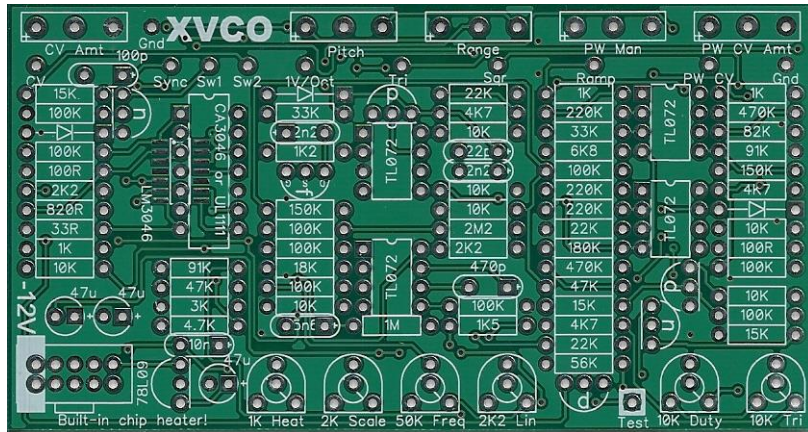


FREQUENCY CENTRAL

Build documentation for:

XVCO

Based on the Roland System 100M VCO.



XVCO has at its heart a transistor array chip, usually a CA3046. These are getting a little harder to source recently, so this PCB has the option to instead use a surface mount LM3046*. Alternatively, the eastern European UL1111 can be substituted. This PCB incorporates an onboard chip heater for the transistor array chip.

* If using a surface mount transistor array substitute the 18K resistor for 2 x 33K resistors in parallel.

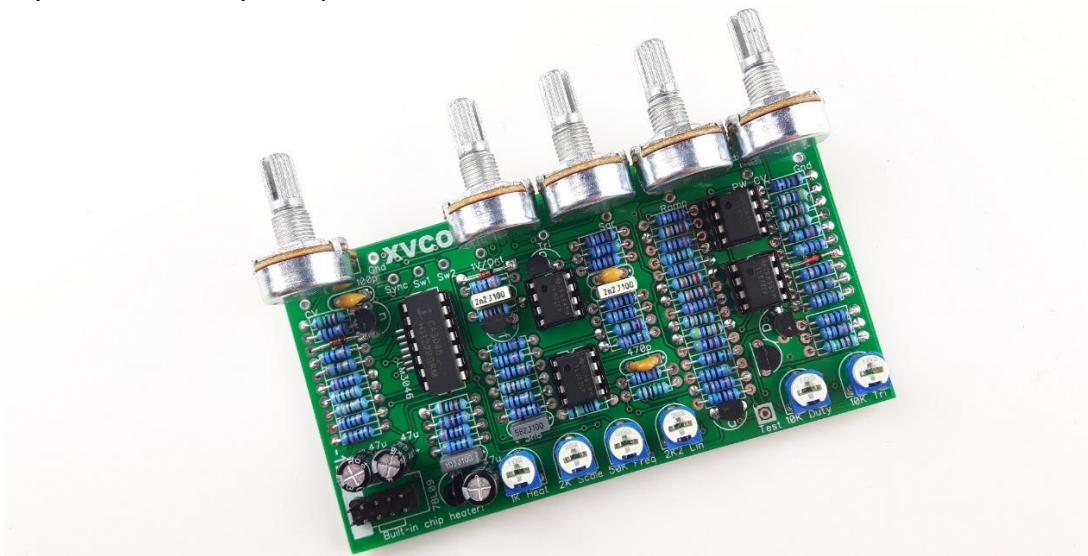
Key to PCB screen print:

n: This signifies NPN BC547 transistors. Note the correct pinout as shown by the half circles.

p: This signifies PNP BC557 transistors. Note the correct pinout as shown by the half circles.

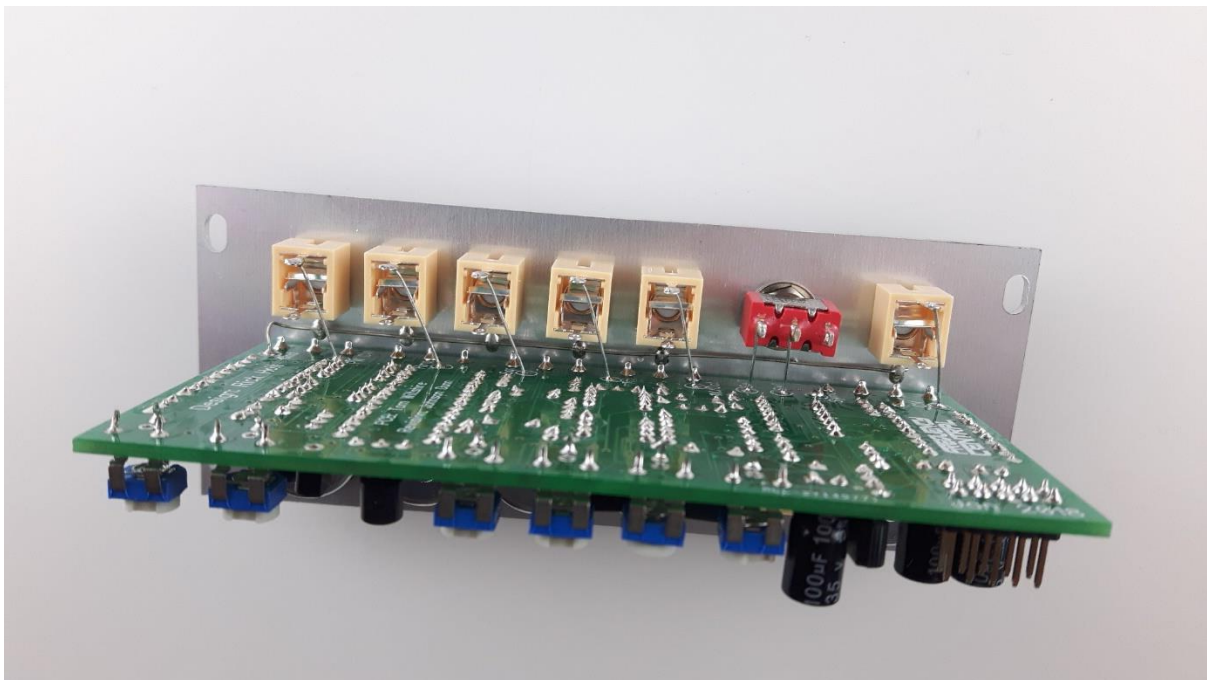
f: This signifies 2N5485 FETs. Note the correct pinout as shown by the half circles.

The PCB shows the correct orientation for BC547/BC557. Other transistor types can be used (eg 2N3904/2N3906), but please observe the correct pinout. Please observe the correct polarity of the electrolytic capacitors.



Assembly

1. Solder all resistors
2. Solder all IC sockets
3. Solder all non electrolytic capacitors
4. Solder all transistors – watch the polarity!
5. Solder the power header.
6. Solder all electrolytic capacitors
7. Solder all trimmers
8. Solder all potentiometers
9. Mount all seven sockets and toggle switch to panel
10. Create a ground bus by connecting all sockets' ground tabs together. When mounting the PCB, there is a pad for this ground bus to connect to the PCB. There is a separate ground pad for the Sync socket.
11. Mount PCB to panel, trading ground bus through ground pad.
12. Solder ground pad.
13. Solder sockets to relevant pads on PCB



Detail showing ground bus and connections between sockets and PCB

Calibration

- 1K Heat: Power up the module and adjust this trimmer until you get a reading of 0.63V at the Test point next to the Duty trimmer.
- 10K Tri: This sets up the triangle wave symmetry. As this VCO is sawcore, there is always going to be a very slight spike at the trough of the triangle, that's just science! However, you can use this trimmer to minimise the spike. Optimal position should be pretty close to the centre of the trimmer.
- 10K Duty: This sets the duty cycle of the square wave, should be just about spot on with the trimmer in the mid position, as I carefully chose associated resistor values to make it so.

- 2K2 Lin: High end trim. There is a set-up procedure for this in the Roland service manual (pages 5 and 6 of this PDF). It requires the use of a 'scope and a precision reference oscillator. I've built a fair few of these by now, and I've found it tracks very well over 6-7 octaves even before using Roland's set-up procedure for high end trim – if you have a good ear and some patience.
- 50K Freq: Sets up the initial frequency of the VCO. Optimal should be close to the mid position of the trimmer, but you may adjust to taste.
- 2K Scale: This trimmer sets the 1V/oct tracking of the VCO, and it's really worth spending some time to get it right. On first power up, the VCO should already be pretty close to 1V/oct with the trimmer in it's mid position, as I carefully chose associated resistor values to make it so. To set it closer, play two notes an octave apart and adjust until it sounds spot on. Then play two notes two octaves apart, and adjust still further until it sounds spot on. If you have a frequency counter, still better!

Another handy tip for scaling the oscillators...if you have a MIDI/CV interface and a MIDI keyboard or sound module, you can set them up both on the same channel and use the MIDI sound module as a reference - you're looking to reduce the beating to a bare minimum. I've used my Juno 60 for this job before.



RDH 30/05/18

<http://www.frequencycentral.co.uk/>