

AVE MOD V2.2 Build Guide

I. Enhancer

A. Resistors:

R1: 91R (White, Brown, Black)

R2: 18K (Brown, Grey, Orange)

R3: 5K6 (Green, Blue, Red)

R4: 330R (Orange, Orange, Brown)

R5: 680R (Blue, Grey, Brown)

R6: 330R (Orange, Orange, Brown)

R7: 680R (Blue, Grey, Brown)

R8: 5K6 (Green, Blue, Red)

R9: 5K6 (Green, Blue, Red)

R10: 220R (Red, Red, Brown)

R11: 7R5 (Purple, Green, Black, Silver)

R12: 75R (Purple, Green, Black)

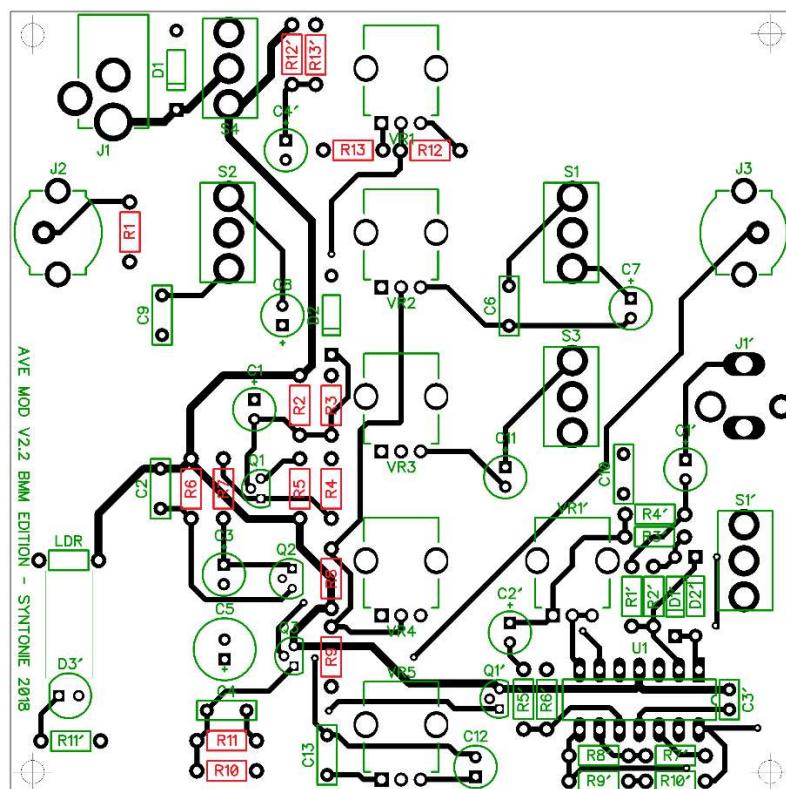
R13: 82R (Grey, Red, Black)

R12': 10K (Brown, Black, Orange)

R13': 10K (Brown, Black, Orange)

Notes:

- R11 has a blue body (cause this value is only available in 1% tolerancy it seems, all the other resistors are 5% and have a beige body)
- Mind that there's components references with an apostrophe " '", it is for the audio part. So don't mix R12/R12' and R13/R13' as their value are different. We only put R12' and R13' now for convenience, it will be easier that when those two resistors will be stuck between S4 and VR1.



B. Capacitors:

Electrolytics:

C1: 47uF
C3: 47uF
C5: 220uF

Film:

C2: 1nF (marked 1nK100)
C4: 47nF (47nJ100)

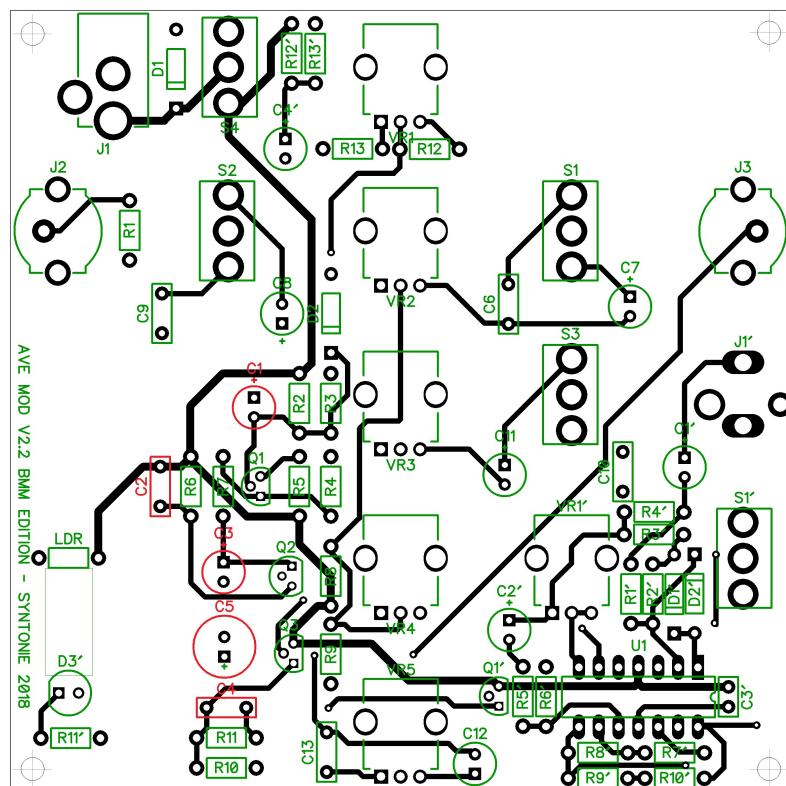
Notes:

- Electrolytic capacitors are polarized (which mean they fit only one way), check the pcb, the square pad is the positive (+) side of the capacitor, and on the capacitor, the grey/white band symbolize the negative (-).

Also, mind to bend the electrolytic capacitor 90° degrees (parallel to the board), it will be easier to fit it in the enclosure after.



- Film box capacitors are non-polarized, you can fit them either way.



C. Semiconductors

D1: 1N4148

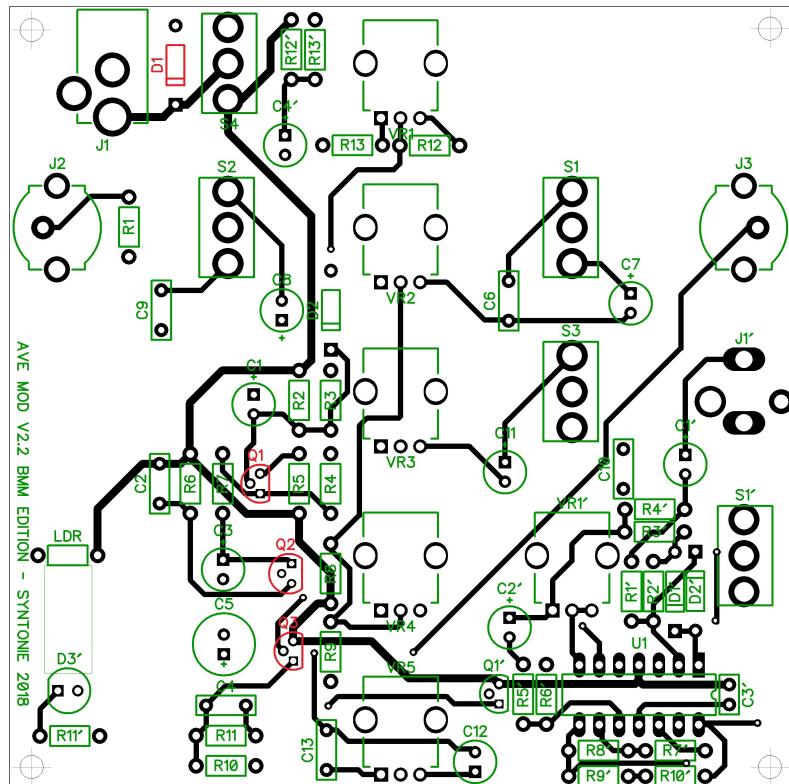
Q1: 2N3904

Q2: 2N3906

Q3: 2N3904

Notes:

- D1 is polarized, the black band on the diode should match the white band on the pcb.
- Mind that there is 2 different type of transistor: 2N3904 NPN and 2N3906 PNP, and that the flat side of the transistor should match the straight line on the pcb.



D. Hardware:

J1: Power connector 5.1mm x 2.1mm

J2: RCA socket

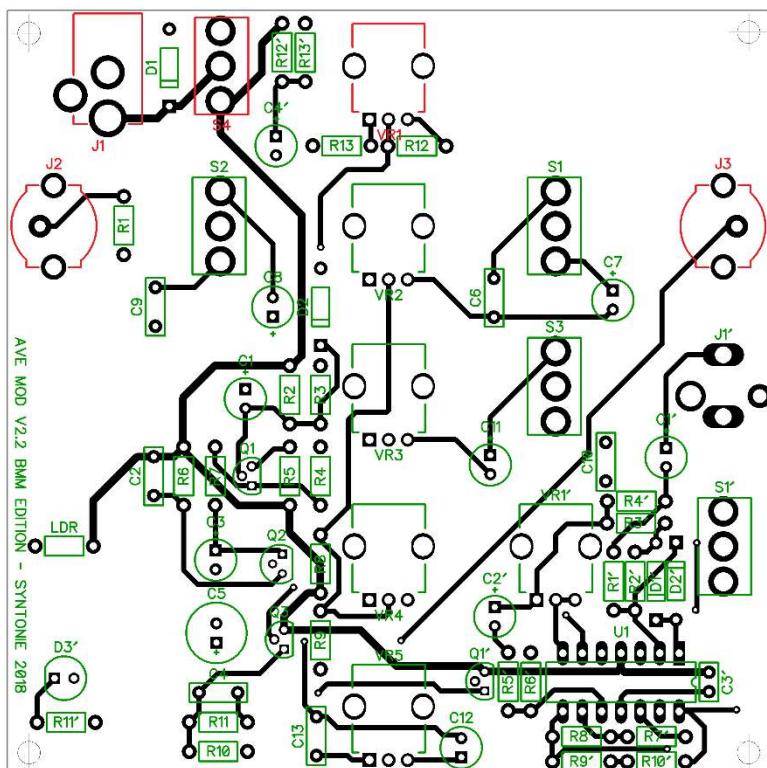
J3: RCA socket

S4: SPDT Switch ON-ON

VR1: 1k linear potentiometer (marked B102)

Notes:

- Be sure that parts like J2, J3, S4 and VR1 are straight both horizontally and vertically, it will be easier for fitting the pcb into an enclosure.
- There are two types of switches: ON-ON (2 positions) and ON-OFF-ON (3 positions), for S4 use a ON-ON (2 positions) switch
- There are 3 types of potentiometers, check under the body of each for the correct value.
- If you intend to use panel mount parts, check the dedicated section at the end of this document.
- At this stage, the enhancer should work. Plug a video source into J2, a monitor into J3, plug the 9V battery/PSU into J1, and be sure that S4 is up. If everything works, you should have an image which brightness varies according to VR1 position. If you have no signal or distorted image, check that every component is in the right spot with the right orientation, that everything is soldered well without cold solder spots or solder bridges. If everything is okay, remember to unplug the power and RCA cables before going to the next step.



II. Modifications

A. Capacitor/Diode:

Electrolytic:

C7: 10uF
C8: 10uF
C11: 1uF
C12: 10uF

Film:

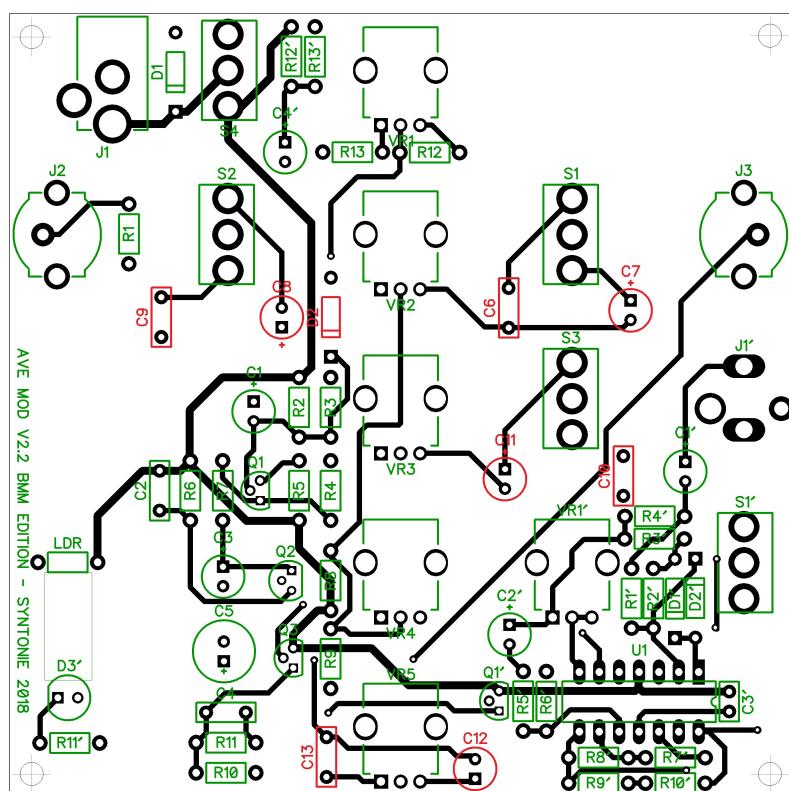
C6 : 1nF (marked 1nK100)
C9 : 10nF (marked 10nJ100)
C10 : 100nF (marked .1J100)
C13 : 330 nF (marked .33J63)

Diode:

D2: 1N4148 (mind the orientation)

Notes:

- Electrolytic capacitors are polarized, however in this section it doesn't matter much. Bend them 90° degrees like in the first part.
- Film capacitors are not polarized, fit them either way.
- Those value affect the effects done by the modifications, you can try different value to have a result that differs a bit.
- C10 is a film box capacitor, don't mix with the 100nF ceramic capacitor which is yellow and have "104" written on it.



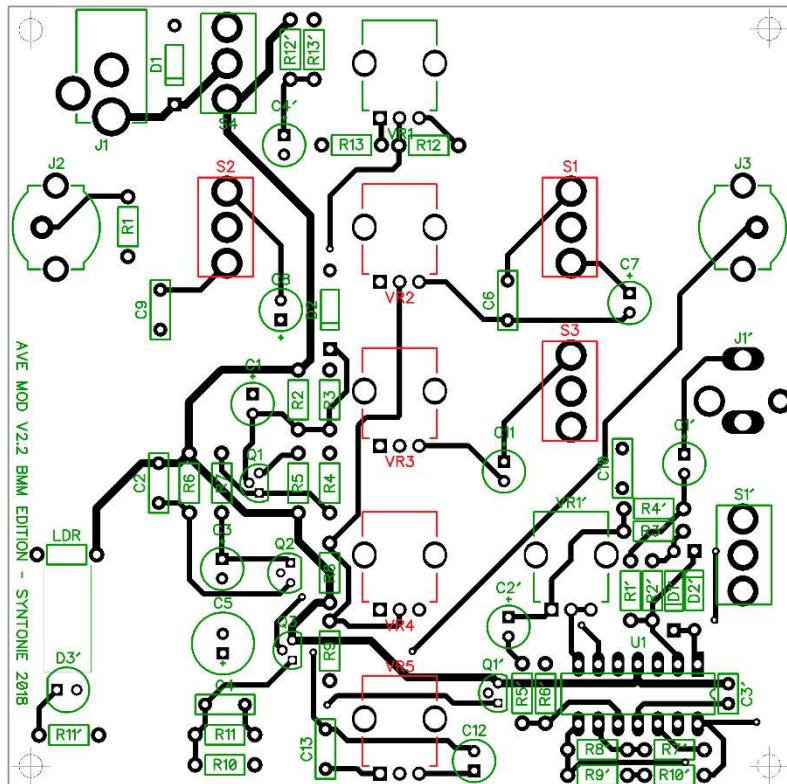
B. Hardware:

VR2: 100k linear center identified (marked B104)
 VR3: 10k linear (marked B103)
 VR4: 10k linear (marked B103)
 VR5: 100k linear center identified (marked B104)

S1: SPDT ON-ON
 S2: SPDT ON-ON
 S3: SPDT ON-ON

Notes:

- There are two types of switches: ON-ON (2 positions) and ON-OFF-ON (3 positions), for S1, S2 and S3, use a ON-ON (2 positions) switch.
 - There are two types of potentiometer left, check for the right value.
 - Now the mods are done, plug the power, video source and monitor again. To start, set VR2 and VR5 halfway (center) and VR3 and VR4 fully ccw (counterclockwise). There should be no effect.
 *Turn VR2 fully ccw, the image should be affected, switching S2 should result in a different effect. If you turn VR2 fully cw (clockwise), you should have another effect, switching S1 should result in a slightly different effect. Put VR2 back to the center.
 *Turn VR3 fully cw, the image should be affected, switching S3 should result in a different effect. Put VR3 back to minimum (fully ccw)
 *Turn VR4 fully cw, the image should be affected. Put VR4 back to minimum (fully ccw)
 *Turn VR5 fully cw, the image should be affected, if you turn it fully ccw, the effect should be different.
- If everything has an effect on the image, it's most likely that the mods work. Unplug everything and go to the next step. If not, check that every component is soldered well and at the right spot.



III. AUDIO

A. Resistors:

R1': 4K7 (Yellow, Purple, Red)

R2': 22K (Red, Red, Orange)

R3': 10K (Brown, Black, Orange)

R4': 22K (Red, Red, Orange)

R5': 10K (Brown, Black, Orange)

R6': 68K (Blue, Grey, Orange)

R7': 10K (Brown, Black, Orange)

R8': 68K (Blue, Grey, Orange)

R9': 10K (Brown, Black, Orange)

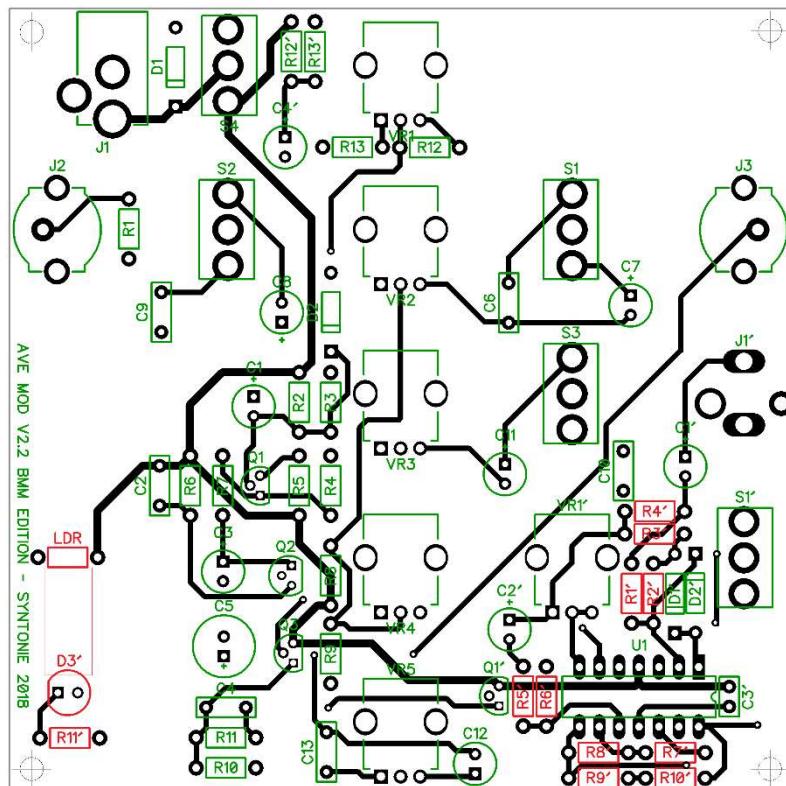
R10': 10K (Brown, Black, Orange)

R11': 1K (Brown, Black, Red)

D3'/LDR: Vactrol (four leg red component)

Notes:

- R12' and R13' have been fitted during the I. Enhancer part.
- R1' value can be lowered for more sensitivity to audio. I already lowered the value from 8K2 to 4K7 between V2.1 and V2.2 so it's more sensitive.
- Don't mind if R8' and R7' pads are solder together, they should be in contact, same for R9'/R10'
- D3'/LDR is an optoisolator, made from a LED and a Light Dependent Resistor. D3' is polarized, check the orientation of the led, flat side/square pad on the pcb should match flat side/shorter leg of the LED. The other side, the LDR, doesn't have an orientation.



B. Capacitors:

Electrolytics:

C1': 2.2uF

C2': 1uF

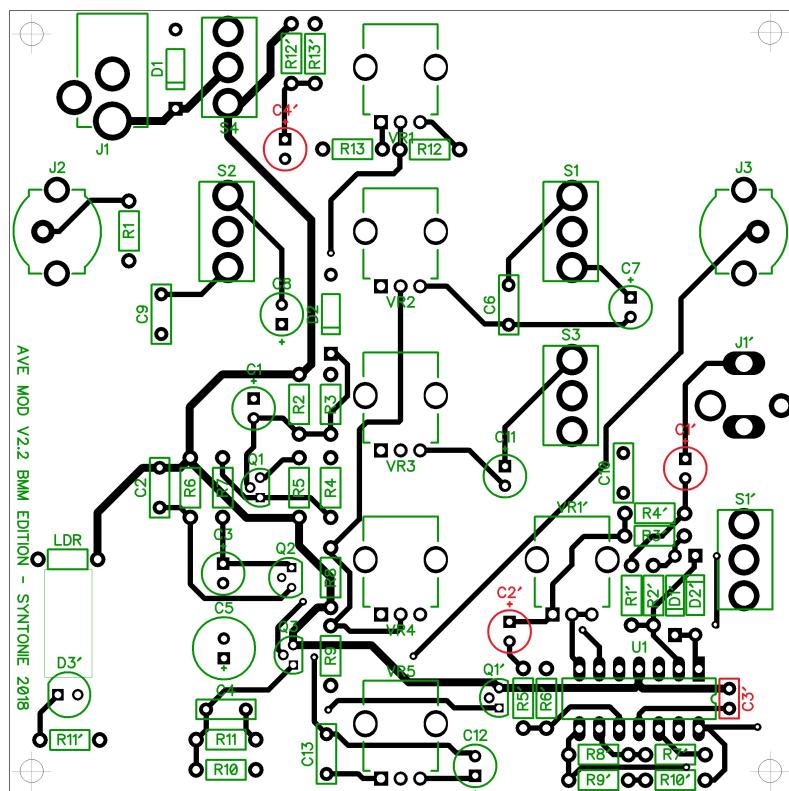
C4': 100uF

Ceramic:

C3': 100nF (yellow body marked 104)

Notes:

- Electrolytic capacitors are polarized, check for their good orientation. Bend them 90° degrees as before.
- C3' is a ceramic film capacitor, it has a different shape than the film one we used before.



c. Semiconductors:

U1: TL074

Q1': 2N3904

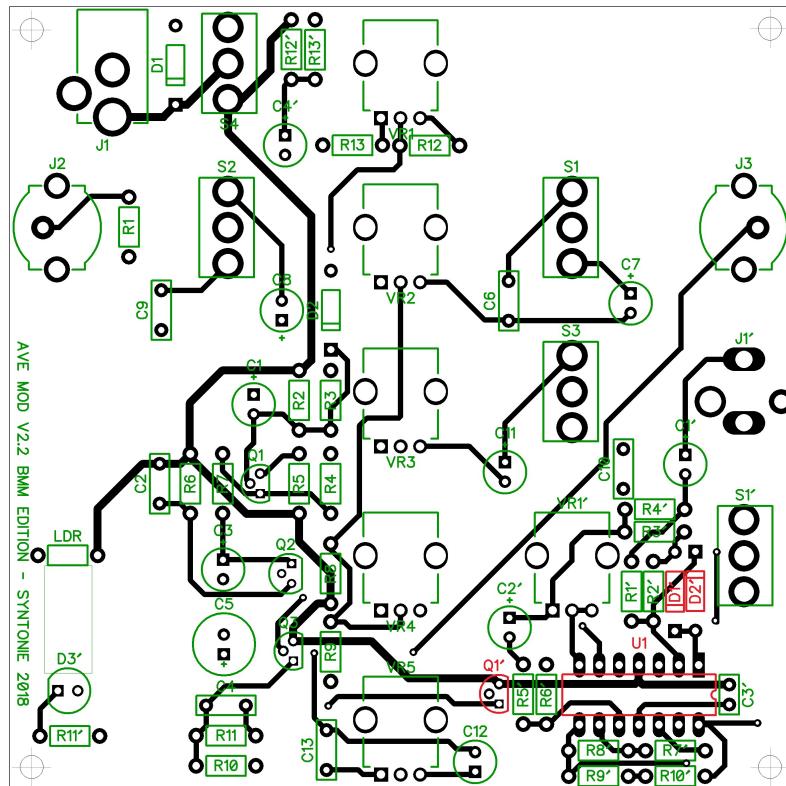
D1': 1N4148

D2': 1N4148

Notes:

- U1/TL074 should come with an IC socket, solder the socket to the pcb and then put the TL074 chip into the socket, it will make things easier in the case there is something wrong with the circuit. Make sure the little notch on the IC and IC sockets matches with pcb marking.

- Q1' is a 2N3904, make sure the flat side of the transistor match the straight line on the pcb.
- Mind the orientation for the two diodes, D1' and D2', the black band on the diode body should match the white line on the pcb.



D. Hardware:

VR1': 100k potentiometer center identified (marked B104)

S1': SPDT ON-OFF-ON

J1': PJ301BM 3.5mm mono jack

Notes:

- Check that each part sits straight on the pcb.

- S1' is a ON-OFF-ON switch (3 positions)

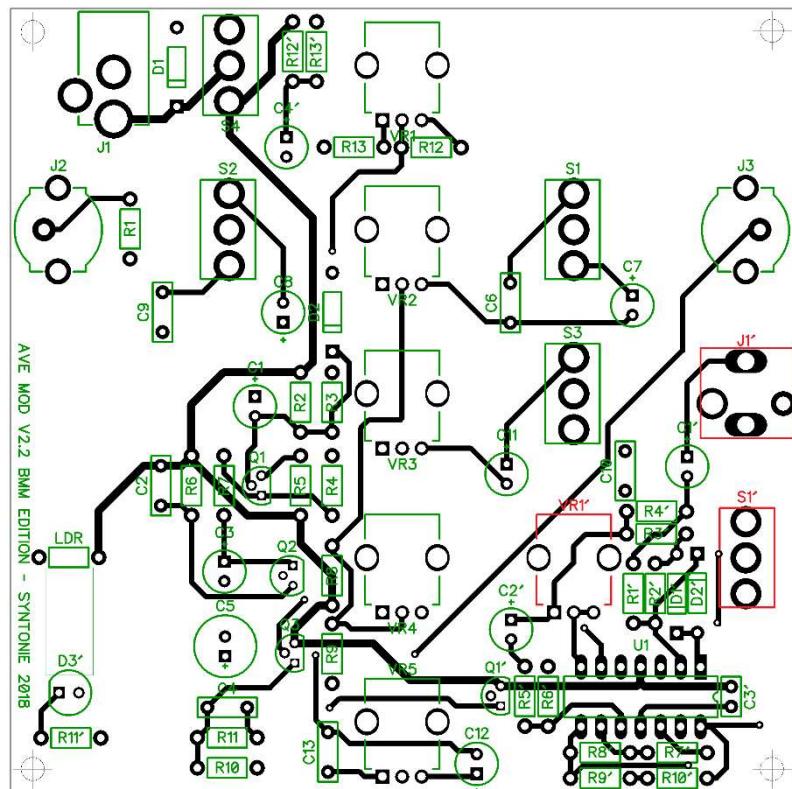
- Now that everything is soldered in place, it's time to test the audio part. Plug the power supply, video source and monitor as before, and also plug an audio source to J1'.

*When S1' is at its center position, audio doesn't affect the video.

*When S1' is up, the audio modulate the video. You can act on modulation depth by turning VR1' from fully ccw to center.

*When S1' is down, the audio modulate the video but inverted this time. You can act on modulation depth by turning VR1' from cw to center.

- The LED (D3') contained in the vactrol should light up when audio is plugged in J1', if it doesn't light up, check that S1' is up or down, and that VR1' is set around center. If it still doesn't light up, check that very components is at the right spot with the right orientation. Also keep in mind that the circuit is an envelope follower, which means it will work best with stuff that has a good dynamic like drums for exemple. Also check the volume from the audio source, while testing with my phone, I need to be around max volume, no problem with a mixing desk however.



IV. Enclosure assembly

Parts needed:

- Laser cut enclosure (front panel, back panel, 1 short side board, 1 short side board with hole for power supply connector, and 2 long side board)
- Rubber feet x4
- 30mm F/F spacer x4
- M3 screws x8

First remove all the nuts from the switches and just leave the tooth washers (the one with the little tooth), don't mix the ON-ON and ON-OFF-ON nuts/washers as the size is a bit different.

Next, put the front panel, and secure it by putting the washer + nut of each switch. Also put a nut on J1', mono jack. Tighten them well. You'll notice that the jack is a bit taller than other parts, so the enclosure might bend a bit there but it's not an issue.

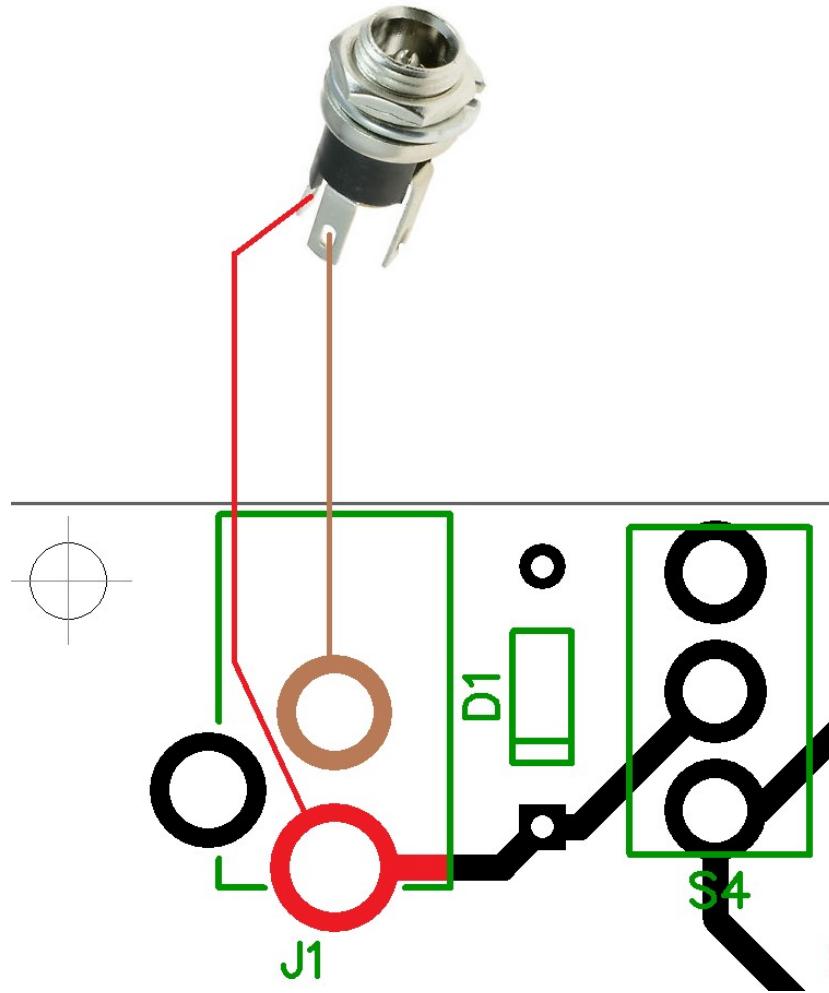
Then, using 4 M3 screws, fit the 4 spacers on the pcb side of the front panel. Then put the 4 side boards, the short one with a hole goes on the power connector side, opposite side is the short one without a hole, and the 2 longer ones on the right and left side.

Put the back panel, and screw it to the spacers using the 4 M3 screws left.

Using panel mount parts:

Power connector:

- Red is +9V and brown is GND, the drawing under shows how the connector should be wired using a 9VDC **center positive** power supply. In doubt, before soldering the connector, plug your power supply to the connector and check with a multimeter to determine which pin is which. The third pin on the connector and pcb are not used.

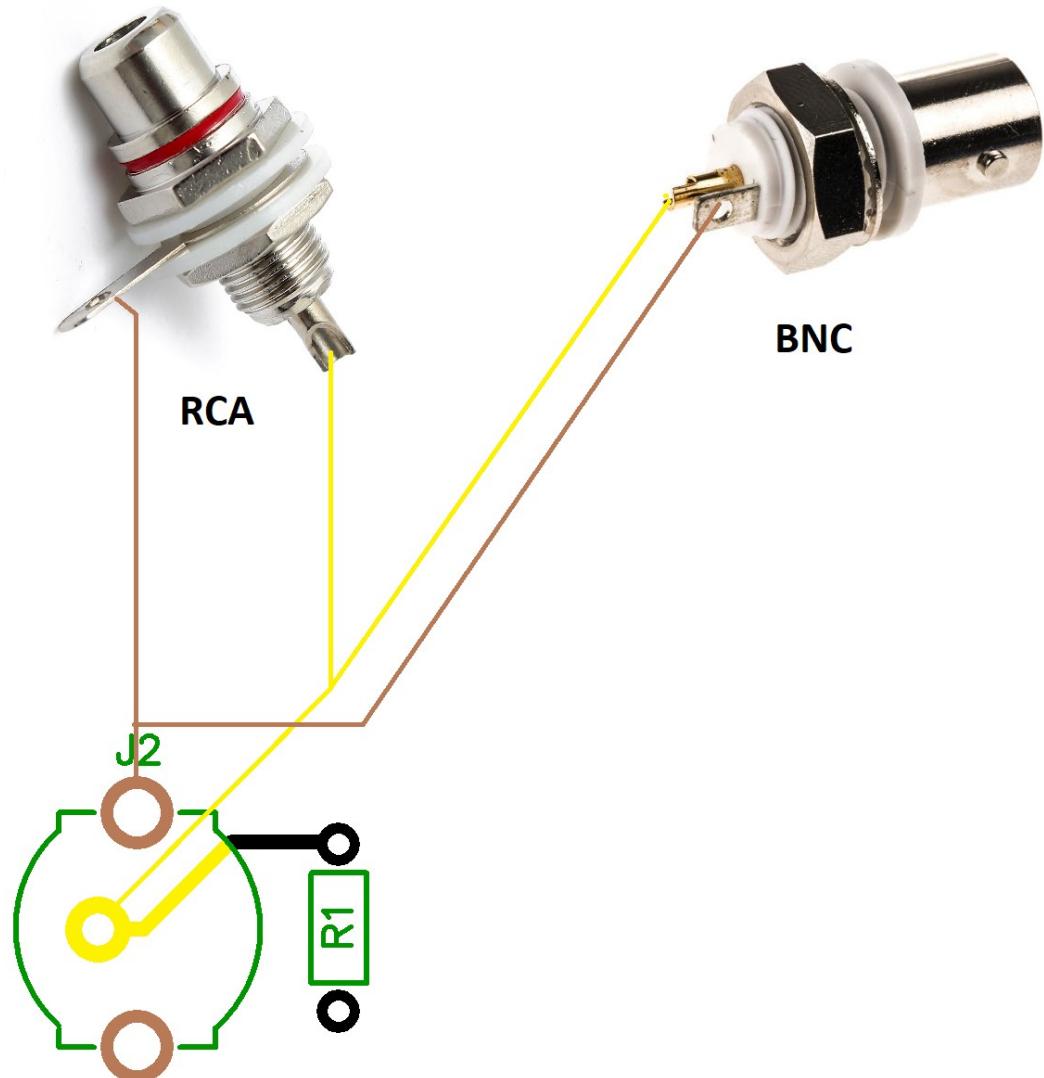


- If you plan to house multiple AVE MOD under one enclosure, you can use only one power supply to power all of them, just remember that each AVE MOD need 100mA minimum.

To do that, just wire the +9V (red) to the +9V of the second board and same for GND (brown), etc...

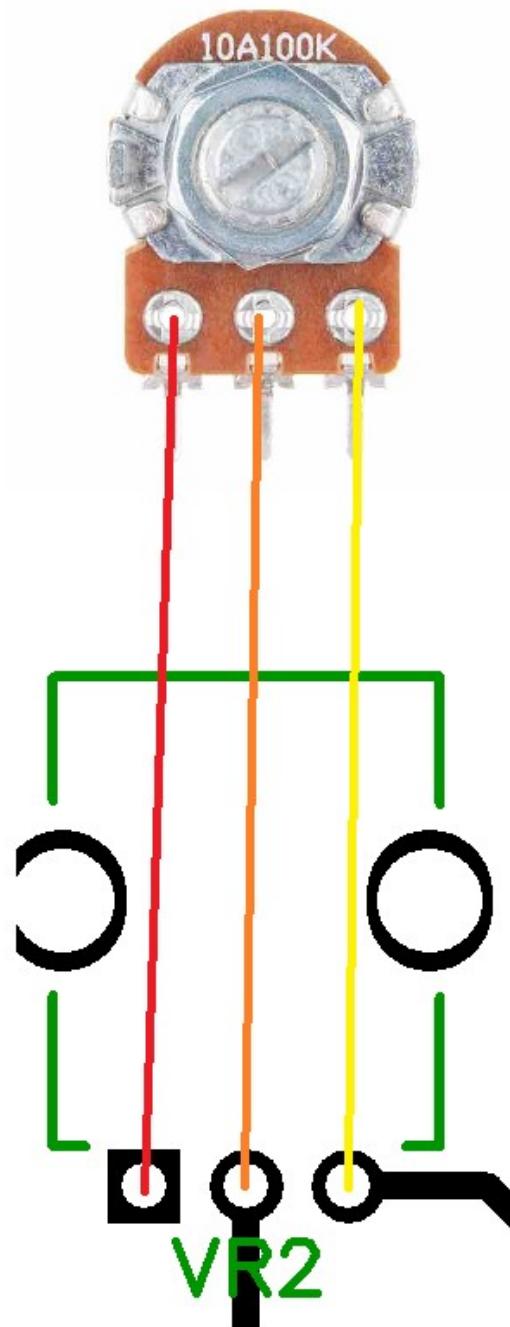
RCA connectors:

- Yellow pad is the one for the signal and brown pads are for GND. You just need to use one of the 2 GND pads. Wire them according to the connector you'll use, both panel mount RCA and panel mount BNC should work.



Potentiometers:

- Pots should be wired this way, note that the two bigger pads are not used here as they are used to attach the pcb mount pot to the pcb.



Audio jack:

- Red is the audio signal pin, yellow is the jack switch pin and is tied to ground, and brown is GND pin. The wiring will depend of the connector type you'll use, a RCA socket will not have a switch so you don't need to wire it. Check the pinout of the connector you use and wire it accordingly.

