

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)

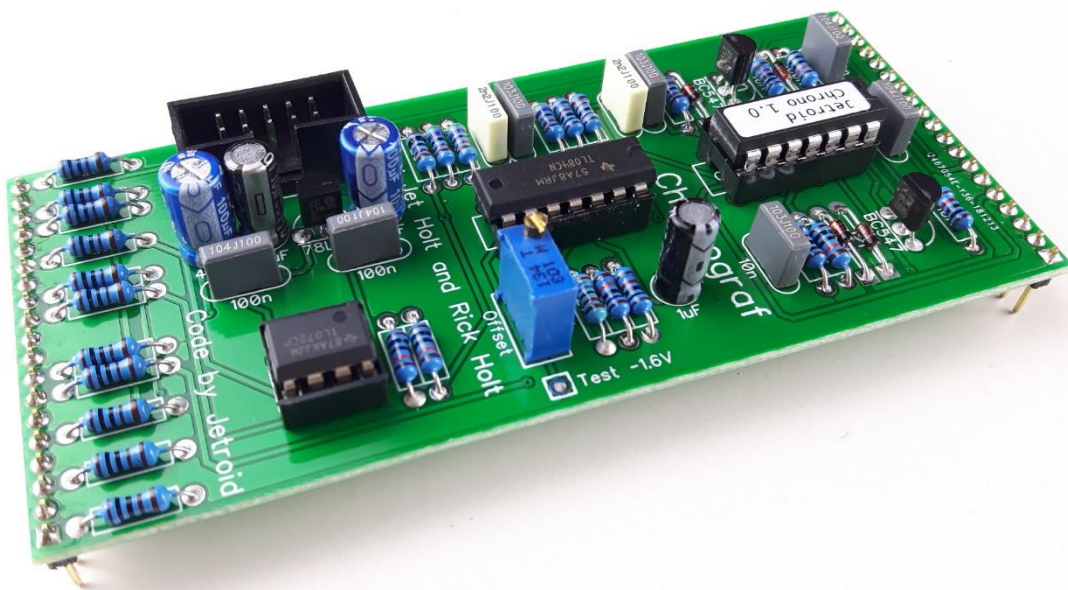
Waveform selection is chosen by a combination of Waveform and Function knobs. In this way (arguably) 64 waveforms can be selected.

Bill of Materials

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 3		BC547 x 2	SPDT switch x 2
100K x 5		1N4148 x 5	Tactile switch x 2
All resistors ¼ watt metal film.		78L05 x 1	Momentary switch x 1
		3mm red LED x 4	1
		14 pin IC socket x 2	Male header x 1
		8 pin IC socket x 1	(cut to size)
			Female header 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 electrolytic 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.



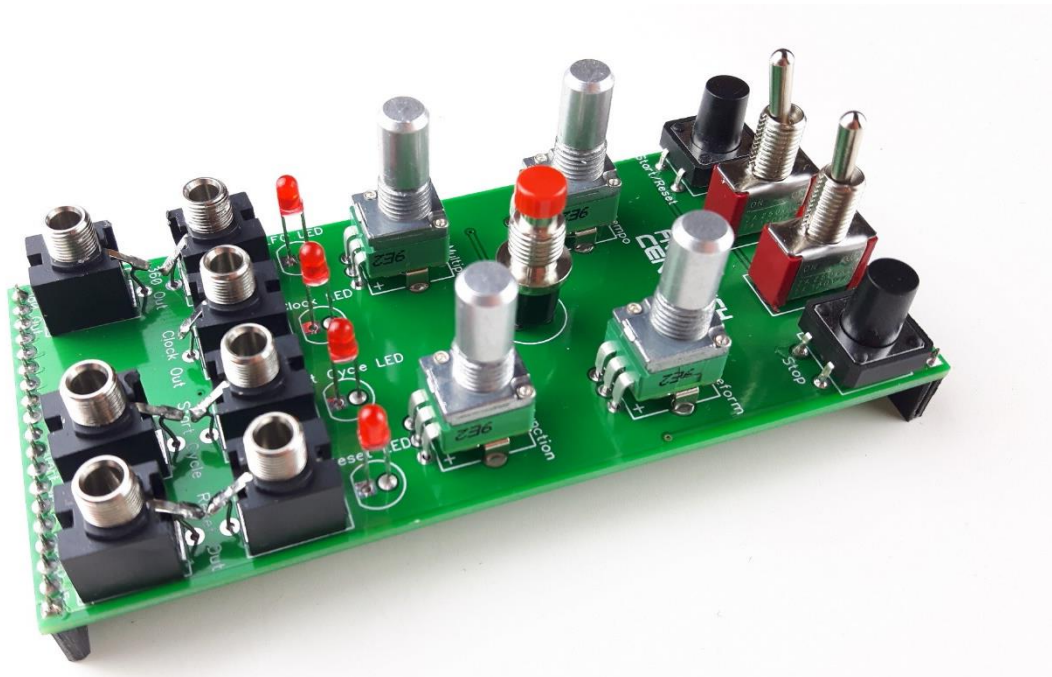
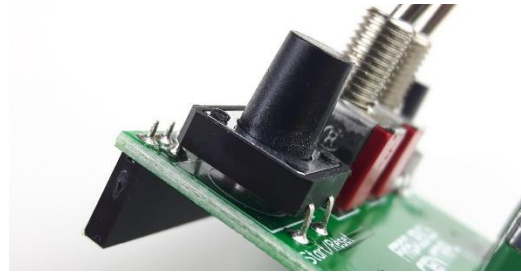
Main PCB minor modification

Chronograf puts out a reset pulse when Start/Reset is pressed. We realised that for some applications it would be useful for Chronograf to also put out a reset pulse when Stop is pressed. It's an easy mod, just add a 1N4148 diode as shown → to the rear of the PCB. We recommend that you perform this mod when building your Chronograf. Later versions of the PCB will include the mod, and will state 'No mod needed' on the back 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 through 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!



RDH 15/08/19

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