● 12HP Eurorack Module ● Built & designed in E.U. ● www.shakmat.com

Shakmat Dual Dagger Building Guide

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1. Preamble

Thank you for purchasing a Shakmat DIY kit !

We spare no effort in our kit packing process to prevent any mistakes or missing parts. In this document as well, we do our best to describe the assembly process in the most practical and comprehensive way. If by any chance there is a missing/damaged part in your kit or if you have any suggestion, feel free to contact us via shakmat.com.

We strongly advise you NOT to spill all the bags open and mix their components. Some of them are virtually indistinguishable (like LEDs that all appear clear when inactive). We recommend to only take the neccesary component out of its bag, or to empty the bags in separate & marked containers. For each step, next to the component's graphic representation, there is a reference indicating where to find it (i.e. P1 for Pack 1, or LP for Loose Part).

The assembly process will be dramatically simplified if you follow the order defined by this building guide. We tested various orders of steps before finding the most convenient, and the one presented here is the best!

2. Component list & necessary tools

Pack 1

6x 50K trimmer
1x 6 pin male header
1x 6 pin female header
1x 3 pin male header
1x 2x5 pin power header
1x Jumper
3x Metal potentiometers
3x Metal potentiometer nuts

Pack 2

4x 1K trimmer
2x 8 pin male header
2x 8 pin female header
3x Slide switch
9x Jack connectors
9x Jack connectors nuts
2x M3 metal screws

Pack 3

1x Top PCB
1x Bottom PCB
1x Front Panel

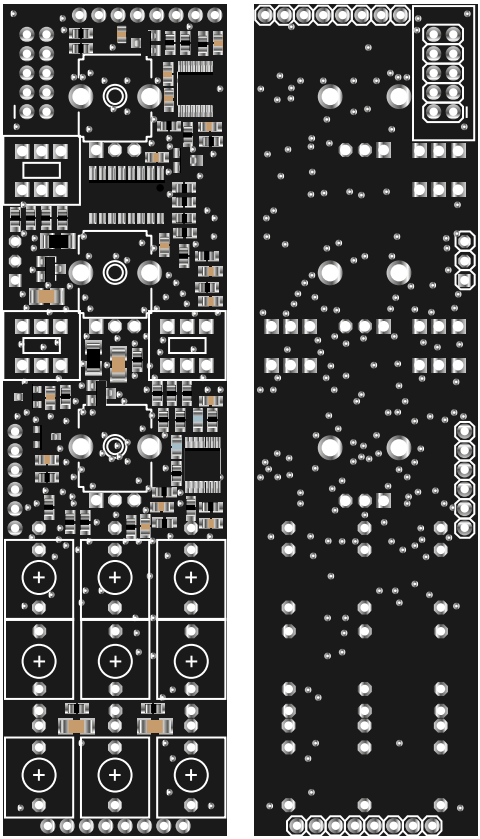
Loose parts

3x Black rubber knobs
1x Power cable
1x User manual

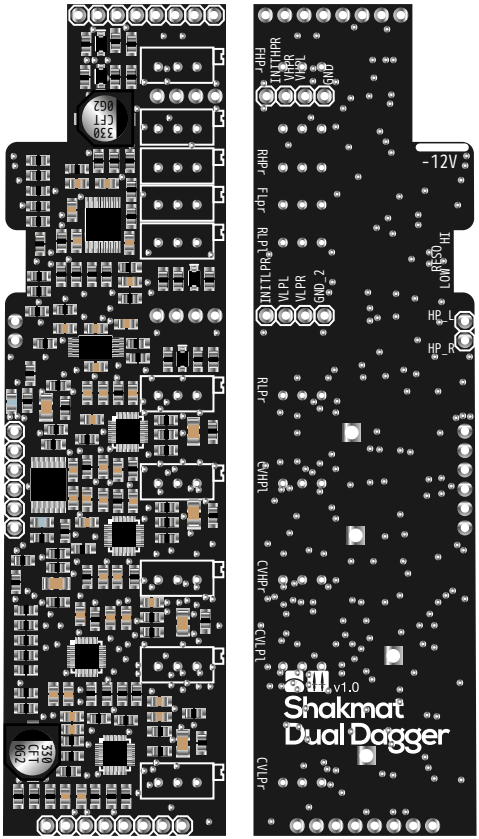
Necessay tools

Soldering iron
Solder
Cutting pliers
Masking tape

3. PCB details

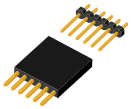


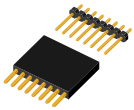
Top PCB
Front & back



Bottom PCB
Front & back

4. PCB stacking

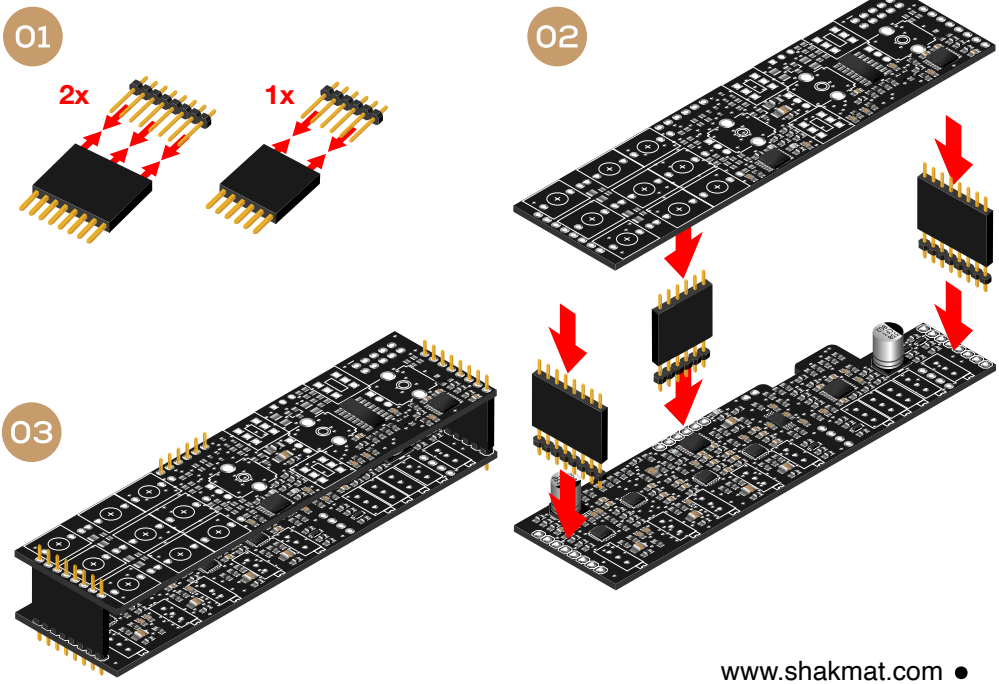
6 pin headers (x1)  P1

8 pin headers (x2)  P2

We begin by joinning and solder the two PCBs together. Be careful during this step, if you solder every pin and the PCBs arn't well aligned, you will likely not be able to correct it. To stack the two PCBs together, headers are used. There are two pairs of 8 pin male & female headers and one 6 pin pair.

First assemble all the headers with their mate. Then place the female part on the bottom PCB and the male part through the top PCB. Then assemble the two boards toghether and proceed to the soldering.

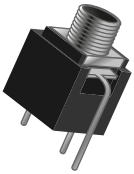
You will first only solder one pin of each header. It is important that you firmly hold the two PCBs against each other while soldering. There must be no gap between the PCBs and the header's black plastic part between them.Once you've soldered the first point of each header and check the alignment, you can move on and carefuly solder the remaining points.



5. Top PCB assembly

5.1 Front

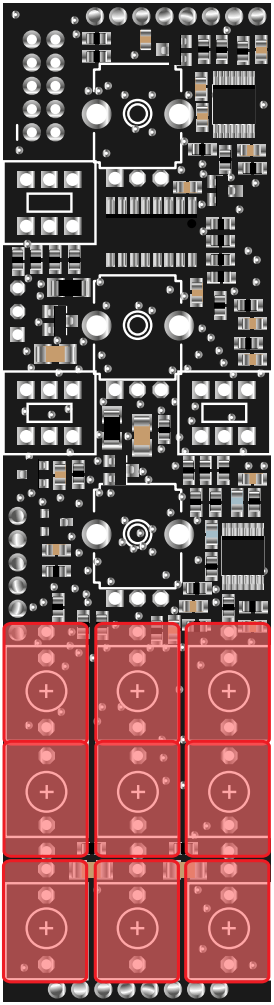
5.1.1 Jack connectors (x9)



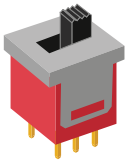
P2

Disconnect the two PCBs and proceed to the following steps with the top PCB only. Place and solder the 9 jack connectors. Be sure to lay them completely flat on the PCB before soldering. If those jacks aren't perpendicular, the front panel will be very hard to mount.

If one of the jacks is not perfectly perpendicular with the PCB, you can reheat the pads and push it down with your thumb to re-align.

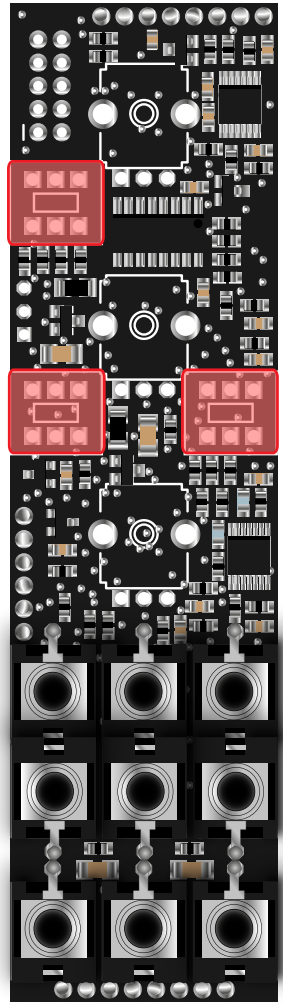


5.1.2 Slide switches (x3)

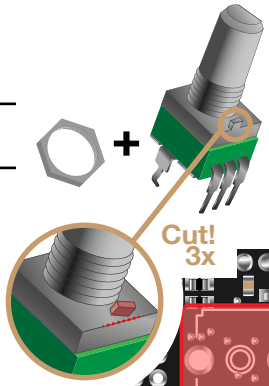


Place and solder the 3 slide switches. Be sure to lay them flat on the PCB when soldering.

We recommend you only solder one of the pin, check alignement and if you are satisfied with you placement, solder the remaining pins.



5.1.3 Potentiometers & nuts (x3)



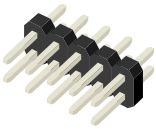
Before soldering, you will have to cut a little metal piece off the top of each potentiometer, as shown in the picture. This little stud prevents the front panel from sitting properly. Use some small & sharp cutting pliers for this task.

Then, place the 3 potentiometers on the PCB. Mount the front panel and tighten the potentiometers nuts lightly (this will ensure a proper placement of the pots) and then solder them.

Once you have soldered everything, remove the nuts, the front panel and proceed to the next step.

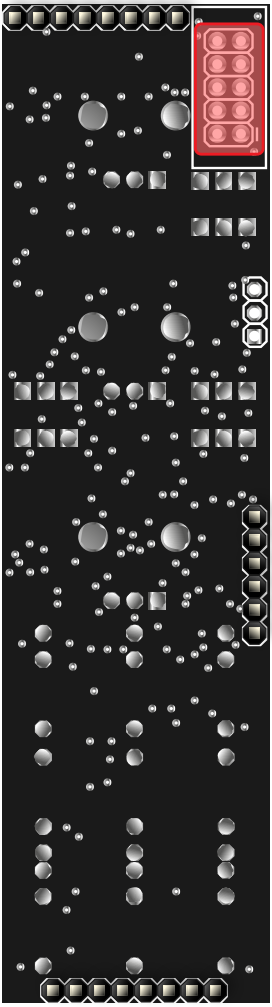
5.2 Back

5.2.1 Power header (2x5 pin)

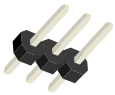


P1

Place the power header, the short pin side in the holes and solder only one of the pins. Check the alignment and correct if necessary. Then, once your component is upright and flat on the PCB, solder the remaining pins.



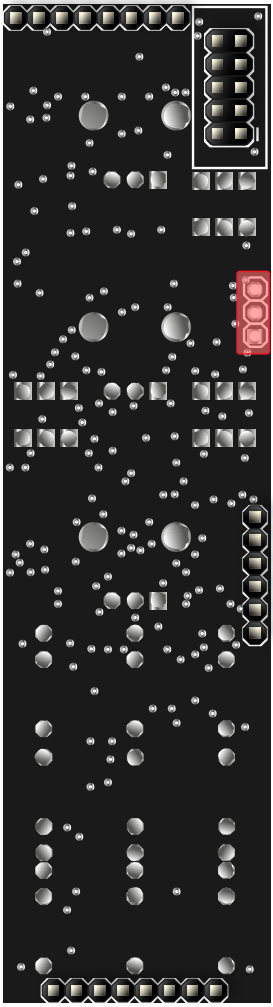
5.2.2 Male header (1x3 pin)



P1

Place the 3 pin male header, with the short pin side through the hole. Be sure to lay it flat and upright. This header will later receive a jumper and control the resonance amount.

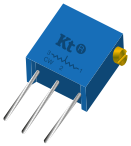
We recommend you only solder one of the pins, check the alignment. If necessary, reheat your soldered point and simultaneously press the plastic part of the header against the PCB until it's flat. Take off the soldering iron but keep pressing. Avoid touching the pin itself because it will become hot very quickly and move out of alignment within the plastic bracket. Once you are satisfied with you placement, solder the remaining pins.



6. Bottom PCB assembly

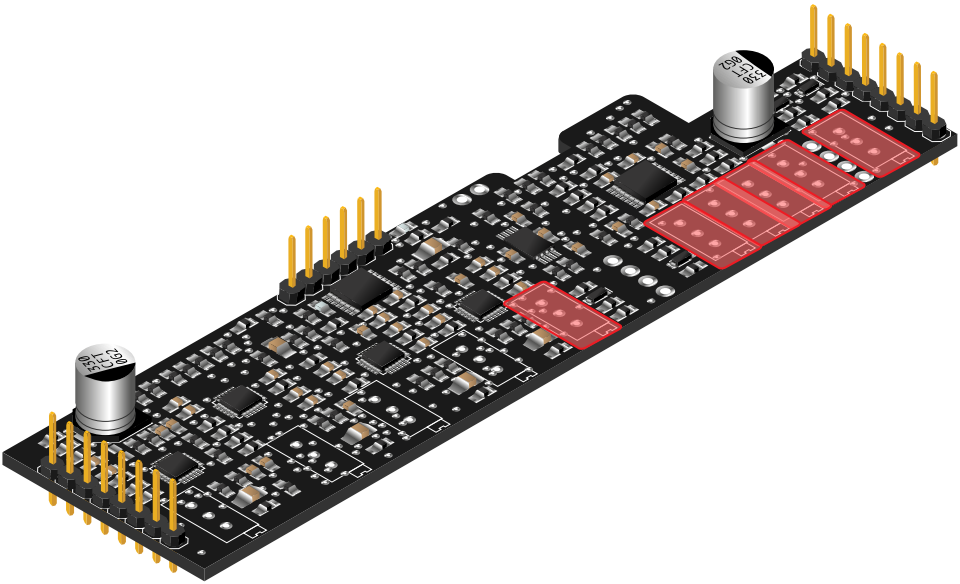
6.1 Front

6.1.1 Trimmers 50k (x6)

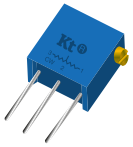


P1

Detach the two PCBs and continue with the bottom PCB. Place & solder the 6 50k trimmers one by one. **Those trimmers have 503 marked on them.** Be careful to put them in the right direction. The little adjustment screw must be pointing outward (see next page for an illustration of the mounting direction)

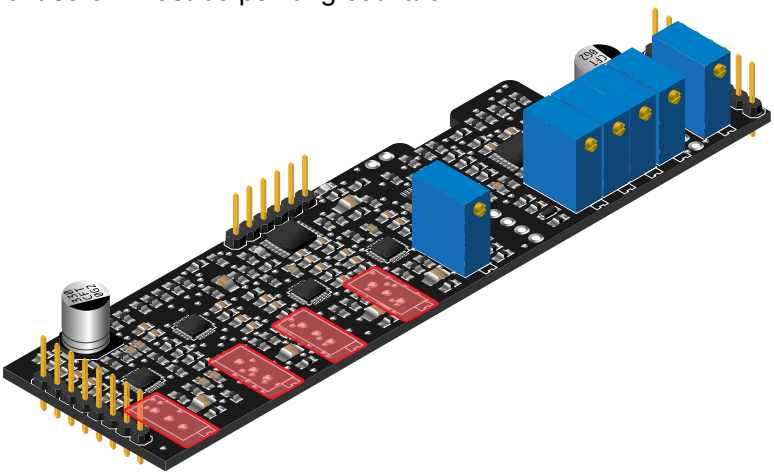


6.1.2 Trimmers 1k (x4)



P1

Place & solder the 4 1k trimmers one by one. **Those trimmers have 102 marked on them.** Be careful to put them in the right direction. The little adjustment screw must be pointing outward.



7. Finish

You're almost done! The last thing to do is to mount the front panel and place the nuts on the potentiometers and jack sockets.

Push the three knobs onto their metal potentiometer. Place de jumper over the three pin header on the back of the module. This jumper allows to set the range of the resonance potentiometer. In "Lo" position the range is limited, avoiding the filter to self-oscillate. In "Hi" position the resonance can go much higher, allowing self-oscillation.

Potentiometer nuts (x3)		**P1**
Jack nuts (x9)		**P1**
Knobs (x3)		**LP**
Jumper		**P1**

8. Calibration

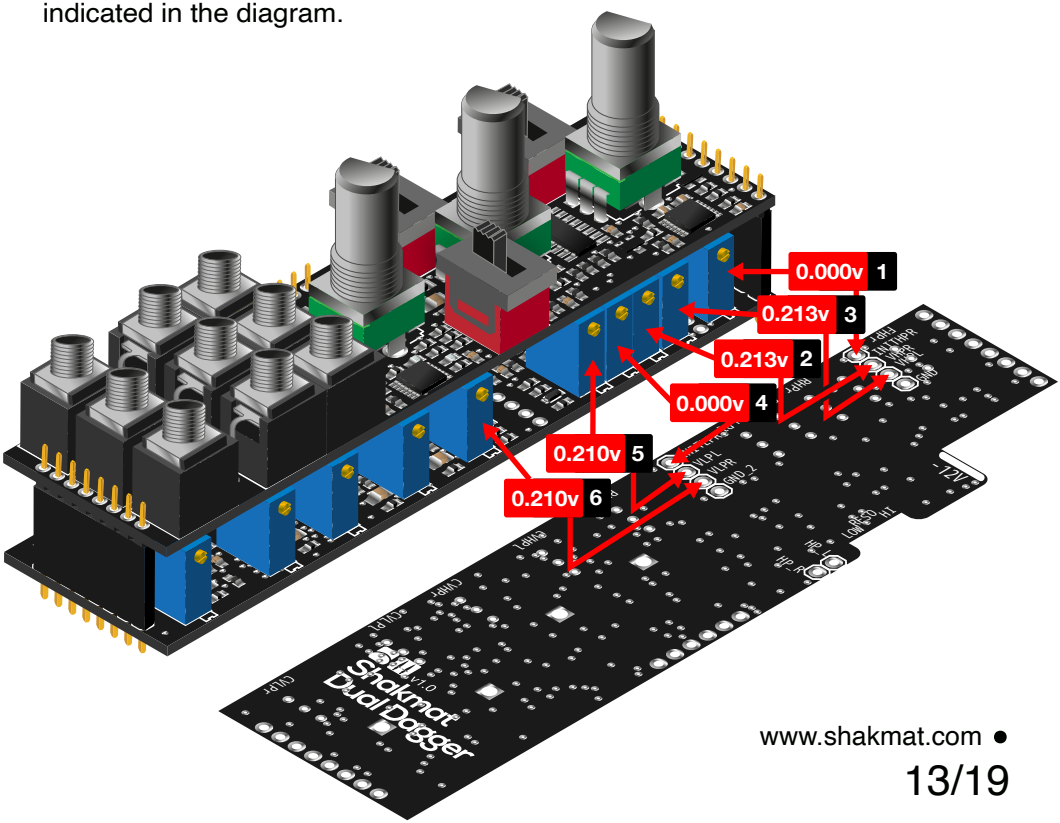
8.1 Range adjustment

The range adjustment can be made in two ways, either by using a multimeter or by using your ears.

8.1.1 Range adjustment using a multimeter

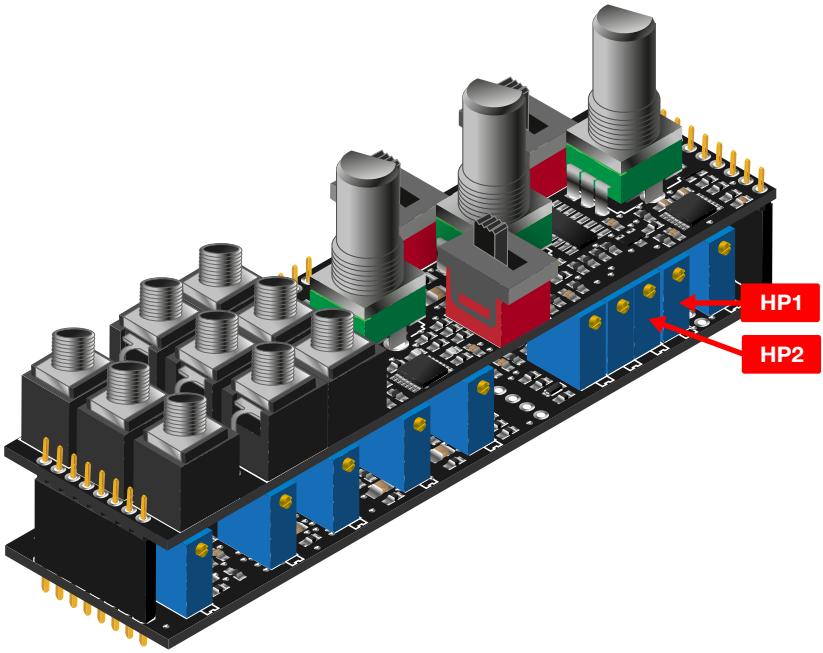
Plug the power cable (red stripe on the -12v side) and turn the module on. All the switches must be off (cursor on the left) and all the potentiometers must be turned fully conterclockwise. It is also important to set the resonance jumper at the back of the module to the HI postion. Connect the negative probe of your multimeter to a ground point with an alligator clip (clip to the sleeve part of a jack connector patch cable connected to one of the jack of the module).

According to the diagram below, check the voltage on the first test point and adjust the associated trimmer until you reach the desired voltage. Then, do the same for the five other test points. It is very important, to follow the order indicated in the diagram.



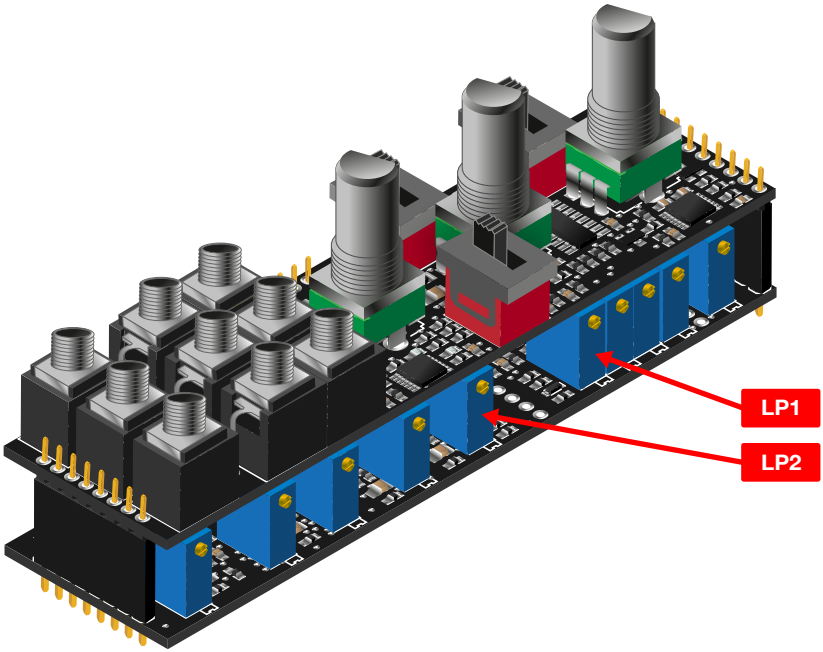
Range of the HP Filter
Connect a well calibrated V/Oct Source to the HPF CV input. Set the LPF & RES potentiometers fully clockwise. Activate the HPF resonance switch by pushing it toward the right. The LPF resonance switch must be off and the HPF potentiometer at noon.

The HP1 trimmer on the diagram below, sets the range of the first highpass filter. Listen to OUT 1, you should hear the filter auto-oscillate. Play on 3 octaves with your V/Oct Source. While playing on 3 octaves, adjust the HP1 trimmer until the interval you hear is as close as possible to 1 octave between each note. Do the same procedure using OUT 2 and the HP2 trimmer.



Range of the LP Filter
Connect a well calibrated V/Oct Source to the LPF CV input. Set the HPF potentiometer fully counterclockwise. Set the RES potentiometer fully clockwise. Activate the LPF resonance switch by pushing it toward the right. The HPF resonance switch must be off and the LPF potentiometer at noon.

The LP1 trimmer on the diagram below, sets the range of the first lowpass filter. Listen to OUT 1, you should hear the filter auto-oscillate. Play on 3 octaves with your V/Oct Source. While playing on 3 octaves, adjust the LP1 trimmer until the interval you hear is as close as possible to 1 octave between each note. Do the same procedure using OUT 2 and the LP2 trimmer.

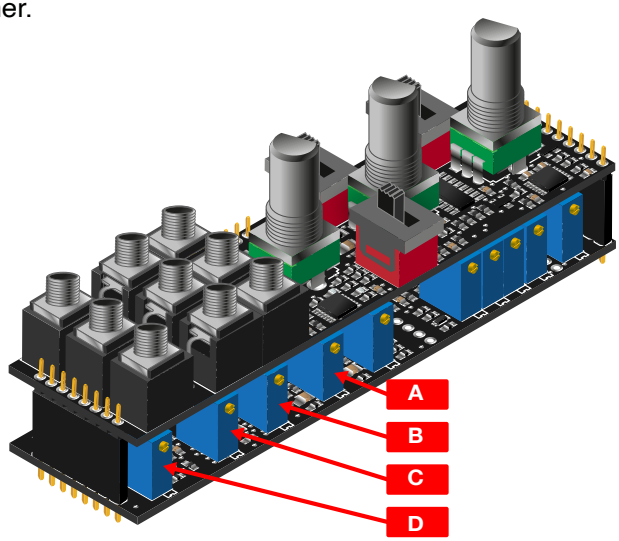


8.2 CV rejection adjustment

8.2.1 Highpass

All the switches must be off. Turn the LPF potentimeter fully clockwise and the HPF potentiometer fully counterclockwise.

Patch an audio signal in the HPF CV in(a 200Hz triangle wave is ideal). Listen to OUT 1, you should slightly hear the audio signal. Turn the trimmer A until you reach the maximum possible attenuation. Do the same for OUT 2 using the B trimmer.



8.2.2 Lowpass

All the switches must be off. Turn the LPF & HPF potentimeters fully counter-clockwise.

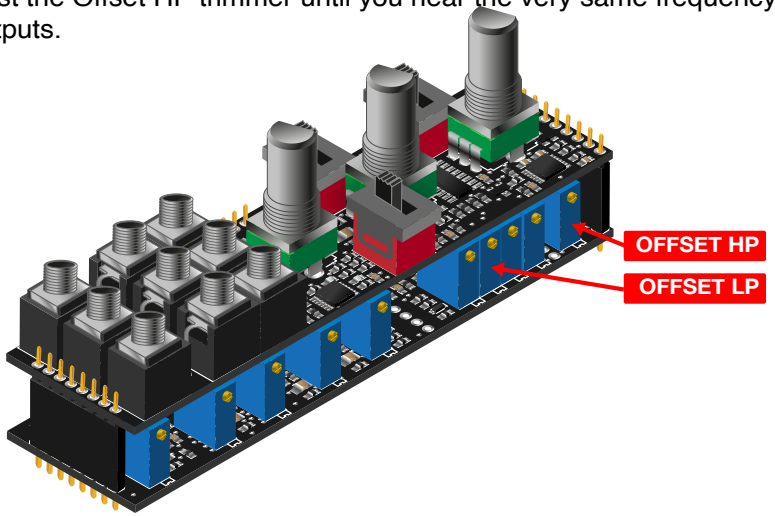
Patch an audio signal in the LPF CV in (a 200Hz triangle wave is ideal). Listen to OUT 1, you should slightly hear the audio signal. Turn the trimmer C until you reach the maximum possible attenuation. Do the same for OUT 2 using the D trimmer. If you have access to an oscilloscope you can use it instead of your ears.

8.3 Offset adjustment

8.3.1 Highpass

Turn the LPF & RES potentimeters fully clockwise.
Activate the highpass resonance switch (the lowpass resonance switch must be off), set HPF potentiometer at noon.

Listen to OUT 1 & 2
At this point you may hear that out 1 and 2 are slightly out of tune with each other. Adjust the Offset HP trimmer until you hear the very same frequency on the two outputs.



8.3.2 Lowpass

Turn the HPF potentimeter fully counterclockwise and the RES potentiometer fully clockwise. Activate the lowpass resonance switch (the highpass resonance switch must be off), set LPF potentiometer at noon.

Listen to OUT 1 & 2
At this point you may hear that out 1 and 2 are slightly out of tune with each other. Adjust the Offset HP trimmer until you hear the very same frequency on the two outputs.

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