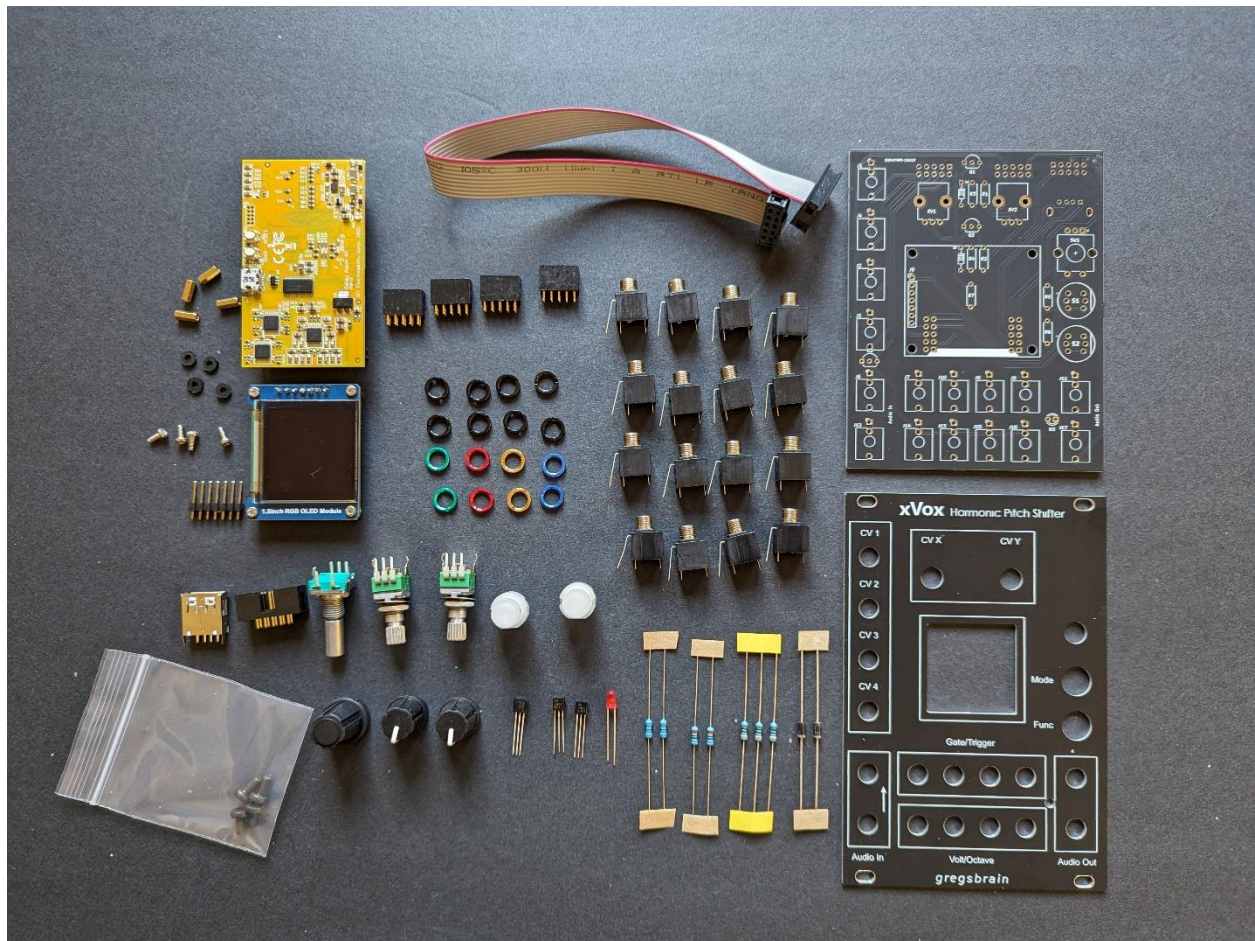




gregsbrain
EURORACK MODULAR

Build guide for the xVox Harmonic Pitch Shifter (rev 3.2)

xVox is a single PCB all through-hole build. Depending on your experience you can expect the complete assembly to take about two hours. Pace yourself and check your solder joints after every step, preferably with a magnifying glass. This will save you some trouble-shooting time later. The xVox software is preinstalled on the included Electrosmith Daisy Patch Sub-module.



Bill of materials

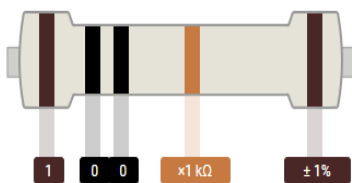
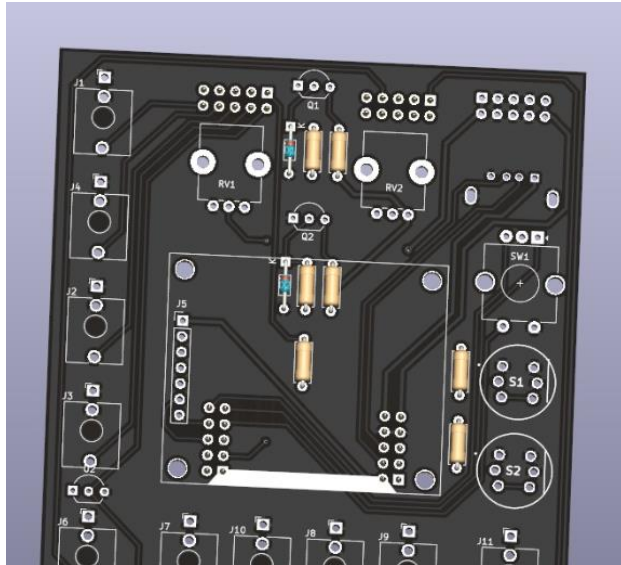
Before starting check that all the parts listed are present and undamaged in your build kit. Note that some of the parts, for example the plastic washers, are quite small.

	Qty	Reference(s)	Item	Description
1	2	D1, D2	Diode	<i>IN4001 diode</i>
2	1	D3	LED	<i>LED</i>
3	16	J1-J4, J6-J17	Jack socket	<i>Thonkiconn-style 3.5mm jack socket</i>
4	1	J5	Pin header	<i>1x7 male header</i>
5	1	J18	Shrouded header	<i>Eurorack 16 pin power connector</i>
6	1	J19	USB A socket	<i>Vertical mount USB A socket</i>
7	4	J20-J23	Pin header	<i>2x5 female header</i>
8	2	Q1, Q2	Transistor	<i>2N3904 NPN switching transistor</i>
9	2	R1, R2	Resistor	<i>10K 1/4-Watt 1% resistor</i>
10	2	R3, R4	Resistor	<i>100K 1/4-Watt 1% resistor</i>
11	3	R5, R6, R7	Resistor	<i>330 1/4-Watt 1% resistor</i>
12	2	RV1, RV2	Potentiometer	<i>10K potentiometer with washer and nut</i>
13	2	S1, S2	Pushbutton	<i>SPST pushbutton switch with LED</i>
14	1	SW1	Rotary encoder	<i>EC11 rotary encoder with switch</i>
15	1	U2	Voltage reference	<i>LM4040LP-3 precision 3.0V voltage ref</i>
16	4	N/A	Standoff	<i>7mm f/f brass standoff</i>
17	4	N/A	Washer	<i>Plastic washer</i>
18	4	N/A	Screw	<i>M2 screw</i>
19	1	N/A	Ribbon cable	<i>Eurorack 16 pin power connector</i>
20	1	N/A	OLED display	<i>Waveshare 1.5" 128x128 RGB OLED module</i>
21	1	N/A	Daisy Submodule	<i>Electrosmith Daisy Patch SM</i>
22	4	N/A	Screw	<i>Rack mounting screws</i>
23	8	N/A	Dress nut	<i>Black dress nut for 3.5mm socket</i>
24	2	N/A	Dress nut	<i>Red dress nut for 3.5mm socket</i>
25	2	N/A	Dress nut	<i>Yellow dress nut for 3.5mm socket</i>
26	2	N/A	Dress nut	<i>Blue dress nut for 3.5mm socket</i>
27	2	N/A	Dress nut	<i>Green dress nut for 3.5mm socket</i>
28	1	N/A	PCB	<i>xVox PCB Rev 3.2</i>
29	1	N/A	Front panel	<i>xVox aluminum front panel</i>
30	2	N/A	Knob	<i>Soft touch knob with indicator</i>
31	1	N/A	Knob	<i>Soft touch knob without indicator</i>

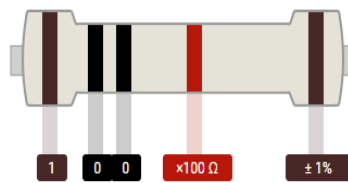
Getting Started

The best way to build the module is to start with the lowest profile components and work up to the highest profile components. There are components on both sides of the board. You will not be soldering any particularly ESD sensitive parts, but an ESD Safe soldering station is preferred if you have access to one.

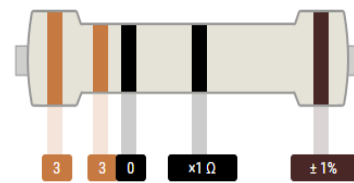
1: Resistors and diodes



Resistor value:
100k Ohms 1%



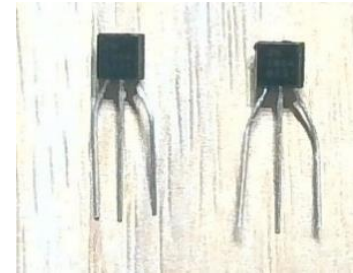
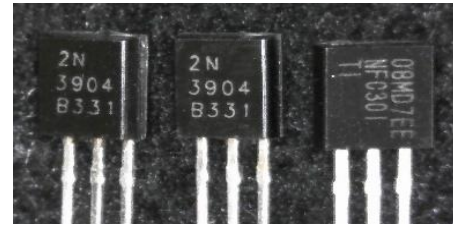
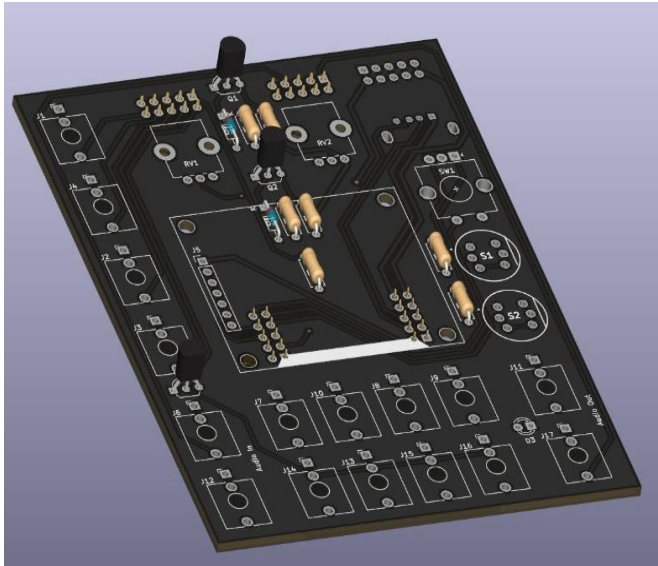
Resistor value:
10k Ohms 1%



Resistor value:
330 Ohms 1%

There are seven resistors and two diodes. Five band resistor color codes can be hard to read; if necessary, check the values with an Ohmmeter if you have one. The resistor numbers are marked on the PCB silkscreen. From the BOM table above R1 and R2 are 10KΩ, R3 and R4 are 100KΩ, and the remaining R5, R6, and R7 are 330Ω. Pay attention to the orientation of the diodes and make sure the line on the diode aligns with the marked lines on the PCB. Once you have inserted the components in the PCB invert it on your work surface and they should all lie flat against the PCB. Solder the components and clip the leads.

2: Transistors and voltage reference



There are two 2N3904 transistors and one LM4040 voltage reference source. Place close attention to the markings on these components, they each have three leads and look very similar, you might need a magnifying glass. To make it easier to solder these devices the spacing of the pads on the PCB is wider than the lead spacing on the devices. Before inserting these components gently bend the leads as shown above. Check that the flat face of these components matches the silkscreen outline on the PC. Note that these components do not need to be tight to the PCB. Once they are inserted turn the PCB over and solder them in place and clip the leads.

3: Submodule headers

The headers for the Electrosmith Daisy Patch Submodule go on the rear of the PCB. Flip the board over and insert the four 2x5 headers into the PCB. Flip the board back again and solder one pin on each header. Check that the headers are all seated tight against and PCB and re-melt to adjust if necessary. Solder the remaining pins.

The headers provide a stable platform for inserting the jack sockets in the next step.



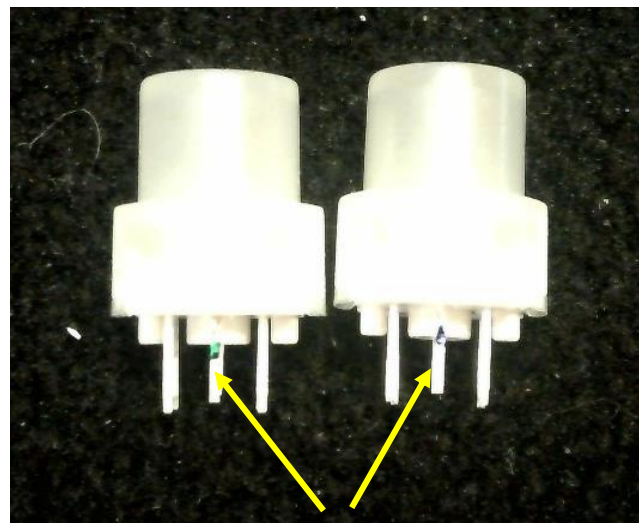
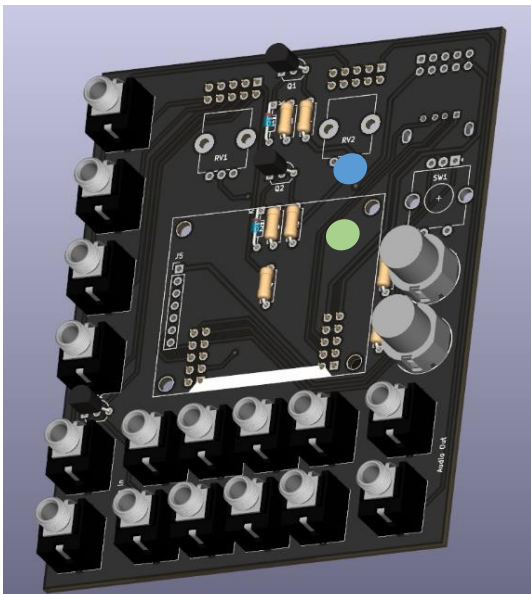
4: Jack Sockets



With the PCB face up and resting on the four headers insert the 16 jack sockets. Do not solder these yet. Position the front panel over the jack sockets and make sure that all the jack sockets are exposed through the front panel holes and sit tight against the PCB. It is useful to have rubber bands to temporarily hold the front panel in place, Scotch tape or similar also works but we find rubber bands are better. Flip the bundle over and solder the socket jacks in place. It is good practice to just solder one pin on each socket jack to start with and then check that the socket jacks are all flush against the PCB before soldering the remaining pins. It is easy to reheat one pin and reset a socket jack, it is much harder if three pins must be desoldered. Keep the front panel on until all the jack socket pins have been soldered.

Remove the front panel.

5: Pushbuttons



The two LED pushbuttons are soldered next. They look almost identical, but the LEDs are different colors. The distinguishing feature is a tiny dot of color on the center pin on the flat side of the button. The blue button is towards the top, the green button below it. When inserting the buttons make sure the flat side faces to the right, this corresponds with the line marked on the PCB silkscreen. Do not solder the buttons yet.

Reinstall the front panel over the jack sockets and the buttons. Using the rubber bands again secure the front panel to the PCB. Alternatively install a dress nut on a couple of the jack sockets to hold the front panel in place. Make sure the buttons protrude through the front panel. Before turning the module over the buttons must be held down flush against the PCB. A rubber band or a piece of Scotch tape will work. Flip the board over and solder one pin on each button. Check that the push buttons are flush and if necessary, re-melt the joint to seat the button on the PCB, then solder the remaining pins.

Remove the front panel.

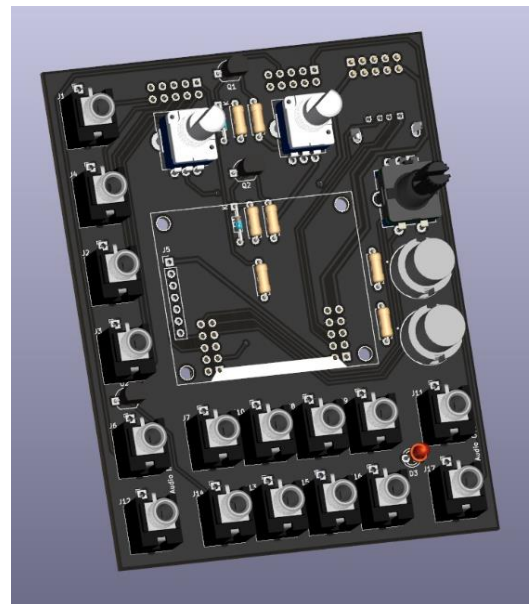
6: Potentiometers, Encoder, and LED

Before inserting the two potentiometers remove the nut and washer if installed and make sure the pins are aligned. If the potentiometers have anti-rotation tabs, clip them off with side cutters. The potentiometers are a snug fit; it is easiest to insert the three pins before wiggling the retaining lugs into place. Insert the encoder. The encoder is not as deep as the potentiometers so temporarily screw one of the potentiometer nuts onto the encoder so the front panel will hold it flush against the PCB. Insert the red LED into the pad marked D3; the shorter leg of the LED goes through the square ground pad.

Re-install the front panel and hold it in place with dress nuts on a couple of the socket jacks or use the trusty rubber bands again. Flip the module over and solder the potentiometer pins, encoder pins, and the retaining lugs.

With the module flipped and the front panel still in place adjust the red LED so that it pokes through the hole in the front panel. The short leg of the LED should be closest to the edge of the PCB. Solder it in place and clip the leads.

Remove the front panel and remove the nut from the encoder.



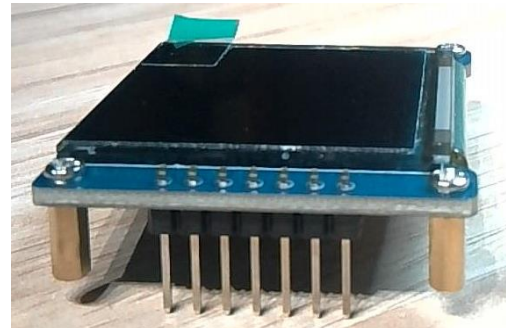
7: Power and USB-A Connectors



Insert the 16 pin Eurorack header into the back of the PCB. The key-slot must be at the **outer edge** of the PCB, turn the PCB over and solder the connector in place. As before, solder one pin and check that the connected is flush with the PCB before soldering the remaining pins.

Insert the USB-A socket, check that it is standing vertically on the board and solder it into place. Solder the retaining lugs. The USB-A connector is only for flashing new firmware onto the module from a USB stick. **Do not attempt to use it for anything else.**

8: OLED Display



The OLED module needs some preparation: from the kit locate the four 7mm male-to-male brass standoffs. Remove the existing standoffs from the OLED module and replace them with the slightly longer 7mm standoffs. Insert the 7x1 header into the module and solder one pin. Check that the pin header is vertical before soldering the remaining pins. Use as little solder as possible and make sure there are no solder blobs on top of the header pins.

From the kit locate the four silver M2 screws and four plastic washers, put the washers on the screws. Insert the OLED header pins of the module into the PCB. Holding the display in place, invert the PCB and loosely tighten the four screws. Turn the module over and check that the OLED module is square, it may help to re-install the front panel. When all looks good, solder the OLED module in place and fully tighten the screws. Now may be a good time to remove the protective film covering the OLED display.

8: Final Checks

Before installing the front panel do another close inspection of all the solder joints, with a magnifying glass if you have one. It is most important to check that there are no solder bridges. Check that all of the submodule header pins have nice shiny solder joints. Check the OLED display module pins on both the display module and the PCB.

The gap between the header pins on the top side of the OLED module and the aluminum front panel is quite small but do not touch it. Make sure there is no excess solder on the top of the header pins that might cause them to make contact with the front panel. If there is, remove the excess solder with solder-wick or carefully clip it off.

9: Front Panel



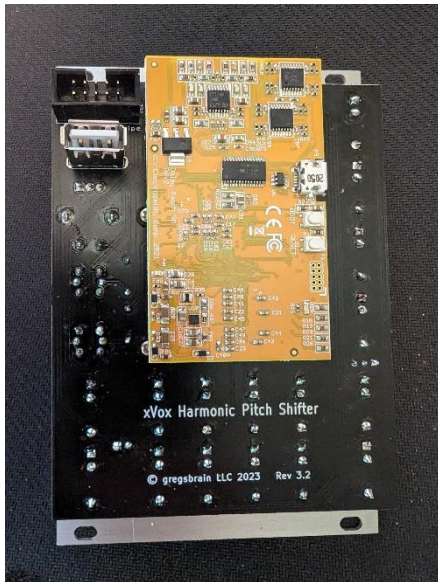
Before installing the front panel check that you have removed the protective covering from the OLED display. Check the red LED is still in the correct position and protrudes through the front panel hole. There should be a small amount of play around the push buttons, check that they are loose and easy to press.

Install the front panel and install the dress nuts onto the jack sockets. Screw black dress nuts onto the four CV inputs, two audio-in, and two audio-out jack sockets. The dress nuts for the VPO and Gate jack sockets are, left to right, red, yellow, green, and blue. The order is important because these colors match up with the colors displayed in the OLED.

The two potentiometers have washers and nuts, the rotary encoder does not. Install the washers and nuts on the potentiometers and tighten the nuts.

Rotate both potentiometers anti-clockwise as far as they will go and push the knobs on with the indicators pointing at about 7 o'clock. Push the plain rubber knob onto the encoder shaft. It is a tight fit but will push all the way down.

10: Install Submodule and Power up



On the rear of the module install the Electrosmith Daisy Path submodule. Take care that the submodule is correctly aligned with the headers with all pins inserted, it is possible to get it skewed.

Using the included Eurorack ribbon cable connect the module to an unpowered Eurorack power supply and turn the power supply on. You will be welcomed with the xVox splash screen.

If the OLED display does not come on, or if the module appears to be dead, refer to the troubleshooting notes below.

Troubleshooting

If the OLED display does not come on but the blue pushbutton is illuminated, try pushing the blue button. If it starts to blink it means the xVox software is running module. Disconnect the module from the power and check the solder joints to the OLED display and the solder joints to header J22. You will need to remove the front panel to do this. If the OLED display is still not working, contact support.

If the blue pushbutton is not illuminated check that that the red LED on the Electrosmith Daisy Patch Submodule lights up. If the LED does not light up first check the power supply and the power connector. It will be necessary to remove the front panel and check the solder joints on the Eurorack power header and on the submodule. Specifically check the solder joints to header J20 which provides the Eurorack voltages to the submodule. If you have a USB power supply with a mini-USB connector, try connecting that directly to the unplugged submodule. If the LED on the submodule does not light up, contact support.

Contact Info

For technical support troubleshooting problems with the build email or other questions related to building the xVox module send an email to support@gregsbrain.co

You can find technical information for xVox including user documentation and links to demonstration videos on www.gregsbrain.co This is also where firmware updates will be posted.