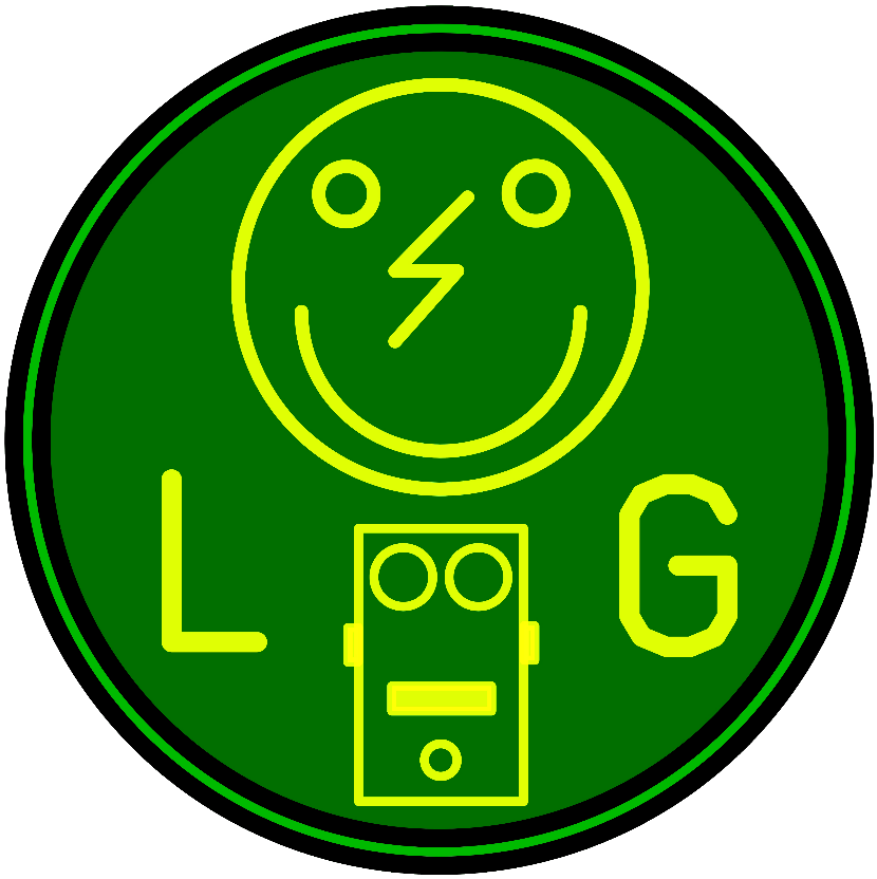
SnoWahFlake

Building instructions

V2.0



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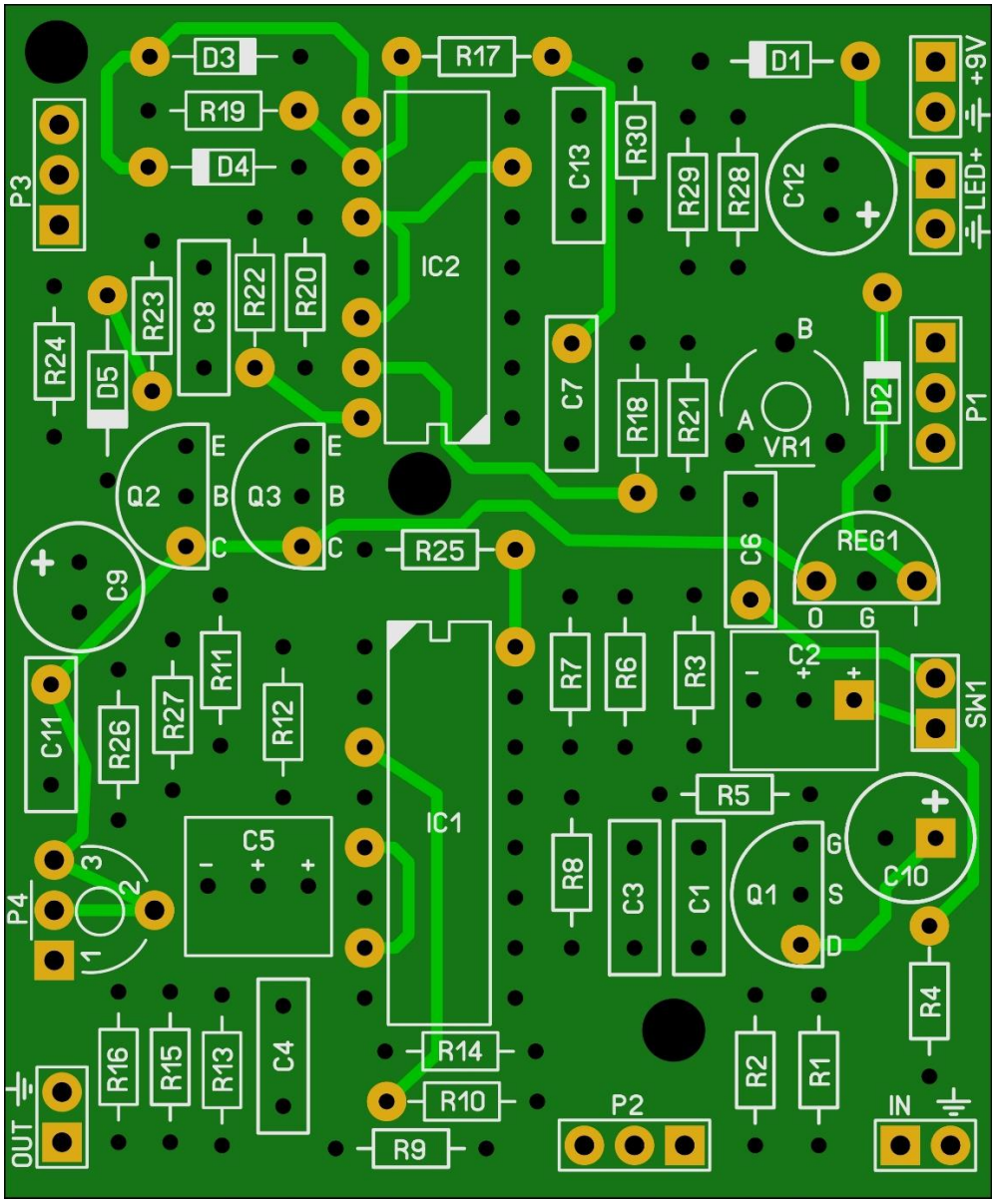
Read this entire manual thoroughly before you start building the effect! There are some available options and mods and you should choose which one you want to incorporate before starting your build.

Last update: 23-10-2017

PCB layout



Dimensions: 50 mm x 60,5 mm
1.97 inch x 2.38 inch

Components

Name	Value	Comment	Name	Value	Comment
C1	22n	SMF	**R1**	10k	1% metalfilm
C2	1u	SMF	**R2**	1M	1% metalfilm
C3	22n	SMF	**R3**	1M	1% metalfilm
C4	22n	SMF	**R4**	10k	1% metalfilm
C5	1u	SMF	**R5**	5K1	1% metalfilm
C6	220n	SMF	**R6**	330R	1% metalfilm
C7	68n	SMF	**R7**	330R	1% metalfilm
C8	8n2	SMF	**R8**	6k8	1% metalfilm
C9	1u	Electrolyte	**R9**	4k7	1% metalfilm
C10	100u	Electrolyte	**R10**	6k8	1% metalfilm
C11	100n	MKT	**R11**	330R	1% metalfilm
C12	47u	Electrolyte	**R12**	330R	1% metalfilm
C13	100n	MKT	**R13**	4k7	1% metalfilm
D1	1N5817		**R14**	6k8	1% metalfilm
D2	1N4001		**R15**	1k	1% metalfilm
D3	1N4148		**R16**	100k	1% metalfilm
D4	1N4148		**R17**	22k	1% metalfilm
D5	1N34A		**R18**	22k	1% metalfilm
IC1	LM13700		**R19**	22k	1% metalfilm
IC2	TL074		**R20**	10k	1% metalfilm
P1	B100k	Sensitivity	**R21**	4M7	1% metalfilm
P2	B50k	Resonance	**R22**	4M7	1% metalfilm
P3	C1M	Decay	**R23**	330R	1% metalfilm
P4	B50k	Bias	**R24**	4k7	1% metalfilm
VR1	B50k	Sensitivity Offset	**R25**	6k8	1% metalfilm
Q1	2N5457		**R26**	4k3	1% metalfilm
Q2	BC550C		**R27**	3k6	1% metalfilm
Q3	BC550C		**R28**	100R	1% metalfilm
REG1	LM78L05		**R29**	47k	1% metalfilm
SW1	Switching jack	Sidechain	**R30**	47k	1% metalfilm

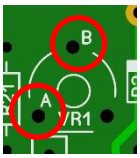
A=Log, B=Lin, C=Rev. Log

Modifications

There are different ways to build this effect. The components list above is based on the modded version of the original.

	Original	Optimized	Modded
VR1*	20k	22k	50k*
R17	20k	22k	22k
R18	20k	22k	22k
R19	10k	22k	22k
D5	1N4148	1N34A	1N34A
C9	2u2	1u	1u
C12	x	x	47u
SW1	jumper	jumper	Switching jack
IC2	LM324	TL074	TL074
Q2**	BC550C	MPSA18	MPSA18
Q3**	BC550C	MPSA18	MPSA18

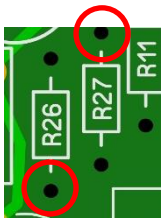
* VR1 uses only in the modded version a trimpot. In the other versions you can use a fixed resistor and place it between pad **A** and **B** of **VR1**.



** The MPSA18 has a different pinout than the BC550C. It needs to be rotated 180°.

You can of course incorporate SW1 for side chaining in any of the versions and feel free to experiment with mixing the optimizations and mods. You can also choose to not incorporate side chaining in the fully modded version by soldering a jumper wire in the SW1 pad

Because there is no 7k9 resistor in exsistance, I chose to split it in 2 resistors (**R26**=3k6, **R27**=4k3). But as the resitor value is not that important because the BIAS (**P4**) can compensate for it, you could choose to use a 7k5 or 8k2 and compensate by turning the Bias pot a bit more up or down. To do so, insert the 7k5/8k2 in the bottom pad of R26 and the top pad of R27



P4 (BIAS) is made to fit either an internal 6mm trimpot or to be used with a regular external 16mm trimpot as in the original. A lot of people just use it as “set and forget” and if you are one of them then install the internal trimpot. If you prefer to set it in realtime during play, then install a regular external alpha 16mm pot.

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!

Start by soldering the jumpers where needed. Next, solder the resistors and then the diodes. Note that D5 is a fragile germanium diode and the orientation can be different than you expect. Always check orientation with a digital multi meter before soldering!

If you want to experiment with other transistors then you could socket them instead of soldering them 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 these sockets on the PCB. Place the transistors only once you are finished with all soldering and off board wiring!

Now continue by soldering the socket for the IC's, the small SMF, trimpots and then the big SMF and Electrolytes.

I suggest you now drill the holes in your enclosure so you can use it during the off board wiring.

Note: Really take some time to determine where to place the pots, (switching) 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 table on the first page, you will need:

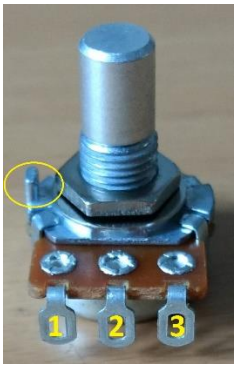
- **2 input jacks.** 2 mono jacks if you are not going to use a battery clip (only 9V DC adapter) or 1 mono (for output) and 1 stereo jack (for input) if you will be using a battery clip.
- When side chaining you will need a switching mono jack (see off board wiring section).
- **3PDT footswitch** (9 pins) and a LED to build in your enclosure (see off board wiring section).
- **2,1mm DC jack** (isolated).
- **9v battery clip** (optional).
- **22 gage stranded hook-up wire**
- **Hammond 1590B** case (or similar) in your favourite colour. If you are to install the side chain then I advise you to use a 1590BB.

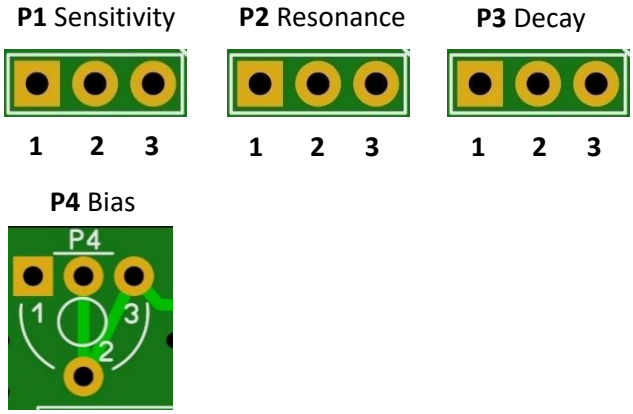
Off board wiring

Potentiometers

In the pictures below you see the correct pin numbering of the pots (Alpha 16mm style).
Solder the wires accordingly and it is always a good idea to twist the wires together to create extra shielding against external noise.

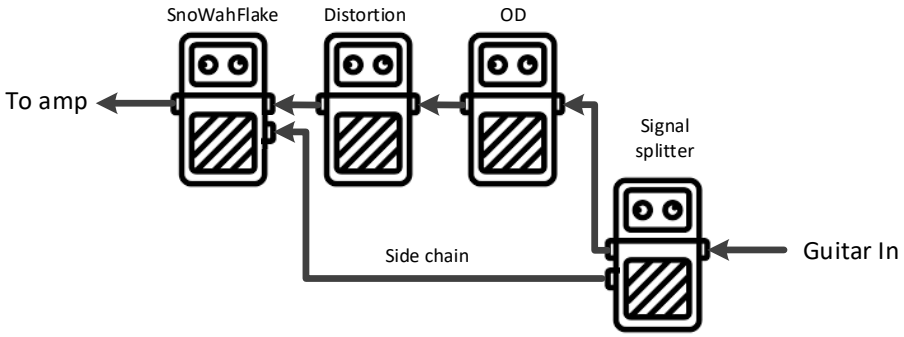
You can break off the pin I marked with the yellow circle with a small pair of pliers.



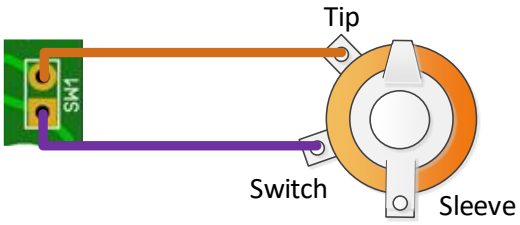


Side Chaining

First off, let's discuss why you could/should use side chaining. By side chaining the effect you introduce the original guitar signal back in the effect. This is especially handy when you are placing the autowah after heavy distortion or fuzz. These type of effects will mess with the triggering of the autowah. For this you will however need a signal splitter at the beginning of your signal chain. Here is an example (and of course I also sell a good signal splitter if needed).

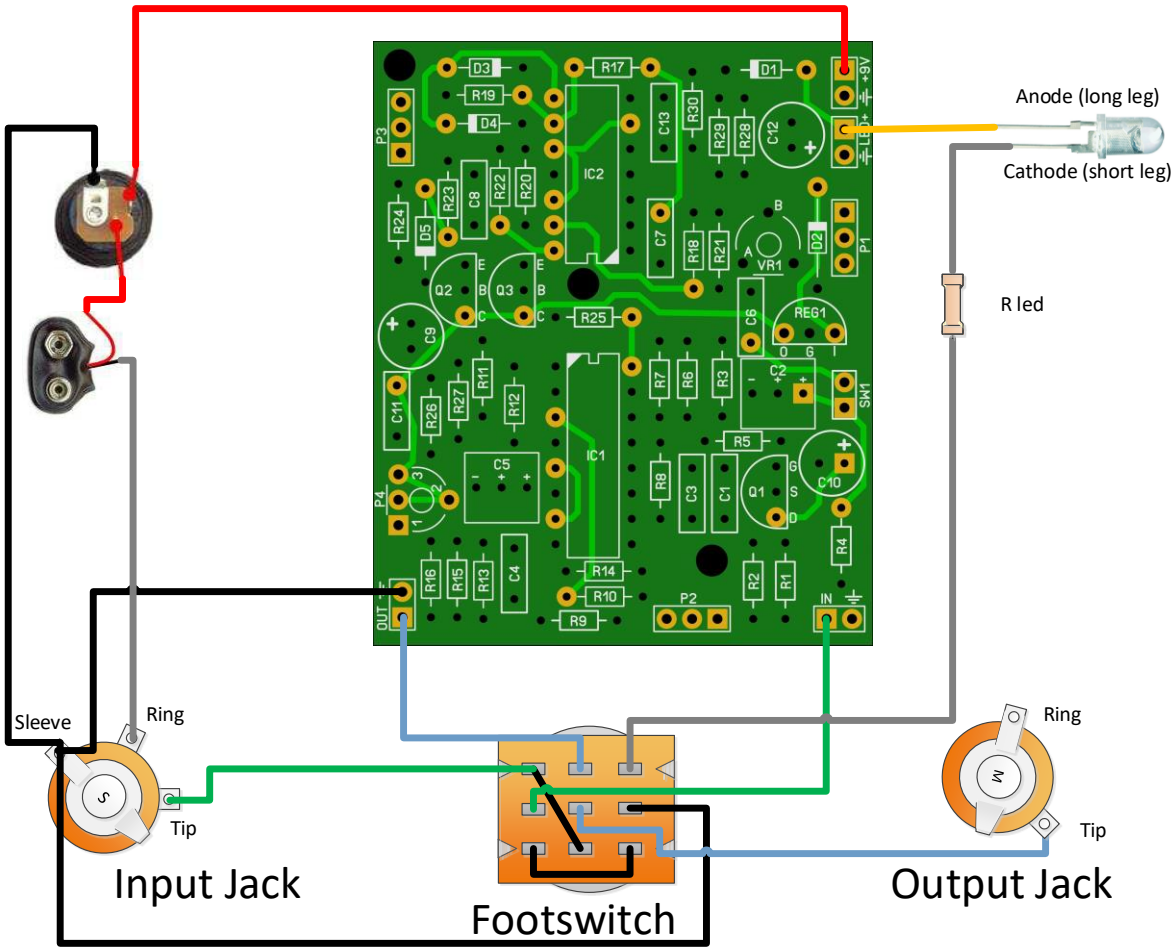


As mentioned before, if you do not want the effect to be used with side chaining then short both pads of **SW1** with a piece of lead wire (left over from eg. a resistor) else you can wire it as follows:



By using this switching jack, the effect will remain working normal when not using the side chaining.
NB. The sensitivity will need to be adjusted when using the sidechain!

Footswitches and stargrounding



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

It is now time to place your transistors in the sockets if needed. Connect everything, build it in your enclosure and enjoy your effect!

The sleeve on the output jack is not connected on purpose. Make sure the output jack is in good electronic contact with the enclosure else you can try and connect the sleeves of the input and output together. If you test the unit outside of an enclosure you need to connect the output sleeve to ground!

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.

Schematic