



### Bill of Materials

33R	<a href="#">22pF x 1</a>	<b>CA3046***</b>	<a href="#">A100K x 1</a>
100R x 2	<a href="#">100pF x 1</a>		
470R	<a href="#">470pF x 1</a>	<a href="#">TL071 x 1</a>	<a href="#">B100K x 4</a>
820R	<a href="#">2.2nF x 2</a>	<a href="#">TL072 x 5</a>	
1K x 3	<a href="#">5.6nF x 1</a>	<a href="#">BC547 x 2</a>	
1k2	<a href="#">10nF x 1</a>	<a href="#">BC557 x 3</a>	<a href="#">1K trimmer x 1</a>
1k5	<a href="#">100nF x 2</a>	<a href="#">2N5485 x 1</a>	<a href="#">2K trimmer x 2*</a>
2k2 x 2	<a href="#">47uF x 3</a>	<a href="#">78L09 x 1</a>	<a href="#">4K7 trimmer</a>
3K		<a href="#">1N4148 x 3</a>	<a href="#">10K trimmer x 2</a>
4K7 x 5			<a href="#">50K trimmer x 1</a>
6K8		<a href="#">14 pin IC socket x 1</a>	
8K2		<a href="#">8 pin IC socket x 6</a>	<a href="#">Rotary switch</a>
10K x 7			
<b>10K 1% x 5*</b>			<a href="#">SPDT toggle x 1</a>
15K x 4			
<b>18K**</b>			<a href="#">6.3mm socket x 7</a>
22K x 3			
33K x 3			<a href="#">Male 40 pin header</a>
47K x 3			<a href="#">x 2</a>
56K			
82K			<a href="#">6 pin female header</a>
91K x 2			<a href="#">x 7</a>
100K x 10			
150K x 3			<a href="#">DOTCOM 6 pin header</a>
180K x 2			
220K x 2			
470K x 2			
1M			
2M2			
<a href="#">All resistors ¼ watt metal film.</a>			

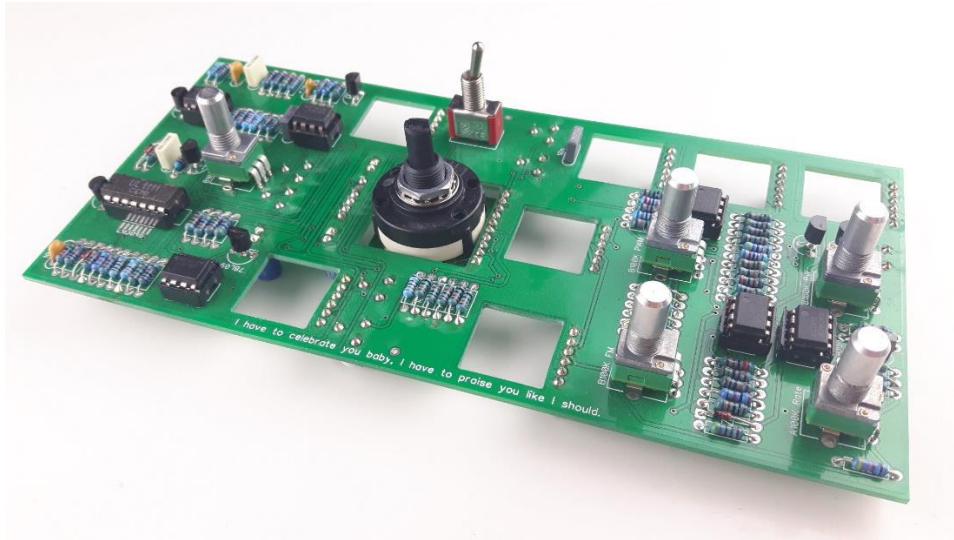
\* **10K 1% x 5** These are the five matched resistors for the octave switch voltage divider ladder. They don't have to be 10K exactly, they just have to be matched to each other, so for example if they are all 9.98K that's fine. Grab a bunch of 10K resistors, measure each one, make little piles of 10k, 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.

\*\* **18K** This is the resistor, which along with the Scale trimmer, sets the 1V/octave trim.

\*\*\* **CA3046** can still be got for some suppliers such as Banzai, Das Musikding, Small Bear and some reputable Ebay sellers. <http://dsmcz.com/prestashop/en/> sell UL1111 for only £1.53, they are functionally identical to CA3046. Alfa Rpar will shortly be releasing a CA3046 clone. The PCB also includes pads for SMD LM3046.

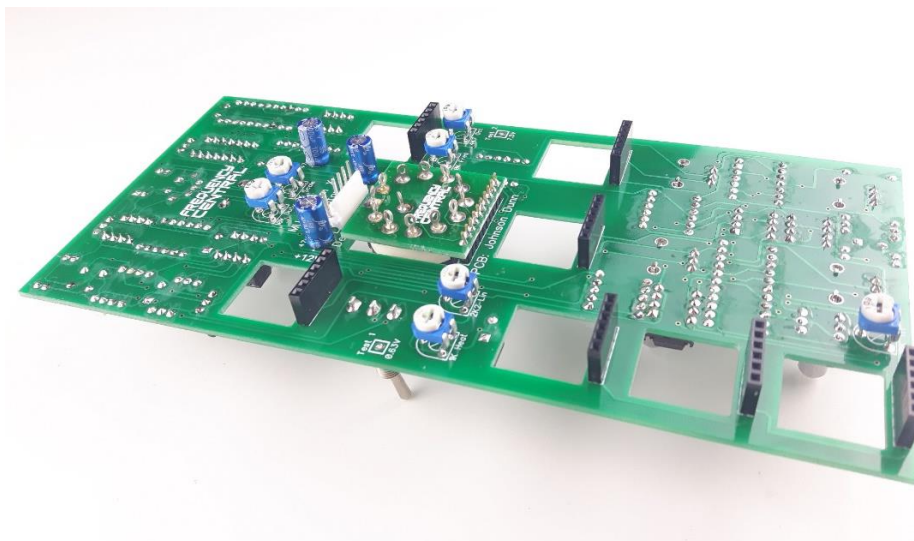
## Main PCB assembly - FRONT

1. Solder all resistors. Tip – don't get 100R and 100K mixed up.
2. Solder all IC sockets
3. Solder all non-electrolytic capacitors
4. Solder all transistors
5. Solder the 5 x Alpha pots and the sync switch. Make sure they fit snug to the PCB.



## Main assembly – REAR

1. Solder all trimmers
2. Cut a piece of male header (10 pins long) and solder in place. This will later accept the Octave switch PCB
3. Solder all 6 pin female headers. These will later accept the Socket PCBs
4. Solder the DOTCOM power header. Don't for get to make it 'keyed' by removing the second pin in (the PCB won't accept it otherwise – it's keyed too!)
5. Solder the electrolytic capacitors



### Octave Switch PCB

1. Solder the 1P12T rotary switch to the pcb, switch sits on it's silkscreen footprint

### Socket PCB

1. Solder the 7 sockets to the 7 Socket pcs, socket sits on it's silkscreen footprint



### Final Assembly

1. Present the pcb to the panel, and bolt the two together using the washers and nuts for the pots and switch
2. Octave switch: remove the nut and washer, and use the *little-washer-with-the-post-attached* to make the switch 6 way. Check that it' now a six way switch. Put the washer back on, and mount it onto the main pcb/panel by presenting it to the male header on the main pcb. Solder into place.
3. Cut 7 pieces of male header to be 6 pins wide. Place the long end of each into the 7 female headers.
4. Present each socket pcb assembly to the main pcb, bolt into place, making sure that the male headers line up with their places on the socket pcs. Solder the male headers to the sockets pcs.

### Calibration

- **1K Heat:** Power up the module and adjust this trimmer until you get a reading of 0.63V at **Test 1** 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. 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!
- **4K7 Octave:** Set the octave switch to it's highest octave position and adjust trimmer until you get a reading of 7.5V at **Test 2** on the rear of the main pcb.

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

