Cave Vibe

Building instructions

V1.0

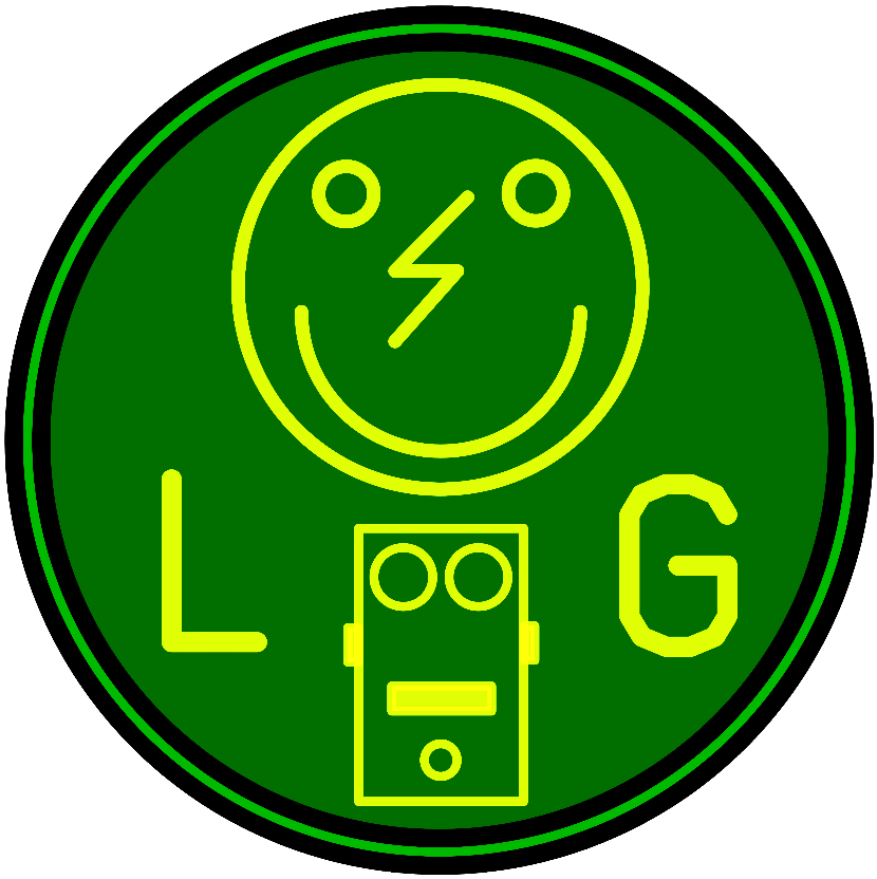


Table of contents

Read this entire manual thoroughly before you start building the effect!

Last update: 16-03-2019

Components

Name	Value	Comment	Name	Value	Comment
C1	100n	SMF	**P1**	B25k	Throb
C2	15n	SMF	**P2**	A100k	Level
C3	220n	SMF	**P3**	B100k Dual	Rate
C4	100p	Ceramic	**P4**	B25k	Intensity
C5	4n7	SMF	**P5**	B10k	Voice
C6	470p	Ceramic	**R1**	1M	1% metal film
C7	1u	Electrolyte	**R2**	1M	1% metal film
C8	1u	Electrolyte	**R3**	47k	1% metal film
C9	100n	SMF	**R4**	47k	1% metal film
C10	47u	Electrolyte	**R5**	22k	1% metal film
C11	10u	Electrolyte	**R6**	47k	1% metal film
C12	10u	Electrolyte	**R7**	47k	1% metal film
C13	100u	Electrolyte	**R8**	47k	1% metal film
C14	10u	Electrolyte	**R9**	47k	1% metal film
C15	1u	Electrolyte	**R10**	47k	1% metal film
C16	1u	Electrolyte	**R11**	100k	1% metal film
C17	1u	Electrolyte	**R12**	100k	1% metal film
C18	47u	Electrolyte	**R13**	10k	1% metal film
C19	47u	Electrolyte	**R14**	56k	1% metal film
D1	1N4001		**R15**	10k	1% metal film
D2	1N5817		**R16**	10k	1% metal film
D3	1N5817		**R17**	3k3	1% metal film
D4	LED	Transparent green	**R18**	220k	1% metal film
IC1	TL072		**R19**	220k	1% metal film
IC2	TL074		**R20**	3k3	1% metal film
IC3	LT1054		**R21**	2M2	1% metal film
LDR1	GL-5539	alternative GL-5549	**R22**	15k	1% metal film
LDR2	GL-5539	alternative GL-5549	**R23**	4k7	1% metal film
LDR3	GL-5539	alternative GL-5549	**R24**	100k	1% metal film
LDR4	GL-5539	alternative GL-5549	**R25**	100R	1% metal film
Q1	MPSA18		**R26**	47k	1% metal film
Q2	MPSA18		**SW1**	SPDT	Voltage Select

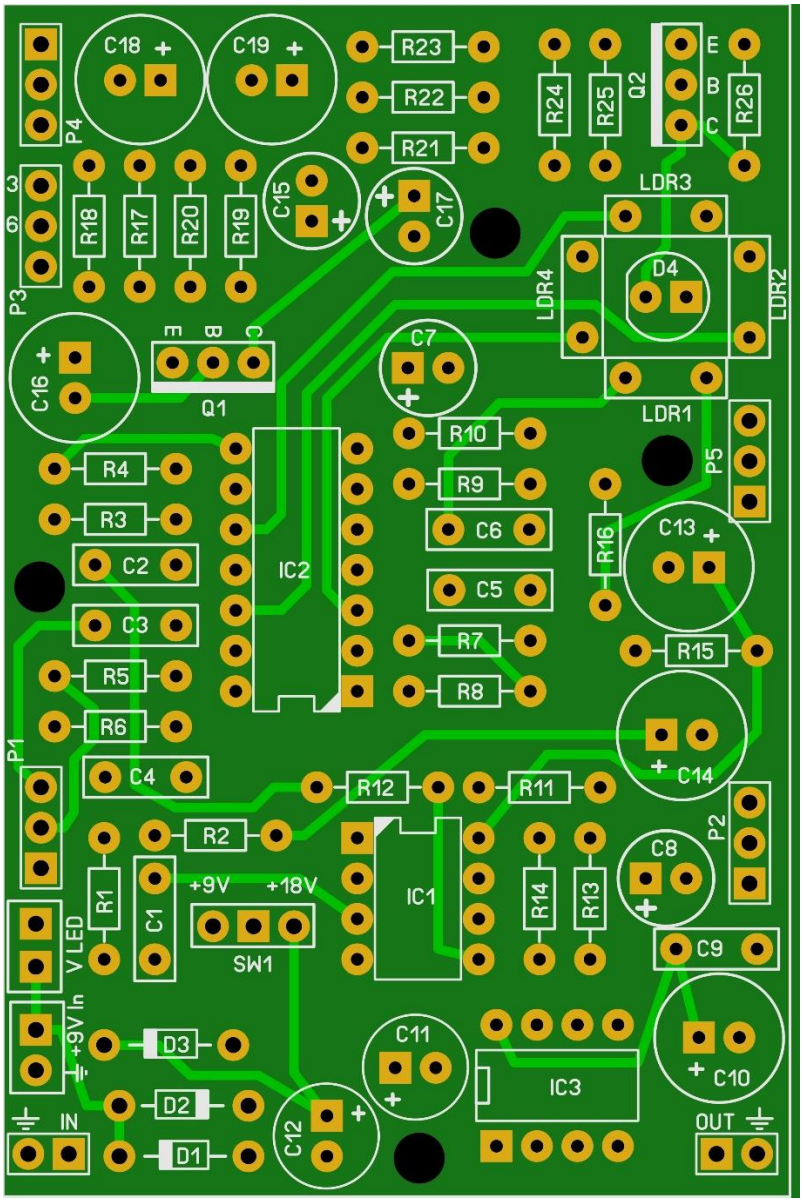
All components must be rated for 25V or higher!

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

PCB layout

50 mm x 75 mm

1.97 in x 2.95 in



Bill of Materials

Capacitors			
Component	**pcs.**	**Type**	**Rating**
100p	1	Ceramic	25V+
470p	1	Ceramic	25V+
4n7	1	MKT	25V+
15n	1	SMF	25V+
100n	2	SMF	25V+
220n	1	SMF	25V+
1u	5	Electrolyte	25V+
10u	3	Electrolyte	25V+
47u	3	Electrolyte	25V+
100u	1	Electrolyte	25V+

Diode		Transistors	
Component	**pcs.**	**Component**	**pcs.**
LED Green 5mm	1	MPSA18	2
LED 5mm	1		
1N4001	1		
1N5817	2		

IC			
Component	**pcs.**	**Type**	**pcs.**
TL072	1	LT1054	1
TL074	1		

Resistors (1% metal film)			
Component	**pcs.**	**Value**	**pcs.**
GL-5539	4	47k	8
100R	1	56k	1
3k3	3	100k	3
4k7	1	220k	2
10k	3	1M	2
15k	1	2M2	1
22k	1		

Potentiometers (Alpha 16mm)			
Component	**pcs.**	**Value**	**pcs.**
B10k	1	B100k Dual	1
B25k	2		
A100k	1		

Note:

Voltage selection switch SW1 can be any type of SPDT switch

Introduction

The Cave Vibe is a unique vibe effect. It has been specially adapted to include an internal 18v charge-pump to provide more headroom to the effect. This charge-pump is made switchable so you can bring it back to the original if needed. This effect functions best with a 9V wallwart adapter and it is advised not to use 9V batteries. Once the battery is drained too much, the 18v charge-pump may function erratically due to the low voltage.

Also note that operating at 18v on the highest intensity and voice settings, you might hear some LFO ticking. In this case turn down the intensity and/or voice just a little and the ticking will disappear.

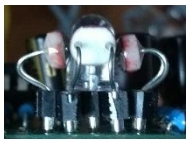
Building sequence

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

Start by soldering the resistors. If you want to socket the transistors then solder the sockets now. **Note:** Do not blow on your solder in an attempt to cool it down. That will possibly result in a bad join that might corrode!

Solder the diodes, the ceramic capacitors and then the IC sockets. Next, solder the SMF and MKT capacitators. Finish by soldering the transistors and electrolytes.

Now.. what did we forget? Yes.. the LDR's and LED. If you do not want to experiment then now is the time to solder them. I advise to solder the LED first and only then the LDR's. This will enable you to better position the LDR's. It is advised to position the LDR's parallel against the LED:



Place the transistors (if socketed) and IC's and you are almost ready to rock.

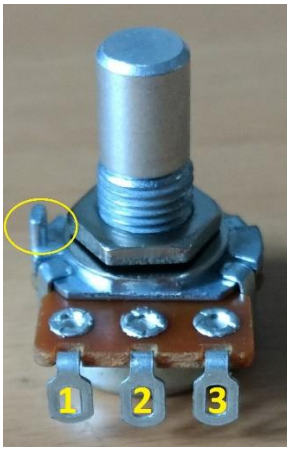
Besides the components mentioned in the Bill Of Materials table, you will need:

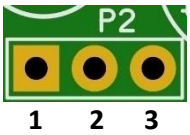
- **2 input jack sockets**. 2 mono jacks if you are not going to use a battery but only the 9V adapter. 1 mono (for output) and 1 stereo jack (for input) if you will be using both a 9V battery and the 9V adapter.
- **1 x 3PDT footswitch** (9 pins)
- **2,1mm DC jack socket** (isolated).
- **9v battery clip** (optional).
- **22 gage stranded hook-up wire.**
- **A LED holder.** This enables you to mount the LED in the enclosure.
- **Hammond 1590BB** case (or similar) in your favorite color.

Off board wiring

Wiring the pots P1,P2,P4 and P5 is very simple. The rectangle pad marks pin 1 of a potentiometer. The images below show how you can recognize which pin is which on a potentiometer.

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





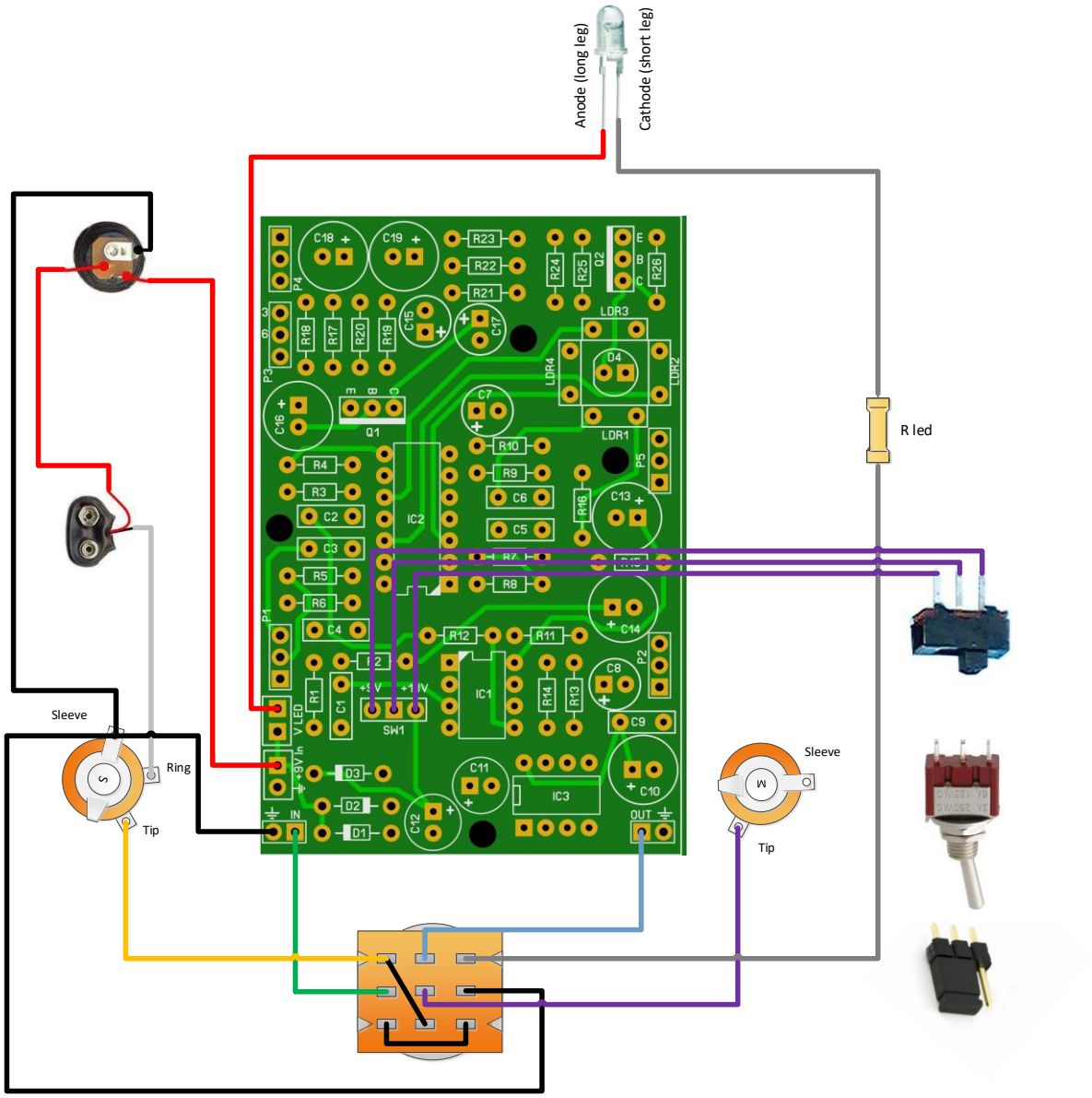
P3 is a dual taper potentiometer and should be soldered differently:

1. Bend the lower 3 solder lugs straight.

2. Solder lugs 1,2,4 and 5 together. This will leave pin 3 and 6 (top right and bottom right) free.

2. Solder one end of the lead wires to pin 3, pin 5 and 6 and the other end to the PCB P3.
   Connect Pin 3 to pad 3 on the PCB, Pin 6 to pad 6 on the PCB and Pin 5 to the last, leftmost pad on the PCB.

After wiring the potentiometers you will need to wire the input, output and LED :



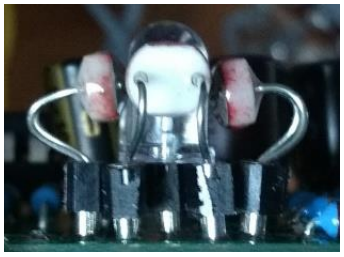
NB. When switching between 9V and 18V you will need to re-adjust the intensity as the 18V setting will also make the effect LED (D4) burn more intense.

Note that this wiring is using a sort of star grounding. The sleeve of the output socket is not connected on purpose. It does however require a good contact between the output socket and enclosure to work. If this is not possible then connect the sleeve of the output socket to the sleeve of the input socket.

You should use Switchcraft/Neutrik type metal chassis sockets. When using plastic, you will need to connect the input socket sleeve to the output socket sleeve!

Testing and mods

Testing this effect is best done in a dark environment. Most importantly you should try to shield the LDR/LED's from outside light because this will affect the working of the effect drastically. You can make a shield out of almost anything. In this section you'll see I used a blue piece of shrink tube which I taped off at the top. This gave me enough shielding to test the effect. Once the effect is built in an enclosure, there will be no need for a light shield anymore as the enclosure itself will ensure enough shielding.



Standard the effect uses GL-5539 LDR's and a transparent green LED. You can experiment with different LDR's and LED's. I tested GL-5549 with success and gives you a bit more sweep. Also I personally prefer diffuse yellow LED's as they give a more intense effect.

If you look at other LDR's, look at the datasheet for the spectral/spectrum peak. The GL55 series has a peak at 540nm which is yellow/green and for example the Silonex NSL-7532 has a peak at 610nm which is more orange/red. As a guide use these values for light identification:

Blue 475 nm, Green 510nm, Yellow 570nm, Orange 590nm, Red 650nm.

Now another small mod which will make the effect even better… replacing the TL072 in IC1. Although you could test almost any dual opamp (as long as the pinout is the same), I strongly suggest to choose one of the following ones I tested:

- JRC4580D More transparent then the TL072, less noise, bit more treble
- AD712 Bit more transparent than 4580
- OPA2134 Even more transparent than the 712, a bit more sterile though
- JRC4558P Perfect mix between less noise, more transparency, more treble and clarity

Also you can experiment with replacing the TL074 in IC2. Here also you can replace it with any Quad Opamp as long as the pinout is the same and it can hold up to 18V.

If you do not want to build the internal 18V charge pump then do NOT solder: C10, C11, C12, D2, D3 and IC3. You will need to short SW1 between the left pad (marked +9V) and the rectangular middle pad. Now you can use the effect with a 9V or 18V wallwart. If used with the internal charge pump then the effect only takes a 9V wallwart adapter, not an 18V!

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).
- 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.
- 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 or transistor, it 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, vintage diodes and transistors) so be careful that you source your parts from reliable suppliers.

Known problem LFO

At high intensity and very low speed, the LFO will stop as it does in the original production model. You can prevent this by first turning down the intensity just a bit and then lowering the speed. You can also consider putting a small value resistor (3k) between pin 3 of P4. This does not solve the problem.

Another option is to try other transistors in the LFO (Q1/Q2) like the BC109 or 2N2907.

Schematic