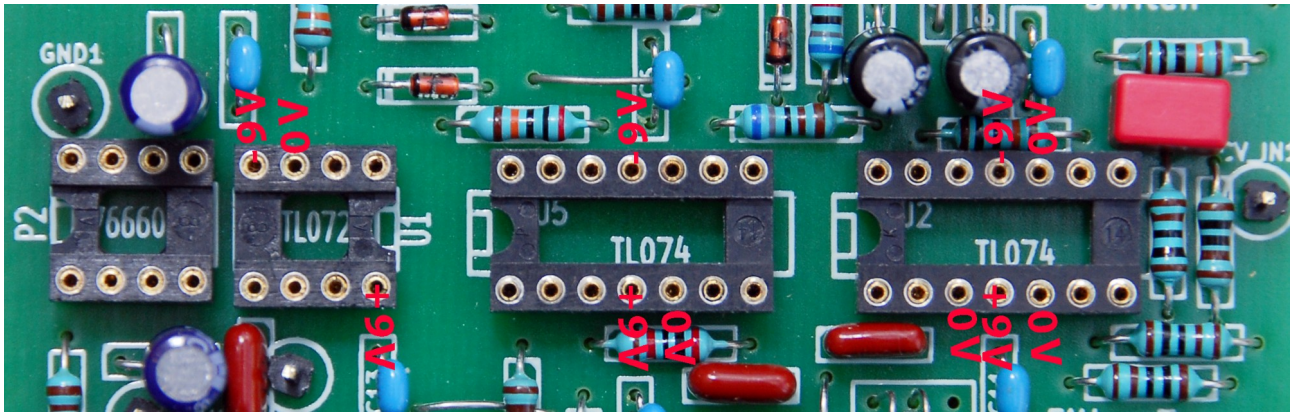
Step 1: connect your 9v DC power unit to the DC jack. Switch on/off your footswitch. The led MUST also switch on and off. If not there's likely to be a bad connection somewhere... (See “debug” paragraph)

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

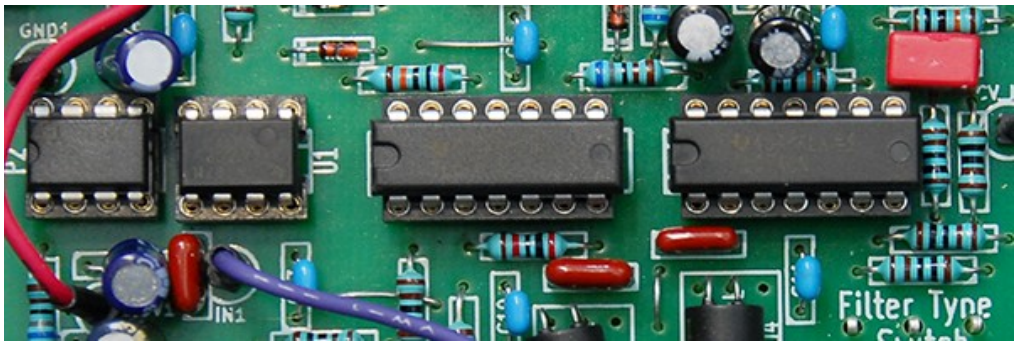


Step3: if step 2 is ok, add the ICL 7660scpa in his socket. Be careful of the orientation or you'll blow it up.

Then check the following voltages on the TL072 and TL074 sockets (-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 orientations:



If you made everything fine, the Love Philter should be working now. I suggest to put all the controls at noone and plug in your favorite instrument and funk 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...

Trimming the FREQ knob span.

There's a wide tolerance on the NSL32. I match them by pairs and I match

resistances R24 and R16 so that when sweeping the FREQ button it sweeps the filter from 0Hz to about 5kHz. If when FREQ is at 0 you still have some sound, R24 should be lowered Or if you want to raise the minimum cut off frequency, R24 should be raised. But depending on the NSLs, +/-10k can be dramatic. Also notice that high values of SENS will raise FREQ's minimum cut off frequency.

Trimming the expression pedal range.

The 2k resistance at Exp jack Ring leg sets the expression pedal range. If you feel it's going to far, replace it for the spare 4,7k. If you feel it's too short, change it for the 1k. Or you can also remove the resistance if you want the range to go up to the maximum range that the FREQ button can reach. You may try different values for this resistance.

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 TL074 socket, remove the DC power immediately. Check the temperature of the ICL7660s.

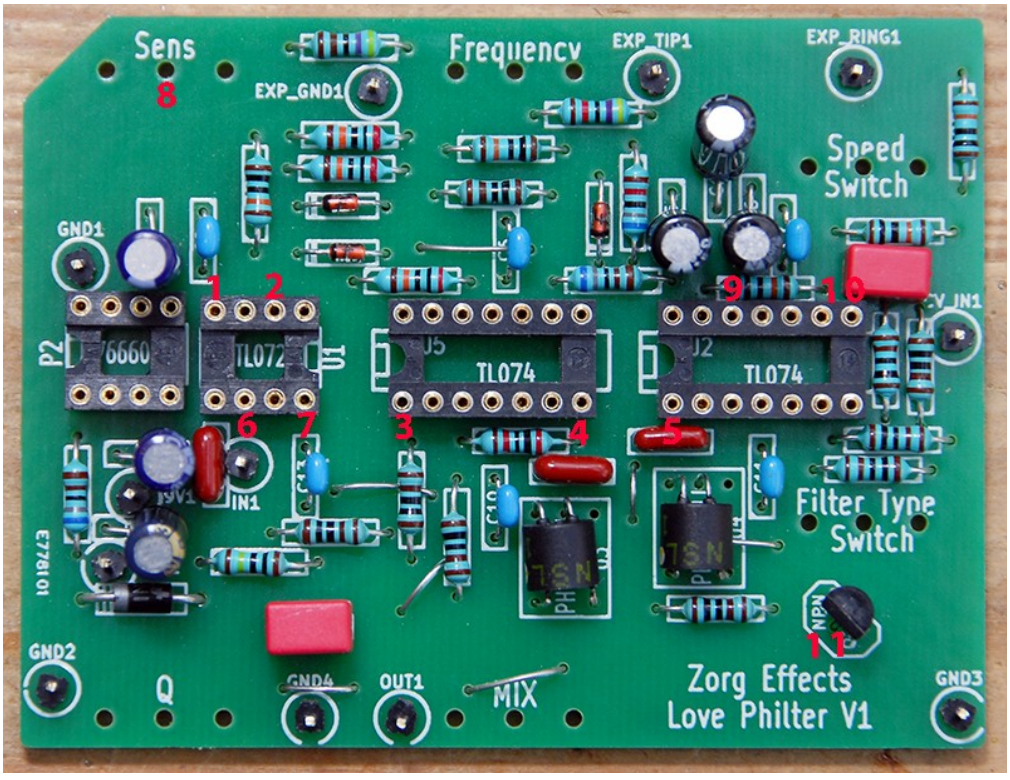
- If it's hot, check the IC and electrolytic caps directions.
- If it's cold, check that you've around -9v on pin 5 of the ICL7660, if not, it's likely to be dead. If there's between -7v and -9v it's ok. If there's between -2v and -7v it's strange, check that all components are at their right place and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

No or poor audio?

BEWARE: the frequency pot can cut **everything**. Set it at 50% before anything else.

You'll need an oscilloscope and a frequency generator. Send a 400Hz sin wave in the pedal input.

We're going to check first that the voltage generated by the envelope follower stage and the expression pedal are ok. Check the following test points from the image below:



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.

8- Check for your sin wave here when Sensitivity is at 100%. If no signal, check your solders.

9- As you change the amplitude of your input signal, a negative continuous tension shall be seen here changing from 0v to -9v (But -5v max more than is sufficient). Setting the filter speed to fast/middle/slow should change the speed at which the continuous tension tracks the input voltages changes.

No continuous voltage change here? Check your diodes and caps directions. Your TL074 might also be dead.

10- Remove the input signal and plug in your expression pedal. If you push it up and down you should see a continuous negative tension (0 to -5v) tracking the pedal movement.

No continuous voltage change here? Check your wirings on the exp jack.

Then if these previous test points are ok, check the tests points below for the sin wave. They are in order of signal flow:

3,4,5- Output of the high pass, band pass, low pass filters. If there is no signal at this location there is a trouble with your filter, check your solders. Check resistances values on the NSLs, if they're very high (Like around or more than 500k) and you have a tension on their led side, they're likely to be dead.

6- Input of the output stage. No signal here? Check your filter type switch solders.

7- Output of the output stage. No signal at that location means your TL074 may be dead.

Still no signal? Have you checked you Mix pot solders?

Hacks!!!

Well there's on cool hack you can do: on pin 7 of U5 is an output of a bandpass filter. So you can try to route it to the output stage too... I let you search how to do that with some more switches...

You can also try to add more than one CV input...

Or change the speed caps (C14,C15,C16) values, bigger values = slower envelope following.

