Humming Bee OD
Building instructions
V2.0

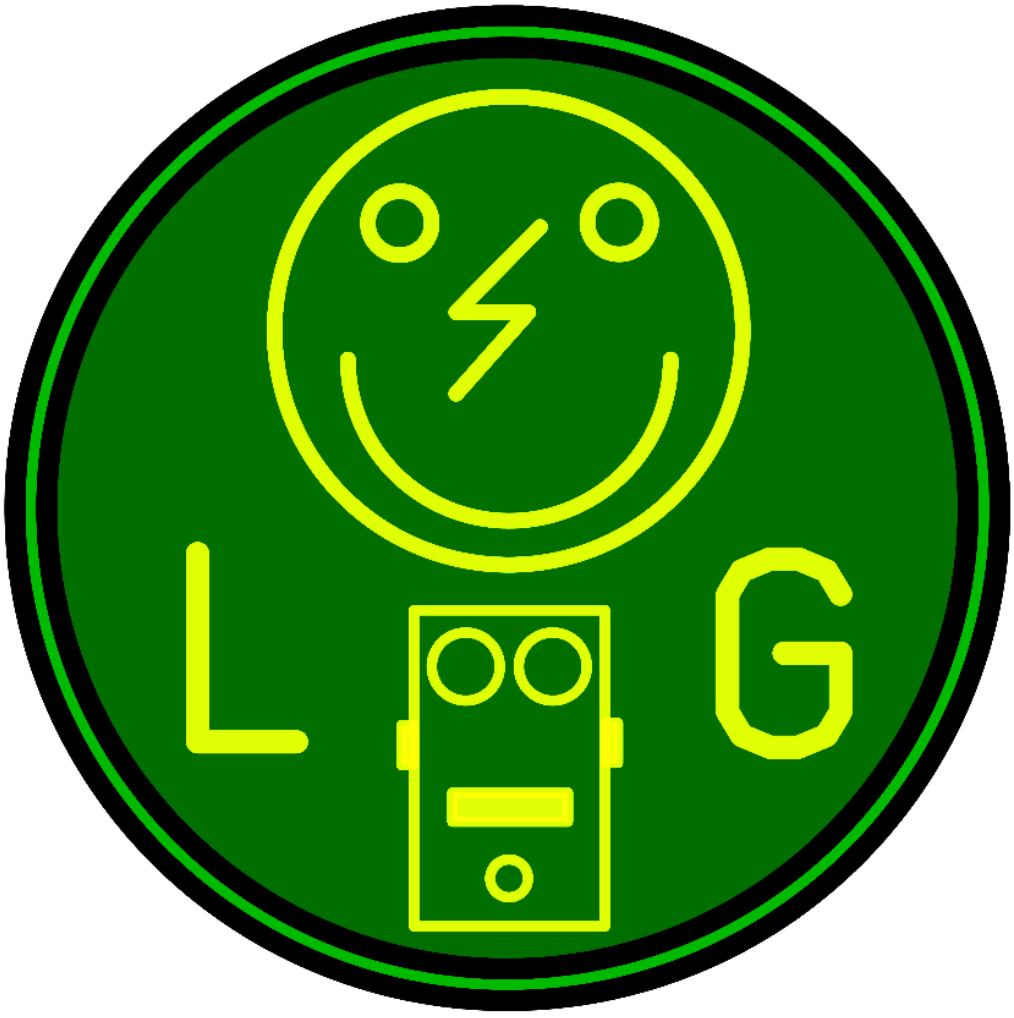


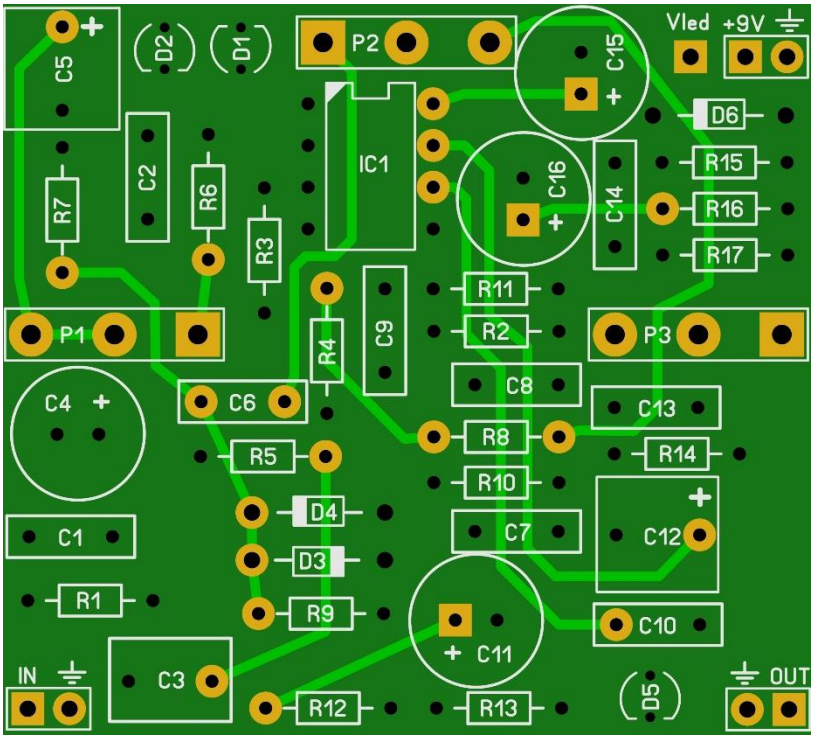
Table of contents

Components

Name	Value	Comment	Name	Value	Comment
C1	4n7	SMF/MKT/Wima	**IC1**	OPA275	
C2	100p	MLCC/Ceramic	**P1**	A500k	Drive (PCB mount)
C3	220n	SMF/MKT/Wima	**P2**	B50k	Focus (PCB mount)
C4	22u	Electrolytic 25V+	**P3**	B50k	Volume (PCB mount)
C5	1u	SMF/MKT/Wima	**R1**	1M	1% metalfilm
C6	22n	SMF/MKT/Wima	**R2**	360k	1% metalfilm
C7	4n7	SMF/MKT/Wima	**R3**	6k8	1% metalfilm
C8	22n	SMF/MKT/Wima	**R4**	1k	1% metalfilm
C9	22n	SMF/MKT/Wima	**R5**	5k6	1% metalfilm
C10	1n	SMF/MKT/Wima	**R6**	3k	1% metalfilm
C11	22u	Electrolytic 25V+	**R7**	2k	1% metalfilm
C12	1u	SMF/MKT/Wima	**R8**	13k7	1% metalfilm
C13	4n7	SMF/MKT/Wima	**R9**	10k	1% metalfilm
C14	100n	SMF/MKT/Wima	**R10**	150k	1% metalfilm
C15	100u	Electrolytic 25V+	**R11**	1M	1% metalfilm
C16	47u	Electrolytic 25V+	**R12**	2k61	1% metalfilm
D1	LED	Red 3mm	**R13**	5k6	1% metalfilm
D2	LED	Red 3mm	**R14**	47k	1% metalfilm
D3	1N4007		**R15**	51R	1% metalfilm
D4	1N4007		**R16**	47k	1% metalfilm
D5	LED	Red 3mm	**R17**	47k	1% metalfilm
D6	1N5817				

* Parts marked in red are specialty parts

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



Dimensions:

49,2 mm x 44,5 mm

1.94 inch x 1.75 inch

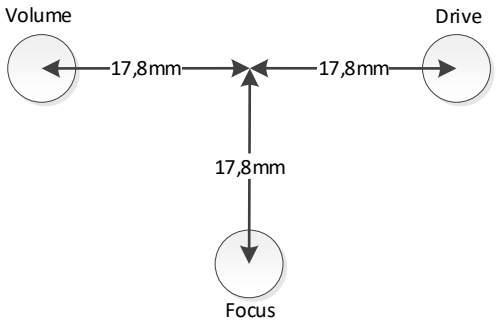
General guideline for components

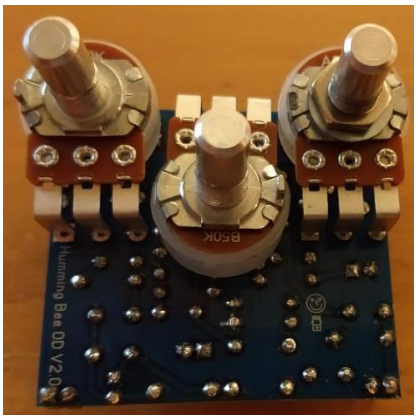
- Capacitors: All values under 1nF should be ceramic disks. From 1nF up to 1uF should be SMF/MKT/Wima (foil/metalfilm capacitors) and over 1uF use electrolyte caps (or tantalum) 16V+ rated and watch out for polarity!
- Resistors: use 1% metalfilm for the best results.
- Socket all IC's and maybe even the 3mm LED's. This way you can easily mod them or replace them if they break.

General building tips

Soldering this board can be complicated for some people since the solder pads can be very close together. Use a magnifying glass to make the job easier.
Start by soldering the resistors and the diodes **D3**, **D4** and **D6**. Next, solder the sockets for the ICs and if you want to the LEDs. For the LED's you can buy a 20 pin SIL socket and cut of the pins you need. IC1 requires a 8 pin DIL socket. Now solder the ceramic capacitors, then you can solder the 3mm LEDs **D1**, **D2** and **D5** (You might need to shorten the legs of LEDs to fit the holes!). Now solder the MKT capacitors (not the 1u ones!) and the electrolyte capacitors. Now finish by soldering the 1u MKT capacitors.

Now for the tricky part. Before you start to solder the potentiometers, you should first drill the holes in your enclosure. The pattern is as follows (top view):





Before you start drilling measure twice!

Insert the potentiometers in the holes of the enclosure and attach the PCB. Note that the PCB mount potentiometers will be attached on the back of the PCB. When everything fits ok, solder the potentiometers to the PCB.

Place the IC's (and if socketed the LEDs) and you are almost ready to rock. The white triangle on the IC's point to where pin 1 of the IC should be inserted.

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

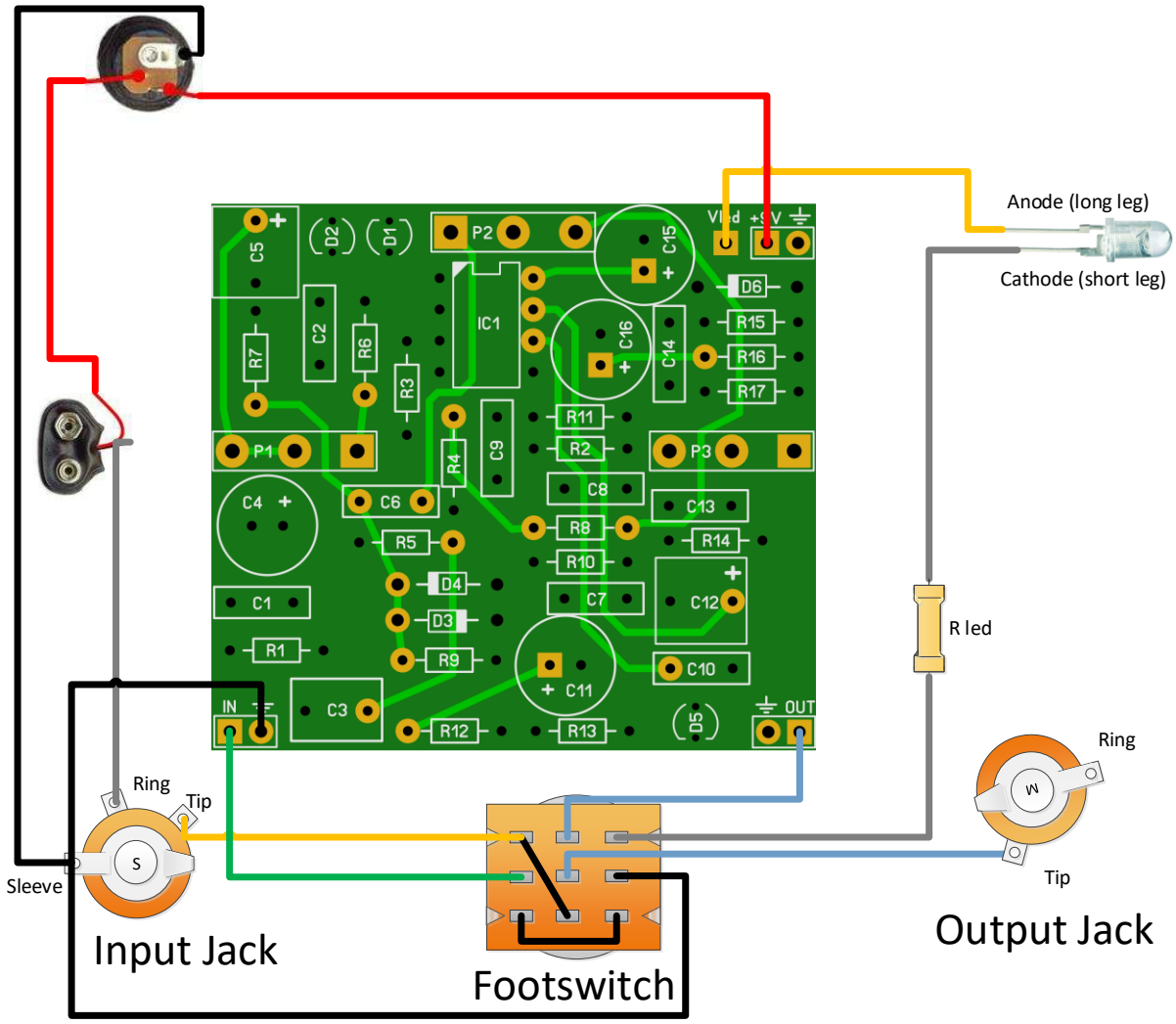
- **2 input jacks**. 2 mono jacks if you are not going to use a battery but only the 9V adapter. 1 mono (for output) and 1 stereo jack (for input) if you will be using both a 9V battery and the 9V adapter.
- **3PDT footswitch** (9 pins). I also carry an easy off board circuit for this.
- **2,1mm DC jack** (isolated).
- **9v battery clip** (optional).
- **22 gage stranded hook-up wire.**
- **Hammond 1590B** case (or similar) in your favourite colour. A 125B (Hammond 1589N1) will give you more room to experiment with.

Modifications

You can experiment with different types of 3 mm LED's. It is reported that clear green LED's are very suitable as replacements.

You can also try different OpAmps for IC1 like the TL072,OPA2134, NE5532, JRC4580D, JRC4558 or any other pin compatible DIP-8 dual OpAmp.

Offboard wiring



Notice that in the “off” position the effect input is connected to ground to prevent possible oscillation. The diagram is also based on star wiring where all ground connections go to the sleeve of the input jack.

The LED requires a resistor (R led in the diagram) depending on the type of LED you are using. An ultra-bright red or blue LED requires a 3k3/4k7 resistor.

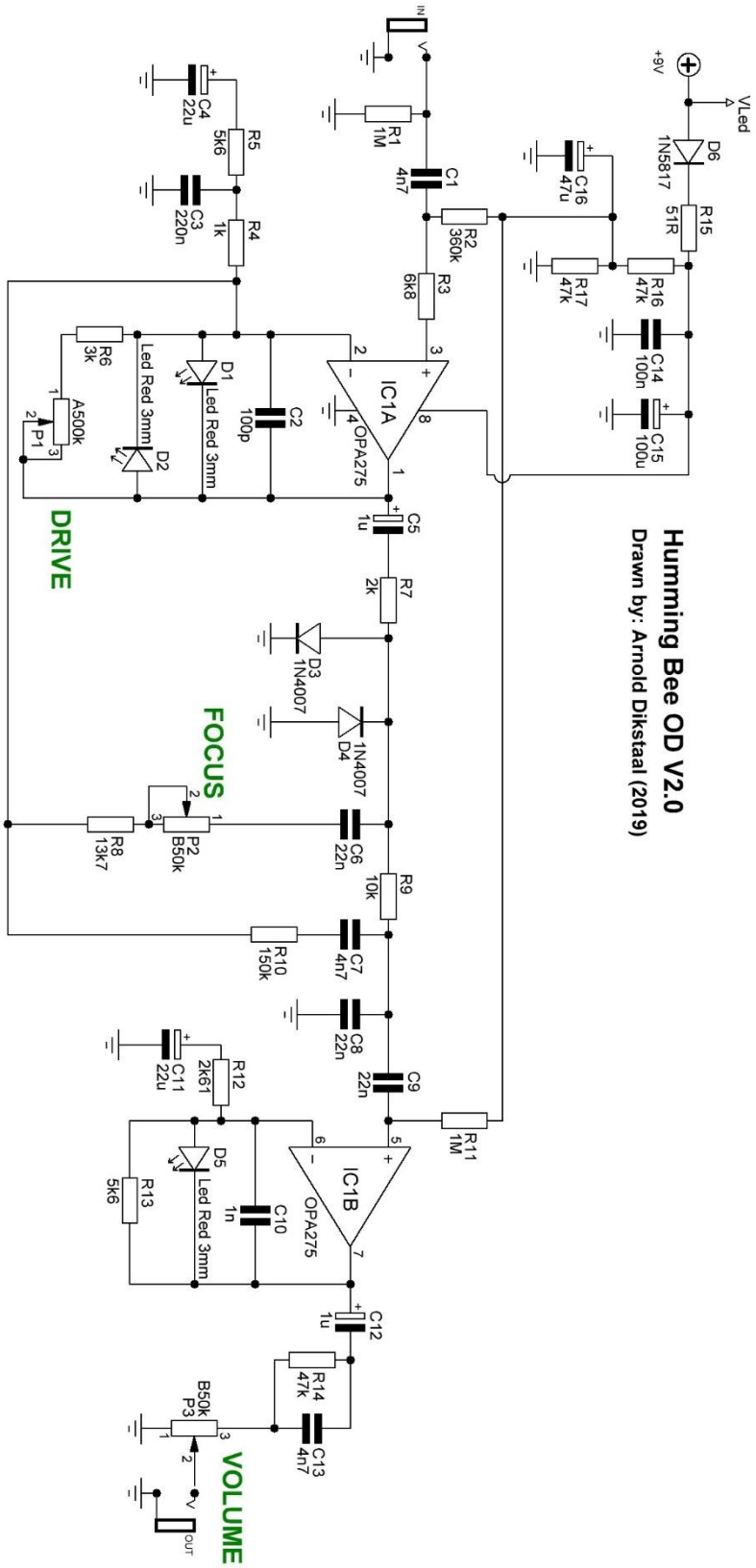
Troubleshooting

All PCB's have been e-tested 100% in the factory, 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. 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 lose 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) so be careful that you source your parts from reliable suppliers.

Schematic


Humming Bee OD V2.0
Drawn by: Arnold Dikstaal (2019)
DRIVE
FOCUS
VOLUME
IC1A
IC1B
OPA275
Led Red 3mm
1N4007
1N5817
+9V
VLed
IN
OUT