OPPRESSOR MOUNTING INSTRUCTIONS.

Zorg Effects

Summary

Important notice.	2
What's in the kit?	3
What you'll need.	4
Soldering on the pcb.	4
Wiring the pedal.	12
Test the board.	13
Debugging chapter.	14
Hacks!!!	15

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

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 information: TODO

  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 information 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.

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

What's in the kit?

This is all you must find in your Oppressor kit:

Q1 Q4 Q5	Transistor BC550	3
R4 R11 + spare	Resistor 100	4
R2+ spare	Resistor 200	2
spare	Resistor 560	1
R1 R8 R10 R13 R14 R18 R27 + spare	Resistor 1k	8
R33	Resistor 1.5k	1
R38	Resistor 2k	1
R5 R12 R26 R34	Resistor 20k	4
R35	Resistor 27k	1
R3 TRIM1 TRIM2	Resistor 100k	3
R17 R36	Resistor 150k	2
R15 R16	Resistor 200k	2
R6 R7 R9	Resistor 1M	3
RV1	Potentiometer A100k log	1
THRESHOLD1	Potentiometer B1M lin	1
U4	Optocoupler VTL5C1	1
Led red bright		1
Led red		1
Led sockets		2
Footswitch 3PDT		1
Enclosure + Wooden plate		1
PCB		1
JACKS 6,35mm		2
Jack DC		1
Red knobs		3
Wire, heat shrink tube, window insulator		x

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

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

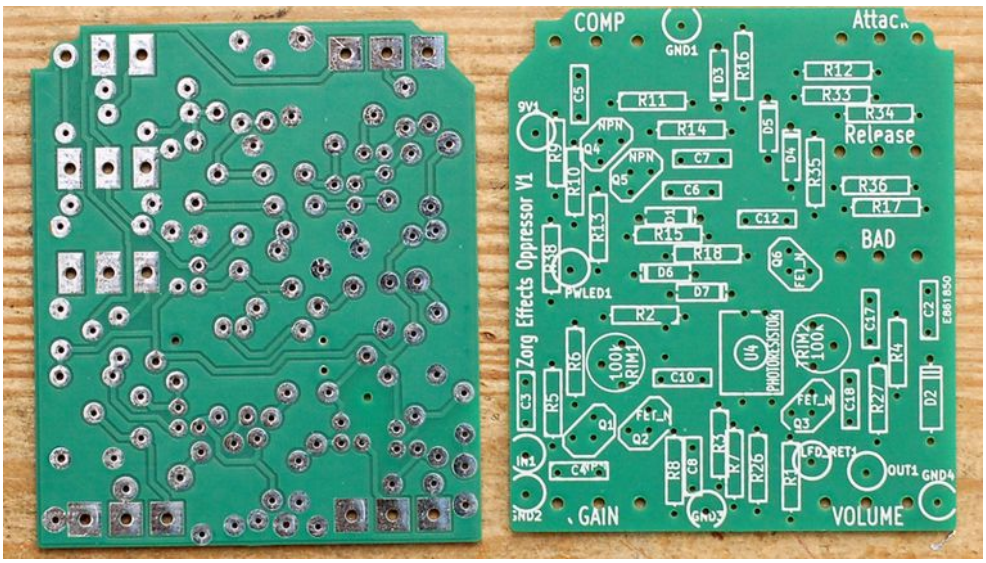
What you'll need.

The following tools are needed to build your Oppressor 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.

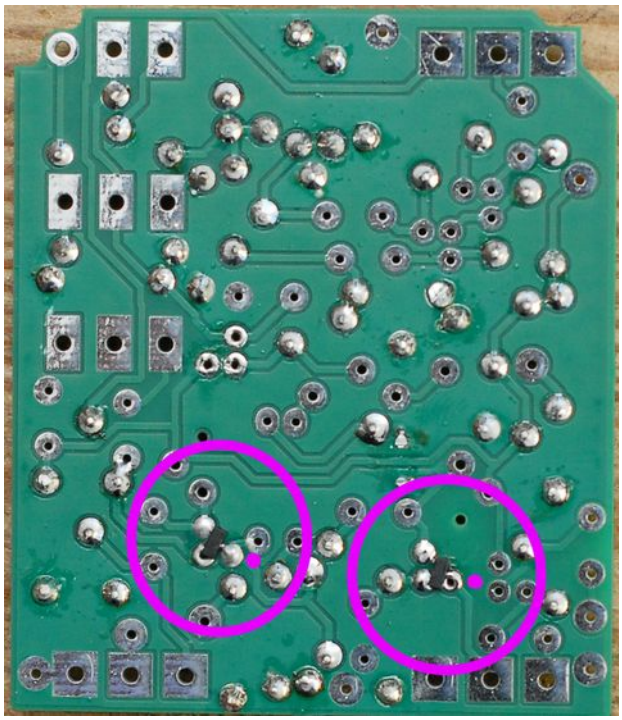
Soldering on the pcb.

This is the PCB (Top/Bottom):

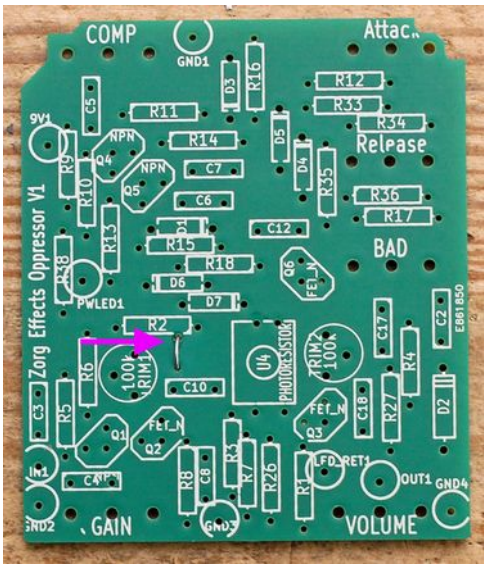


Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

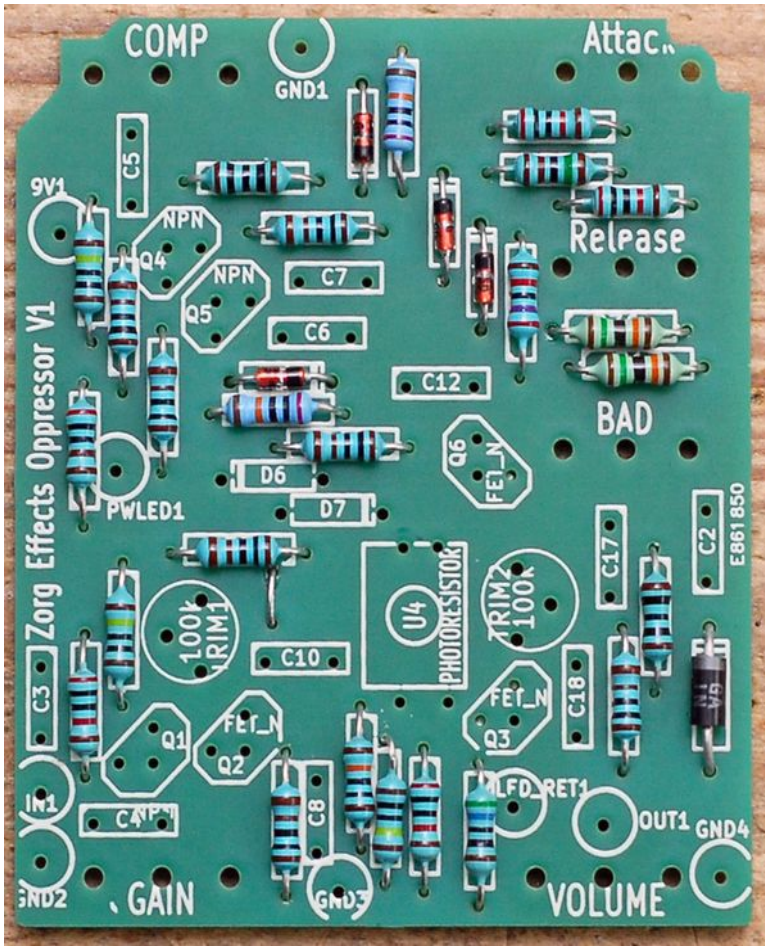
On copper side, begin by soldering the 3 J201 CMS transistors. Beware of their directions, they must be like on the picture below. The purple dot shows the pad where the transistor's grid must be soldered. The grid being the single leg on the rectangle's side. Because of the transistor's size, one must use a precise soldering iron. Be careful that the solders do not overlap eahc others. Test with your multi-meter if needed.



Flip the board and solder the jumper by using resistance's legs.



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 :

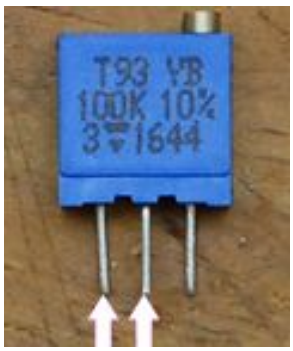


Please note that D6 and D7 are not on this photo. In fact you can put D6, but D7 will be added later.

Also R1 and R2 don’t have the values mentioned in the tab page 3. An explanation is given in the chapter “testing the board”.

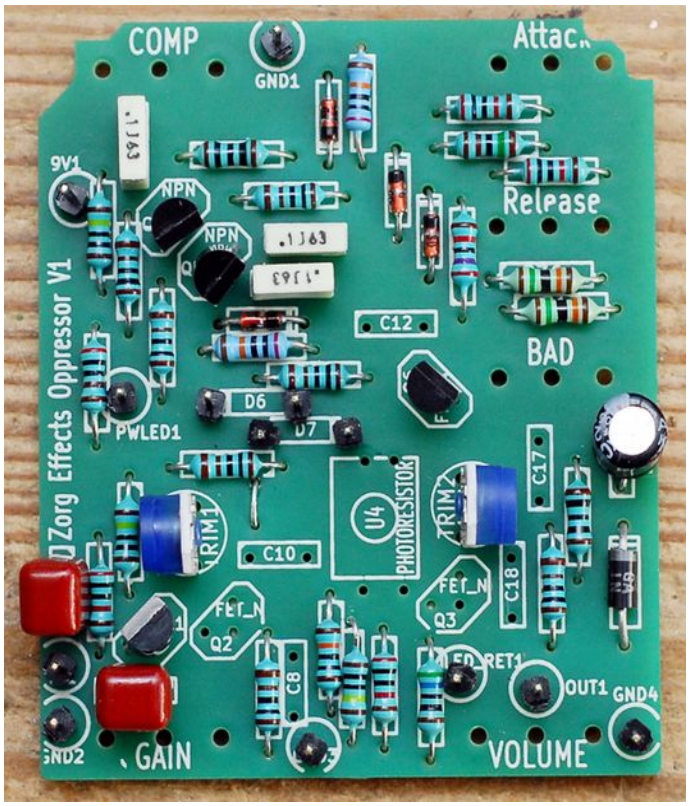
Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

Before soldering the trimpots, we'll pre-bias them, as when the pots will be put we'll no longer have access to their legs. **It is mandatory if you don't have an oscilloscope**. For this, just turn the screw to get a 15k resistance between the legs shown on this picture:



And then solder by size :

- The panasonic caps C3 and C4
- white 100nF caps
- Transistors Q4, Q5 and Q6, beware of their directions!
- Cut the SIL connector to make terminals used for GND1,2,3, IN1 etc… **Use two of them in place of D7. Then solder D7 across them.** Be careful of its direction (see picture page 8)
- The trimpots



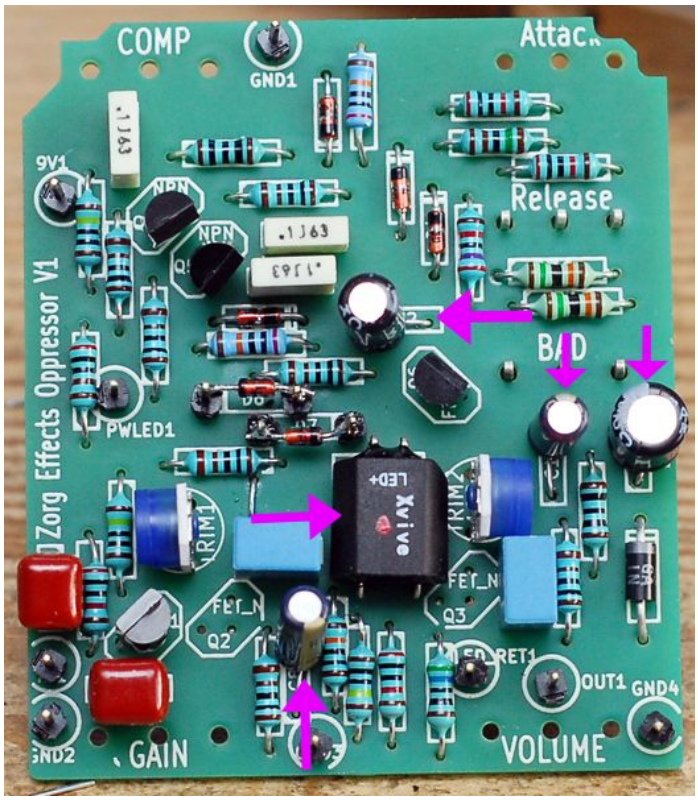
Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

Add the optocoupler. Be careful of its direction (See below), the "led+" text must be on top with the "+" on the left.

We now can add the blues and 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.

You can put or not the C8 cap, refer to chapter "hacks!!!" at the end of this document to make your choice.

Also notice how to solder D7.



Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

Now flip the board. We're going to solder the switch and pots on the other side.

Soldering the SPDT switches can be a bit boring.

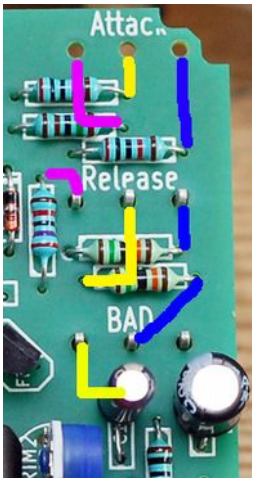
First, if you push them all the way, they won't be slightly lower than the pots and you'll need to level them with the remaining washer after having flattened its little lug, otherwise you might snatch the switch from the board when screwing it to the enclosure. But if you push it on all the way you'll need a fine soldering iron to solder it… Or you can let a bit of space between the board and the switch.

Whatever your choice is, solder one leg of the "bad" and "release" switch. See if the card fits in the enclosure, because the switch can be leaning a little bit. If it's the case unsolder the leg a put the switch back right. When both switches are in their best position, solder their others two legs and do the same with the Attack switch.

Then just after soldering, you must test that your switche's solders are ok. **This stage is really important: 99% of your problems will come from a badly soldered switch!!!**

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

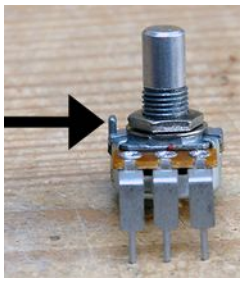
To do so, use your ohmmeter and check that the following path are not opened:



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).

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

Now add the card in the enclosure. Screw the switches (there's no screw for "bad"). Add the wooden plate and screw the bypass led's socket to hold it.

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

Wiring the pedal.

So there you go with the card in the box.

Now you can screw the audio jacks, led socket, leds, footswitches and DC jack. The bright, transparent, led goes on the right **in** the box. It'll be the compression visualization led, the standard red led is the bypass led. We're going to wire it like this:

Here's a list of the wirings:

9v1 goes +9v of DC jack (long leg if you wish to wire it center negative)

Gnd1 (top right of 9v1) goes to gnd of the DC jack (short leg if you wish to wire it center negative)

GND4 and GND2 go to audio jacks grounds.

PWLED1 goes on the positive leg of the bypass LED (longest leg).

If we number the legs of the footswitch :

1 2 3

4 5 6

7 8 9

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

Then :

4 Is connected to GND3

5 Is connected to intput jack

6 Is connected to output jack

8 and 9 are soldered together.

1 Is connected to the ground of the bypass led (shortest leg)

2 Is connected to IN1 on the board

3 Is connected to OUT1 on the board

7 is connected to 2

LED_RET1 is connected to the ground of the bright compression led (shortest leg)

The positive leg of the compression led should be soldered to the right leg of D7. But be careful, when the pedal is plugged with no signal in input (guitar in input with volume pot at 0 and amp in the output) and "comp" at 0, it should be very very slightly lightening. If it's not the case, try to solder it to the left leg of D7. This is in order two have the best precision of lightening of the led.

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: Bias the JFETs.

Part of this step has been made on page 7. If you don't have an oscilloscope and didn't do the pre-bias written page 7, you're doomed: trimpots should be unsoldered, pre-biased to 15k and soldered back...

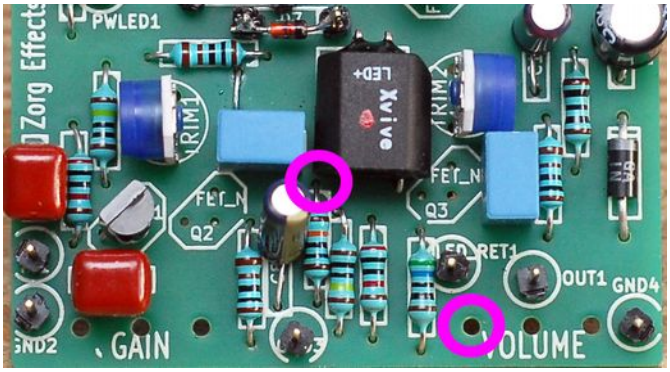
After that, if you don't have an oscilloscope:

You can first make a simple finely tuned bias by feeding sound through your pedal. Then turns both trimpots to maximize volume out of the pedal. It's as simple as that.

With an oscilloscope and a frequency generator, plug in your frequency generator at the Oppressor input and send a 1kHz sine.

Then, with your oscilloscope probe, check for the signal on the R3 resistance test point (see picture below). And rotate the trimpot to get the maximum of gain from this stage.

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.



Then set the gain pot a bit upper that the minimum and do the same for the volume pot test point (see picture above). Then for each stage, level the gain or your input signal so that you can work with a very slightly saturated signal and trim the pots for the best gain.

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.

Step 3: we're going to set the compression response. When get to this point your Oppressor should be working almost perfectly. But it's using 2 components with larges tolerances values on them: the J107 and the VTL5C1. It might be possible that when playing the compressor you'll find the compression too strong, or not strong enough.

I consider the Oppressor is perfectly setup when with fast attack and release and comp knob at ¾, it pumps violently the signal when attacking notes, allowing for snappy country music style attacks.

So that's why there's so much spare resistors. If you feel the compression is too weak, add a 200 or 100 ohm in parallel of R2. If it's too strong, change R2 fo 560 or 1kOhm or combinations of 200+100 or 560+100…

Also if you feel the comp led is blinking too much or not enough, you can do the same with R1.

If you made everything fine, the Oppressor 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 1 of tests chapter you don't have 9v voltages on the DC plug check:

- That your DC power unit is working.
- That the connections between the plug and the board are ok.
- The directions of your diodes and caps.
- Check you soldering. Big solderings can overlay others tracks, that's bad.

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.

Poor audio?

If you didn't make the bias with the oscilloscope, do it. If you did, check that your J201 are not counterfeits (It happens...).

Hacks!!!

Sure you can also try some other JFETs than J201. But six others fun mods can be done:

- More gain: put the C8 cap. (I never put it, it's already a lot without). Beware: noise level will increase.
- Less gain: don't put C8.
- Change the ratio: Change R26. The ration is given by Ratio=(R3+R26)/R26. With 20k we've got a ratio of 6. With 100kOhms a ratio of 2. 33kOhms give a ratio of about 4 and 15kOhms a ratio of almost 8. You can even put a jumper for swell effects… Or a rotating switch, if you've got an enclosure with room for it.
- Change the attack speeds: Change R12, R33 and R34 for greater values for slower attack, or smaller values for faster attack. Just note that we've the following values:
  - Fast: Req=R12//R33 = 1,4kOhm. Speed = Req x C12 = 1,4ms
  - Medium: Req=R12//R34 = 10kOhm. Speed = 10ms
  - Slow: Req=R12 = 20kOhm. Speed = 20ms

  I don't think it's worth going lower than 1ms.

  If you have enough room in your enclosure you can aslo put a 25kOhm pot instead of R12 and remove R33 and R34.
- Change the release speeds: Change R17, R35 and R36 for greater values for slower release, or smaller values for faster release. Just note that we've the following values:
  - Fast: Req=R17//R35 = 22,9kOhm. Speed = Req x C17 = 22,9ms
  - Medium: Req=R17//R36 = 75kOhm. Speed = 75ms
  - Slow: Req=R17 = 150kOhm. Speed = 150ms

  I don't think it's worth going lower than 10ms.

  If you have enough room in your enclosure you can aslo put a 250kOhm pot instead of R17 and remove R36 and R35.
- Change the optocoupler for different compression response. You'll need to re-adapt R2 to it.

Copyright Zorg Effects G.Denneulin December 2016 – For non commercial use only.