# Assembly Guide



https://vocoder.hoerold.com

# Contents

1	Expected Level of Experience	3
2	Main Steps	3
3	List of Components	4
4	Solder Wire and Tools	5
5	Getting Familiar With the Preassembled PCB	5
6	Assembly of Power Socket and Pin Headers	6
7	Assembly of All Components, Except LEDs	7
8	Assembly of the LEDs	8
9	Finalizing the Assembly With the Knobs and Caps	10

# List of Figures

1	DIY kit overview	4
2	PCB front side	5
3	Potentiometers with leads cut off	5
4	PCB backside with power and pin headers inserted	6
5	All components placed, except LEDs	7
6	All components secured to the front panel	7
7	All LEDs inserted, top view	8
8	All LEDs inserted, side view	8
9	All LEDs dropped in their sockets	8
10	All components placed and soldered, backside	9
11	All components placed and soldered, front view	9
12	Concentric viewpoint of knob for proper cap alignment	0
13	Misaligned viewpoint for cap placement	0
14	Final VoIS Modular assembly 10	0

# **1** Expected Level of Experience

This assembly guide is a step–by–step description for building the VoIS Modular, a 15-Channel Eurorack Vocoder and Fixed Filter Bank. The DIY kit is targeted at do–it–yourself enthusiasts that already have solid experience with assembling and soldering Eurorack modules.

The PCB is already preassembled with SMD components. Be sure to treat it gently and do not bend it. The PCB needs to be finalized with the addition of several through–hole components. There are a few tight spaces where soldering is needed just a couple of millimeters away from SMD components. If you do not have very good experience with soldering or do not feel comfortable soldering in tight spaces, please do not attempt this project.

You will also have to bring up a lot of patience for the mechanical assembly. Therefore please read through the entire document first and familiarize yourself with the individual steps. Only then start the assembly. You do not want to waste time searching for problems or, even worse, mutilate your module while desoldering incorrectly placed components or fix other mistakes. You also do not want a module that works intermittently or exhibits obscure behavior because of cold or missing solder joints.

Do not rush through the project. While most components withstand high soldering temperatures, do not overheat components or keep them heated up for too long. This is particularly important for the LEDs as the plastic lenses tend to soften up quickly. Therefore do not heat the leads of the LEDs for more than 3 to 5 seconds. If an attempt to solder an LED lead fails, give it enough time to cool down, then try again.

Expect to spend a total of about two to three hours on this project. About two thirds of the time is required for manual assembly and about one third for soldering. No measuring equipment is needed. There is also no calibration required.

Have fun with your do-it-yourself project.

## 2 Main Steps

Here are the principal steps for going through the assembly of the VoIS Modular vocoder:

- 1. Verify that your do-it-yourself kit is complete.
- 2. Prepare solder wire and tools.
- 3. Get familiar with the PCB.
- 4. Solder the power socket and the two pin headers on the backside of the PCB.
- 5. Insert all components except the LEDs into the PCB, secure them to the front panel, then solder them.
- 6. Remove the front panel, insert the LEDs, secure the components permanently and solder the LEDs.
- 7. Push the knobs onto the potentiometers and insert the caps.

# 3 List of Components

Please check that your DIY kit contains the following parts and components:

- 1× Preassembled printed circuit board (PCB)
- $1 \times$  Front panel (either black or silver)
- 21× Black knobs (Sifam TPN110)
- 15× White caps
- 4× Light gray caps
- 2× Dark gray caps
- 4× Audio jacks (PJ398SM) + nuts
- $2 \times$  Pin headers + jumpers
- 1× Miniature on-off-on switch (3 settings 2MS3T1B1M2QES)
- 3× Miniature on-on switch (2 settings 2MS1T1B1M2QES)
- $4 \times$  Toothed washers and nuts for miniature switches
- $17 \times 3 \text{ mm LEDs, red (TLLR4401)}$
- $3 \times 3 \text{ mm}$  LEDs, green (TLLG4401)
- $19 \times 9 \text{ mm}$  Alpha potentiometers, lin.  $10 \text{ k}\Omega (B10\text{K} \text{RD901F-40-15K-B10K})$
- $2 \times 9 \text{ mm}$  Alpha potentiometers, log.  $50 \text{ k}\Omega (A50\text{K} \text{RD}901\text{F}-40-15\text{K}-A50\text{K})$
- $21 \times$  Washers and nuts for potentiometers
- $1 \times 10$ -pin shrouded power header
- $1 \times$  Eurorack power supply cable



Fig. 1: VoIS Modular DIY kit components. Note that the ratchet sockets are not part of the kit.

#### 4 Solder Wire and Tools

It is recommended to use lead–free solder with some silver content for better solderability, such as Sn95Ag4Cu1, and a diameter of 0.5 mm. If the recommended solder wire is used, it is suggested to set the solder tip temperature to about 330  $^{\circ}$ C (630  $^{\circ}$ F).

To fasten the potentiometers, the switches, and the audio jacks onto the front panel, three socket sizes are required: 7 mm, 8 mm and 10 mm. To prevent the surface of the front panel from getting scratched, wrap some thin masking tape (crepe tape) around the socket and on the front of it (see the sockets shown in Fig. 1).

A wire cutter is needed to cut off the leads of the LEDs once they have been soldered.

#### 5 Getting Familiar With the Preassembled PCB

Take a closer look at the PCB. All SMD components are located on the backside (the side that will face away from the front panel). That is the side on which the shrouded power socket and the two pin headers are going to be placed. All other components are going to be populated to the front side of the PCB.

On the front side of the PCB, notice the through-holes for the potentiometers. Some of them are inserted upside down (rotated by  $180^{\circ}$ ). Fig. 2 shows two places where through-holes are missing as the area is blocked by the microcontroller placed on the opposite side of the PCB. Prepare two potentiometers with the side leads cut off as shown in Fig. 3: on one pot on the left side and on the other pot on the right side. Make sure you do this with two of the  $10 \,\mathrm{k}\Omega$  potentiometers and **not** with the  $50 \,\mathrm{k}\Omega$  potentiometers.



Fig. 2: *PCB front side showing the area with missing through–holes for two potentiometers* 



Fig. 3: Two  $10 \text{ k}\Omega$  potentiometers with side leads cut off

## 6 Assembly of Power Socket and Pin Headers

First, the headers need to be placed inside the two small rectangles on the backside of the board where the SMD components are placed. Insert and solder the pin headers one by one (the shorter ends of the leads sticking inside the PCB). The two rectangles are marked "2x FFB" and "2x Voc" (see Fig. 4).

Once the pin headers are soldered, insert and solder the shrouded power socket. It is very important that you position the socket with the correct orientation and line up the socket cutout with the thicker line (see Fig. 4).



Fig. 4: Backside of the PCB with power and pin headers inserted.

# 7 Assembly of All Components, Except LEDs

#### • Components insertion:

- 1. Insert the two  $10 \text{ k}\Omega$  potentiometers (B10K) with the cut off leads at the location shown in Fig. 2.
- 2. When inserting the pots in the next two steps, do not force them into the PCB to avoid scratching or damaging the board. The side leads may have to be slightly bent inward for easier insertion.
- 3. Insert the two 50 k $\Omega$  potentiometers (A50K) where it says "100k log". When the board was designed, it was originally prepared for 100 k $\Omega$  potentiometers but 50 k $\Omega$  works just as well.
- 4. Populate the remaining  $10 \text{ k}\Omega$  potentiometers.
- 5. Insert the miniature on–off–on switch (3 settings) in the place where it says "SPDT". This is the switch for the three V/UV settings. The orientation of the switch does not matter.
- 6. Insert the other three miniature on-on switches (2 settings) in the places where it says "SPST". The orientation of the switches does not matter.
- 7. Place the four toothed washers over the miniature switches.
- 8. Insert the four audio jacks properly oriented in their positions.
- 9. Once all components are placed, the PCB should look like shown in Fig. 5. The LEDs will be inserted at a later stage.
- Front panel placement This is the part where you need to take your time. Do not scratch the printed surface of the front panel:
  - 1. Place the front panel over the components. Make sure the front panel is properly seated, sitting flush on top of the bodies of the potentiometers.
  - 2. Place the washers for the potentiometers. Secure all components (potentiometers, switches, and audio jacks) using their respective nuts. Tighten the nuts just enough so that the components have a snug fit for later soldering.
  - 3. Turn over the board and check that all component leads are fully inserted in the PCB by pushing the PCB against the front panel.
  - 4. After securing all components, the assembly should look as shown in Fig. 6.
- Solder all parts. It is not needed to solder the side leads of the potentiometers, just the three active leads.



Fig. 5: All components placed, except LEDs.



Fig. 6: All components secured to the front panel.

# 8 Assembly of the LEDs

Before the LEDs can be inserted, the panel needs to be removed. So unscrew all nuts and remove all washers.

Straighten potentially bent LED leads.

Letter "A" on the PCB front side marks the anode of an LED, the longer of the two leads. Notice that all anodes are to the left of each LED location.

Perform the following steps by holding the PCB in one of your hands:

- 1. Insert the green LEDs in the through-holes oriented in a  $45^{\circ}$  angle, close to the switches.
- 2. Populate all other locations with the red LEDs.
- 3. Let all LEDs drop on the surface of the PCB.
- 4. Check that the four toothed washers are still placed over the switches.
- 5. The assembly should now look as shown in Figs. 7 and 8.
- 6. Once more patience is needed for this step: put the front panel over the components.
- 7. Secure the front panel by putting the washers over the potentiometers for "Slew", "185 Hz", "7000 Hz", and "Voice Level", followed by the corresponding nuts. Tighten the nuts for a snug fit.
- 8. Turn over the assembly and let the LEDs slide into their sockets. You may have to gently adjust and push some of the LEDs into their sockets. Be careful not to scratch the LED lenses. See Fig. 9.
- 9. Check if all LEDs are fully inserted in their sockets by holding up the assembly and looking at the surface of the front panel from beneath.
- 10. Now the assembly does not need to be held in one hand anymore. Put the assembly down on the work surface, potentiometers facing down so that the LEDs remain in their sockets.
- 11. Solder the LEDs one by one and keep checking that the LEDs are properly seated while soldering. Make sure the LEDs do not get too hot while soldering.
- 12. Cut off the leads just above the solder joints using a wire cutter.



Fig. 7: All LEDs inserted, viewed from the top.



Fig. 8: All LEDs inserted, viewed from the side.



Fig. 9: All LEDs dropped in their sockets. This is a also good viewing angle to check if the longer leads are all on one side.



Fig. 10: All components placed and soldered, backside.



Fig. 11: All components placed and soldered, front view.

# 9 Finalizing the Assembly With the Knobs and Caps

- 1. Add all remaining washers and nuts for the potentiometers, switches and audio jacks.
- 2. Tighten all nuts with the corresponding sockets. Do not overtighten the nuts as otherwise the front panel surface may get scratched.
- 3. Put the 21 knobs over the potentiometers.
- 4. Turn all potentiometers fully clockwise.
- 5. Remember that the white caps go on the channel controls, the four mid gray caps are meant for the effects and the two dark gray caps are for the volume controls.
- 6. Do the following for each knob: Look straight down a knob, best with one eye closed, so that the knob appears centered and parallax error is minimized. Add a cap in such a way that the indicator lines up with the last line of the dial and push it onto the knob. See Figs. 12 and 13.



340 Hz 🥝

Fig. 12: Looking straight down a knob for proper placement of the cap. The indicator line of the cap is aligned with the last tick of the dial.

Fig. 13: *This is a bad viewing angle as the image is not concentric.* 

Congratulations, your assembly is done! Just add the power cable and mount the vocoder in your Eurorack.



Fig. 14: The finalized VoIS Modular assembly.