

# Expert Sleepers



*amelia*

*User Manual*

*Revision 1.0*

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## ***Introduction***

Congratulations on your purchase of an Expert Sleepers “Amelia”. Please read this user manual before operating your new module.

Amelia is an envelope/function generator with an unusual ADBR (attack/decay/break/release) configuration. CV control of all envelope times and of the break level 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/release sections can be independently and continuously adjusted from exponential, through linear, to logarithmic.

Amelia was developed with use with sequencers particularly in mind, where often you only have a trigger output, not a gate of adjustable length. It allows you to create complex and flexible envelope shapes from that simple trigger signal that can be fully modulated under voltage control.

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](#)<sup>1</sup>. 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***

Amelia draws up to 33mA on the +12V rail, and 33mA on the -12V rail.

It does not use the 5V rail.

## ***Inputs and outputs***

Amelia'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, Amelia's sockets are:

- Gate/trigger input
- Envelope output
- Attack time CV input
- Decay time CV input
- Break level CV input
- Release time CV input

For the time CV inputs, a voltage range of 10V corresponds to the full range of the knob. The Break level CV input is used directly (i.e. the break occurs when the output envelope passes the voltage on the input). In all cases, 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, Decay, Break, and Release.

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

Finally, there are two switches. The upper switch sets the mode of operation; the lower switch sets the time range.

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<sup>1</sup> [http://www.doepfer.de/a100\\_man/a100t\\_e.htm](http://www.doepfer.de/a100_man/a100t_e.htm)

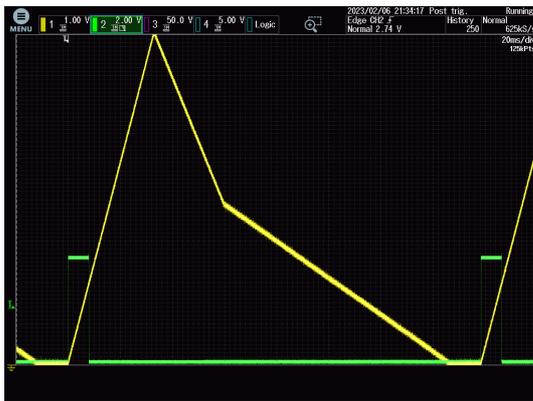
## Theory of operation

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

### 'Break' 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 then begins to fall at the rate set by the Decay knob (and CV) until it reaches the Break level. (Note that the Break control is a *level*; it is not a *time*.) The envelope then falls at the rate set by the Release knob (and CV) until it reaches 0V, at which point it stops.



*Break at mid-way; fast decay, slow release*



*Break set high; slow decay, fast release*

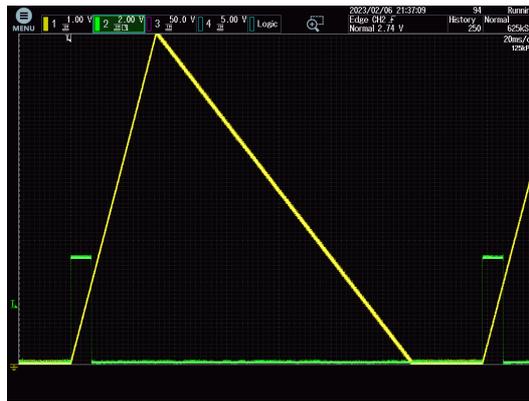
The envelope always rises to the maximum level, even if the trigger is shorter than the time it takes to do so.

The envelope can be retriggered during the decay and release stages, 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 release*

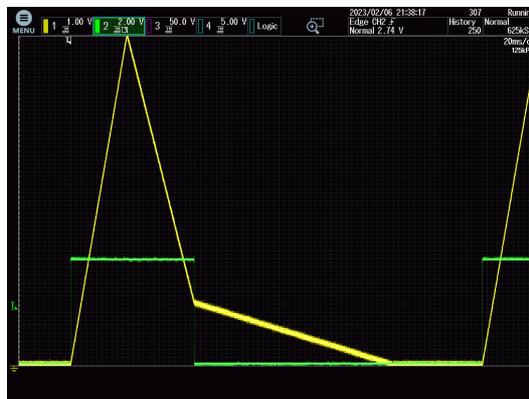
Because the Break level defines when the envelope switches from Decay to Release, it follows that if you set the Break level to maximum, there will be no Decay stage, only Release; likewise if you set the Break level to minimum, there will be no Release stage, only Decay. So if you want a simple two stage AD envelope, Amelia can provide that, simply by setting the Break control to one extreme or the other.



*Attack and release only*

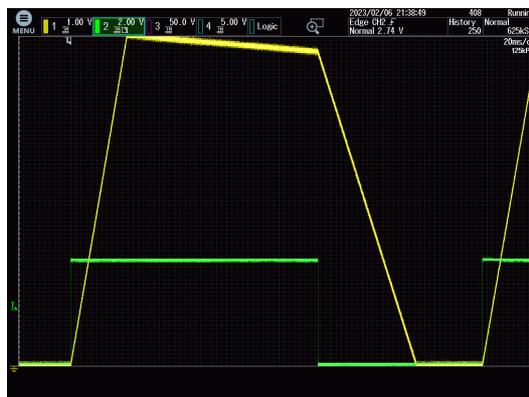
### 'Gated' mode

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



*Gated mode*

In this mode, if you set the Decay time very long, you can achieve something like a sustain stage. In fact, the shape is then somewhat like a piano: the note will continue, though gradually fading, while you hold a key down, but will stop (that is, decay much more quickly) when you release the key.



*Gated with slow decay*

## 'Auto' mode

In this mode, the envelope is automatically retriggered when it reaches 0V at the end of the release stage – that is, it becomes a free-running LFO. The Break level behaves as in 'Break' mode. Note that the Gate input is still available to retrigger the envelope mid-cycle.



*Auto mode*

## Time ranges

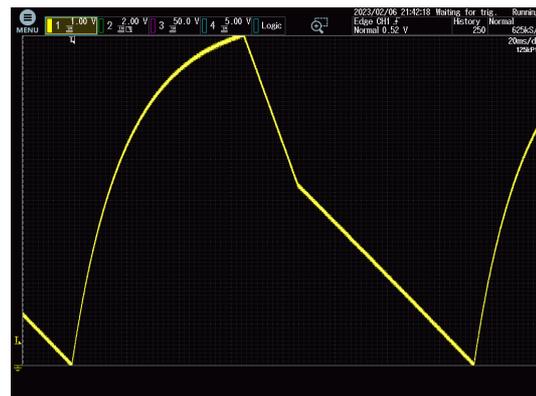
The time range switch has three options: Med(ium), Slow, and Fast. When Fast is selected each envelope phase can be adjusted from approximately 1 millisecond to 1 second. Medium is about six times slower; Slow is six times slower again.

## 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*

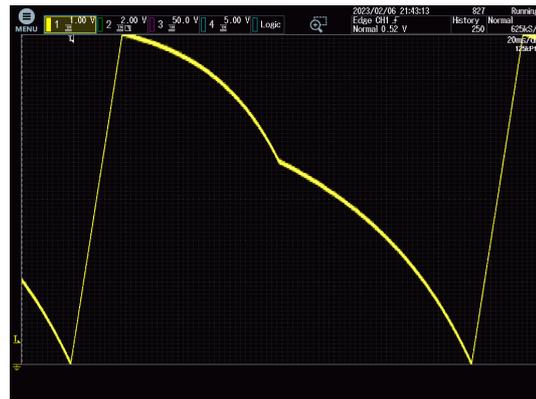


*Logarithmic attack*

The lower knob (marked 'R') sets the shape of both the decay and release stages, in a similar manner.



*Exponential decay/release*



*Logarithmic decay/release*

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



*Logarithmic attack, exponential release*

When using long envelope times (within a range) avoid using extreme positions of the shape knobs, or unexpected results may occur. If necessary, use the next slowest time range setting and a lower time knob position to achieve the desired time and shape.

## ***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 (which is actually the negative of the output voltage i.e. -8V by default). 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, setting the two shape knobs to centre (linear), and measuring the voltage at test point TP3. The factory setting is 10mV.

## ***Where to get help***

Email, forum, and social media links can be found at the bottom of every page on [our website](#)<sup>2</sup>.

## ***Acknowledgments***

Black and white photography by [Israel Denadai](#)<sup>3</sup>.

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2 <https://www.expert-sleepers.co.uk>

3 <http://israeldenadai.com.br/bw>