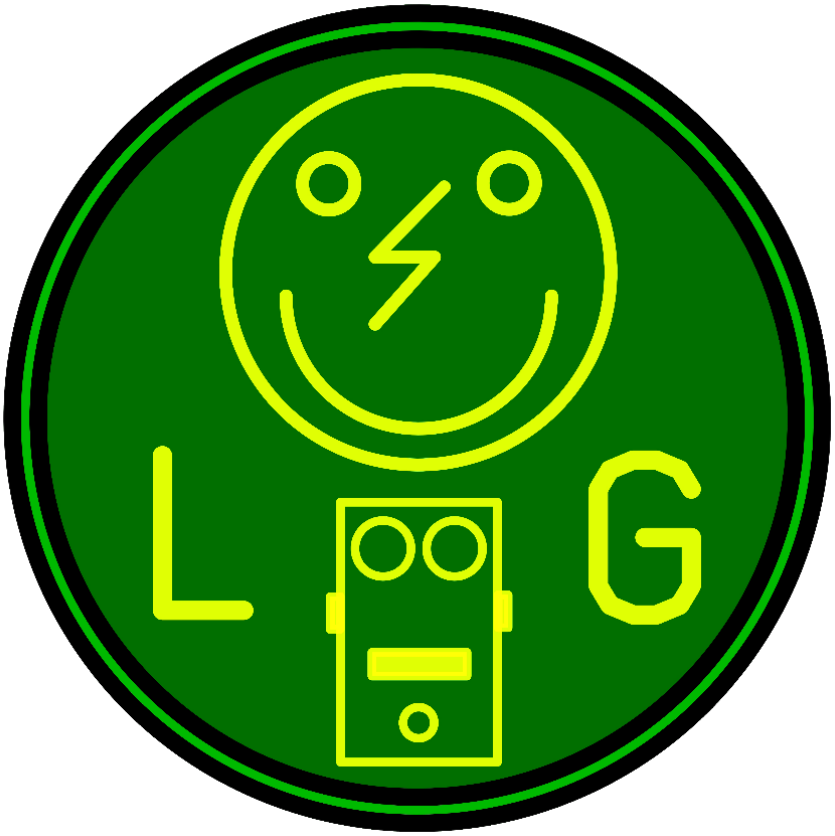
Snail Gear

Building instructions

V1.1



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Read this entire manual thoroughly before you start to building the effect! Especially the Modification and Biasing part. Decide before building the effect which mods you want to try so that you do not need to desolder parts later.

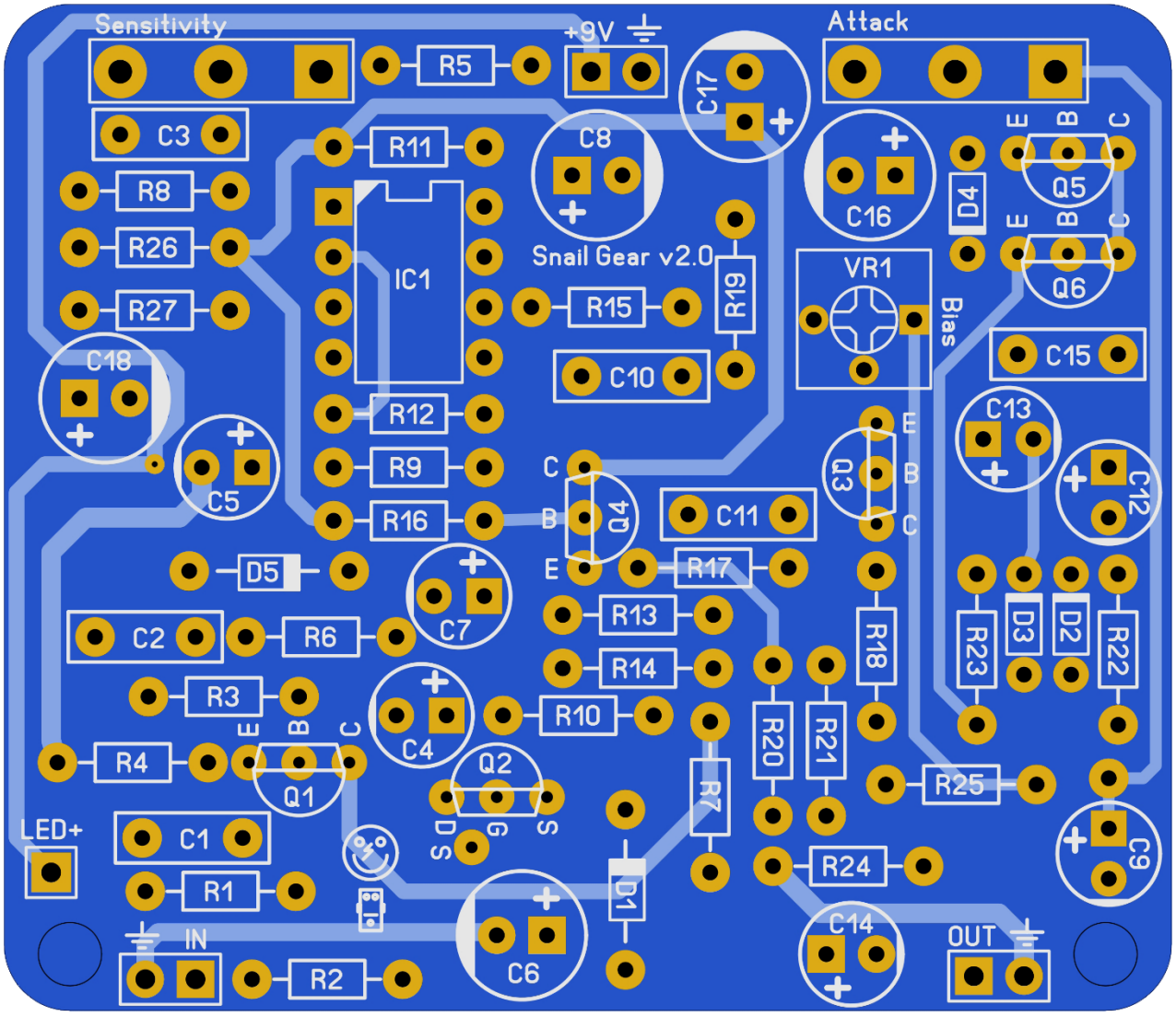
Last update: 20-05-2024

Components

Name	Value	Comment	Name	Value	Comment
C1	47n	MKT	**R1**	1M	
C2	22n	MKT	**R2**	1k	
C3	22n	MKT	**R3**	470k	
C4	1u	Electrolytic	**R4**	10k	
C5	1u	Electrolytic	**R5**	470R	
C6	47u	Electrolytic	**R6**	22k	
C7	1u	MKT	**R7**	3k3	
C8	10u	Electrolytic	**R8**	220k	
C9	470n/680n	MKT	**R9**	390R	
C10	1n	MKT	**R10**	470k	
C11	33n	MKT	**R11**	1k	
C12	1u	Electrolytic	**R12**	1M	
C13	1u	Electrolytic	**R13**	47k	
C14	1u	Electrolytic	**R14**	1M	
C15	47n	MKT	**R15**	390k	
C16	10u	Electrolytic	**R16**	1M	
C17	47u	Electrolytic	**R17**	1M	
C18	10u	Electrolytic	**R18**	4k7	
D1	Zener 5,6V		**R19**	4k7	
D2	1N4148		**R20**	10k	
D3	1N4148		**R21**	1k	
D4	1N4148		**R22**	100k	
D5	1N5817		**R23**	100k	
IC1	TL071		**R24**	100k	
Q1	BC549C	2N5088 alternatively	**R25**	10k	
Q2	2SK30A	2N5457 use extra D pad	**R26**	22k	
Q3	BC549C	2N5088 alternatively	**R27**	22k	
Q4	BC549C	2N5088 alternatively	**P1**	A100k	Sensitivity
Q5	BC549C	Match with Q6	**P2**	B25k	Attack
Q6	BC549C	Match with Q5	**VR1**	B10k	BIAS Trim pot

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

PCB layout

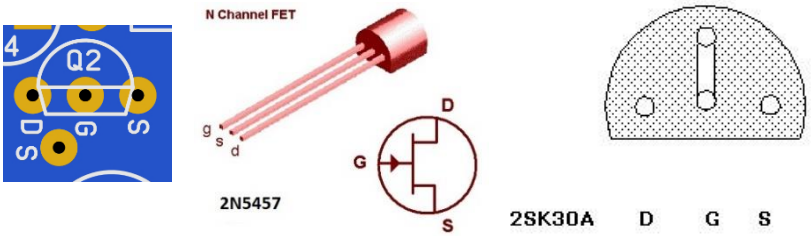

Sensitivity
+9V
Attack
R5
C3
R11
C8
C17
C16
R8
R26
R27
IC1
Snail Gear v2.0
R15
R19
VR1
Bias
C18
C10
C15
C5
R12
R9
R16
C13
C12
C11
R17
R13
R14
R10
R18
R23
R22
D5
C7
C2
R6
C4
R3
R4
Q1
Q2
R20
R21
R25
LED+
C1
R1
R7
D1
C9
R24
IN
R2
C6
C14
OUT
Q5
Q6
Q3
Q4
D4
D3
D2

General guideline for components

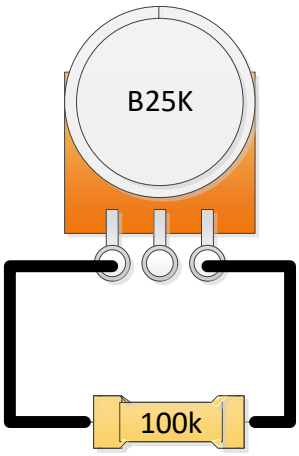
- Capacitors: All values under 1nF should be ceramic disks or silver mica. From 1nF up to 1uF should be SMF (Panasonic stacked metal film) or MKT (Metallized plastic polyester) and values over 1uF use electrolyte caps 16V+ rated and watch out for polarity.
- Resistors: use 1% metal film for the best results.
- Socket the IC's. This way you can easily mod them or replace them if they break.
- Orientation of the transistors: the white stripe on the PCB indicates where the flat side of the transistor should be <u>except</u> for Q2, that one the bold side is facing the white stripe.

General building tips

Before you start you will need to make sure that you match the Hfe of Q5 and Q6 for the best result. Matching is done by using a Digital Multi Meter (DMM). Get them as close together as possible. You can use any BC549A/B/C or even BC550A/B/C for Q1,Q3,Q4,Q5 and Q6. For Q2 you can <u>only</u> use a 2SK30A or a 2N5457, but the pinout is different so you'll need to use the extra S pad for the 2N5457:



The original Attack pot (**P2**) is B20K. You can easily use the readily available B25K or you can place a 100K resistor between pins 1 and 3 to lower the B25K to B20K.



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. If you want to experiment with other transistors than you could socket them instead of soldering them to the board. You'll need a 20 SIL, break off the sockets and solder them to the board.

Start by soldering the diodes and resistors.

<u>Note:</u> Do not blow on your solder in an attempt to cool it down. That will possibly result in a bad join that might corrode!

Next, solder the IC sockets, and transistors or if desired the transistor sockets (only if you want to try different transistors!) then the VR1 and MKT. Lastly solder the electrolyte capacitors.

Place the IC (and transistors) and you are almost ready to rock. The flat sides of the transistor are indicated by the thick white line.

Besides the components mentioned in the table on the page 3, you will need:

- **2 input jacks**. 2 mono jacks if you are not going to use a battery but only the 9V adapter. 1 mono (for output) and 1 stereo jack (for input) if you will be using both a 9V battery and the 9V adapter.
- **1x 3PDT footswitch** (9 pins). I also sell an easy off board circuit for true bypass.
- **2,1mm DC jack** (isolated).
- **9v battery clip** (optional).
- **22 gage stranded hook-up wire.**
- **1 x 3mm LED** (and if needed a LED holder to mount it in the enclosure)
- **Hammond 125B** case (or similar) in your favorite color.

Modifications

- **Swell MOD.** You can extend the swell time by changing **C9** to a higher value (eg. 22uF).
- The original uses a LM741 instead of a TL071.

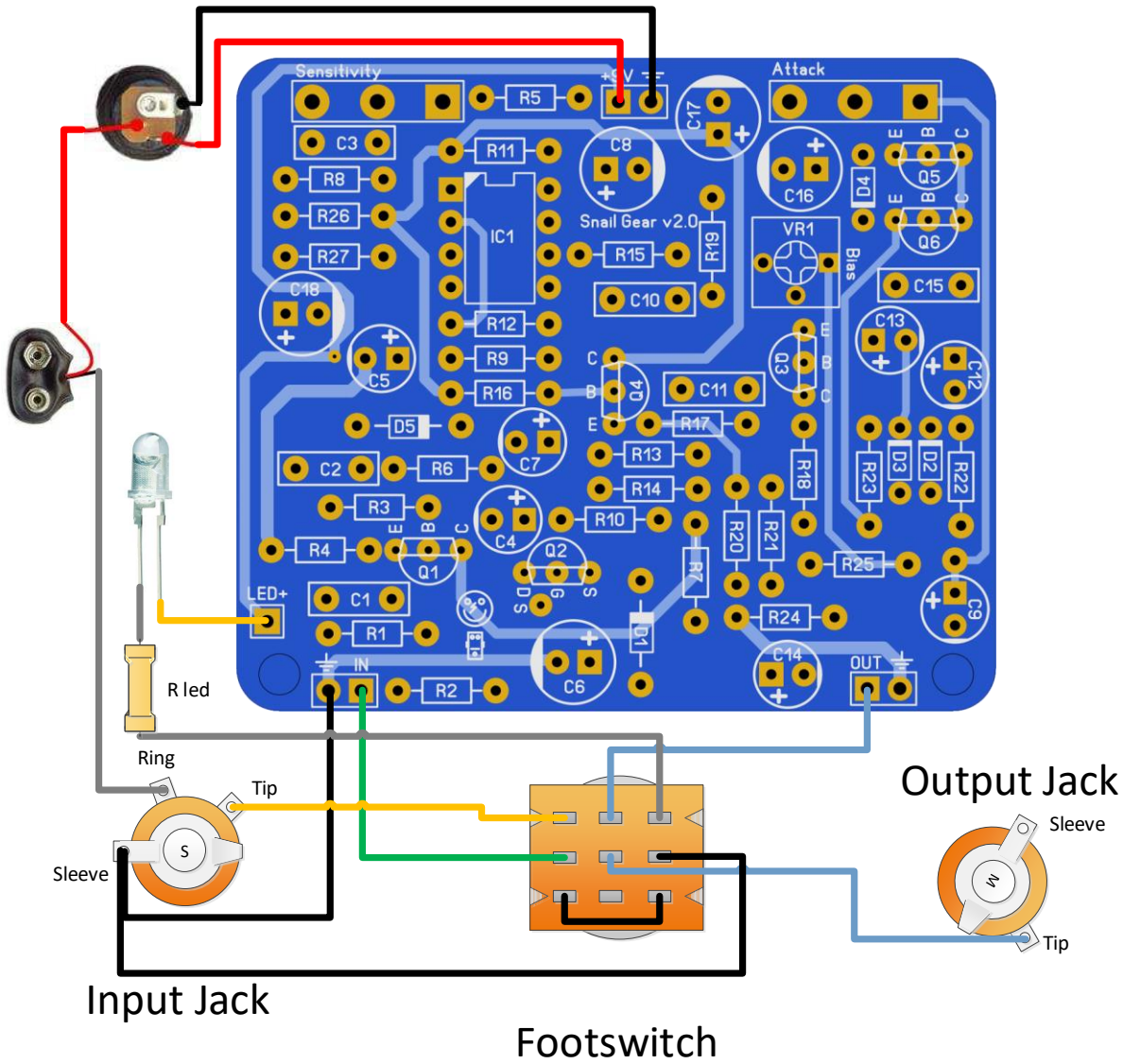
Biasing

The most important part of this build is the biasing. If your effect is inaudible at low attack settings then it is not biased correctly. Biasing can be done by ear, but can be difficult, so take your time.

1. Turn **Attack** to 0 (=fully counterclockwise) and **Sensitivity** to 5 (=halfway/12 o'clock) and VR1 to 10 (=fully clockwise)
2. Turn the VR1 until you hear the effect swell correct and without volume loss.

NB the Sensitivity pot is used to adapt the effect to the amount of input the effect gets (like an input boost). If you use a booster/fuzz in front of the effect, you will need to lower the Sensitivity to get the optimal result.

Off board wiring



The LEDs requires a resistor (R led in the diagram) depending on the type of LED you are using. To be safe use a 3k3 or 4k7 resistor. If you want to be more exact then go here: http://www.muzique.com/schem/led.htm

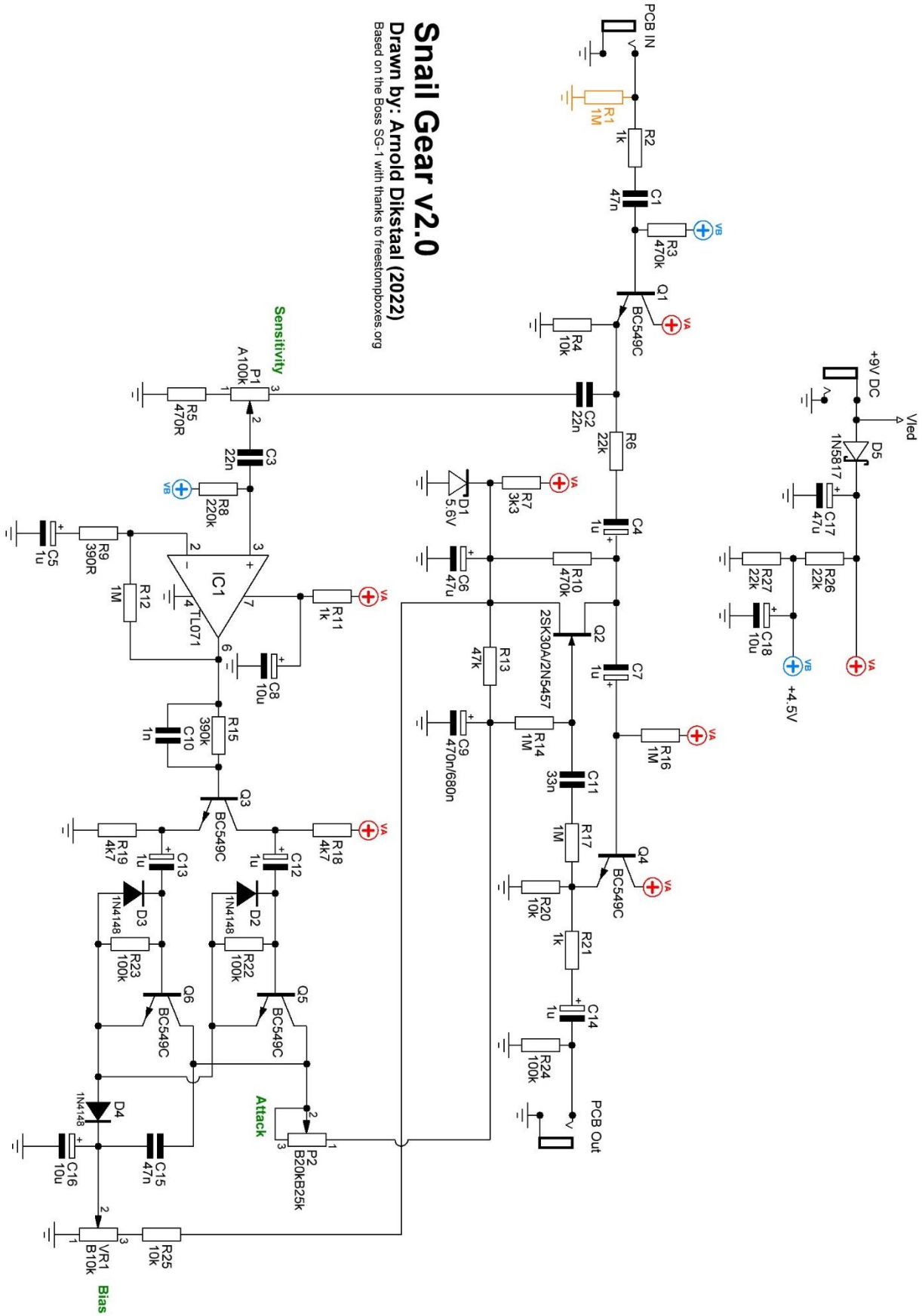
Troubleshooting

All PCB's have been 100% factory e-tested and out of every batch I receive I build a 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).
- Check that you oriented the capacitors, IC's ,transistors and diodes the right way. SMF, MKT capacitors and resistors do not need to be oriented.
- 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's and transistors, one might be defective. Before doing that first unplug the 9V and wait 5 seconds.
- Check that you have good/high grade components. A lot of Chinese sourced parts are fakes (especially high end opamps, vintage diodes and transistors) so be careful that you source your parts from reliable suppliers.

Schematic


Snail Gear v2.0
Drawn by: Arnold Dikstaal (2022)
Based on the Boss SG-1 with thanks to freestompboxes.org
PCB IN
PCB Out
+9V DC
Vled
+4.5V
Sensitivity
Attack
Bias
IC1
TL071
2SK30A/2N5457
BC549C
1N4148
1N5817
5.6V