

# FREQUENCY CENTRAL

Build documentation for:

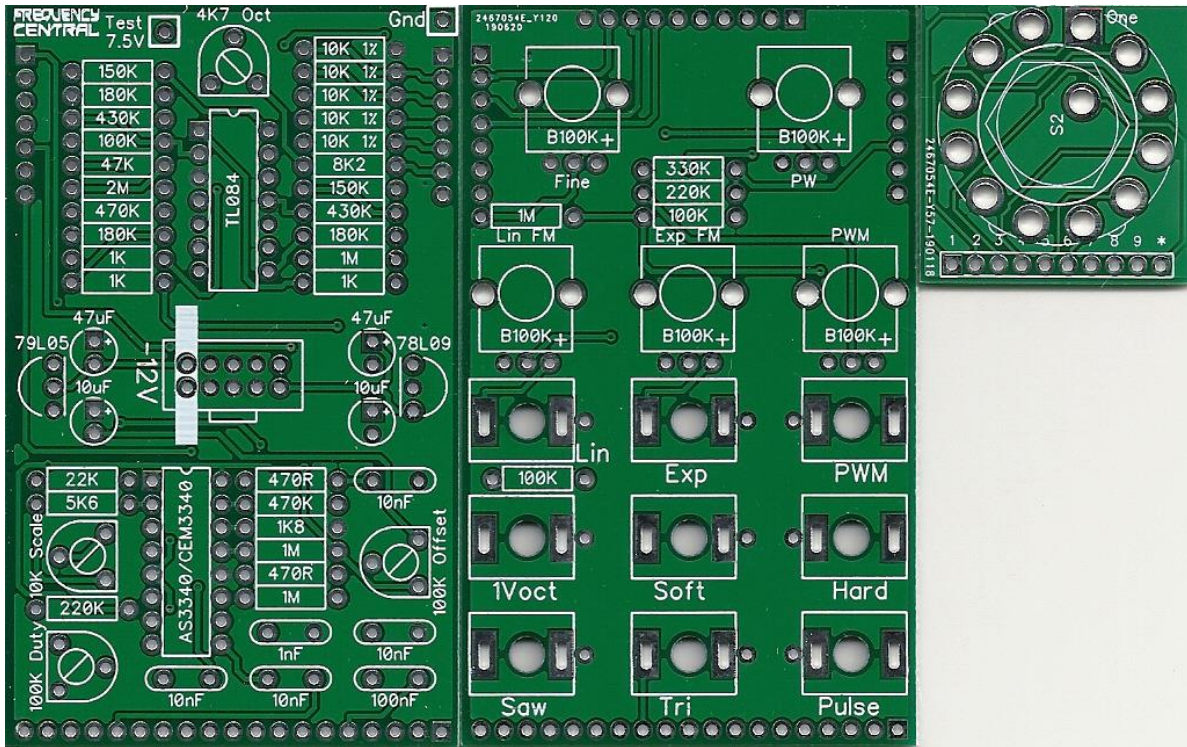
## CEMosc

Stable, accurate, and full featured VCO based around the AS3340 reissue.

Main PCB

Pots 'n' sockets PCB

Octave Switch PCB



CEMosc features a 3 PCB set:

- Main PCB
- Pots 'n' sockets PCB
- Octave switch PCB



### Bill of Materials

470R x 2 1K x 3 1K8 x 1 5K6 x 1 8K2 x 1 <b>10K 1% x 5*</b> 22K x 1 47K x 1 100K x 3 150K x 2 180K x 3 220K x 2 330K x 1 430K x 2 470K x 2 1M x 4 2M x 1  <a href="#">All resistors ¼ watt metal film.</a>	<a href="#">1nF x 1</a> <a href="#">10nF x 4</a> <a href="#">100nF x 1</a>  <a href="#">10uF x 2</a> <a href="#">47uF x 2</a>	AS3340**  <a href="#">TL084 x 1</a>  <a href="#">78L09 x 1</a> <a href="#">79L05 x 1</a>  <a href="#">14 pin IC socket x 1</a> <a href="#">16 pin IC socket x 1</a>	<a href="#">B100K x 2</a>  <a href="#">B100K x 3 (or these)***</a>  <a href="#">4K7 trimmer</a> <a href="#">10K trimmer x 1</a> <a href="#">100K trimmer x 2</a>  <a href="#">Rotary switch</a>  <a href="#">3.5mm socket x 9</a>  <a href="#">Male 40 pin header</a> <a href="#">Female 40 pin header</a> <a href="#">10 pin box header</a>  <a href="#">Big knob</a> <a href="#">Little knob x 2</a>
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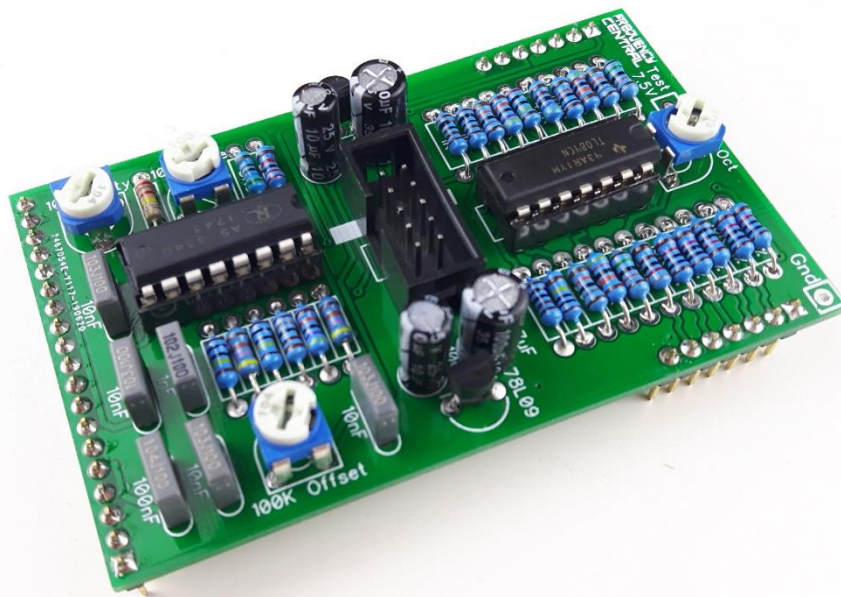
\* **10K 1% x 5** These are the five matched resistors for the octave switch voltage divider ladder. They don't have to be 10K exactly, they just have to be matched to each other, so for example if they are all 9.98K that's fine. Grab a bunch of 10K resistors, measure each one, make little piles of 10k, 9.99K, 9.98K etc. Before long one of the piles will have five resistors in it, that's your matched set! Should only take 5 minutes.

\*\* You can use either AS3340 or CEM3340. We sell AS3340 only.

\*\*\* **We** prefer the Song Heui tall trimmers because they have a longer shaft and a white notch.

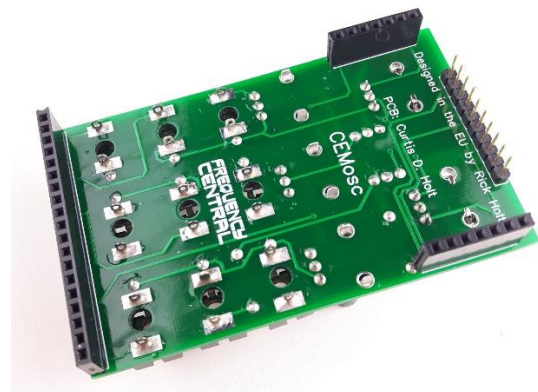
## Main PCB assembly

1. Solder all resistors. Tip – don't get 470R and 470K mixed up.
2. Solder all IC sockets
3. Solder all non-electrolytic capacitors
4. Solder both voltage regulators
5. Solder all trimmers
6. Solder the power header – if you're using box type, observe correct polarity
7. Solder all electrolytic capacitors
8. Cut male headers to size and solder them into place. Make sure that they stick out of the bottom of the PCB.



## Pots 'n' sockets PCB

1. Solder all resistors
2. Solder the two capacitors
3. Place the two metal shaft pots on the PCB, and fold over the mounting tabs of the pots at the rear of the PCB, then place the panel over them. This will assure that they are correctly positioned. Flip the whole lot over and solder the pots into place.
4. Place all sockets on the PCB, making sure the ground tabs line up with the PCB's ground pads, then place the panel over them. This will assure that the sockets are correctly positioned. Flip the whole lot over and solder the sockets into place. Don't forget to ground the sockets to the PCB using cut off resistor legs.
5. Place the three plastic shaft pots on the PCB, fold over their mounting tabs at the rear of the PCB, then place the panel over them. This will assure that they are correctly positioned. Flip the whole lot over and solder the pots into place.
6. Cut **three female** headers to size and solder them into place. Make sure that they stick out of the bottom of the PCB. **See photo below.**
7. Cut **one male** header to size and solder it in place. Make sure it sticks out of the bottom of the PCB. **See photo below.**





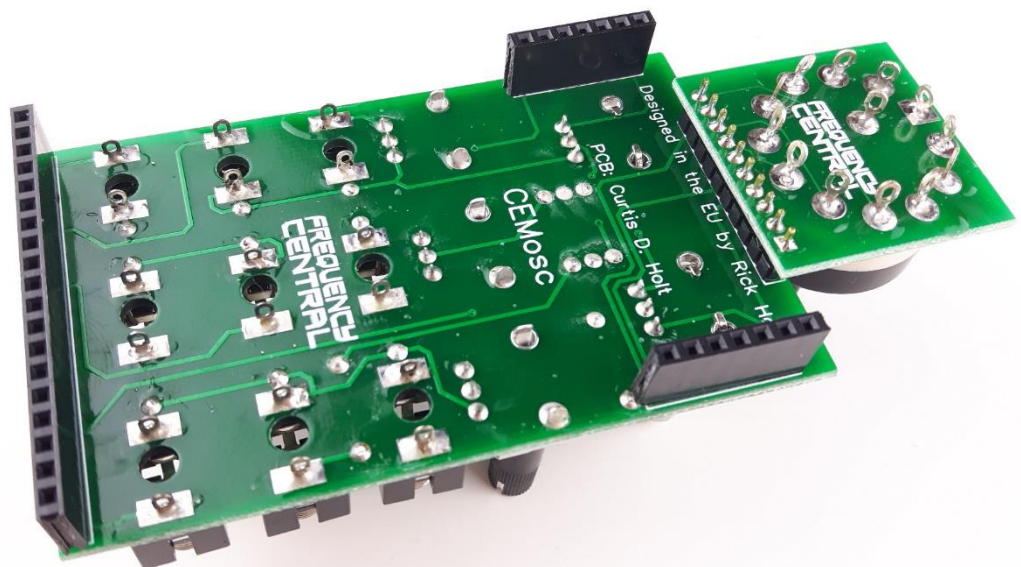
## Octave Switch PCB

1. Solder the 1P12T rotary switch.



## Final Assembly

1. Mount the Pots 'n' sockets PCB onto the panel. Tighten all mounting nuts.
2. So, the 1P12T rotary switch needs to be adjusted to be a 1P6T rotary switch. Remove the mounting nut and the washer, below them you will find another washer with a small flange at 90°, the inner part of the switch has a number of slots, drop the flange into the slot marked 6, then waggle the switch to make sure you're getting 6 positions.
3. Mount 1P12T rotary switch onto the panel, making sure the relevant pads also pass through the male header of the Pots 'n' sockets PCB. Tighten the nut. Solder the Octave Switch PCB to the Pots 'n' sockets PCB via the male header. **See photo.**
4. Plug the Main PCB into the Pots 'n' sockets PCB



## Calibration

- **4K7 Octave:** Set the octave switch to it's highest octave position (2') and adjust trimmer until you get a reading of 7.5V at the **Test** on the octave rotary switch daughter board.
- **10K 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!
- **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. Set the Pulse Width knob to 50 (hard left), and twiddle the trimmer until you hear the easily recognisable hollow sounding square wave.
- **100K Offset:** Sets up the initial frequency of the VCO. Set Fine Tune to it's centre position, play an A on your keyboard. Adjust the Offset trimmer until you can read a frequency of 110 Hz, 220 Hz, 440 Hz, 880 Hz etc when playing octaves of A.

RDH 03/12/20

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

