

PSDN-Env

(Poseidon CV Envelope Generator)

1. Introduction



The PSDN-Env (short for *Poseidon Envelope*) is a CV envelope generator utility. It has two identical six-stage envelopes that can be used independently or linked and combined together, creating a more complicated and dynamic envelope. Each envelope has a curve section that can drastically alter each attack, decay, and release stage, curving and shaping a normally linear ramp. There's also a front panel mod section that can wire up anything to anything else. And on the back panel, there are plenty of input and output connections and controls, including another link section designed for chaining multiple PSDN-Envs together.

The rest of this section will give an overview of the device, while the rest of the manual will go into more detail on each knob and button. I've tried to be redundant, so skip ahead if you want.

The general controls section on the left has a **device on/off**, a **graphics on/off**, a **frames per second** knob, a **note on** lamp, and the **link** and **gate controls**, explained below.

By default, a new PSDN-Env just has its first envelope on. If the second envelope is turned on, it will function independently of the first, with its own inputs and outputs. The two envelopes can also be linked together via the **link type** menu so that the second launches from and adds to the first.

The two menus next to this **link type** menu read **S** and **R** by default. This is where the 2nd envelope begins and ends (or is released): the sustain and release of the 1st. These can be freely changed, but if the **end** is before or equal to the **start**, the **red error** light (underneath the menu) will light up instead of the green **link active** light (to the left of the menu).

The second envelope is added to the first envelope automatically in a way that depends on the **link type**. Right now there are three options. The first, *link A*, will just add the second to the first, which can result in the total signal flattening out at 1 (so you will probably want to lower the **level** knobs). The second, *link B*, will normalize the level so that the max of the first and second is the first's **level** setting. The **link scale** knob will scale the second envelope's output to the first's by a positive or negative amount. The third, *dual*, will act like the other link types but not add the outputs together.

There are two gate input controls in the general section. **Gate velocity** scales the overall velocity using the gate velocity by a positive or negative amount. The **polyphony** menu has three choices: hold all

notes and gates until they're all released, mono (but poly gate inputs), and poly. If you're going to drive this with MIDI/sequencer notes and it's inside a combinator, make sure to click on the *receive notes* box next to this device inside the programmer.

The main envelope controls are the same as you find elsewhere in Reason: **attack**, **decay**, **sustain**, and **release**, plus **delay** stages before **attack** and before **decay**. All of these, except sustain, can be free (in seconds) or sync (sync'd to the song) lengths. To the left of those faders are the **on/off**, **sync/free**, **loop**, and **invert** toggles. To the right of them is the **level** knob.

On either side of the envelope's number, above the **level** knob, there are green gate input lamps. Each stage also has a green lamp underneath its fader, to the right of the fader's label, that will light up while that stage is active. The red, yellow, and orange lamps to the left of these labels show the **link start** and **end** points for the front and back panel links (red for front, yellow for back, and orange if they overlap).

The curve sections, to the right of the displays, affect the normally linear ramps. The **midpoint** knobs—one for each of the **attack**, **decay**, and **release** ramps—light up a bit as they move off of 0. They change a line into two, moving the midpoint vertically or horizontally, depending on the **midpoint direction** toggle above the **level** knob.

The **curve type** menu (with green text) has various functions that will curve the normally linear ramps according to their green **curve amount** knobs. The **curve shape** menu (with gold text) subdivides the output into regions and applies the curve, its inverse, or no curve to each region. This menu is yellow/orange and the **use** buttons of the same color above the curve knobs are used to apply the curve shape to that ramp. This way, some ramps can have a special shape and the rest can have a more standard curve. The red **midpoint** knobs set the midpoints vertically or horizontally (according to the small **midpoint direction** toggles) and are especially useful with **curve shapes**. They are equivalent to using the linear **curve functions**.

The front panel mod section, on the right side of the device, can wire up just about anything to anything else. Each of the four entries has a **source** menu (just about anything and everything), a **destination** menu (which envelope: 1, 2, both, or a special both that does 2 parallel mods at once), a **knob** menu (every knob and button, plus a few special things), and an **amount** knob that can be positive or negative.



The folded front panel has the envelope controls without the curve section, along with some of the general and link controls and all of the lamps and displays. That's all that would fit!



On the back panel, the **gate inputs** and **envelope outputs** are outlined in gray. In between the two are gate outputs for each stage. These trigger on when the corresponding stage is active (the back **level** knobs control their velocity/level).

The **outputs** have two toggles next to them: **bi**(polar) and **invert**. **Bi** affects the top two, while **invert** affects the right two (and both affect the top right). This way you can have multiple versions of the same original signal.

When using the **linked modes**, the first gate inputs trigger the first envelope, which will trigger the second via the link. The second gate inputs will trigger the second envelope independently of that link. The first outputs will be the total linked output, and the second will only be the second's original output (what you see on the front panel displays). However, there are green toggles next to each section of the second envelope that will rewire those connections to the first envelope. This way you can have up to 4 gate inputs, 8 outputs, and 2 stage outputs per stage for the linked/first envelope.

The **done** stage output has a special purple **limit done on/off** toggle that covers both envelopes and a **length** knob for each of the envelopes. Normally, **done** is on whenever the envelope is not actively running. Toggling this on will limit it with a free/sync length (just like the front panel faders).

The mod inputs are to the right of the envelopes. They can be used individually, in pairs, or in groups of four in the **mod source** menu. The **destination** and **knob** menus then have options for wiring up more than one input to more than one output.

The **extra link** is underneath the mod inputs. This is designed for linking PSDN-Envs together and functions like the front panel link. This link's **start** and **end** positions display in yellow on the front panel (or orange if it's overlapping with the main link). It has a green toggle above its **on/off** for using it on the first envelope instead of the second (just like the other green toggles). To use this, turn it on, connect the extra link's outputs to other PSDN-Envs' gate inputs, and wire up their outputs to the original PSDN-Env's mod inputs. Then use the front panel mod section to add their outputs to the main output (there is a special menu item for this in the **knob** menu: "Add to Envelope").

Finally, there are four extra outputs on the far right side of the device that can be used for anything by wiring them up in the mod section.

That's it for the introduction! The rest of the manual covers each parameter in detail. Feel free to contact me if you encounter bugs or if you have suggestions for curve functions or link types, etc.!

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2. General Controls



This section controls the entire device with a device **on/off**, graphics **on/off**, and **frames per second**. It also has the **link** and **gate** options.

On/Off

Turns the device on and off.

Graphics On/Off

Turns the graphics on and off.

Frames per Second (FPS)

From 10 to 60 in increments of 5, this sets the maximum **FPS** of the displays. However, the actual fps is dependent on the computer and the audio settings. Higher audio latency correlates with lower fps, but even the lowest latency may not be able to reach a full 60 fps. This depends on your graphics hardware and Reason itself. This knob is partially for future compatibility, partially for adjusting how the displays look, and partially for saving a few CPU cycles if you really need them.

Linked Envelopes

The PSDN-Envelope can function in several different modes. When the **link type** menu is blank, it functions as a single or dual envelope. If either link mode is selected, the second envelope is tied to the first via the **start/end** selectors. For these linked modes, red lamps to the left of the fader labels show the start and end points, corresponding to the scrolling menus. Yellow is used for the back panel link, and orange is used when the two overlap.

Link Type

No link (blank)	Both function independently
Type A	The 2nd is added to the first and both level knobs just control their respective envelopes.
Type B	The 2nd is added to the first but the first level controls the actual max volume, and the relationship between the two levels is dynamically tied to their knobs. However this only has an effect on the levels if both envelopes are or are not inverted, not if only one is inverted.
Dual	The two are linked but not added together.

Link Start

This goes from attack delay (d1) to release (R). If linked, when the first envelope reaches this stage, the second will trigger. If this value is to the right of or equal to the **link end** value or there are no stages with non-zero faders in between the two, the red error light will turn on. Otherwise, if these values are valid, the device is on, and both envelopes are enabled, the green link active light will turn on.

Link End

This is where the second envelope is released from. It goes from attack (A) to done (X).

Link Scale

This is a zero-snap knob with a middle of 0. Positive values scale the volume of the 2nd envelope proportionately with the output of the 1st envelope. Negative values do this inversely so that the 2nd envelope will contribute less at the maximum than at the minimum of the 1st. It is also used when adding other signals to the envelopes via the "Add to scaled by volume" mod destination. The knob lights up red when off of 0.

Gate Options

Gate Velocity Amount

This green knob is the amount for which the gate velocity should affect the output level. The default is 0%, no effect. Positive values make the gate velocity correlate with the envelope output so that stronger hits make stronger envelopes. Negative values do the inverse.

Polyphony

Hold	Hold the envelope while any notes and gate inputs are on. Only release when all notes and gates are off.
Mono	Mono notes but poly gates.
Poly	Poly notes and gates (max 32 for notes).

Note On

This lamp next to the quarter note symbol lights up when a note trigger is on that is coming from a combinator or a sequencer note lane. If a PSDN-Envelope is inside a combinator and you want it to trigger with the notes that are driving the combinator, make sure to select the device in the programmer window and check the box next to "Receive Notes." You can also use standalone sequencer lanes, but you'll have to create an automation lane and a note lane. Neither are automatically created when one of these devices is created.

3. Envelopes



Basic Controls

On/Off

Turns an envelope on and off.

Sync

Toggle to use synced values instead of seconds for the stages.

Loop

If on, the envelope will loop back to the first active stage as soon as it hits the **sustain** stage, treating the sustain level as the new baseline, rather than 0.

Invert

Inverts the envelope so that 0 is now the "maximum" and the **level** setting is the "minimum". The back panel also has an **invert** toggle for two of the outputs. This way, the main signal can be inverted or not, and you can also have additional inverted signals relative to that signal.

Level

Controls the maximum reach of the envelope or the resting state if inverted. If the envelope is linked or altered via an "add to" mod, this just controls the level of the envelope before adding anything else.

Envelope Stages

There are six of these per envelope: two delays and the usual ADSR stages. Each of them will light up a corresponding lamp and trigger the back panel stage gate-outs when active.

Attack Delay (labeled d)

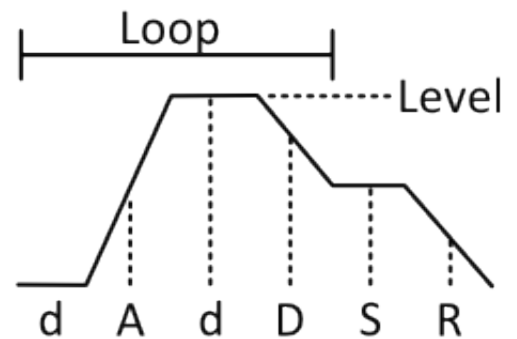
A delay before the **attack** ramp starts.

Attack

The attack ramp (going up unless inverted), and it can be modified via the **curve** section.

Decay Delay (labeled d)

Another delay in-between **attack** and **decay**.



Decay

The decay ramp (going down unless inverted). Once the **attack** (or **decay delay**) is finished, the envelope decays until the **sustain** level is reached. This ramp can be modified in the curve section. If the gate is released before then, the **sustain** will be skipped and the **release** will start.

Sustain

The only stage fader that is not expressed in time, this is the percentage of the **level** that the envelope will hold at while the gate is held, after all previous stages have finished.

Release

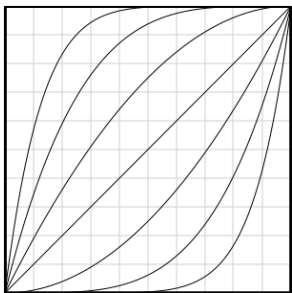
Once the gate is off, the ramp is released, moving down (unless inverted). This ramp can also be modified in the curve section.

Curve Section

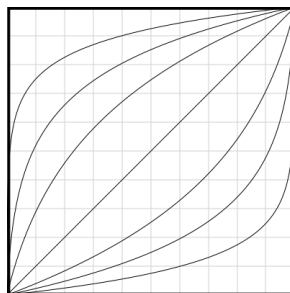
This can be used to curve and otherwise shape the **attack**, **decay**, and **release** stages.

Curve Type

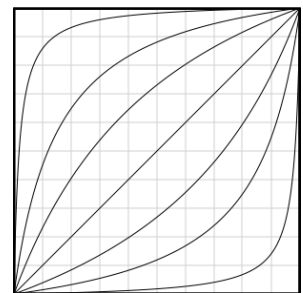
This menu has various linear and nonlinear curve functions that are applied to each ramp according to their **curve amount** knobs. The functions currently include: two linear adjustments (just like the midpoint knobs—see that section below), two versions of x^n , two versions of $\log x$, and an ROCC function. The second versions of x^n and $\log x$ are the inverses of the other versions—basically solving for x instead of y on an x,y plot. An ROCC function (Receiver Operating Characteristic Curve) is its own inverse, so there is only one version of this.



x^n



$\log x$



ROCC

Curve Shape

This menu is blank by default. It subdivides a ramp into n pieces and applies the curve amount, its inverse, or nothing at various parts of that ramp. It's designed for doing s-curves, curved steps, etc. It only applies to ramps with the yellow **use shape on attack/decay/release** buttons toggled on. This way you can have a special ramp or two and the rest can still have simple curves.

This **shape** is applied to the ramp from left to right (in time). So, like the **curve amount** and **midpoint** knobs, the *up/down behavior* for the **decay** and **release** ramps is inverted relative to the **attack** ramp. You can use the **DR shape direction toggle** on the back panel to flip this.

Use Shape on Attack/Decay/Release

These yellow toggles below the menus simply apply the shape to the corresponding ramp if the curve and shape menus are non-blank and the corresponding **curve amount** knob is non-zero.

Curve Amount

These green knobs light up when active (not 0) and have positive and negative values. They are a variable for the selected **curve type (function)** and will only affect the envelope when a **curve type** is selected.

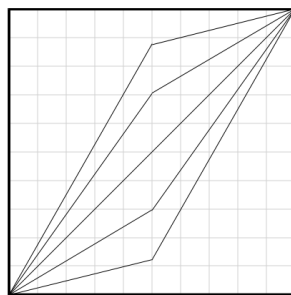
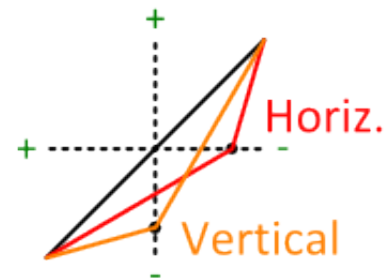
Midpoint

These red knobs light up when active and operate regardless of whether a **curve type** is selected. They operate the same as the *linear* function with the default **midpoint direction** setting, moving the midpoint of the ramp.

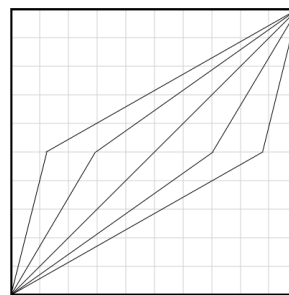
Both the **midpoint** and **curve amounts** for all of the ramps have the same positive/negative orientation relative to the beginning and end of their ramps. Each knob skews its ramp to the left (over time) for negative values and to the right for positive values. In other words, negative values make the ramp hesitate and then rapidly approach the endpoint at the tail end of its time. Positive values do a fast approach that slows down, the opposite of this.

Midpoint Direction

This toggle controls which direction the **midpoint** knobs operate in. The default is vertical (shown on the bottom left graph), and toggling it on makes the **midpoints** work horizontally (bottom right graph). The diagram to the right shows what the same *negative* **midpoint** will do to an **attack** ramp with the horizontal (in red) and vertical (in orange) settings. Note that it will actually negate the midpoint for the horizontal setting in order to keep the general shape and "speed" of the envelope consistent for positive/negative **midpoint** and **curve** knobs.



vertical



horizontal

Gate Lamps

On either side of the numbers, "1" and "2", to the left of the output displays, are two gate lamps that turn on when their gate-in is on (hitting).

Stage and Link Lamps

To the right of each single-letter label for the envelope stages is a lamp that indicates when that stage is active. The back panel stage gate-outs will output at the same time if they are connected. To the left of these labels are the link **start/end** lamps—red for the front panel, yellow for the back, and orange if they overlap.)

4. Mod Section



There are four front panel mods. From left to right, each of them has a **source** menu, a parameter-to-be-affected menu (**knob/button**), a destination menu (**dest**) for choosing which of the envelopes to mod, and a positive/negative **amount** knob. Note that all of these have to be non-default for a mod to be active (the default is blank for menus and 0% for the amount knob).

Source

The **sources** are selected from both envelopes, the combined gate inputs for each, the note velocity (if driven by notes, either via a sequencer track or a combinator, in which case make sure to click on the *receive notes* box next to this device in the programmer), the 8 back panel inputs, **bank** combinations of 2 or 4 of the envelopes, gate inputs, or CV inputs, and an on/off value for each stage of both envelopes. The **bank** combinations allow summing multiple inputs before modding and also individually modding 2 separate parameters with 2 or 4 signals.

Destination (dest)

The **dest** menu chooses between the envelopes along with different ways of doing both. If **banks** are used as sources (labeled that way in the source menu), and the **dest** is "1 2", the bank will be summed and then applied to both envelopes. If a bank is used and the **dest** is "12* — Bank 1 2 to Bank 1 2", the 2 (or 4) sources are applied individually to each envelope. For a bank of 2, this maps 1 to 1 and 2 to 2. For a bank of 4, this maps 1 and 3 to 1, and 2 and 4 to 2.

Knob

The **knob** menu lists all parameters for each envelope, with the free/sync faders being first listed together so that you don't have to worry about choosing one or the other and switching back and forth if you toggle the **sync** button. They are also listed individually at the end of the menu (if for example, you want to switch back and forth between the two and mod them each separately).

Special Knob Options

"Add to Envelope" just adds the signal to the envelope's signal. "Add to scaled by volume" will use the **link scale** knob when adding. "Extra Outputs A" or "B" or "A & B" can be used to wire up any sources with the four extra outputs on the back panel.

Amount

This knob goes from -200% to 200%. With a bipolar source (-1 to 1), using a 100% **amount** to mod any knob or fader that is at its midpoint, that knob or fader can move across its entire range. With a unipolar source (0 to 1) and a 200% **amount**, a knob or fader at its lowest setting will move across its entire range (and vice versa with a -200% **amount** and a knob or fader at its highest setting).

Notes

The **delay** and **ADSR** faders are all one-way when it comes to modding and automation, so that movement of the faders will not make the envelope move "backwards." The ramp will be adjusted so that the current position will remain the same (for the current batch) and the ramp's slope will change, taking less or more time accordingly. This is also the case for the **curve section** controls, but it's done in a fuzzier way and so it can move backwards a bit.

5. Back Panel



Both envelopes have **gate ins**, **stage gate outs**, and **envelope outs**. The second envelope has a green toggle next to each of these groups that will redirect them to use (or drive via a gate) the first envelope instead.

Gate In

Each envelope has two gate-ins. In the default independent mode, each triggers its corresponding envelope, and any note triggers will trigger both. In a linked mode, the 1st envelope's gate-ins control the combined envelope (so does a note trigger) and the 2nd gate-ins can be used for triggering the 2nd envelope on top of the normal linked behavior. These gate-ins can also be used as 1st/link gate-ins instead by toggling the green toggle next to them.

Stage Gate Outs

Each envelope has 7 gate-outs that are triggered when and if the corresponding stage is reached. Any stages that aren't used (that have 0 or *instant* values) will just be skipped. You can use these to trigger other devices upon reaching various stages or perhaps mod various things while certain stages are active. There is a single **level** knob that controls the output level (velocity) of these gates, with a default of 100%.

Limit Done and Done Length

This purple toggle enables a limited done stage out for both envelopes. Each of them has a small knob that has the same free/sync values as the front panel faders. Normally, **done** will be on the entire time that the envelope is not running. This will give it a length of time before shutting off. (It will also shut off no matter what if the envelope triggers on again.)

Envelope Out

There are four outputs for each envelop. To the right of these are two toggles that can alter these outputs: **bipolar** and **invert**. **Bipolar** affects the top two outputs, and **invert** affects the right two outputs. If both toggles are on, the top left output will be bipolar; the top right output will be bipolar and inverted; the lower left output will be normal (unipolar); and the lower right output will be inverted. This **invert** is also relative to the front panel **invert**, so that if the front panel **invert** is on, the back panel **invert** will make those outputs normal again.

Mod Inputs

There are 8 inputs, organized in 2 banks of 4. These can be used to mod any parameter of the envelopes in the mod section. Because of limited space, they do not have trim knobs, but each of the front panel mods has an **amount** knob that does a similar thing.

Extra Link

This functions like the front panel link and is designed for chaining PSDN-Envs together. Use its **enable/on** button to turn it on, and set the **start** and **end** points. The green toggle causes it to trigger from the first envelope instead of the default second. It has a green active and red error lamp and two outputs. On the front panel, it lights up yellow underneath the stages (or orange if it's on the same position as one of the main links).

DR Shape Direction

Normally the shapes, like normal curves and midpoints, operate from bottom to top for all ramps. This makes the decay and release ramp shapes reversed.

Extra Outs

Four extra outputs are available. They can be wired up individually, in pairs, or all together with the front panel mod menus.

Mod Version (not available yet)

In future versions, if/when I add more curve functions and options and such, I will add a mod version menu that will allow easy backwards compatibility by default and still allow me to add more options to already modded menus.

6. Etc.

That's it! Please let me know if you find a bug or have suggestions for functions, other features, other devices, etc. Good luck and thank you! :)

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