FREQUENCY CENTRAL

Build documentation for:
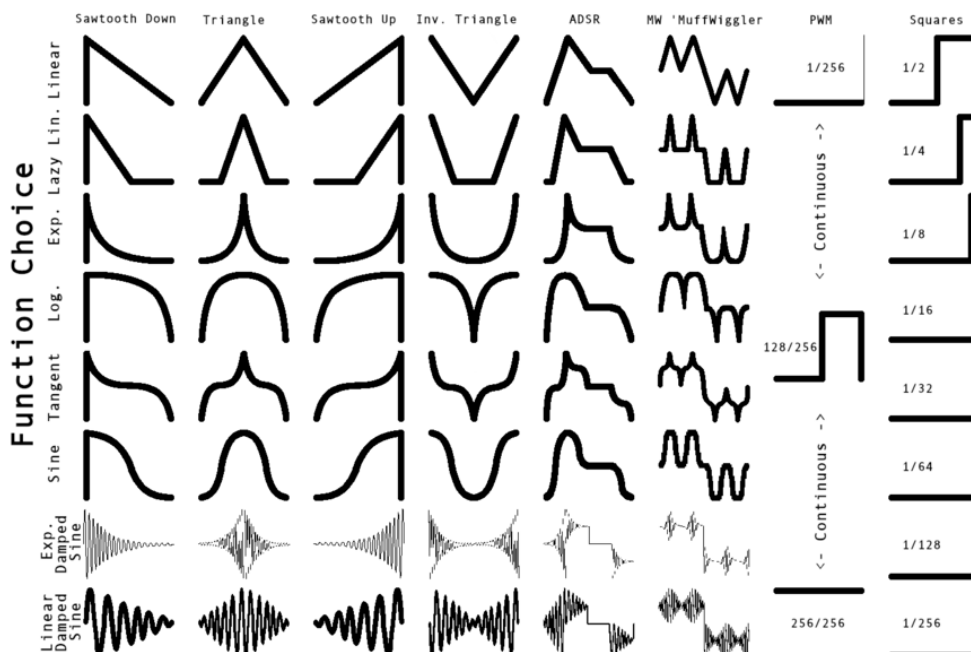
CHRONOGRAF

Featuring code by Jetroid

Main PCB

Pots 'n' sockets PCB
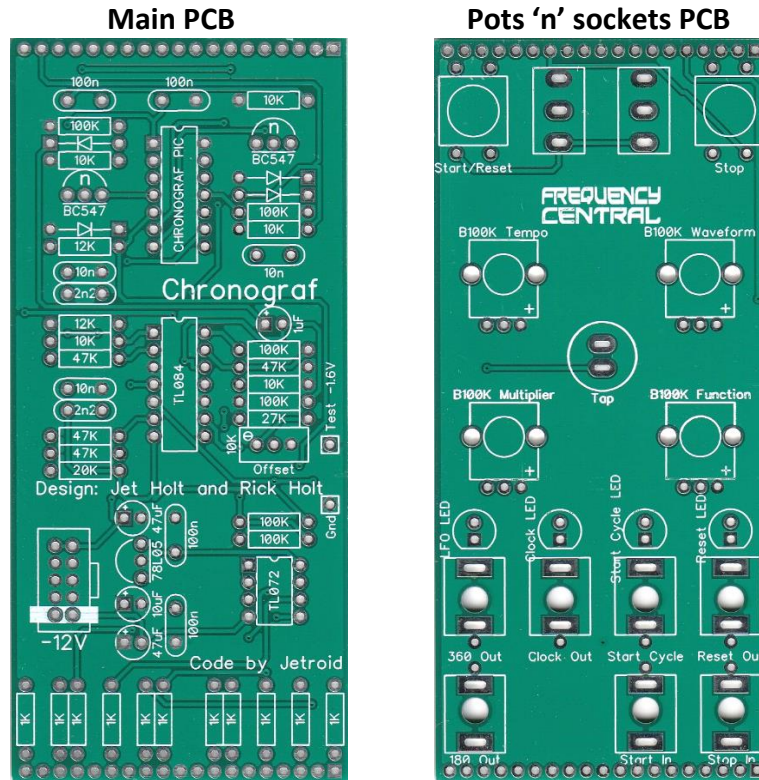
Chronograf Waveforms
Waveform Choice

Chronograf is a super flexible one-shot and cyclic event generator. It can be used as an envelope generator, LFO, or master clock.

Chronograf features Start/Reset and Stop momentary switches, each with associated control inputs, as well as a tap tempo momentary switch. A toggle switch selects between one-shot and cyclic modes.

Four knobs are available to set Tempo, Waveform, Multiplier and Function. There is another toggle switch to select whether changes to Multiplier happen immediately or at the start of the next clock cycle.

Chronograf has 5 outputs:
- LFO out
- 180 out (same as LFO out but 180° out of phase)
- Clock out
- Start cycle out (Clock divided by Multiplier)
- Reset out (momentarily goes high whenever Start/Reset is pressed)

Waveform selection is chosen by a combination of Waveform and Function knobs. In this way (arguably) 64 waveforms can be selected.

Bill of Materials

You will notice that all of the components listed below are also hyperlinks to where I buy each specific part from. You can also use the hyperlinks to find out more about what each component looks like. If you want to know even more, Google is your friend.

1K x 11	2n2 x 2	CHRONOGRAF PIC	B100K x 4
10K x 5	10nF x 3		
12K x 2	100nF x 4	TL084 x 4	10K trimmer x 1
20K x 1	10uF x 1	TL072 x 1	
27K x 1	47uF x 2		3.5mm socket x 7
47K x 4		BC547 x 2	
100K x 6			SPDT switch x 2
		1N4148 x 4	
All resistors ¼ watt metal film.			Tactile switch x 2
		78L05 x 1	
			Momentary switch x 1
		3mm red LED x 4	
			Male header x 1 (cut to size)
		14 pin IC socket x 2	Female header x 1
		8 pin IC socket x 1	(cut to size)
			Power header x 1

Main PCB assembly

1. Solder the diode and all resistors
2. Solder all three IC sockets
3. Solder the non elecrolytic capacitors
4. Solder the 78L05 – watch the polarity!
5. Solder the box power header. Make sure the notch lines up with the screenprint legend. If in doubt, have a look at a power cable, and make sure when inserted into the header the red stripe lines up with the -12V screenprint.
6. Solder all electrolytic capacitors and the trimmer
7. 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. Place the PCB on a flat surface. Place the 2 tactile switches into their solder pad. Do not push them all the way through, they should sit proud of the PCB (see photo), their legs should not protrude through the other side. Solder them into place from the top of the PCB.

2. Solder the 4 potentiometers, the 2 toggle switches and the Tap LFO momentary switch. Use the panel to make everything line up nicely.

3. Place all sockets on the PCB, making sure the ground tabs line up with the PCB's ground pads – be careful because there are two different orientations - 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. Use cut off resistor legs to connect the sockets' ground tabs line up with the PCB's ground pads.

4. Cut female headers to size and solder them into place. Make sure that they stick out of the bottom of the PCB.

5. Put all 4 LEDs through their pads. Present the panel to the PCB, flip the whole lot over, make sure the LEDs stick though the holes in the panel, solder in place.
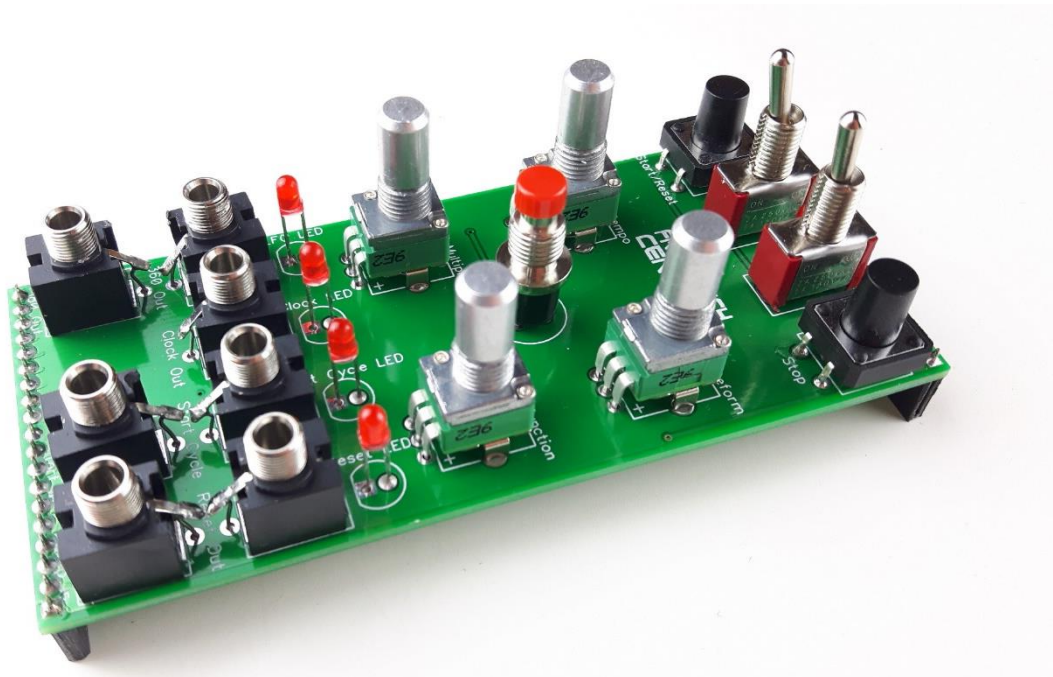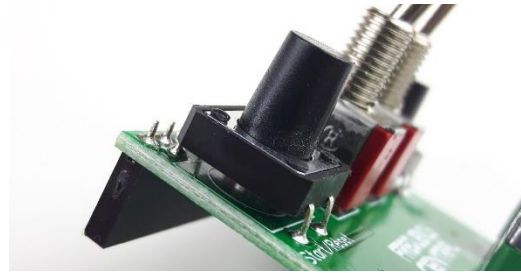
Calibration

The Offset trimmer, as you might guess, adjusts the offset of the LFO waveforms. Take a DMM, connect the black probe to ground and the red probe to the test pad next to the trimmer. Adjust the trimmer until you read -1.6V on your DMM. The waveform should now be centred with respect to 0V.

All done! Go play!

Troubleshooting

Not all DIY builds work first time. The vast majority of build issues are down to soldering inconsistencies. This is far more likely than a bad IC, for example. The first step of successful troubleshooting should always be to reflow all soldering to eliminate any dry joints (bad connections) or solder bridges (short circuits). This is also an opportunity to closely inspect your work – you might find some unsoldered pads, or an IC not inserted into its socket, for example. Next steps are to double check all resistor values are correct, and to check polarities of all diodes, transistors, ICs and electrolytic capacitors. This is not an exhaustive troubleshooting guide, but should address 95% of build issues.

RDH 18/11/20

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