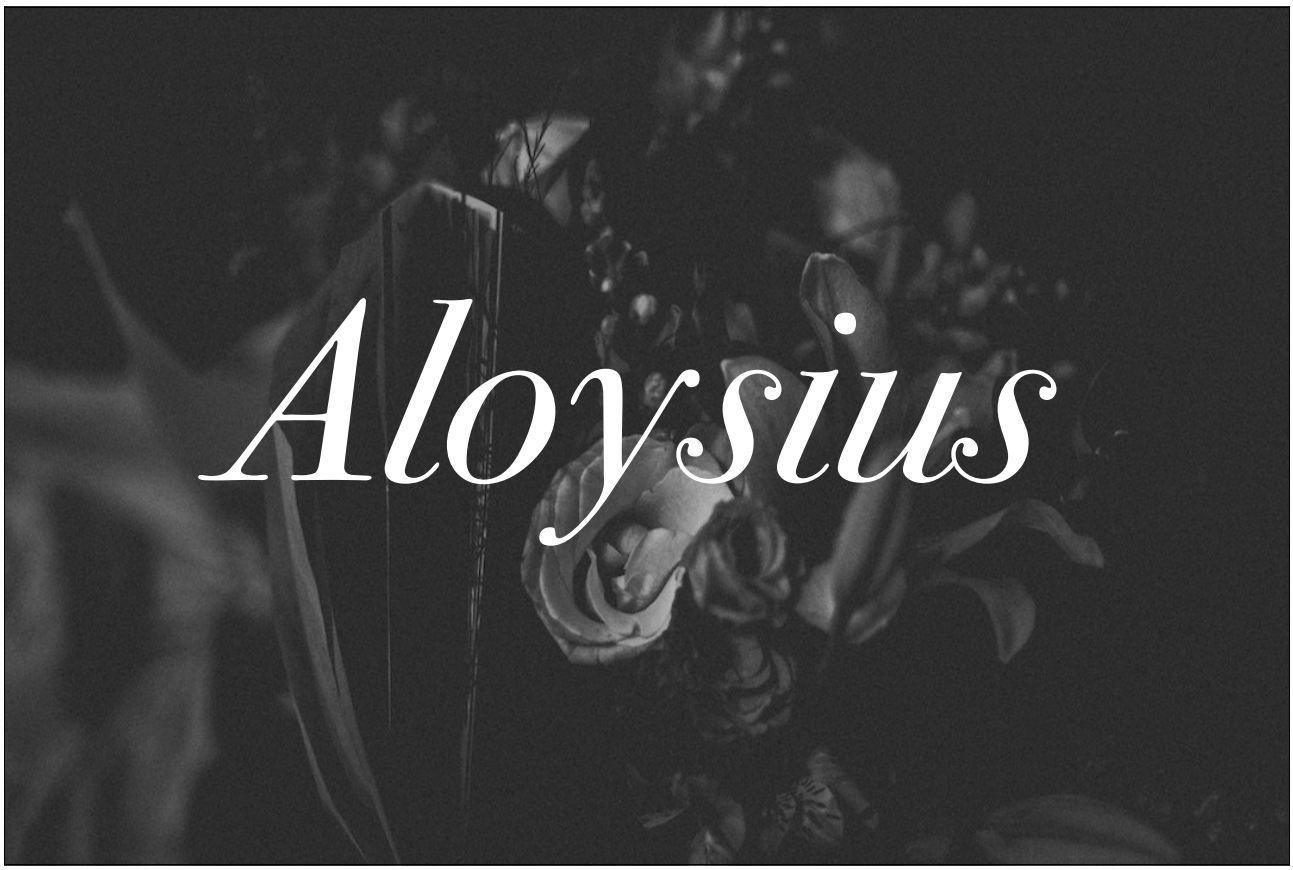
Expert Sleepers



User Manual

Revision 1.0

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Introduction

Congratulations on your purchase of an Expert Sleepers "Aloysius". Please read this user manual before operating your new module.

Aloysius is an envelope with an unusual AHDW (attack/hold/decay/wait) configuration, sometimes referred to as a trapezoid generator. CV control of all envelope times is provided. The envelope can be set to auto-trigger, turning it into a complex voltage-controlled LFO.

The shape of the attack and decay sections can be independently and continuously adjusted from exponential, through linear, to logarithmic.

The module is constructed entirely from analogue parts and discrete logic. There is no microcontroller or digital-to-analogue conversion involved and therefore no quantization of voltage levels or of the response time.

Installation

House the module in a Eurorack case of your choosing. The power connector is 16-pin Doepfer standard[1]. If using the power cable supplied with the module, the red edge of the cable is closest to the bottom edge of the PCB, and carries -12V. ("-12V" is marked on the PCB itself next to this end of the connector.) Be sure to connect the other end of the power cable correctly, again so -12V corresponds to the red stripe on the cable.

Power requirements

Aloysius draws up to 43mA on the +12V rail, and 25mA on the -12V rail.

It does not use the 5V rail.

1 http://www.doepfer.de/a100_man/a100t_e.htm

Inputs and outputs

Aloysius's input and output jack sockets are illuminated, lighting red for positive voltage and blue for negative voltage. (Audio appears purple, since it is a rapid alternation of positive and negative.)

From top to bottom, Aloysius's sockets are:

- Gate/trigger input
- Envelope output
- Attack time CV input
- Hold time CV input
- Decay time CV input
- Wait time CV input

For the time CV inputs, a voltage range of 10V corresponds to the full range of the knob. The knob and CV are simply added, and negative CVs are accepted (a negative CV having the same effect as turning the knob counter-clockwise).

Controls

There are four large knobs, which correspond exactly to the four CV inputs: Attack, Hold, Decay, and Wait.

There are two smaller knobs, which set the shape of the attack and decay portions of the envelope. These knobs have a centre detent, which corresponds to a linear shape.

Finally, there are three switches. The upper switch sets the mode of operation; the lower two switches set the time ranges for the attack/decay times and the hold/wait times, respectively.

Theory of operation

The exact behaviour depends on the mode switch, but is broadly the same in all modes.

'Hold' mode

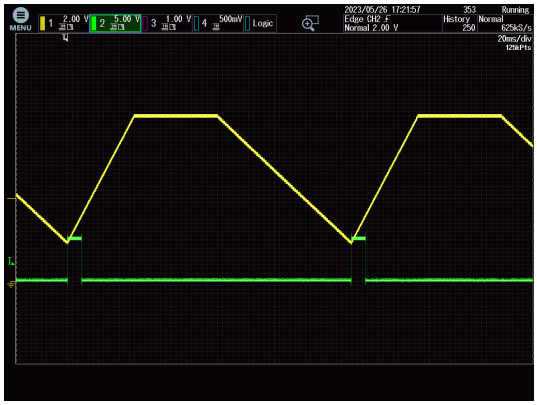
In this mode, the envelope is triggered by a pulse on the Gate input. (In the images below, the input trigger/gate signal is shown green, with the output envelope in yellow.)

Once triggered, the envelope rises at a rate set by the Attack knob (and CV) until it reaches the maximum (8V). It stays at the maximum level for an amount of time set by the Hold knob (and CV). It then begins to fall at the rate set by the Decay knob (and CV) until it reaches 0V, at which point it stops.

Hold mode

The envelope always rises to the maximum level, even if the trigger is shorter than the time it takes to do so.

The envelope can be retriggered during the decay stage, in which case it begins to rise again to the maximum level. It does so from its current level; it does not reset to zero when triggered.



Retriggered during decay

Triggers during the attack or hold stages are ignored.

Triggers during attack and hold are ignored

'Gated' mode

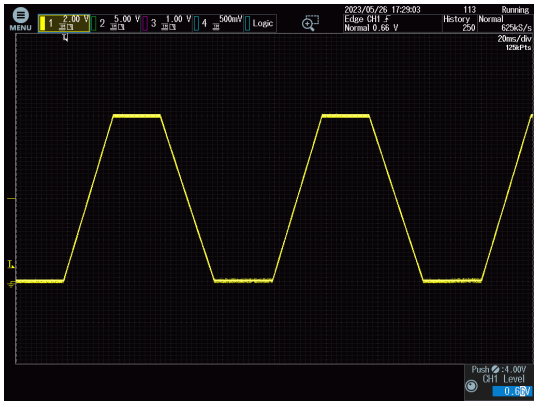
This mode differs from 'Hold' mode only in that the transition from Hold to Decay happens when the input trigger signal goes from high to low. The Hold time control no longer has any effect, but the length of the input trigger (or rather, gate) now matters.

Gated mode – gate shorter than attack

Gated mode – gate longer than attack

'Auto' mode

In this mode, the envelope becomes a free-running LFO. When the level hits 0V at the end of the decay stage, the envelope waits for the time set by the Wait knob (and CV) before automatically retriggering the attack. Note that the Gate input is still available to retrigger the envelope mid-cycle.



Auto mode

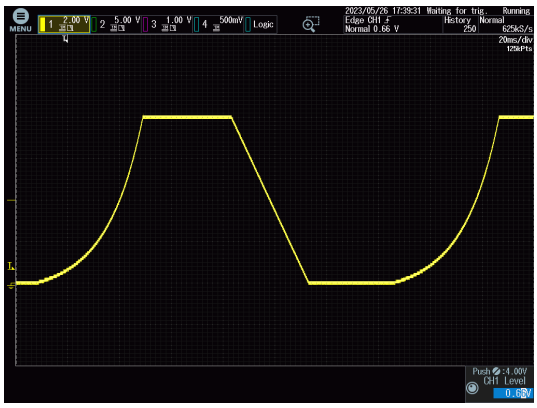
Time ranges

The time range switches have three options: Med(ium), Slow, and Fast. When Fast is selected each envelope phase can be adjusted from approximately 1 millisecond to 1 second. Medium is about six times slower; Slow is six times slower again.

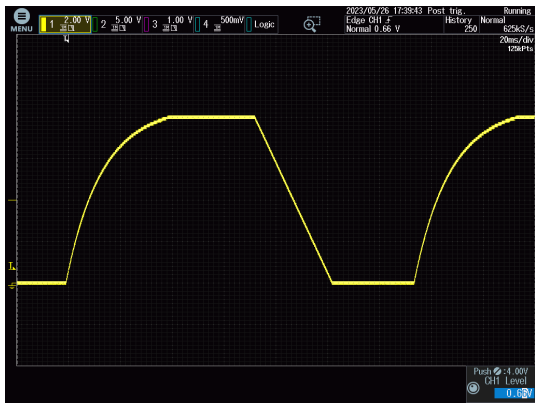
The upper range switch sets the range for the attack and decay times; the lower range switch sets the range for the hold and wait times.

Envelope shapes

The upper small knob (marked 'A') sets the shape of the attack stage. At its centre position the attack is linear – a simple ramp. Turning the knob counter-clockwise makes the attack exponential – that is, it rises slowly at first and then gets faster. Turning it clockwise makes the attack logarithmic – it rises quickly to begin with and then slows.

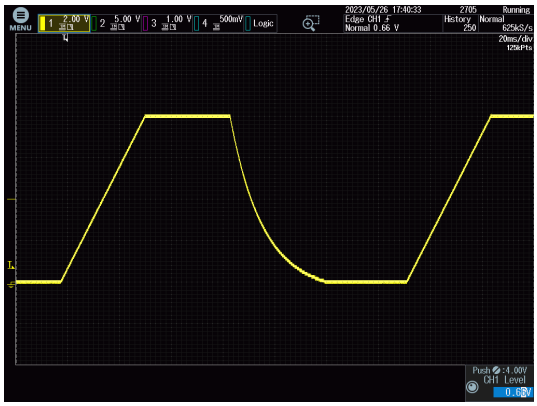


Exponential attack

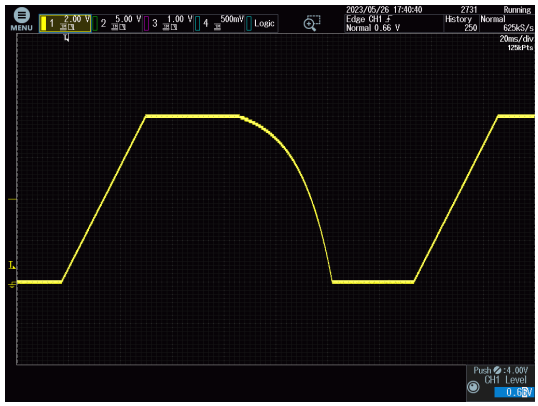


Logarithmic attack

The lower knob (marked 'D') sets the shape of the decay stage, in a similar manner.

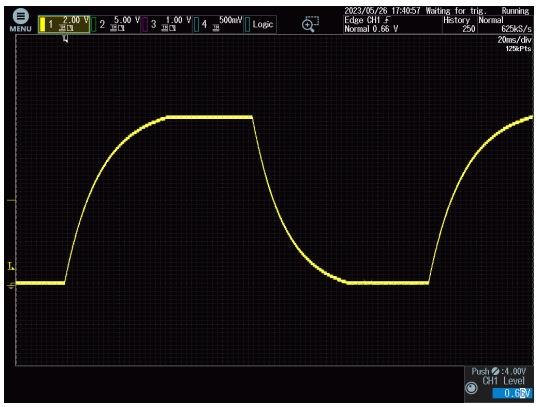


Exponential decay



Logarithmic decay

Note that a traditional analogue ADSR envelope generator has a logarithmic attack and an exponential decay/release.



Logarithmic attack, exponential decay

Calibration

There are two trimmer pots on the upper PCB.

Single-turn pot RV6 sets the full-scale envelope output. This is factory set to 8V. The value can be conveniently measured at test point TP2. Note that since all the envelope time controls are actually speed controls, changing the full-scale envelope output also changes all the envelope times.

Multi-turn pot RV5 sets the slowest envelope speed, and also has a strong affect on the most extreme log/exp envelope shapes that can be achieved. This is calibrated by setting all the

envelope time knobs to maximum and measuring the voltage at test point TP3. The factory setting is 10mV.

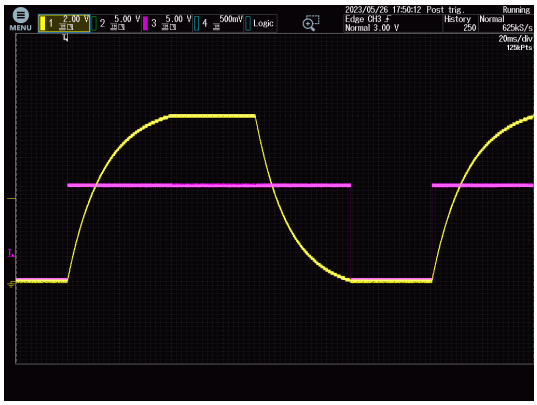
If, at high values of Attack/Decay and extreme values of the shape knobs, the envelope doesn't progress as expected – for example, if the envelope gets stuck in Attack and never moves on to Hold – this indicates that the calibration of RV5 may need to be adjusted.

Test point TP1 is ground.

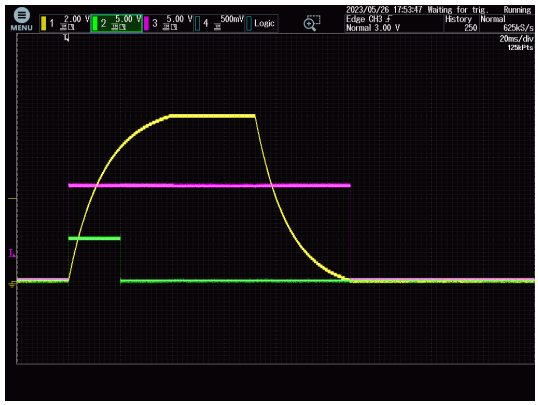
Hacking resources

Test point TP4 exposes an 'envelope active' signal, which is high (near 12V) during the attack, hold, and decay stages. The inverse of this can therefore be used as an end-of-cycle trigger.

The signal on TP4 is shown as the magenta trace in the examples below.



Envelope active – auto mode



Envelope active – hold mode

Where to get help

Email, forum, and social media links can be found at the bottom of every page on our website[2].

Acknowledgments

Black and white photography by Israel Denadai[3].

2 https://www.expert-sleepers.co.uk
3 http://israeldenadai.com.br/bw