Cabulator

Building instructions

v1.0

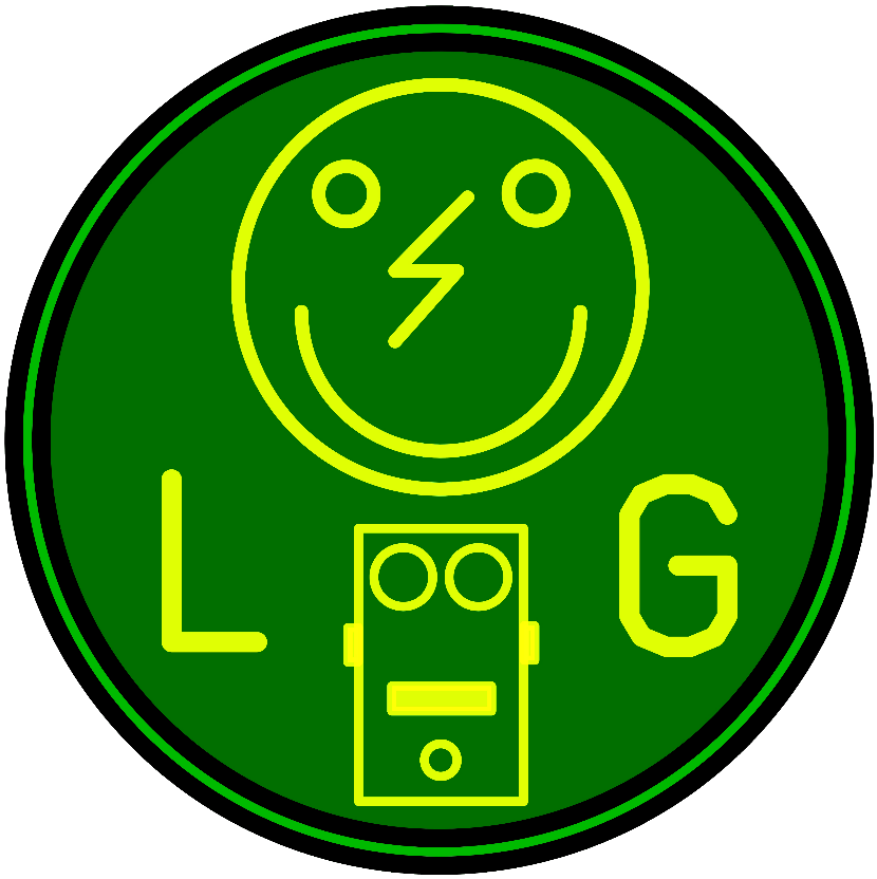
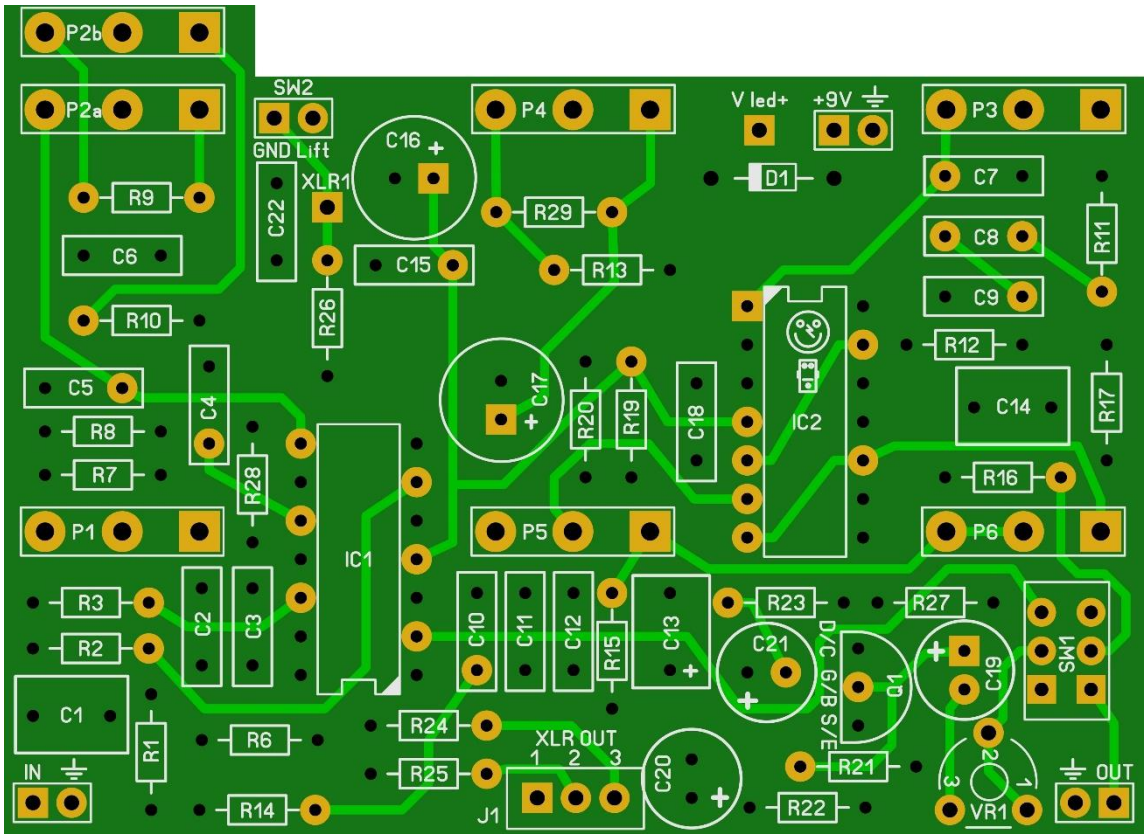


Table of contents

Read this entire manual thoroughly before you start building the effect! There are a lot of available mods and you should choose which one you want to incorporate before starting your build.

Last update: 18-02-2019

PCB layout



Dimensions: **75 mm x 54,6 mm**
2.95 inch x 2.15 inch

Components

Name	Value	Comment	Name	Value	Comment
C1	470n	SMF/MKT/Wima	**Q1**	2N2222A	
C2	100n	SMF/MKT/Wima	**R1**	1M	1% metalfilm
C3	100n	SMF/MKT/Wima	**R2**	1M	1% metalfilm
C4	470p	MLCC	**R3**	10k	1% metalfilm
C5	4n7	SMF/MKT/Wima	**R6**	1k	1% metalfilm
C6	8n2	SMF/MKT/Wima	**R7**	22k	1% metalfilm
C7	10n	SMF/MKT/Wima	**R8**	10k	1% metalfilm
C8	47n	SMF/MKT/Wima	**R9**	4k7	1% metalfilm
C9	47n	SMF/MKT/Wima	**R10**	10k	1% metalfilm
C10	5n6	SMF/MKT/Wima	**R11**	1k	1% metalfilm
C11	18n	SMF/MKT/Wima	**R12**	4k7	1% metalfilm
C12	3n3	SMF/MKT/Wima	**R13**	100k	1% metalfilm
C13	470n	SMF/MKT/Wima	**R14**	15k	1% metalfilm
C14	470n	SMF/MKT/Wima	**R15**	10k	1% metalfilm
C15	100n	SMF/MKT/Wima	**R16**	10k	1% metalfilm
C16	100u	Electrolytic 16V+	**R17**	100k	1% metalfilm
C17	47u	Electrolytic 16V+	**R19**	10k	1% metalfilm
C18	1n	SMF/MKT/Wima	**R20**	10k	1% metalfilm
C19	10u	Electrolytic 16V+	**R21**	10k	1% metalfilm
C20	1u	Electrolytic 16V+	**R22**	10k	1% metalfilm
C21	1u	Electrolytic 16V+	**R23**	10k	1% metalfilm
C22	100n	SMF/MKT/Wima	**R24**	1M	1% metalfilm
IC1	TL074CN		**R25**	1M	1% metalfilm
IC2	TL074CN		**R26**	10R	1% metalfilm
J1	XLR Out	Male Chassis	**R27**	10k	1% metalfilm
P1	B100k	Mid Response	**R28***	jumper	1% metalfilm
P2a	B100k	Resonance	**R29***	NC	1% metalfilm
P2b*	NC	Jumper 2-3	**SW1**	DP3T (on-on-on)	Output select
P3	B100k	High Response	**SW2**	SPDT	Ground lift
P4	A500k	Cabsize	**VR1**	B200k	XLR pad
P5	B100k	Punch			
P6	A100k	Gain	**D1**	1N5817	

* Optional parts (see modifications section)

All parts need to be 16V+ rated

A=Log, B=Lin, C=Rev. Log

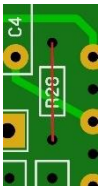
Build sequence

Soldering this board can be very complicated for some people since the solder pads are very close together. Use a magnifying glass to make the job easier.

The trick to soldering a PCB is to work from small to big components. My building sequence suggestions in this section are based on the parts I used myself. Sometimes some components are smaller (or bigger) so always use your own common sense and change the order accordingly. Usually capacitors can differ a lot in size depending on their rating and value.

Note: Do not blow on your solder in an attempt to cool it down. That can result in a bad join that might corrode! Also take extra care not to short components.

Start by soldering the jumpers (if needed) and resistors. If you are building the default configuration (as mentioned in the component section on p4) you will need to place a jumper for **R28** and between pad 2 and 3 (the round pads, not the square pad!) of **P2b.** You can create a jumper using a spare piece of lead from a resistor or diode. Next comes the diode.



If you want to experiment with another transistor for Q1 then you could socket it instead of soldering it to the board. You'll need a some 20 SIL sockets, break off the sockets and solder them to the board. Now is the time to solder the sockets for the ICs. Place the transistor and ICs not before you are finished with all soldering and off board wiring!

Now continue by soldering the SMF and MKT capacitors then solder the internal trimpot (**VR1**). Finish with soldering the transistor (if not socketed) and the Electrolytics. Note that the orientation of the transistor (2N2222A) on the PCB is 180 degrees reversed!

I suggest you now drill the holes in your enclosure so you can use it during the off board wiring and to correctly fit the pots to the backside of the PCB.

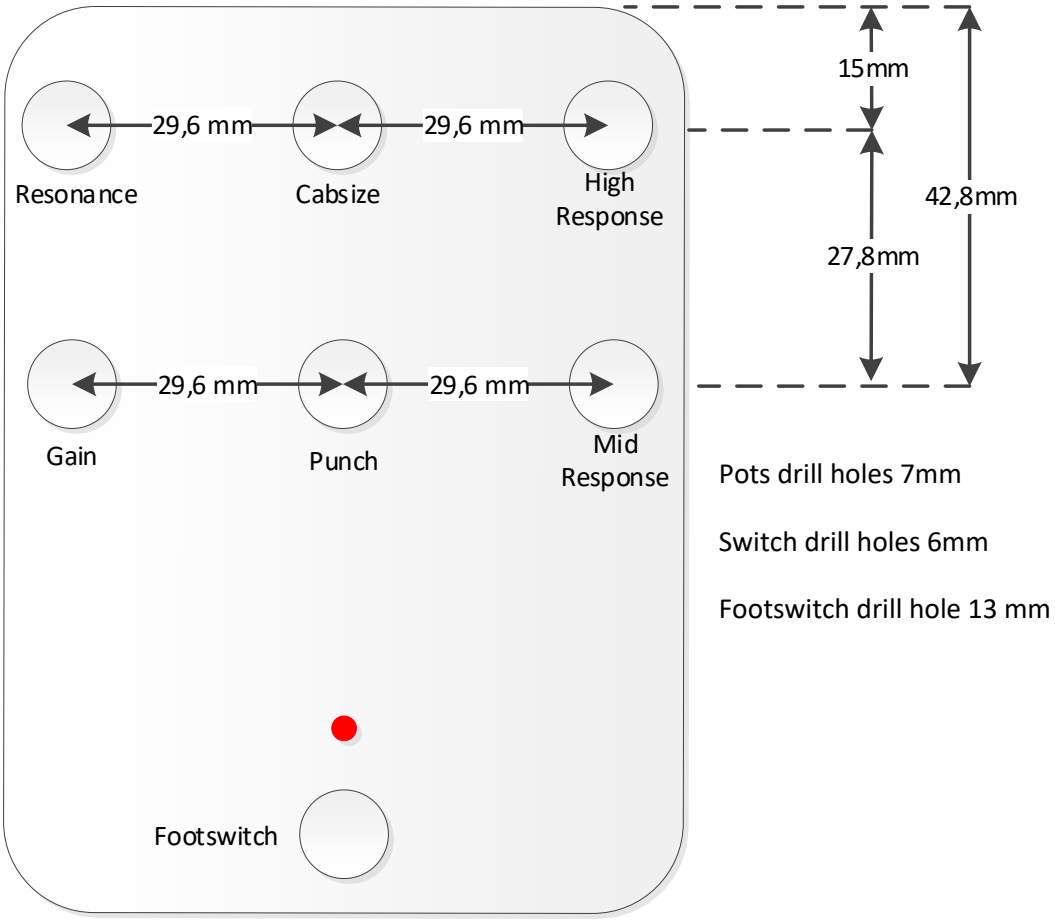
Note: Really take some time to determine where to place the pots, switches, jacks and PCB in the enclosure before you start drilling. **Measure twice, drill once**.

You are almost ready to rock, well… not really. The difficult part starts now.

Besides the components mentioned in the components table, you will need:

- **1 mono input jack, 1 stereo output jack**.
- **3PDT footswitch** (9 pins)
- **2,1mm DC jack** (isolated).
- **22 gage stranded hook-up wire.**
- **LED holder.** This enables you to mount the LEDs in the enclosure.
- **LED (3mm or 5mm depending on your taste).** This will be the status LEDs
- **Hammond 1590BB** case (or similar) in your favorite color. This case will fit tightly and leaves no room for error! If you need more room you could consider using a **Hammond 1590XX**.

Drill template

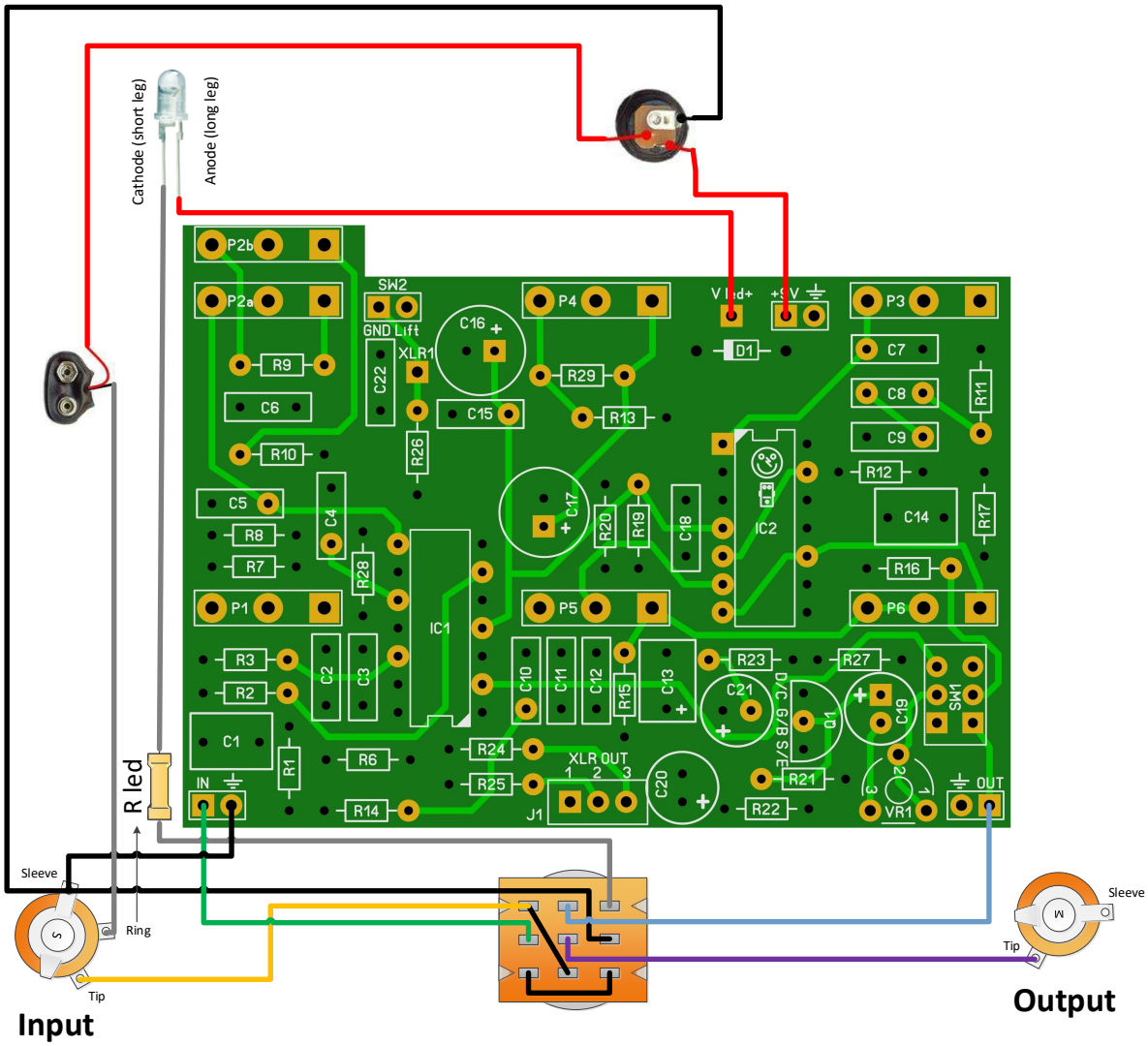


After drilling the holes, insert the potentiometers in the enclosure and then insert them in the back of the PCB.

You can break off the pin I marked with the yellow circle with a small pair of pliers. The rectangle pad marks the pad for **pin 1**.

If all fits well you can solder the potentiometers to the board.

Off board wiring



R led is a **3k3/4k7** resistors. You can change the value depending on the type of LED you use but 4k7 is safe enough for almost all LEDs @9V.

Note that the diagram is using star wiring for the ground connection. This requires that the output jack makes very good contact to the enclosure! If this is not possible, you can connect a wire to the sleeve of the output jack and the sleeve of the input jack.

VR1 (XLR Padding) is by default a PCB mounted potentiometer as it is mostly used as set and forget. If you want to, you can make it and externally controllable potentiometer using a **16mm Alpha pot B250k**, The pins configuration is marked on the PCB and correspond to the pinout as shown on the potentiometer on the previous page.

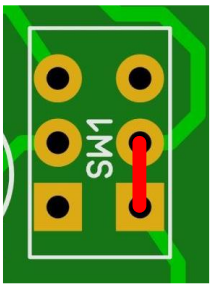
Switches

SW1

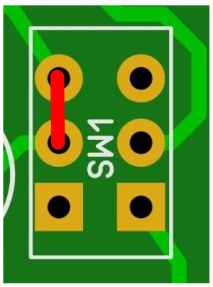
SW1 determines the output of the PCB. You can choose to attach a switch or to hardwire it. If you attach a DP3T on-Z-on switch, you can choose between normal out via the output jack, output via both XLR and normal out and XLR out only.

Hardwired

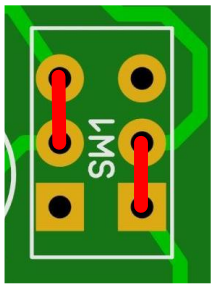
Normal out



XLR out

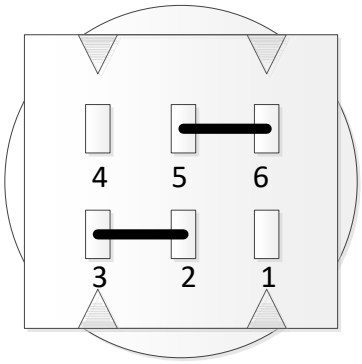


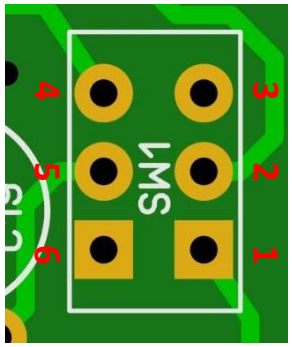
Normal and XLR out

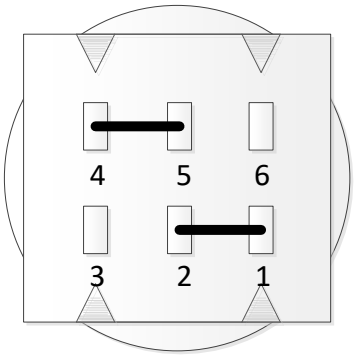


DP3T switch

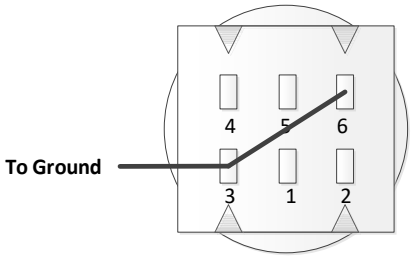
When you are using a DP3T on-Z-on, you must test which pins are connected in the middle position. There are 2 types of switches which are shown below in the middle position:







Find out which one you have and wire accordingly. To prevent a floating output, I would advise to reverse pin 1 and 2 (either on the PCB or on the switch). Also connect pin 3 and 6 on the switch to ground. This way you ground the effect output and/or XLR output when it is not in use. You could use the spare ground next to the output on the PCB. It will look like this:



XLR Out and SW2

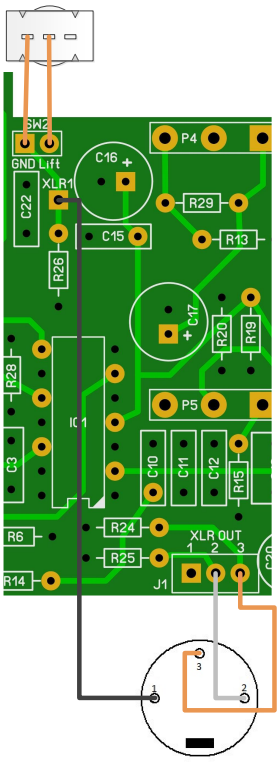
You can use the XLR out with or without a ground lift switch (**SW2**).

If you do not want to use the ground lift then you can leave out **C22** and **R26**.

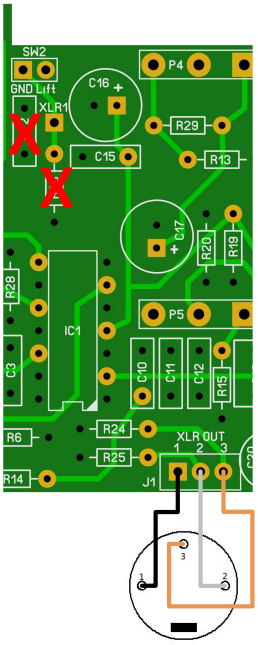
Turning VR1 will pad the output of the XLR if it is too loud.

The XLR chassis is shown upside down and looking at it from the rear.

Ground lift



No ground lift



Modifications

The PCB was designed to enable you to make several different mods. There were a lot of experiments with making the effect sound even better, mainly by Bajaman. All these versions have their good sides so you can build any of them by using only this single board. The only thing you will have to do is choose. I personally like the optimized version the best.

The components section on page 4 reflects the traced original. The following paragraphs reflect the modded version of the original followed by an optimized version.

Modded version

Name	Value	Comment	Name	Value	Comment
C1	470n	SMF/MKT/Wima	**Q1**	2N2222A	
C2	100n	SMF/MKT/Wima	**R1**	1M	1% metalfilm
C3	100n	SMF/MKT/Wima	**R2**	1M	1% metalfilm
C4	470p	MLCC/Ceramic	**R3**	10k	1% metalfilm
C5	4n7	SMF/MKT/Wima	**R6**	1k	1% metalfilm
C6	8n2	SMF/MKT/Wima	**R7**	22k	1% metalfilm
C7	4n7	SMF/MKT/Wima	**R8**	10k	1% metalfilm
C8	47n	SMF/MKT/Wima	**R9**	10k	1% metalfilm
C9	47n	SMF/MKT/Wima	**R10**	10k	1% metalfilm
C10	4n7	SMF/MKT/Wima	**R11**	470R	1% metalfilm
C11	4n7	SMF/MKT/Wima	**R12**	4k7	1% metalfilm
C12	680p	MLCC/Ceramic	**R13**	100k	1% metalfilm
C13	470n	SMF/MKT/Wima	**R14**	18k	1% metalfilm
C14	470n	SMF/MKT/Wima	**R15**	39k	1% metalfilm
C15	100n	SMF/MKT/Wima	**R16**	10k	1% metalfilm
C16	100u	Electrolytic 16V+	**R17**	100k	1% metalfilm
C17	47u	Electrolytic 16V+	**R19**	10k	1% metalfilm
C18	1n	SMF/MKT/Wima	**R20**	10k	1% metalfilm
C19	10u	Electrolytic 16V+	**R21**	10k	1% metalfilm
C20	1u	Electrolytic 16V+	**R22**	10k	1% metalfilm
C21	1u	Electrolytic 16V+	**R23**	10k	1% metalfilm
C22	100n	SMF/MKT/Wima	**R24**	1M	1% metalfilm
IC1	TL074CN		**R25**	1M	1% metalfilm
IC2	TL074CN		**R26**	10R	1% metalfilm
J1	XLR Out	Male Chassis	**R27**	10k	1% metalfilm
P1	A10k	Mid Response	**R28**	1k5	1% metalfilm
P2a	B100k	Resonance	**R29**	2M2	1% metalfilm
P2b	NC	Jumper 2-3	**SW1**	DP3T (on-on-on)	Output select
P3	B100k	High Response	**SW2**	SPDT	Ground lift
P4	A500k	Cabsize	**VR1**	B200k	XLR pad
P5	B100k	Punch			
P6	A100k	Gain	**D1**	1N5817	

Optimized version

Name	Value	Comment	Name	Value	Comment
C1	470n	SMF/MKT/Wima	**Q1**	2N2222A	
C2	120n	SMF/MKT/Wima	**R1**	1M	1% metalfilm
C3	120n	SMF/MKT/Wima	**R2**	1M	1% metalfilm
C4	4n7	SMF/MKT/Wima	**R3**	10k	1% metalfilm
C5	47n	SMF/MKT/Wima	**R6**	1k	1% metalfilm
C6	39n	SMF/MKT/Wima	**R7**	2k2	1% metalfilm
C7	68n	SMF/MKT/Wima	**R8**	1k	1% metalfilm
C8	330n	SMF/MKT/Wima	**R9**	1k	1% metalfilm
C9	330n	SMF/MKT/Wima	**R10**	1k	1% metalfilm
C10	39n	SMF/MKT/Wima	**R11**	jumper	1% metalfilm
C11	39n	SMF/MKT/Wima	**R12**	470R	1% metalfilm
C12	22n	SMF/MKT/Wima	**R13**	22k	1% metalfilm
C13	4u7	Electrolytic 16V+	**R14**	1k8	1% metalfilm
C14	470n	SMF/MKT/Wima	**R15**	3k9	1% metalfilm
C15	100n	SMF/MKT/Wima	**R16**	10k	1% metalfilm
C16	100u	Electrolytic 16V+	**R17**	100k	1% metalfilm
C17	47u	Electrolytic 16V+	**R19**	10k	1% metalfilm
C18	3n3	SMF/MKT/Wima	**R20**	10k	1% metalfilm
C19	10u	Electrolytic 16V+	**R21**	10k	1% metalfilm
C20	1u	Electrolytic 16V+	**R22**	10k	1% metalfilm
C21	1u	Electrolytic 16V+	**R23**	10k	1% metalfilm
C22	100n	SMF/MKT/Wima	**R24**	1M	1% metalfilm
IC1	TL074CN		**R25**	1M	1% metalfilm
IC2	TL074CN		**R26**	10R	1% metalfilm
J1	XLR Out	Male Chassis	**R27**	10k	1% metalfilm
P1	A10k	Mid Response	**R28**	470R	1% metalfilm
P2a*	B10k	Resonance	**R29**	NC	1% metalfilm
P2b*	B10k	Resonance	**SW1**	DP3T (on-on-on)	Output select
P3	B10k	High Response	**SW2**	SPDT	Ground lift
P4	A50k	Cabsize	**VR1**	B200k	XLR pad
P5	B10k	Punch			
P6	A10k	Gain	**D1**	1N5817	

*** P2a/b are formed by a single stereo B10k potentiometer**

Troubleshooting

All PCB's have been 100% factory e-tested and out of every batch I receive I build an effect to double check, so there should not be a connection problem on the PCB itself.

The board is not working (at all), what now?

- Check if your 9V is plugged in correctly (and/or soldered correctly on the board). Pay special attention to the polarity.
- Check that you oriented the capacitors, IC's ,transistors and diodes the right way. SMF, MKT and ceramic capacitors as well as resistors do not need to be oriented. A likely sign of incorrect capacitors and/or orientation is when an effect is sputtering, rumbling or "motorboating".
- Check if you used the correct values of the components. For resistors you can look here: http://www.diyaudioandvideo.com/Electronics/Color/
- Double and triple check your soldering! A loose or cold solder can be really bad for your board.
- Replace the IC and/or transistors, one might be defective. Before doing that first unplug the 9V and wait for 5 seconds.
- Check that you have good/high grade components. A lot of Chinese sourced parts are fakes (especially high end opamps, audio capacitors, vintage diodes and transistors) so be careful that you source your parts from reliable suppliers.

Schematics