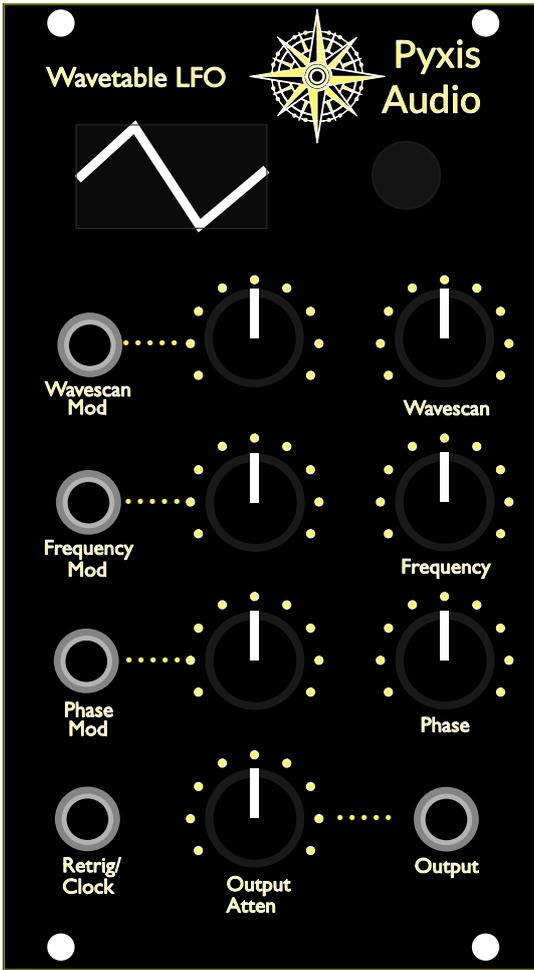


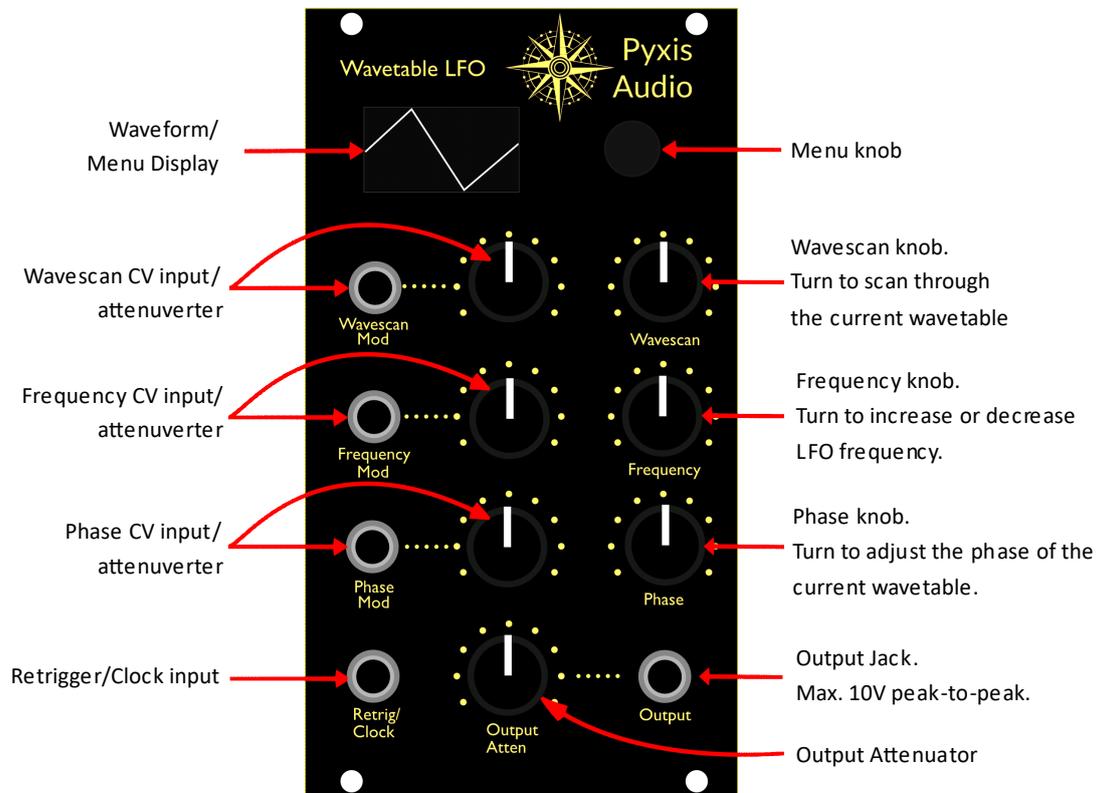
Pyxis Wavetable LFO

User Manual

Version 1



Pyxis Wavetable LFO

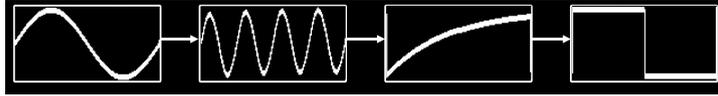


Features

- Wavetable scan between sequences of up to four waveforms; define custom wavetables from 9 waveforms, with control over the multiplier and phase of each entry in the table.
- Three switchable frequency ranges: 1 Hz, 0-10 Hz, 0-100 Hz
- Voltage control over wavescan, frequency and phase.
- Attenuverters on all voltage control inputs.
- Retrigger and/or clock input; quantise the LFO output to either an external or internal clock source, for tempo synced modulation effects.
- OLED screen provides intuitive visual feedback on the current state of the oscillator.
- High performance ARM microcontroller; hardware floating point DSP, 22khz sample rate, 12 bit ADC/DAC resolution.

Introduction/Concept

This manual is intended as a guide for using the Pyxis Wavetable LFO. As the name implies, the module is based around a wavetable scanning oscillator. A wavetable consists of four waveforms arranged in a linear sequence; for example "Sine-Square-Triangle-Saw". The Wavetable LFO allows the user to smoothly crossfade between waveforms, allowing for a huge amount of wave shapes and modulation options.

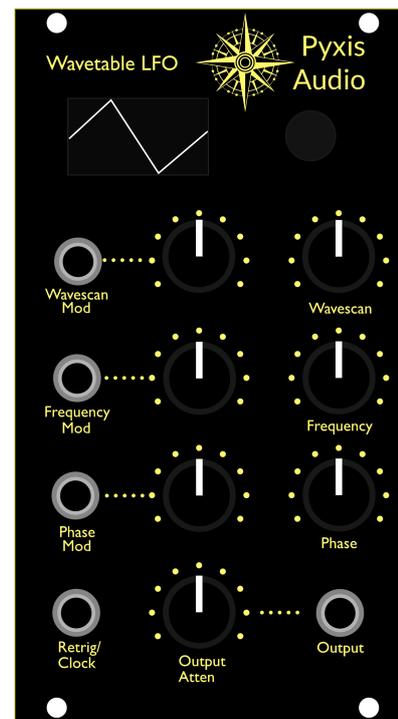


Parameters

The Pyxis Wavetable LFO has four modulatable inputs, and one output. A brief description of these I/Os follows.

Input Parameters

- **Wavescan.** This parameter will cause the LFO to smoothly scan through the waveforms in the current wavetable.
- **Frequency.** This parameter allows control over the frequency of the LFO. The range of speeds is selectable in the menu. The speeds can optionally be quantized to an external or internal clock.
- **Phase Mod.** This parameter allows control over the overall phase of the LFO; this phase offset is applied equally to all waveforms in the currently selected wavetable. Control over individual waveform phases is also possible; consult the section on "Customising Wavetables" later in this manual.
- **Retrig/Clock.** This parameter accepts a Gate type control input, used for either retriggering the LFO, or as an input for an external clock (or both, if needed). For more information on using it to accept an external clock signal, see the "Setting Speeds" section of this manual.



Output

A single LFO output is available; this includes an attenuator. The range of the LFO with the attenuator fully open is -5 to +5 volts.

Basic Operation

Selecting Wavetables

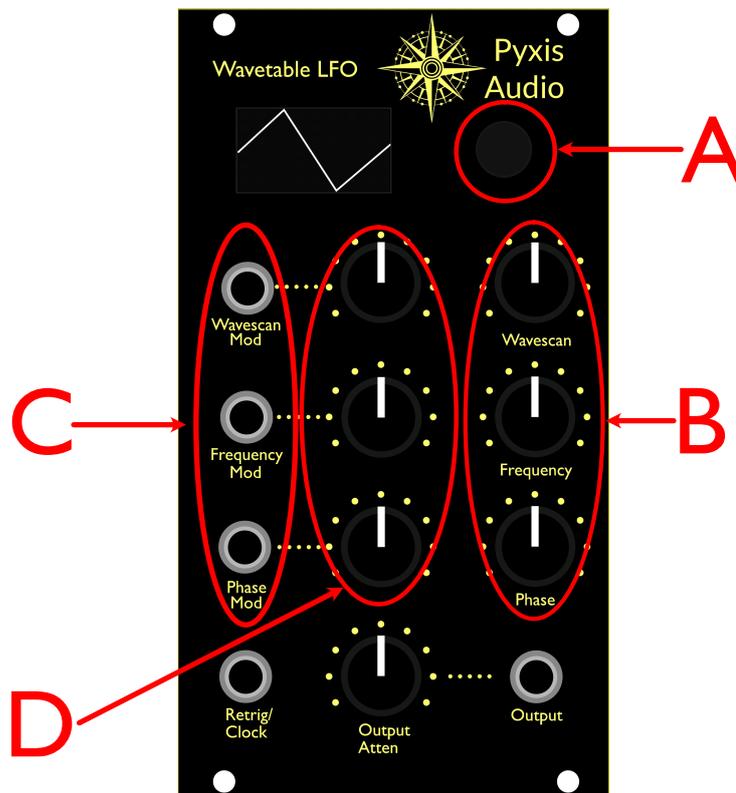
The Pyxis Wavetable LFO allows selection of a number of predefined (and user editable) wavetables. Scroll through the available wavetables using the menu knob (marked “A” on the diagram below).

Changing and Modulating Parameters

Basic operation of the LFO is fairly simple; Wavetable scan, speed, phase, and output attenuation can all be adjusted using the dedicated knobs on the front panel (the group marked “B” on the diagram below).

Wavetable scan, speed, phase can also all be modulated by external signals fed in through the jacks (Marked “C” on the diagram below).

External signals can be attenuated or inverted using the knobs adjacent to the input jacks (Marked “D” on the diagram below). When the knobs associated with the input jacks are in the centre position, no external signal will be passed through. If the knobs are turned towards the right, the signal passed in through the external jack will be summed with the signal selected by the main parameter knob. If a knob is turned to the left, the signal passed into the external jack will be subtracted from the signal level selected by the main parameter knob.



Using the Menu

Due to the amount of potential configuration options, it was impossible to provide immediate access to all the functionality on the front panel; this means that some of the LFO options must be altered via a menu system. To access the menu system, simply "click" the menu knob by pressing it.



Scroll through the available options by turning the menu knob to the left or right. Menu items can be edited by clicking the menu knob; a flashing cursor will indicate that you are in editing mode, and options can be selected by scrolling left or right. To finish editing, click the menu knob again to select the currently visible option.

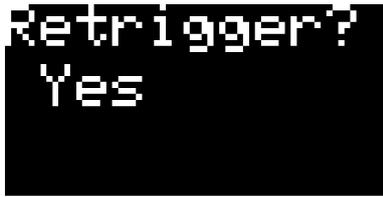
To exit the menu, scroll to the end by turning the menu knob, where there will either be an "Exit Menu" option (that will return you to the home screen), or a "Back" menu option (that will take you up one level in the menu hierarchy).

Menu diving has been minimized as much as was practical in this module; there's only one sub menu for a group of the more infrequently used display options. The menu tree available is shown below:

- LFO Speed range
- Edit Table
- Clock Source
- Retrigger
- Phase Retrigger
- Loop Type
- Settings
 - Screen Timeout
 - Show position
 - Show frequency
 - Show BPM
 - Show time division
 - Back
- Exit

The specifics of the above items are covered in more detail in the following sections of this manual.

Retrigger/Phase retrigger



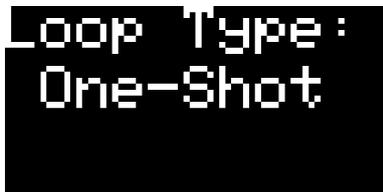
By default, a rising signal fed into the Retrigger input will cause the LFO to "restart" at the beginning of the current waveform. This can be useful if you wish to restart the LFO at the same position every time a note is played on a keyboard.

There is also the option to use the Phase input as an additional retrigger. This might be useful if you wish to use both an external clock and have the ability to retrigger the LFO. To use the Phase input as a retrigger input using a typical signal, perform the following actions:

- Select Phase Retrigger -> Yes in the menu system.
- Set the Phase Knob to the left.
- Set the Phase Mod attenuverter to + or -, depending on the polarity of the signal you want to trigger on (typically +)

Using the Phase input as a retrigger leaves you free to use the/Clock input for a clock signal. It does mean that you lose the ability to change the phase of the LFO; however, it is possible to work around this by altering the phase of the waveforms that form the wavetable (see "Editing Wavetables" for more information).

Loop Type

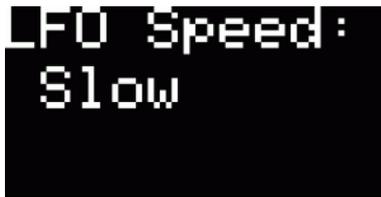


By default, the LFO will continually loop over the selected waveform (as you might expect an LFO to do). Changing the Loop Type alters this behaviour.

Setting the LFO to One Shot mode means that the LFO will go through a single cycle of a waveform, in response to a stimulus from an input; this enables it to be used as an envelope generator.

Selecting One Shot from the Loop Type menu option also sets the option to Yes (it doesn't make much sense to have a one-shot loop that can't be retriggered!).

Speed Ranges/Clocking options



The LFO can be configured to a number of different speed ranges, and can optionally be synchronized to an internal or external clock pulse. This section of the manual describes these various options, and how they differ.

Default speed ranges

There are three standard (non-clocked) speed ranges available within the LFO. This allows for more fine control over the speed of the LFO.

- Slow (0-1 Hz)
- Medium (0-10 Hz)
- Fast (0-100 Hz).

These speed ranges can be selected from the main menu, using the Menu knob. Note that the speed range selected here is not used when an internal or external clock source is selected.

Internal Clock Generator

The LFO can optionally be clocked from an internal time source. This can be useful if you are working at a particular speed (beats-per-minute or BPM), and wish to have your LFO time synchronized to some multiple or division of this time signature. To use the internal clock generator, select "Int Fixed" option from the Clock Src main menu. You will then be prompted to enter a BPM value. Once you have done this and are on the main screen again, the Frequency knob (or CV input) can be used to select between speeds that are quantized to different multiples or divisions of this BPM.

External Clocking

To use an external clock, an appropriate signal must be fed into the "Retrig/Clock" input, and a corresponding "Pulses Per Quarter" (PPQ) value selected from the "Clock Src" menu.

The available PPQ settings are:

- 1 PPQ (one pulse per quarter note)
- 2 PPQ
- 4 PPQ
- 24 PPQ
- 48 PPQ

Once this setting has been configured, the LFO will calculate the BPM of a signal applied to the "Retrig/Clock" input, and allow the rate of the LFO to be set relative to the calculated BPM. Note that the Retrigger setting is set to "Off" and the Envelope Type set to "Looping" automatically if an external clock source is selected (although there is nothing to stop you setting it back should you desire).

Customizing Wavetables

One of the more exciting features of the Wavetable LFO is the ability for the user to define their own wavetables. A wavetable is a set of four waveforms (for example sine, triangle, square etc). There are 16 slots that can be used to save predefined wavetables; by default the first 8 have some predefined wavetables to get you started, but these can (and should!) be overwritten by your own creations...

To edit the wavetable stored in the currently selected slot, select "Edit table" from the main menu. In editing mode the menu knob can be used to scroll through the currently selected waveforms (1 to 4). To edit the currently visible waveform within the current wavetable, click the menu knob.

When editing an entry in the wavetable, the current waveform can be selected by scrolling the menu knob left and right. In addition to selecting the waveform, there are a number of characteristics that can be altered for each wave within the table. These are "Phase" and "Multiplier". The Phase allows for adjustment of the phase of each individual waveform within the table; note that this is distinct from the overall Phase that can be adjusted via the Phase knob/CV input when using the wavetable. Multiplier repeats the current waveform for multiple cycles; instead of a single cycle, up to 8 cycles of a selected waveform can be entered as an entry in the table.

Editing a waveform can be ended by clicking the menu knob. The best way to gain familiarity with the waveform editor is by experimentation; have a play around with it and see what results you can get!

Display Settings

Out of the box, a lot of text is visible on the display, giving information about the state of the oscillator. For those who prefer less visual feedback, the following options are available within the "Settings" menu item:

- S.Timeout - Set the number of minutes after which the display turns off automatically.
- Show Pos - Choose whether or not to display the position of the oscillator output within the current waveform. The position of the output is only displayed at speeds of less than 2 Hz (anything else becomes a blur!).
- Show Freq - Whether or not to display the current speed of the oscillator in Hertz (does not apply when using time synched to internal or external clock).
- Show BPM - Choose whether to display the calculated BPM of an external signal, or the fixed internal BPM. Does not apply when the LFO is not clocked.
- Show Div - When the LFO is being driven from an internal or external clock, whether or not to show the current beat division.