FREQUENCY CENTRAL

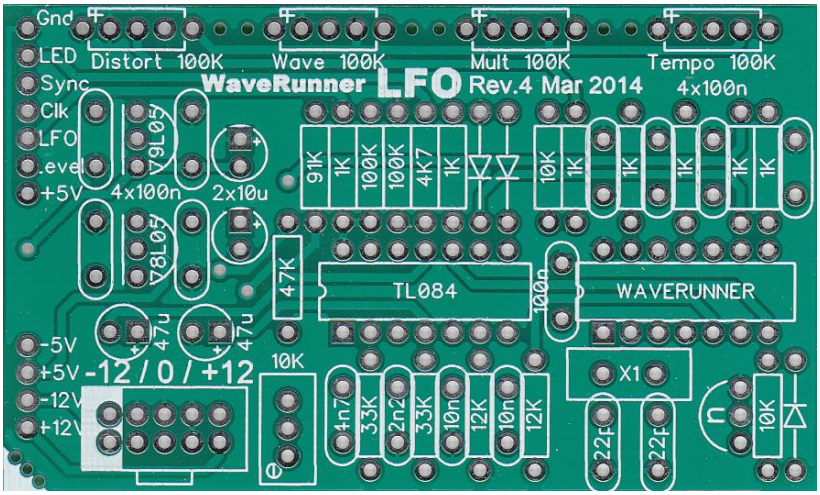
Build documentation for:

WAVE RUNNER

Powered by Electric Druid code exclusive to Frequency Central

Wave Runner is a multi-waveform sync-able LFO based on the Electric Druid TAPLFO2D family of code, but with some significant additions and improvements. The TAPLFO2D-FC PIC is not compatible with similar modules, and was developed specifically for the Wave Runner.

Please note that the Wave Runner PCB incudes pads for either 9mm pots or 16mm pots. If you're using my 4HP panel you'll need to use 9mm pots. Be sure to install them into the correct pads, indicated by boxes on the PCB. Wave Runner is not fussy, you can use B10K, B50K, B100K etc. I mention this because in the past I've found that a few stores seem to be regularly out of stock of B100K.



Bill of Materials

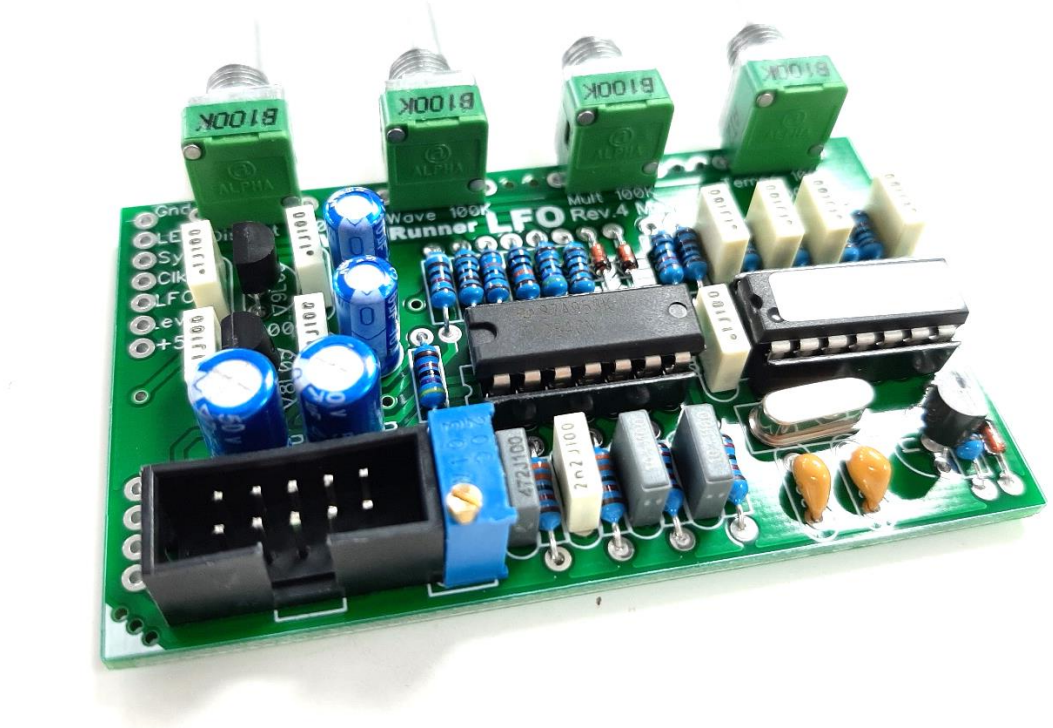
You will notice that all of the components listed below are also hyperlinks to where I buy each specific part from. You can also use the hyperlinks to find out more about what each component looks like. If you want to know even more, Google is your friend.

1K x 7 4K7 x 1 10K x 2 12K x 2 33K x 2 47K x 1 91K x 1 100K x 2 All resistors ¼ watt metal film.	22pF x 2 2.2nF x 1 4.7nF x 1 10nF x 2 100nF x 9 10uF electrolytic x 2 47uF electrolytic x 2	WAVERUNNER PIC x 1 TL084 x 1 BC547 x 1 78L05 x 1 79L05 x 1 1N4148 x 3 3mm red LED x 1 20MHz crystal x 1 14 pin socket x 2	B100K x 4* *pads provided for either Alpha 9mm or Alpha 16mm pots. For 4HP panel use 9mm pots. 10K trimmer Sockets x 4 Box Header x 1 Knob x 4 A bit of wire

Assembly

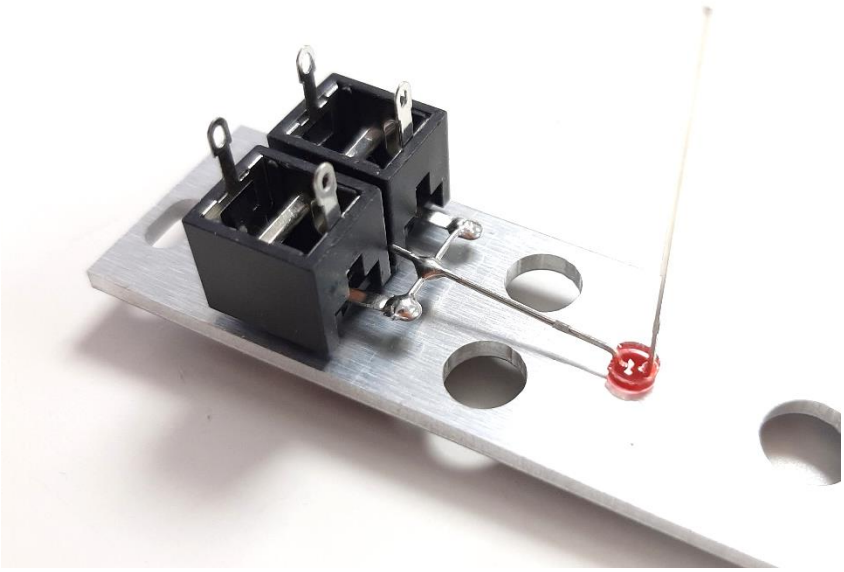
Solder the components from the lowest profile to the highest profile:

1. All resistors
2. 20Mhz crystal
3. 22pF capacitors
4. 14 pin IC sockets
5. 2.2nf, 4.7nF, 10nF and 100nF capacitors
6. 78L05, 79L05 and BC547
7. Box header
8. 10uF and 47uF capacitors
9. B100K pots
10. Mount TL084 and WAVERUNNER PIC into their sockets

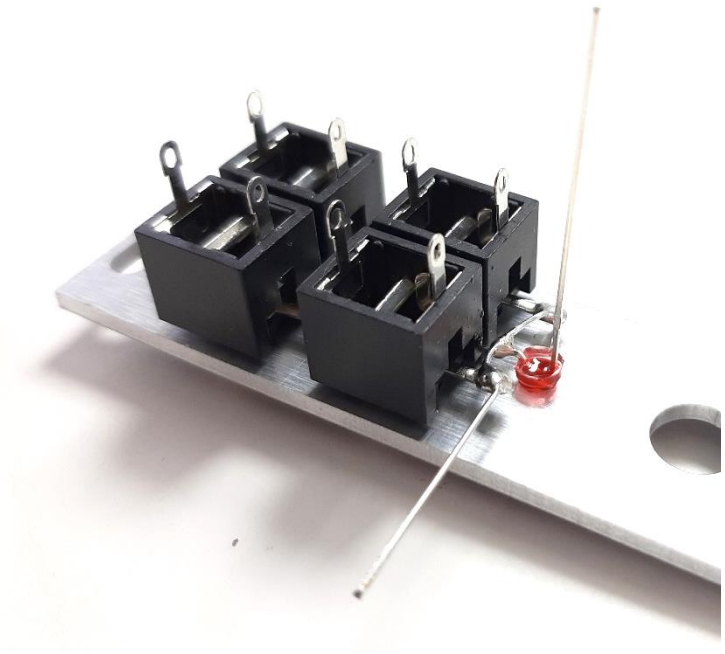


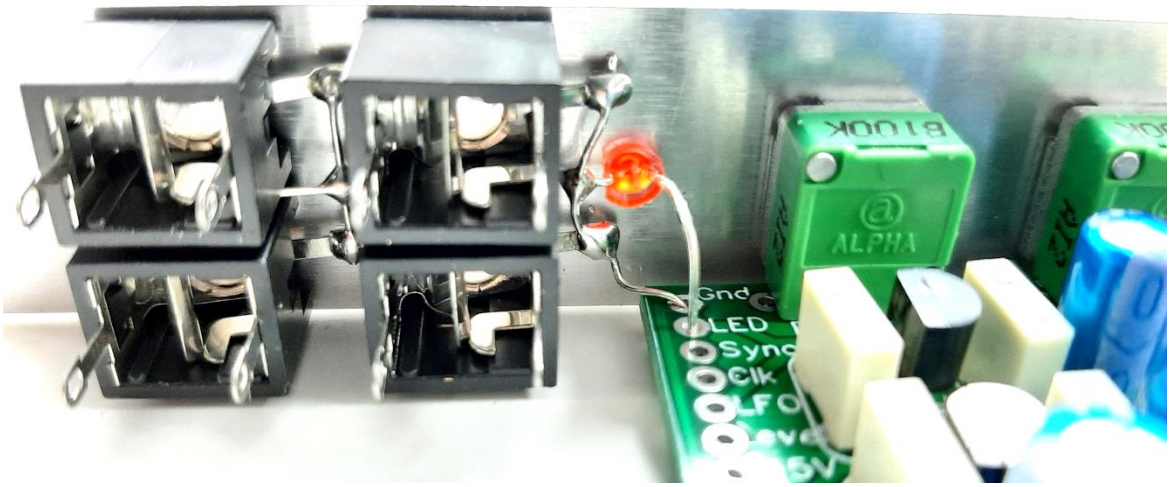
Mounting onto the panel

- Mount the two lowest sockets (LFO, CLOCK) onto the panel with the ground tabs pointing upwards.
- Bend the short leg of the LED by 90° and push it through it's hole. The bent leg should meet the sockets.
- Use a resistor leg to connect the two socket grounds to the bent leg of the LED.



- Mount the two highest sockets (LEVEL, SYNC) onto the panel with the ground tabs pointing upwards.
- Use a resistor leg to connect the two socket grounds to the bent leg of the LED, allowing the resistor leg to extend out from the panel by 15mm or so (see photo)
- Gently bend over the LED leg that's sticking up by 90°, making sure it's 5mm or so above the panel (see photo).
- Grab the PCB, push the ground wire (that you created from the resistor leg) through the pad marked **Gnd** on the PCB, and the LED leg through the pad marked **LED** on the PCB.
- Push the pots into their holes, and mount them with their washers/nuts.
- Take up any slack on the ground wire and LED leg, solder in place.

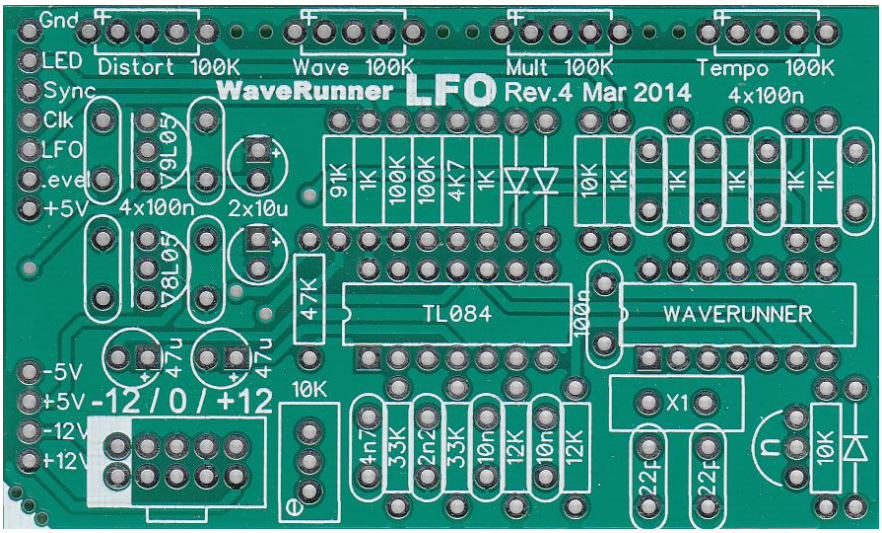


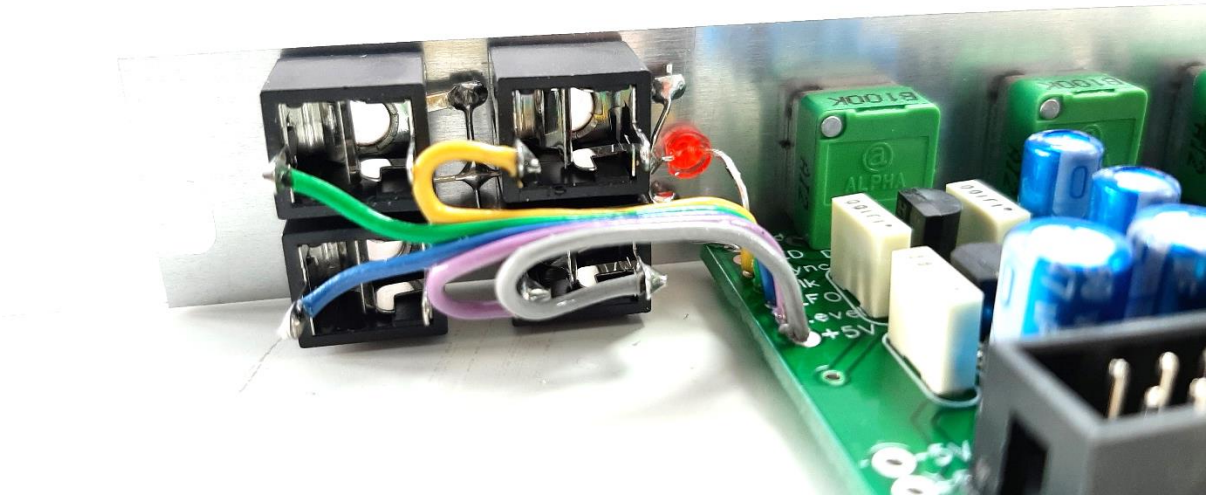


Wiring the PCB to the sockets

Connect to ground wire
Connect to LED leg
Connect to SYNC socket
Connect to CLOCK socket
Connect to LFO socket
Connect to LEVEL socket
Connect to LEVEL switched lug

No connection for these four





Calibration

The 10K trimmer right by the power header is for Level CV zero offset. Correct set calibration ensures that the output from the LFO socket is spot-on at 0V when the Level CV input sees 0V. This is particularly important when using Wave Runner as a pitch vibrato source into a VCO with a mod wheel controlling LFO depth via the Level CV.

1. Hook up the LFO output to a DMM
2. Ground the Level CV input
3. Adjust the trimmer until your DMM reads exactly 0V

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 28/01/21

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