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Charlotte Envelope Generator v1.0

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Coding by Pitchblende Ltd for Jiggery-Pokery

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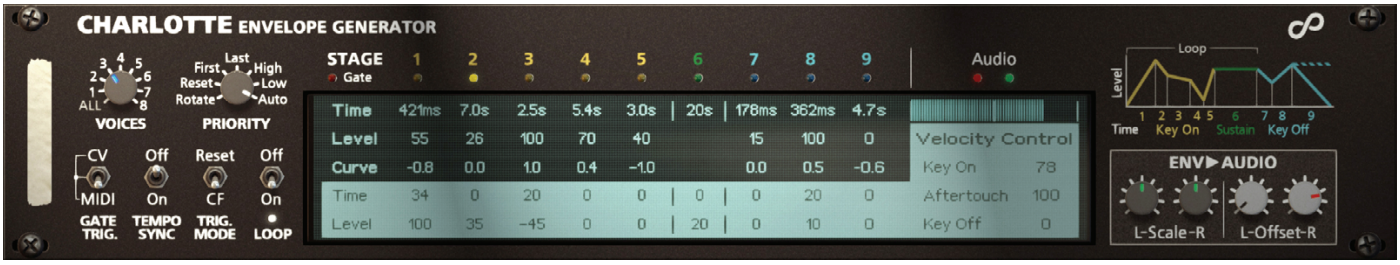
Re Rack Extension

Charlotte Envelope Generator



Charlotte is the first dedicated Envelope Generator (EG) for Reason, offering five Time-, Level- and Curve-adjustable attack and decay stages, a Sustain stage, envelope looping and LFO waveshaping, and three Release stages. She also features an 8-voice MIDI-to-CV pitch conversion with seven-mode note priority control, and built-in Amp EG to adjust the level of an audio input/output.

Triggering the EG

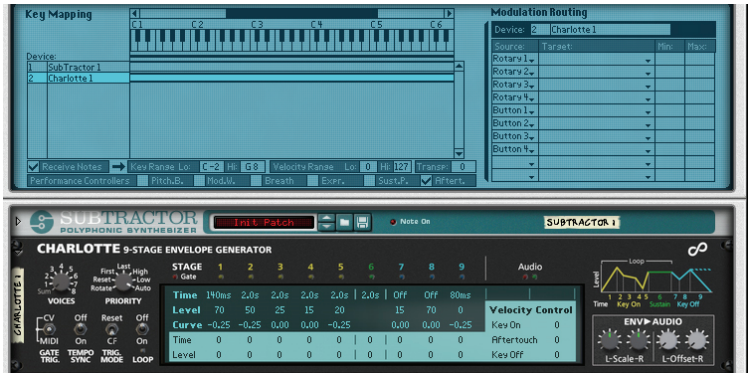
As with all of Reason synth EGs, an envelope is triggered by a *gate* event, that is, whether a note is On or Off, or if a CV value is zero (Off) or not zero (On). So pressing a key and holding it down will trigger and persist a gate On, releasing it is gate Off. There are three modes that can trigger, hold and release *Charlotte* envelopes by selecting the 3-way **Gate Trig.** switch.

CV: Use this mode to use only the Sequencer Gate CV jack on the back of *Charlotte*

CV+MIDI: Use this mode to use the Sequencer Gate CV Jack **and/or** a MIDI gate from your keyboard or from *Charlotte*'s sequencer track

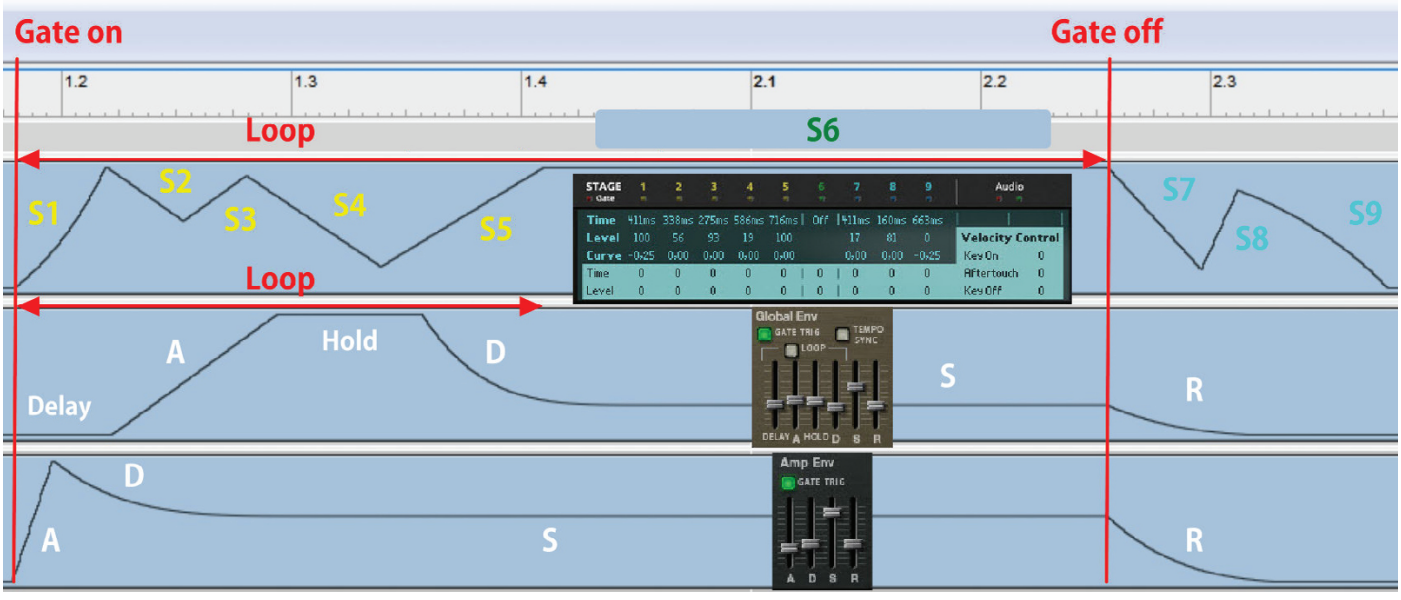
MIDI: Use this mode to use just a MIDI gate from your keyboard or a note/gate from *Charlotte*'s sequencer track

Creating *Charlotte* devices



When creating a new instance of *Charlotte* straight into the rack, a sequencer track and note lane is automatically created for recording or drawing notes/gates to trigger it. You can then hook EG, Note CV and Gate outputs to any instrument/s and just use *Charlotte* to handle the note-to-cv conversion as you would playing the RPG-8.

If a new instance is created into a Combinator, sequencer tracks are not created, as Reason assumes you will want to use the track for the Combinator. Currently there is no way for Rack Extensions to set default Combinator settings for non-instruments, so to ensure *Charlotte* receives appropriate MIDI data, click her Device name in the Key Mapping section and tick the "Receive Notes" and "Aftertouch" boxes, as shown in this example. You may want to select the instruments too and turn their "Receive Notes" box off. You'll probably want to leave their performance controller selections turned on.



9-Stage Envelope Generator

Typical envelopes in Reason and many synthesizers feature four stages: Attack, Decay, Sustain and Release, commonly known as ADSR. Some devices, such as NN-XT, additionally include Delay and Hold stages, which are are known as DAHDSR. With *Charlotte*, instead of merely being limited to a fixed [D]A[H]DSR, by adjusting Stage Time and Level parameters Stages 1–5 and 7–8 can effectively be *either* a Delay, Attack or Decay. Stage 6 is always Sustain; Stage 9 is always final Release, however it can function as a sustain!

For *Charlotte* the envelope stages are split into three, colour-coded zones: **Key On**, **Sustain** and **Key Off**.

Key On and **Sustain** are used when you have a gate active; **Key Off** is used when that gate is released.

For each Stage except Sustain you have five parameters. For this section we will be focusing on the first three: **Stage Time, Stage Level** and **Stage Curve**.

The **Stage Time** parameters can be globally set to milliseconds/seconds (up to 20 seconds per stage) or synced to the Reason tempo (from 1/128th up to 16/1) using the **Tempo Sync** switch. Stages are entirely bypassed if **Stage Time** is set to "Off", *except Stage 6*, where the length of the Sustain is based on whether the Gate Event is still On. Note that the **Stage 6 Time** *only* applies when **Loop** mode is On: we'll come back to the **Loop** and **Trig.** modes a little later.

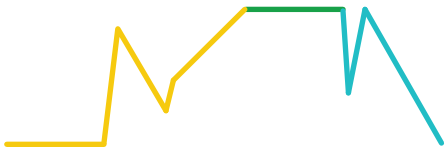
The most important concept to grasp in using digital envelopes is that the Stage Time and Stage Level *must* be considered together to set the action you require for Stage. **Stage Time** means *the length of time required to reach the maximum envelope level set by* **Stage Level**. Each Stage begins at the final level of the previous Stage. The third parameter, **Stage Curve** allows you to set a precise curve of the Stage from -1.00 (Exponential) through to +1.00 (Logarithmic); use a **Stage Curve** value of 0.0 for Linear. For snappy Stage 1 attacks -0.25 works well; extreme lower values, less than -0.5, may feel "laggy".

Note that the exponential and logarithmic curves appear inverted for decaying levels. In the diagrams above notice how the -0.25 exponential curve of the Stage 9 Release is the opposite shape to the Stage 1 Attack. To mimic the decay curve of the Thor envelopes shown you'll need to use a logarithmic value.

For the purpose of the following examples, let us assume *Charlotte* receives a gate event triggering a new envelope at a start velocity of zero.

Example 1: Using Stage 1 as Envelope Delay, no Curves

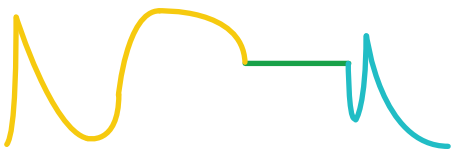
Stage	1	2	3	4	5	6	7	8	9
Time	5.0s	874ms	3.5s	115ms	3.1s	Off	98ms	420ms	3.5s
Level	0	70	20	38	81		20	81	0
Curve	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00



Since our non-adjustable start level is always zero, by setting **Stage 1 Time** to **5.0 seconds** but leaving **Stage 1 Level** at **0**, the first Stage in effect becomes the envelope delay on NN-XT or Thors' Global Envelope, as there is no output but it still takes 5 seconds to run through the entirety of Stage 1: the final level (zero) is the same as the start level (zero). Stage 2 is starting at the end level of Stage 1: so it will take 874ms from the start of Stage 2 to reach the maximum set level of 70 at the end of Stage 2. It will then take a further 3.5 seconds for the envelope level to *fall* to the maximum set level of 20 during Stage 3, and so on. When the gate is turned off, the Off event will then trigger the **Key Off** release section: 98ms to fall from 81 to 20, then 420ms to rise to 81, then 3.5s to fall to zero.

Example 2: Triple Attack/Double Decay Cycle with Curves

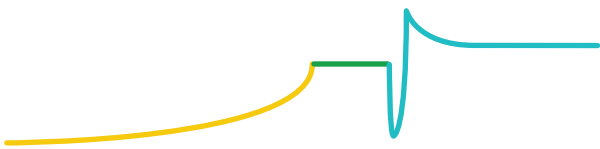
Stage	1	2	3	4	5	6	7	8	9
Time	585ms	3.5s	2.0s	2.1s	4.1s	Off	98ms	420ms	3.5s
Level	95	5	38	100	63		20	81	0
Curve	-0.25	-0.75	-0.20	0.60	-0.50		-0.30	-0.40	0.81



From our start level of zero, we have an exponential 585ms attack followed by an exponential 3.5s decay, then two attack stages of 2.0s and 2.1s but with, respectively, an exponential then logarithmic curve. Stage 5 is the second decay, taking 4.1 seconds to fall to 63, the velocity that will be held by Stage 6 (**Sustain**) for the remaining duration of the active Gate.

Example 3: Sustained Release Velocity

Stage	1	2	3	4	5	6	7	8	9
Time	20s	Off	Off	Off	Off	Off	97ms	101ms	3.5s
Level	60	5	38	100	63		6	100	75
Curve	-0.25	-0.75	0.20	0.60	0.90		-0.30	-0.40	0.81



Stage 9, as noted previously, supposedly always ends on a final level of zero. That's true if, as in normal practice, you leave its level at nought!

However, *Charlotte* is capable of outputting the Stage 9 velocity as a fixed level without even having an active gate simply by not setting the **Stage 9 Level** to zero! In Example 3, you can see the EG will take the full twenty seconds to exponentially reach a level of 60. With Stages 2–5 all turned "Off", Stage 6 (**Sustain**) will instead hold the final Stage 1 output value of 60 until the gate is Off/zero and thus the **Key Off** stages are automatically triggered. It will then take 97ms for the envelope to drop to 6, 101ms to rise to the maximum velocity of 100, then 3.5 seconds to fall back to just **75**. But that value is now output continuously, indefinitely. Or until the next gate On event restarts the entire EG.

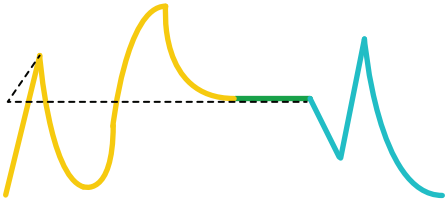
This feature is particularly useful for drone-effects on free-running oscillators (e.g. Pulsar).

Remember! Stage 6 (Sustain) will hold the ***final*** level of Stage 5 (e.g. 81) until the gate is turned off, ***regardless*** of its time setting when ***not*** using **Loop** mode.

Loop Mode and Stage 6 Time

This switch will loop the EG from the end of Stage 6 (**Sustain**) back to the start of Stage 1. With **Loop** Mode On, you can set the Stage 6 Time to sustain for a fixed time to hold the Stage 5 maximum level before restarting the envelope, or bypass Stage 6 entirely by leaving it set to "Off", in which case the EG will loop back to Stage 1 from the end of Stage 5.

Trig. Mode



This switch offers a choice of "Reset" or "CF" modes to Gate on events.

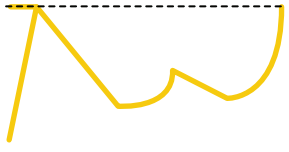
Reset: **Stage 1 Level** starts at 0 on every gate On.

CF: **Stage 1 Level** starts at the level of the last Stage. While not exactly enabling a full *legato* mode, **CF** works well with **Loop** on or off, but is particularly useful when **Loop** is on. CF, as shown in the dotted black line on this next curve allows us to go from a Sustain value of 50 to a **Stage 1 Level** of 50, rather than jumping back to zero. Where the **Stage 1 Level** is less than the last value of the previous Stage the envelope is interpolated for smoother retriggering. Try setting **State 1-5 Level** to 100 with **Loop** On, then drop **Stage 3 level** to around 20.

Charlotte as LFO generator

With **Loop** mode on together with the **CF** retrigger mode, you can use *Charlotte* as a very simple waveform creator for providing an LFO using Stages 1–6 or, as in this example, 1–5.

Stage	1	2	3	4	5	6	7	8	9
Time	1/32	1/16	1/16	1/16	1/16	Off	Off	Off	1/8
Level	100	25	52	31	100		20	81	0
Curve	0.00	0.00	-0.53	0.00	-0.25		0.00	0.00	0.00



This gate-triggered LFO will run for a long as a Gate On event is active. Typically you would might want the first and last stages of the loop to have the same Level value, and setting Stage 1 Time to 0ms, but experimenting with differing values can give interesting results! Here the gate on gives the LFO an attack from zero, but a loop restart of 100 with a 1/32 "shelf".

Velocity Control

There are three global settings for Velocity Control, that being velocity-to-envelope modulation.

- **VC Key On** handles Stages 1–6
- **Aftertouch** handles Stage 6 Sustain
- **VC Key Off** handles Stages 7–9

You can set each control from zero to 100%, for the maximum amount of modulation each Stage zone will receive. This means you can automate these VC Global settings to apply or cancel modulation on all Stages. Each stage can then independently set a modulation and amount up to its zones' global maximum, either zero to 100, to increase the time or level according to velocity, or -100 to zero, to reduce the time or level according to velocity.

VC Time and VC Level from the Key On/Off are not dynamic, that is, you can't change the value during the Stage: changes are reflected only if the value has changed before the Stage commences.

For **VC Key On** and **VC Key Off**, the envelope uses the velocity detected when the gate is started, i.e, key on velocity. Release of course has no velocity of its own.

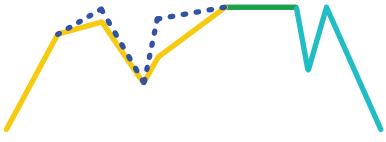
Velocity Control is essentially the *Charlotte* equivalent of using Thor MBRS, only we are able to manipulate both Attack Time and Attack Level independently. Take the following Thor MBRS statement:

MIDI Velocity > 100 > Amp Envelope Attack > 100 > Rotary 1

The *Charlotte* equivalent of this Thor modulation would be as in Example 1, where **VC Key On** is the MIDI Velocity to Envelope amount, while **VC Stage Level** is a Rotary 1 scaler per-stage for precision programming.

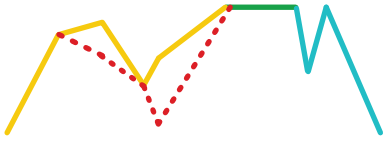
Example 1: Velocity to Level

Stage	1	2	3	4	5	6	7	8	9		
Time	585ms	874ms	3.5s	115ms	3.1s	Off	98ms	420ms	3.5s		
Level	95	70	20	38	81		20	81	0	**Velocity Control**	
Curve	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	**Key On**	100
VC StageTime	0	0	0	0	0	0	0	0	0	**Aftertouch**	0
VC Stage Level	0	100	0	75	0	0	0	0	0	**Key Off**	0



A positive value in a **VC Stage Level** would increase the final level of the stage with increasing velocity. So a VC Level of 100, with a MIDI velocity of 1 would be the original stage level, while a velocity of 127 would take the stage level to maximum amount set via the two scalers (blue-dashed line).

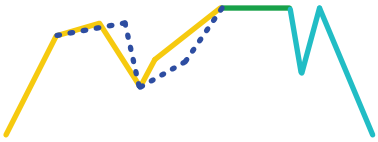
Stage	1	2	3	4	5	6	7	8	9		
Time	585ms	874ms	3.5s	115ms	3.1s	Off	98ms	420ms	3.5s		
Level	95	70	20	38	81		20	81	0	**Velocity Control**	
Curve	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	**Key On**	100
VC StageTime	0	0	0	0	0	0	0	0	0	**Aftertouch**	0
VC Stage Level	0	-50	0	-80	0	0	0	0	0	**Key Off**	0



A negative value in a **VC Stage Level** would increase the final level of the stage with increasing velocity. So a VC Level of -100, with a MIDI velocity of 1 would be the original stage level, while a velocity of 127 would take the stage level to minimum amount set via the two scalers (red-dashed line).

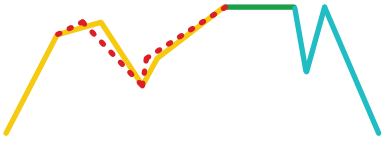
Example 2: Velocity to Time

Stage	1	2	3	4	5	6	7	8	9		
Time	585ms	874ms	3.5s	115ms	3.1s	Off	98ms	420ms	3.5s		
Level	95	70	20	38	81		20	81	0	**Velocity Control**	
Curve	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	**Key On**	100
VC StageTime	0	100	0	75	0	0	0	0	0	**Aftertouch**	0
VC Stage Level	0	0	0	0	0	0	0	0	0	**Key Off**	0



A positive value in a **VC Stage Time** would increase the length of the stage with increasing velocity. So a VC Level of 100, with a MIDI velocity of 1 would be the original stage time, while a velocity of 127 would take the stage level to maximum amount set via the two scalers (blue-dashed line).

Stage	1	2	3	4	5	6	7	8	9		
Time	585ms	874ms	3.5s	115ms	3.1s	Off	98ms	420ms	3.5s		
Level	95	70	20	38	81		20	81	0	**Velocity Control**	
Curve	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	**Key On**	100
VC StageTime	0	-50	0	-80	0	0	0	0	0	**Aftertouch**	0
VC Stage Level	0	0	0	0	0	0	0	0	0	**Key Off**	0



A negative value in a **VC Stage Time** would decrease the length of the stage with increasing velocity. So a VC Level of -80, with a MIDI velocity of 1 would be the original stage level, while a velocity of 127 would take the stage level to minimum amount set via the two scalers (red-dashed line).

Aftertouch

Aftertouch is a dynamic parameter and allows you to use aftertouch velocity changes to modulate the Level of Stages 1–6 via your aftertouch-enabled keyboard. For smooth envelope adjustment, aftertouch is sampled every quarter-second and interpolated. As with the Key On/Off modulation options, set the global maximum amount for Aftertouch in the right column, then use the VC Stage Level to per-stage modulation amounts. Since it can be applied as well as modulation to the level by the **VC Key On** velocity, to only use aftertouch, leave **VC Key On** at zero. While it is impossible of course to play aftertouch velocity after a key has been released, with *Charlotte* you still have the ability to use aftertouch on Stages 7–9 via sequencer automation.

Note/Pitch and Gate CV connections

Charlotte can use note and gate CV information by connecting up pairs of Pitch/Gate jacks on the back.

Using the Sequencer Pitch/Gate jacks and a set of Pitch/Gate CV Outs, *Charlotte* can act as a passthrough between a sequencer device such as RPG-8 and a target synthesizer, while hooking up the EG Out to a modulation CV target like Amp level or Filter Frequency. If *Charlotte* is set to receive MIDI notes via the **Gate Trig.** switch, then pitch and gate from her sequencer track/MIDI performance is forwarded through the Pitch/Gate CV Outs to the device. In this manner you will not always need a sequencer track for both *Charlotte* and the synthesizer.

You can see that the EG has eight sets of Voice, Envelope, Gate and Notes (**VEGN***) outputs. With the **Voices** control set to "ALL", all the output jacks export the same signal appropriate to the jack type. So the EG is sent to all eight EG Outs, all notes to all Pitch Outs etc. However if you set the **Voices** to a fixed number, only the output sets up to and including that voice number are used, e.g. if **Voices** is set to "3", only **VEGN** sets 1, 2 and 3 are used.

When using such split voice Gate/Note outputs it is recommended that target instrument/s should be set to mono.

* Yes, it's pronouced "vegan"

Voice/Priority and MIDI-to-CV splitting

Charlotte can split up to eight notes from her sequencer track, or MIDI, into a separate pitch CV output per note. For this we use the **Voices** control knob to set a maximum number of notes that Charlotte should process: these voices are routed to the equivalent number **VEGN** output. You can consider a **VEGN** output set as a slot that can be filled with a single note. By setting this control, and in combination with a **Priority** mode, which determines the order in which notes are sent to which **VEGN** output, we can tell *Charlotte* to disregard subsequent events if all the slots are full ("prioritise existing stuff"), or to interrupt and replace an already used slot with a subsequent event ("prioritise new stuff"). Each voice gets its own envelope gate trigger, as you would expect in a polyphonic synthesizer. Note however that there is only one envelope shape, as determined by the 9-Stage EG section. The number of Voices should match the number of notes in the chord being played: playing 3 notes but with 4 Voices connected, the fourth Voice might get stuck retriggering a previous note value, so always play 4 notes.

There are seven Priority modes to select from. The first six use a very short "gate window" we call the **Chord Catch Adjust** (**CCA**) in order to ensure chords chords are detected fully and process the priority accordingly, so will introduce a small latency. The length of the Chord Catch defaults to 40ms. The last mode, "Auto", does not use the CCA window and so has no latency; notes are handled on a first-come-first-served. "Auto" is the default mode.

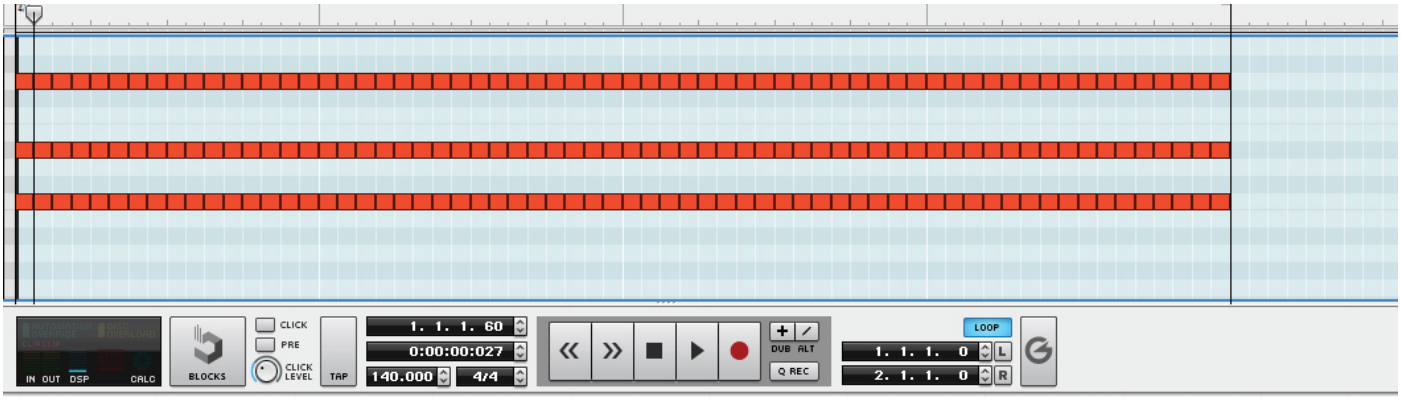
- **Rotate**:
  —Voices are allocated round-robin style, interrupting previous events if all slots are filled ("prioritise new stuff")
  —Lowest notes take interrupt priority if number of notes is greater than number of available Voice slots
  —Newest note takes priority of lowest available VEGN set
- **Reset**:
  —All Voices slots are emptied on new gate events and new voices are re-allocated
  —Lowest notes take interrupt priority if # of notes is greater than number of available Voice slots
  —Lowest note takes priority of lowest available VEGN set
- **Low**:
  —Voices are allocated to a Voice slot from lowest note to highest ("prioritise new stuff")
  —Lowest notes take interrupt priority if # of notes is greater than number of available Voice slots
  —Lowest note takes priority of lowest available VEGN set
- **High**:
  —Voices are allocated to a Voice slot from highest note to lowest ("prioritise new stuff")
  —Highest notes take interrupt priority if # of notes is greater than number of available Voice slots
  —Highest note takes priority of lowest available VEGN set
- **First**:
  —Voices are allocated to according to the age of the event ("prioritise new stuff")
  —Newest notes take interrupt priority if # of notes is greater than number of available Voice slots
  —Lowest note takes priority of lowest available VEGN set
- **Last**:
  —Voices are allocated to according to the age of the event ("prioritise existing stuff")
  —Oldest notes take interrupt priority if # of notes is greater than number of available Voice slots
  —Lowest note takes priority of lowest available VEGN set
- **Auto**:
  —Voices are allocated on a first-come-first-served basis provided there is a empty Voice slot ("prioritise existing stuff")
  —Existing Voices are not interrupted and excess Voices are dropped.
  —Lowest note takes priority of lowest available VEGN set
  —No latency. Does not use Chord Catch

Chord Catch Adjust

The **CCA** screw allows you to change the length of the length window used to detect chords in all **Priority** modes *except* Auto, which does not use Chord Catch. The **CCA** can adjust the Chord Catch window from zero (off) to 80ms.

For live performance with a keyboard, and possibly also depending on the system latency set in your audio driver, the default setting of 40ms will be likely be appropriate for most songs up to around 140bpm, as it is difficult to play extremely short chords at higher tempos.

Where you need chords/notes that are shorter than 40ms, such as sequencing rapid chords—as shown below—you should reduce the **CCA** until the chords trigger correctly. At 140bpm, a 1/32 note is around 50ms, so the default **CCA** setting should be adequate. However a 1/64 at just 27ms won't trigger correctly, as the gate on and off will be within the window: in fact the slowest 1/64 you could trigger correctly with a Chord Catch of 40ms would be 89bpm. So reducing the **CCA** screw to 20ms would allow you to play 1/64 notes at 140bpm and still maintain a specific **Priority** rule.



Here you can see a drawn sequence of 1/64th chords at 140bpm. The playhead marker after the first chord on the timeline shows a time of 27ms in the transport bar. With **Voices** set to "3" and **Priority** set to any mode except "Auto", try playing it with the **CCA** at the default 40ms setting, then reducing that value using the **CCA** screw until each chord triggers correctly.

Stage Trigger

An additional row of CV outputs are available underneath the VEGN jacks providing per-stage gate on triggers to other Charlotte instances or any other appropriate device. There two different output types:

- **Track**: This jack outputs a *fixed* CV level for the current Stage in progress. We use a fixed value in order to prevent possible stepping issues that may arise through automation or velocity control adjustments of the Stage Time parameters. The values are as follows:

Stage	Idle	1	2	3	4	5	6	7	8	9
CV level	0	14	28	42	56	71	85	99	113	127

- **S1–5** and **R**: These jacks provide a gate on CV for the duration of its respective Stage, except for **S5**, which covers Stages 5 *and* 6, and **R**, which covers Release Stages 7–9.

Monophonic/Polyphonic Gate Note Triggering

Use the **Mono/Poly Gate Output** selector switch at the top left of *Charlottes*' front panel to choose whether you want gate events to be held open polyphonically or monophonically.

- **Mono**: The gate is closed between each new gate event, causing the attached instrument to stop the current voice and trigger and new one. Voices in "release" can still overlap.
- **Poly**: The gate is held open when new gates are triggered to create new voices without interrupting the existing voice, in a similar way to the Reason RPG-8 device. This means there is only a single note off event, so all voices will be cancelled simulateously when the gate ceases. **Remember that Reason only supports polyphonic note ON via CV, not polyphonic note *off***. This means that, like RPG-8, playing a three-note chord and releasing two notes, holding the last, all three notes will continue to play until that last note is released.

Be aware that while this functions as expected with native Reason instruments, we cannot guarantee that all other third party Rack Extensions will produce the desired result due to alternative methods of CV handling. Unfortunately we can neither test all Rack Extensions nor offer user support for that scenario.

Amp Envelope with Stereo Scale and Offset

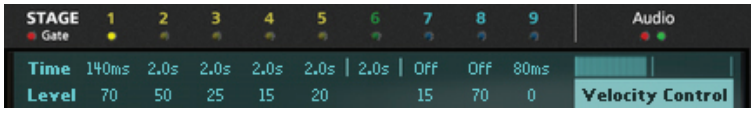
Charlotte's EG is connected as a handy amp envelope for audio level control. Simply connect an audio source to the audio in/out jacks, and the EG will be applied to the audio level of the outputs. Both left and right channels can be independently scaled or delay-offset for stereo envelope applications. The **Scale** multiplier knobs have a range of 0 to x2. The defaults are x1, so the EG level to the audio signal is not scaled. Increase or decrease the knobs as required to scale overall levels of the envelope for left and right.

The Offset knobs will delay the start of the envelope. The default times are 0ms–20s. Use the **Env. Offset Tempo Sync** on the back of the device to change the Offset mode to tempo sync (1/128–16/1).

Metering

On both the front panel and the folded front panel *Charlotte* features LEDs to notify you of a new gate in event (left-hand red LED), a lamp for each Stage to indicate the current Stage in progress, which is especially useful if using longer Stage times, and a red Audio In and green Audio Out signal lamps. The Audio Out lamp is wired after the amp envelope, and so will be off if the envelope level is zero, even while the red input LED is showing an input (above -60dB).

The front folded view has an additional white indicator LED between the Stage 6 and 7 lamps which will be lit to remind you if the device is in loop mode. A white "loop on" LED also appears below the **Loop** switch on the front panel.



Additionally there is an **Envelope Level Meter** above the Velocity Control section of the main display, which shows the current level of the envelope that is being sent to the **EG Outs**. Where MIDI-to-Voice is active the meter and Stage LEDs are mapped to the envelope of the highest priority note as determined by the **Priority** mode setting.

Everything Automation!™

All front panel parameters can be automated and Remote controlled. Please note that automating EG parameters will interpolate values linearly for the duration of the automated event to prevent the unwanted stepping artifacts that will arise by having to recalculate exp/log equations on the fly.

Version history

1.0.0

- **Initial release**

Note:
All envelope diagrams in this guide—except those rendered directly from Reason on page 3—are intended as merely generic representations of the typical behaviour of *Charlottes*' EG for the benefit of the users' understanding of this device's operation, and do not necessarily reflect accurate envelope output shapes available.

Special thanks to the Charlotte *testing crew: André Sacher, Simon Bader, Adrian Bybowski, Adrian Bebbington*

Charlotte Envelope Generator was designed and assembled by Jiggery-Pokery of London, England; DSP coding by Pitchblende Ltd.

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From the maker of ...

Rack Extensions

- **Anansi Mid/Side Mastering Router** - Mid/side audio router with mono compatibilty check, 3-in merger and 3-out splitter
- **Charlotte Envelope Generator** - 9-stage EG with time, level, curve and velocity control per stage, and a priority-selectable MIDI-to-cv-pitch splitter
- **Itsy Stereo/Phase Inverter** - L/R channel flip, cv-controllable 180˚ stereo inverting width adjust, stereo phase inverters and phase correlation metering
- **Lolth CV Delay Splitter** - 4x4 channel cv splitter with independently adjustable gain and inversion controls, channel delay, and mirroring
- **Miranda CV Delay Merger** - 4x4 channel cv merger with independently adjustable gain and inversion controls, channel delay, and mirroring
- **Mordred Audio Bypass Merger** - 4 x 5 channel stereo audio merger with independently switchable outputs and autofade control
- **Shelob Audio Bypass Splitter** - 4 x 5 channel stereo audio splitter with independently switchable outputs, mirroring, and autofade control

ReFills

- **Guitars vol.1+2: Stratocaster & Telecaster** - Multi-sampled guitars with slides, mutes, signature L6 effects and keyswitching
- **Elements²: Vector Synthesis Workstation** - Korg Wavestation/MS2000, Waldorf Blofeld and Roland SC-8850
- **Additions: Vintage Additive Synthesizers** - DK Synergy + Kawai K5m + Thor FM.
- **Blue Meanie: Virtually an ARP2600** - Thor and Kong-based analogue synth machine
- **Kings of Kong Classic Drum Machines*** - the premier ReFill for Reason 5+, with over 50 classic beatboxes for Kong Drum Designer
- **Retro Organs v2**- Hammond B3 + Farfisa Combo Compact + Vox Continental in one brilliant ReFill. Also available for Reason Essentials
- **B3 Tonewheels v1.5** - the original 24-bit non-Leslie samples ReFill with advanced rotary speaker emulation
- **Farfisa Combo Compact Deluxe v1.5** - the complete set of original 24-bit Farfisa samples covering, both standard and Deluxe models
- **Vox Continental v1.5** - a complete set of original samples from the classic C300 organ, featuring original and extended Continental footages
- **Hammond Novachord*** - the near-antique pre-WW2 monster polyphonic valve synthesizer
- **Retrospective: 40 years of Synthesizer History*** - Over 1Gb of vintage samples from synths and electronic keyboards from the Hollow Sun archive

FreeFills

- **Additives** - demo version of Additions: the fantastic Additives tracks from PUF Challenge #2 can be found at **http://soundcloud.com/groups/additives**
- **8-BIT Magic**: The ZX Spectrum ReFill
- **Classic Drum Machine Collection v1.1**
- **Eminent 310 Strings** v3** - the classic Jarre string sound, with stereo samples plus the Oxygene II / Equinoxe 4 pizzicato lead
- **Harpe Laser**** - the famous Laser Harp sound, the Elka Synthex preset 46 “Ring Mod”
- **Moog Taurus Bass Synthesizer** v1.1**

For more information on these products and for direct downloads of these latest versions, plus a wide range of great Combinator skins, please visit **www.jiggery-pokery.com**

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