Tobinski

LFOs

USER MANUAL

The Tobinski LFOs module is a dual LFO built using Electric Druid technology. The LFOs combine the TAPLFO 3D and the VCLFO 10. For more information on these ICs and a whole host of other great projects and information you can visit https://electricdruid.net/ .

The main purpose of this module was to have 2 LFOs that could be used to cross modulate each other while each having their own different ways of syncing. The left LFO can be synced to an incoming clock source and the right LFO can be reset to incoming pulse. This allows for some really interesting possibilities of chaotic modulation.

Furthermore, each LFO features 2 banks of 8 different wave shapes selectable via the wave set switch (which also acts as both a frequency and wave set indicator) and the shape control.

Each LFO provides controls for:

Shape, Frequency, Frequency Multiplier (X FREQ), Waveform Skew and Level.

These can all be modulated with CV which is enabled via 2 x CV inputs for each LFO (normalled to the output of the opposing LFO). These inputs each feature an attenuator and a switch that selects the destination for the CV.

The CV destinations follow the same assignment for each LFO.

CV 1 (left) can be sent to SHAPE (SH), FREQ (FRQ) or X FREQ (XFQ).

CV 2 (right) can be sent to X FREQ (XFQ), SKEW (SKW) or LEVEL (LVL).

The X FREQ CV destination is enabled on all CV selecters to allow frequency multiplication in combination with other CVs at all times as this is a very useful CV when the LFOs are being synced.

Two of the CV selector switches also perform an additional function when held. The left side changes the left LFO from bipolar +-5V output to unipolar 0V to 10V output. The right side enables an inbuilt sample and hold circuit on the right LFO that uses the LFO waveform as the sample source and the RESET input as the sample and hold trigger.

The CLOCK IN and RESET IN for each LFO as well the corresponding outputs complete the panel layout.

IMPORTANT – PLEASE USE THE SUPPLIED POWER CABLE ONLY
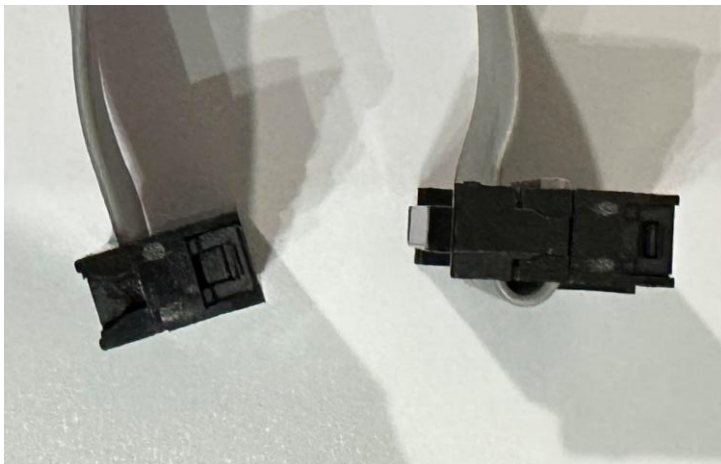
The cable on the left is the supplied power cable that doesn't have a strain relief attached.

The cable on the right has a strain relief and is longer which will cause the power header to be damaged as it will push the power header shroud back and possibly damage the components on the PCB when the module is inserted into the rack.
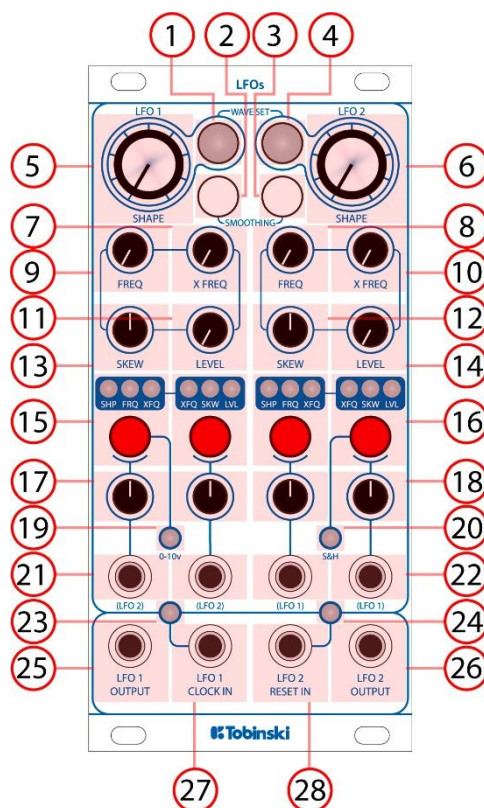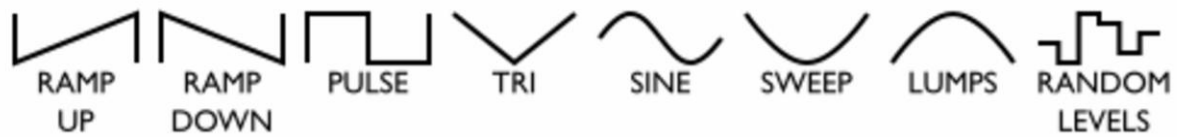

1 and 4, WAVE SET – LED Switches to select the wave set bank and display the LFO tempo. The LED colour indicates the selected wave set (yellow for bank A and red for bank B).
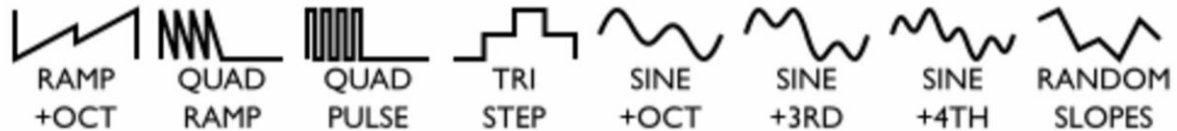
2 and 3, SMOOTHING – Adds a filter to round off sharp transients so they don't cause clicks when modulating sensitive circuits.

5, SHAPE (LFO 1) – Selects the wave shape.

Wave set 1 has:

RAMP UP | RAMP DOWN | PULSE | TRI | SINE | SWEEP | LUMPS | RANDOM LEVELS

Wave set 2 has:

RAMP +OCT | QUAD RAMP | QUAD PULSE | TRI STEP | SINE +OCT | SINE +3RD | SINE +4TH | RANDOM SLOPES

6, SHAPE (LFO 2) – Selects the wave shape.

Wave set 1 has:

RAMP UP | RAMP DOWN | SQUARE | TRIANGLE | SINE | SWEEP | SPIKE | NOISE

Wave set 2 has:

RAMP +OCT | QUAD RAMP | QUAD PULSE | SINE +OCT | SINE +3RD | SINE +4TH | QUAD SPIKE | RANDOM

7, X FREQ (LFO 1) – Multiplies the frequency set by either the FREQ control or the CLOCK IN if used. Multiples are: x0.5, x1, x1.5, x2, x3, x4.

10, X FREQ (LFO 2) – Multiplies the frequency set by the FREQ control. Multiples are: x1, x2, x4, x8.

9, FREQ (LFO 1) – Adjusts the free running frequency of the LFO. This control is overridden if the CLOCK IN is used. To go back to using the FREQ control if the CLOCK IN is no longer being used, just turn the FREQ control or apply a CV to the FREQ destination.

8, FREQ (LFO 2) – Adjusts the frequency of the LFO.

11 and 14, LEVEL – Set the amplitude level of the LFO.

12 and 13, SKEW – Skews the LFO waveform left or right. Centre is the default position.

15 and 16, CV destination selectors. The CV destinations follow the same assignment for each LFO.

CV 1 (left) can be sent to SHAPE (SH), FREQ (FRQ) or X FREQ (XFQ).

CV 2 (right) can be sent to X FREQ (XFQ), SKEW (SKW) or LEVEL (LVL).

The X FREQ CV destination is enabled on all CV selectors to allow frequency multiplication in combination with other CVs at all times as this is a very useful CV when the LFOs are being synced.

17 and 18, CV input level controls.

19, Bipolar or unipolar indicator. Holding the leftmost selector changes the left LFO from bipolar +-5V output to unipolar 0V to 10V output.

20, Sample & Hold indicator. Holding the rightmost selector enables an inbuilt sample and hold circuit on the right LFO that uses the LFO waveform as the sample source and the RESET input as the sample and hold trigger.

21, CV inputs for LFO 1. Normalled to LFO 2 outputs for cross modulation.

22, CV inputs for LFO 2. Normalled to LFO 1 outputs for cross modulation.

23, CLOCK IN LED – Shows the incoming clock timing.

24, RESET LED – shows the Incoming reset pulse.

25, LFO 1 Output.

26, LFO 2 Output.

27, CLOCK IN – LFO 1 sync input. Syncs the LFO to external sources.

Works on the fast transition from low to high of a pulse or square wave. 0V to 5V is the minimum input requirement and it is protected so it can handle up to +-12V.

28, 27, RESET IN – LFO 2 reset input. Resets the LFO waveform to 0V.

Works on the fast transition from low to high of a pulse or square wave. 0V to 5V is the minimum input requirement and it is protected so it can handle up to +-12V.

All inputs are tolerant of full modular +-12V signals.

LFOs
Width 12HP
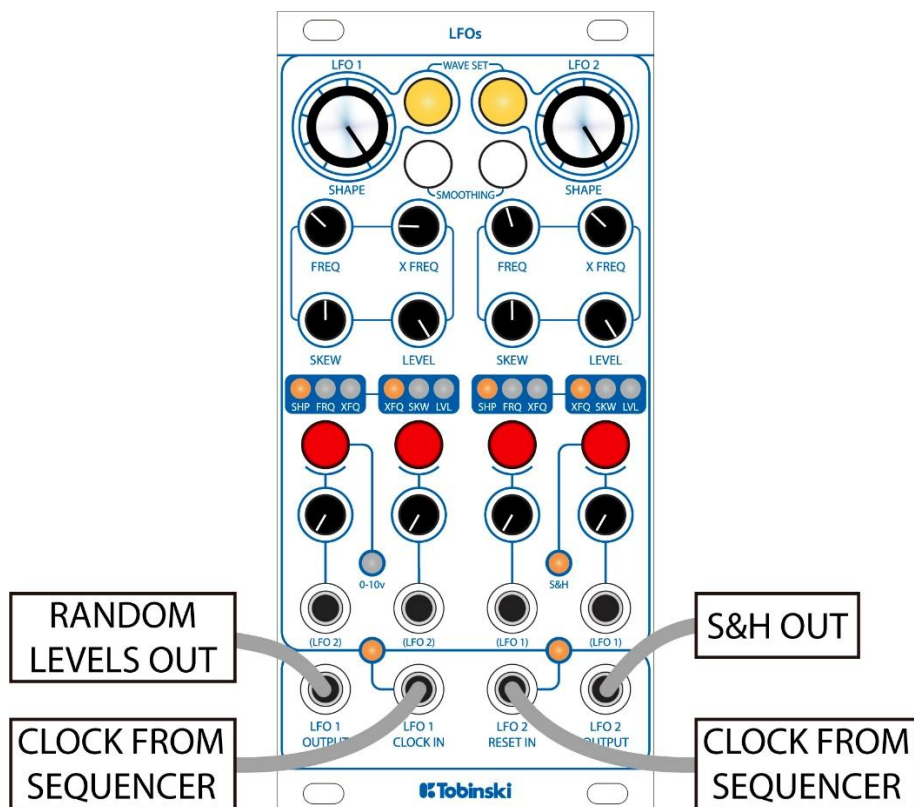Depth (internal from panel) = 27mm
-12V @ 45mA
+12V @ 40mA
+5V @ 11mA

LFOs – EXAMPLE PATCHES AND TIPS

The following patches are just examples to show some of the ways the LFOs can be used.

TWO TYPES OF RANDOM VOLTAGES

This first patch shows two types of synced random voltages.

The first type is using the random levels waveshape on LFO 1 and a clock source from a sequencer to generate random voltage levels. The X FREQ control and XFQ CV input can be used to change the LFO 1 clock multiplier for rhythmic variation etc. The waveform could also be set to random slopes using the wave set switch.

The second type of random voltage uses the S&H (sample and hold) feature of LFO 2 which is selected by holding down the rightmost CV destination selector switch. In S&H mode the LFO 2 RESET IN triggers the S&H which samples the current voltage of the LFO 2 waveform. If the waveform is set to noise, as in the above example, then it will produce the classic S&H random voltages. It should be noted that when the S&H mode is activated the LFO 2 output only changes when a trigger is received at the LFO 2 RESET IN.

TWO TYPES OF SEQUENCER CLOCK SOURCE
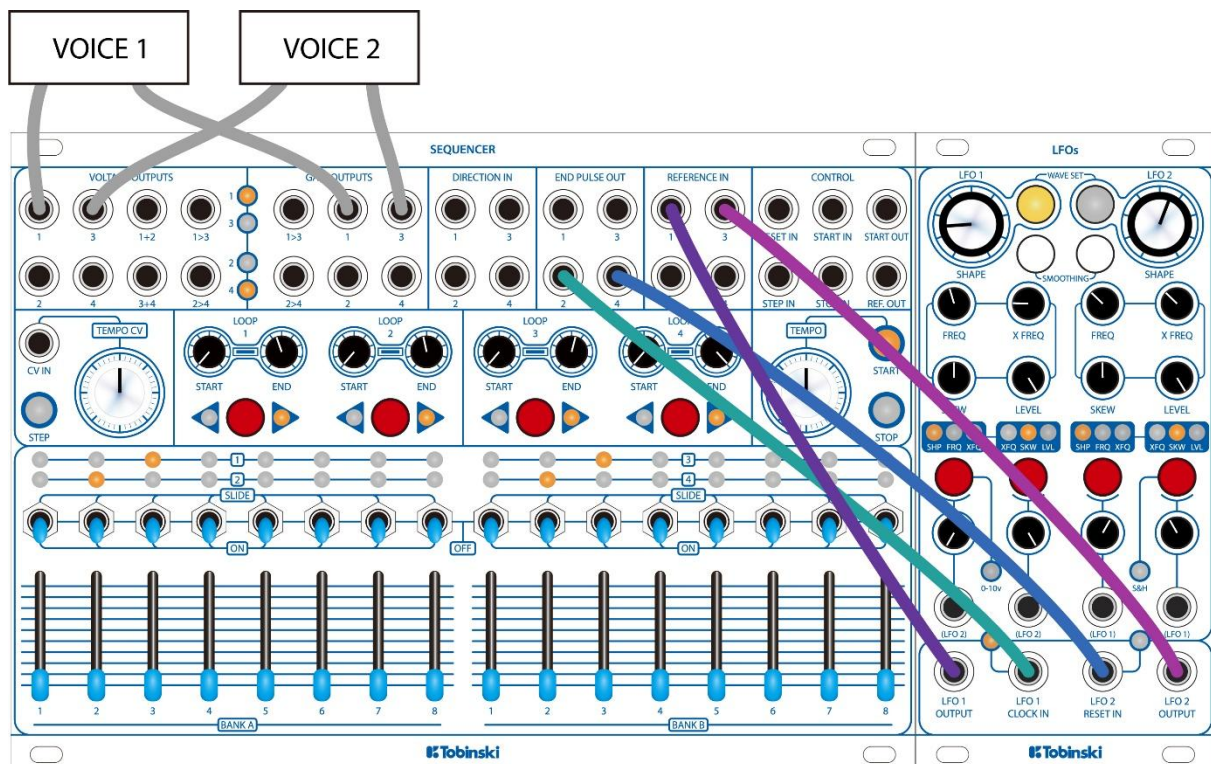
The purpose of this patch is to generate some interesting unquantized rhythmic variations that are synced to the first beat of the bar but are not locked the standard timing grid within the bar.

The patch shows the connections for clocking the sequencer using two different methods.

The first method uses LFO 1 set to a falling ramp waveform. The LFO is receiving a CLOCK IN from the sequencer's END PULSE OUT 2 and the LFO 1 OUTPUT is then used to clock sequencer 1 via REFERENCE IN 1.

The second method uses LFO 2 set to the sweep waveform in the above example but any waveform can be selected. The LFO 2 RESET IN comes from the sequencer END PULSE OUT 4 and the LFO 2 OUTPUT clocks sequencer 3 via REFERENCE IN 3. Adjusting the FREQ and X FREQ controls as well as the SHAPE and SKEW will all affect how sequencer 3 is clocked.

The example patch also shows the LFOs cross-modulation being used to dynamically change each others outputs which really adds extra dimensions to the overall rhythmic strangeness. Keeping the LFO 1 CV modulation fairly conservative by only using the SKEW CV and setting the waveform to falling ramp is a nice way to keep things grounded rhythmically which allows LFO 2 to be free for more experimental rhythms.

This patch is used to demonstrate some chaotic type modulation using the cross-modulation of the LFOs and a reset pulse from a sequencer or drum machine etc so that the modulation can achieve some kind of rhythmic pattern. Setting the reset pulse to 1 or more bars is best as it gives the LFOs time to form a rhythmic pattern before being reset.

The patch uses the CALI OSC, TIMBRE and MULTI-MODE LADDER FILTER so that the modulation can be heard.

In the above example LFO 1 and 2 are each modulating each others frequency and level. This gives some nice sounds but also changing to modulate any of the other parameters can also produce some great results.

Holding the left most button down so that LFO 1 is set to 0-10V can produce some nice variations as well as selecting the second set of waveshapes for even more alternatives.

LFOs CALIBRATION

To calibrate the LFOs you will need an oscilloscope or multimeter and a trim pot adjuster.

LFO 1 TRIM   LFO 2 TRIM
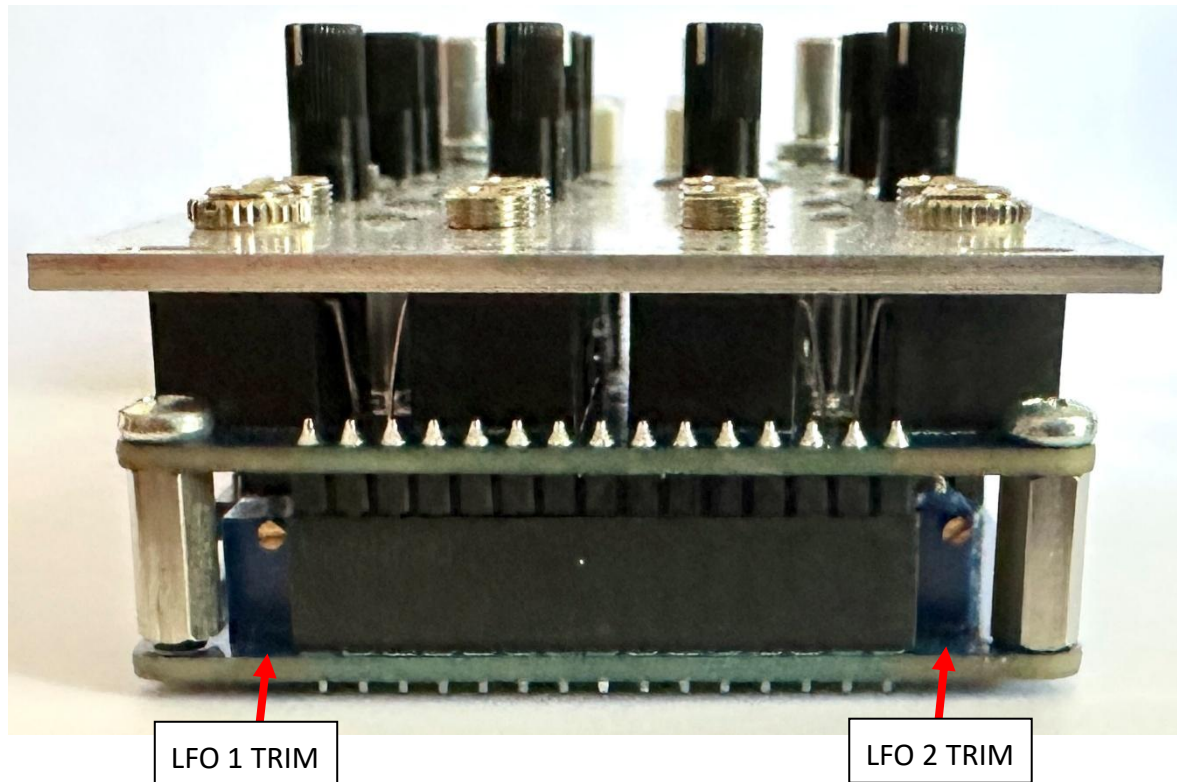
The calibration for each LFO removes the dc offset so that the LFOs are centred around 0V. The procedure is exactly the same for each LFO.

1. Connect the output of LFO 1 to an oscilloscope or multi-meter.
2. Set the LEVEL control to 0.
3. Set the FREQ and X FREQ controls to 50%.
4. Set the CV controls to 0 and ensure that the 0-10V LED is not lit.
5. Adjust the trimmer so the output of the LFO reads 0V.

The procedure for calibrating LFO 2 is the same but on step 4 make sure the S&H LED is not lit.

When measuring the output, there might be a very small waveform noticeable, due to the component tolerance of the potentiometer. If this is the case just make sure the output is centred at 0V.