CV SUITE
LINE PROCESSOR

CV SUITE
LINE PROCESSOR

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ON   GAIN   POLARITY   + NORM.   – INVERT.

INPUT   TRIMMER   WARPING   QUANTIZATION   WAVE

LOW CUT   HI CUT   FOLDBACK   LOW END   HI END   BAL. POINT   QUANTIZER   SMOOTH   CURVE DIST.

Operation Manual
version 1.2.1

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Re
Rack Extension

We would like to dedicate our first Rack Extensions to the inventors of Roland TR-707 and TR-727.

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1. Introduction

Welcome, and thank you for choosing Quadelectra CVSuite Line Processor Rack Extension. We've put a lot of effort to design a unit that is easy to use, nice looking, with a clean interface, but also efficient enough to expand your inspiration and creativity.

The CVSuite Line Processor is a perfect companion to its little brother, the Quadelectra CVSuite Line Mixer. We advise you, if you haven't already, to try that as well.

We hope, that you'll enjoy making music with the CVSuite Line Processor.

↘ 1a. What Is The Quadelectra CVSuite Line Processor

The CVSuite Line Processor, operates on an incoming Control Voltage (or CV) Signal. This operation consists of a set of processes applied to the input, in order to manipulate its amplitude, its distribution and range. Although there are already ways to manipulate a CV signal via Reason's Factory Devices, CVSuite Line Processor, is and offers the most convenient, effective and easy way for musicians & sound designers to tweak LFOs, Envelopes and Matrix Patterns.

This makes CVSuite Line Processor a powerful companion in your tool case.

↘ 1b. Who Is It For?

Sound Designers will enjoy exploring new ideas with the Line Processor: Use the unit inside Combinator patches f.e. to distort, trim or quantize LFOs and Envelopes. To create "strange" and complex pitch or filter wobbles using foldback distortion, or add warp & curve distortion to Envelopes to increase or decrease dynamic ranges etc.

Musicians with a... tendency to modulate. Use The Line Processor to modify your Matrix patterns with flexibility or easily tweak with accuracy your wobbling dubstep bass line. Simplify your stepped filter changes per musical measure units by using the sample & hold functionality of the Quantizer. Change the range and the distribution of your pattern steps. Make changes to all of the above in realtime using the automation.

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↘ 1c. CV Signals

Just in case you haven't read Reason's manual (we recommend reading it by the way) on CV signals, here's a quick roundup:

As you already know Reason CV signals are used (besides sequencing) to control device parameters. This signals are in fact floating point numbers varying either from 0.0 to 1.0 or -1.0 to 1.0.

Signals ranging from 0.0 to 1.0 are called Unipolar Signals (i.e. they contain positive values only), while signals ranging from -1.0 to 1.0 are called Bipolar.

A unipolar signal is f.e. the CV output of an envelope, whereas a bipolar signal is the CV output from an LFO.

CV Signals operate on the constant value of a parameter and produce values above (if their value is a positive number) or below (if the value is a negative number) that value. The trimmer knob situated in some cases below input CV sockets defines the range of values above and below the constant value, and thus the strength of the effect of the input CV signal.

CV Line Processor handles both unipolar and bipolar types of CV signals.

↘ 1d. How To Read This Manual

We depict the various alterations that an incoming CV signal is subjected to, by the Line Processor with the use of graphs per section effect.

In these graphs you'll see these alterations in a reference signal wave form. The reference wave form is a normalized sinusoid. Meaning a sine wave fully extended to the boundaries of a Bipolar signal range. For your convenience, and comparison reasons, the previous state of the wave form is contrasted in a dashed line.

All graphs have a image caption below with a short caption describing the effect results in brief.
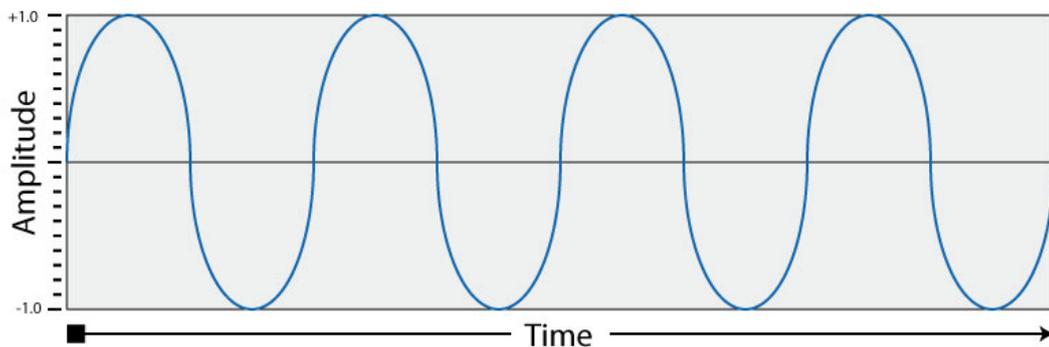
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Figure 1d-1: The reference wave form CV Signal.

In the Second Chapter we'll check out the front panel and see what kind of manipulation can you perform to an input signal using the CVS Line Processor.

In Chapter Three, we take a look at the back panel and the available connections.

Finally at the end of the manual you can find a Specifications Chart and MIDI control map to help you set up an external controller.

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2. The Front Panel

The CVSuite Line Processor Front Panel, consists of 5 different sections. Each of them is dedicated to a different kind of signal processing and contains a set of knobs or switches to adjust all related parameters.

The order of the sections from left to right reflects also the order by which the processing algorithms take place. Meaning that a section will not process the signal before its preceding sections on the left do so first.

The sections of the device are:

- **Enable Switch:** Enables Or Disables the process chain and lets you compare the altered signal to the original.

- **Input**: Makes basic changes to the signal, such as amplification / de-amplification and polarity inversion.

- **Trimmer**: Trims the signal from the "Input Section" to a low / hi range and applies a foldback distortion to it if desired.

- **Warping**: "Warps" or conforms the signal to a lower and upper limit. Allows repositioning of the middle point (zero crossing).

- **Quantization**: Quantizes the changes to the signal according to intervals based on time or measure units. Additionally gives a smoothing option to smooth out the transition from step to step.

- **Shaper**: Reshapes / Redistributes the signal's dynamic range, by bloating (pushing higher) or puckering (pulling lower) the linear signal's distribution.

⬎ 2a. Input Section

The Input Section provides basic operations to the incoming signal, such as Gain and Polarity Inversion.

2ai. Gain Knob

The "Gain" Knob Control changes the amplitude of the incoming CV signal. While values lower than the middle position (100%)

decrease the amplitude, values higher than the middle boost the signal. The summed amount of both the knob and the corresponding CV Gain Modifier at the back panel can amplify the signal to a range of up to -4.0 ... +4.0.
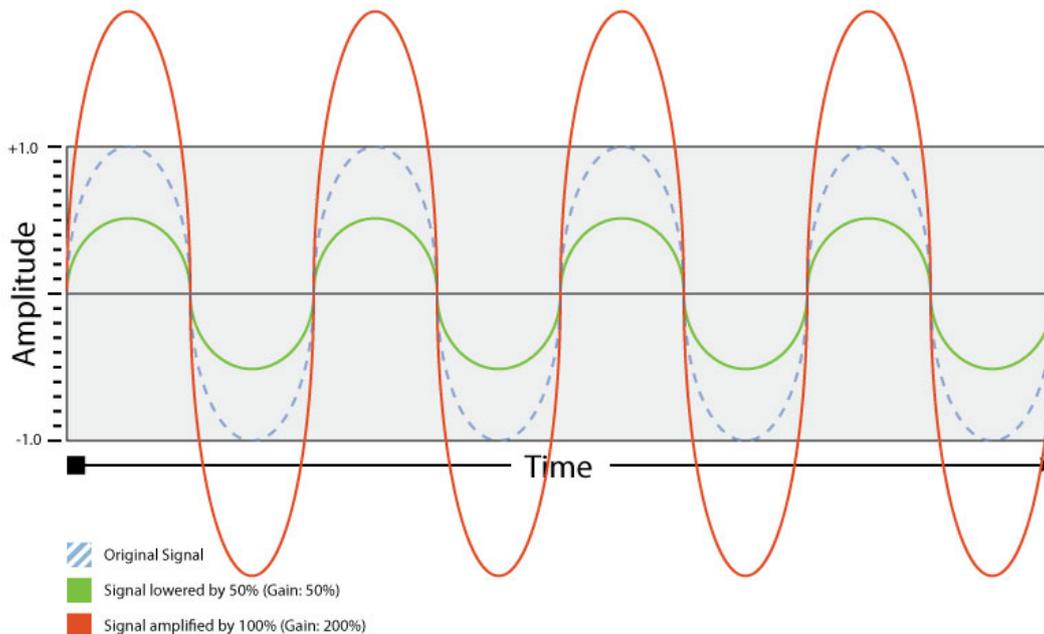

Figure 2ai-1: Example changes made by 2 different Gain levels in the amplitude of the Reference Signal waveform. There is no clipping to the signal. The Trimmer section will take care of that!

NOTE	*No clipping is done to the signal. Clipping is applied by the "Trimmer" section of the device for reasons that will be explained later.*

2aii. Polarity Switch

The "Polarity" switch reverses the signal polarity, so that negative values will revert to positive and vice versa. The polarity switch has (obviously) two modes.

- **Normal:** The original polarity of the signal is preserved.

- **Inverted:** The signal polarity is reflected so that negative values revert to positive and vice versa.
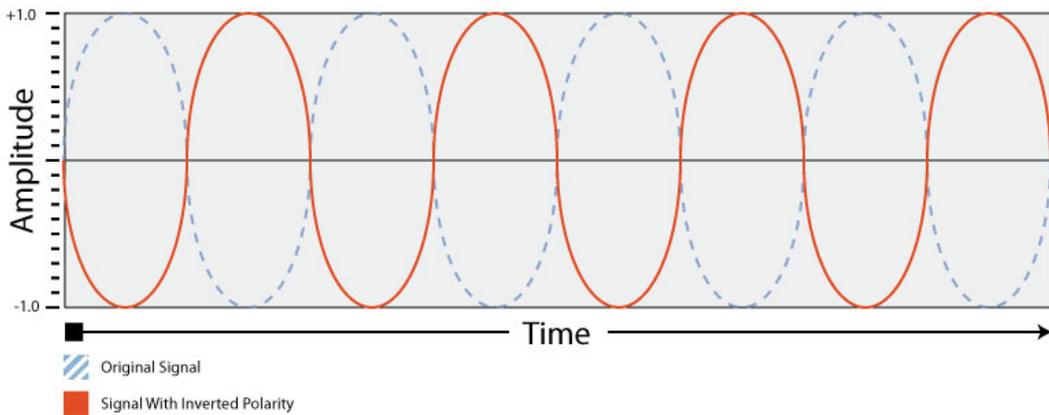
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Figure 2aii-1: The affected Reference Signal using Polarity to "Inverse Mode".

↘ 2b. Trimmer Section

Trimmer Section, "trims" the CV signal to an upper and a lower cutting point. Additionally, if desired by the user, a foldback distortion can be applied to the resulting trimmed signal.

2bi. Low Cut & Hi Cut Knobs

You "trim" the range of the incoming signal using the Low & Hi Cut knobs. The "Low Cut" knob will clip to its value, occurring lower values of the CV signal, while "Hi Cut" will clip occurring higher values than its value.

Figure 2bi-1: The Reference Signal trimmed from -0.4 to +0.8

NOTE *Although you can set the "Low Cut" in a higher value than "Hi Cut" using the knobs or the CV Modifiers, the device will also clip the "Hi Cut" to the "Low Cut" value ignoring the non-nominal change.*

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2bii. Foldback Knob

"Foldback" applies a sort of foldback distortion to the trimmed signal. Foldback Distortion will "bounce" the extent of the signal, outside the trimmed area, inwards. The effect works like Reason's own "D-11 Foldback Distortion" device.
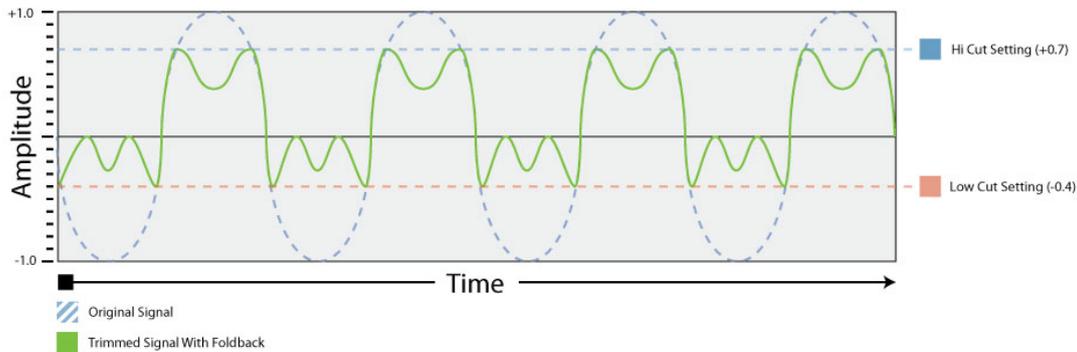

Figure 2bii-1: The previously trimmed Reference Signal Waveform, with foldback distortion applied to it.

Trimming and foldback distortion are applied to the full unclipped signal amplitude range, as provided by the "Input" Section. Because of that feature, a signal with Gain value of 200% where values range from -2.0 to +2.0 will produce twice the distortion of a signal ranging from -1.0 to 1.0.

NOTE

Do not confuse the term "Trim" with Reason's CV Trimming Knobs found in some devices. Reason's CV trim knobs, reduce the amount of the amplification of a signal by multiplying it to a factor from 0.0 to 1.0

In the CVSuite Line Processor terminology, the amplitude of the signal is preserved. Low and Hi Cut knobs affect portions of the signal by clamping the exceeding values to their limit settings, respectively.

↘ 2c. Warping Section

Warping Section conforms the incoming signal to a set of new limits - Low and Hi. Additionally the user can redefine the balance point position (zero crossing) inside the range of these limits.

2ci. Low End & Hi End Knobs

You use the "Low End" and "Hi End" controls to conform the full range CV input signal between the lowest and the highest desired

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value. As a result of this process the balance point, which normally (without warping) is the zero crossing will move in the middle of the warped range.
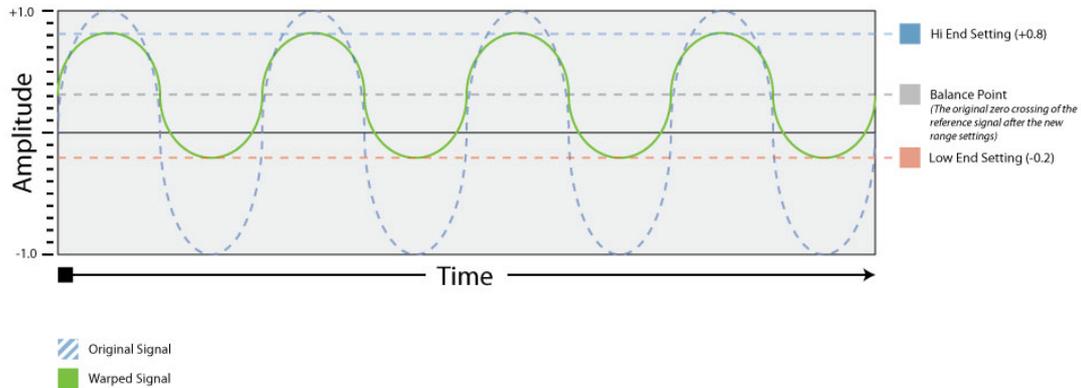

Figure 2ci-1: The Warped signal. Notice that in contrast to the trimming process the Balance Point which normally is the zero crossing has been moved upwards. A change that occurred as a result of warping to the new values.

NOTE   *The area that was previously trimmed by the "Trimmer" section is taken under account in the warping process. This is because the "Warping" section always conforms the full range of -1.0 to +1.0 to the lowest and highest value.*

2cii. Balance Point Knob

"Balance Point" enables you to reposition the balance point of the warped area to a value closer or even equal to the warped low or hi end.
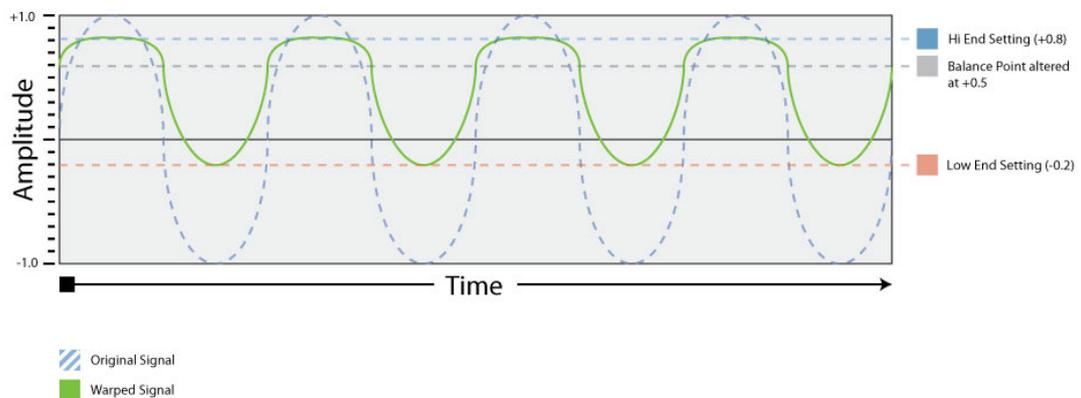

Figure 2cii-1: The Warped Signal with a further alteration of the Balance Point at 0.5

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The parameter ranges from -1.0 to 1.0. These values are by analogy to the Low and Hi End settings, meaning that -1.0 sets the balance point to the low end, +1.0 to the hi end, and 0.0 to the middle between the two.
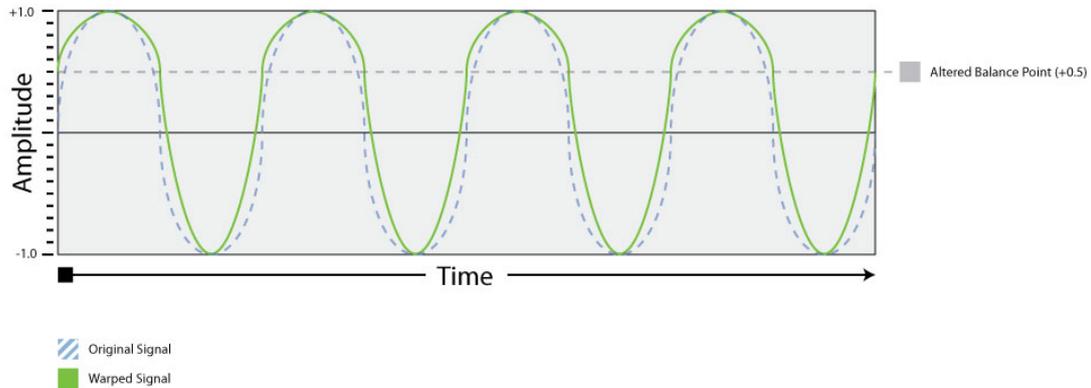

Figure 2cii-2: A The reference signal with Balance Point applied to 0.5, but without modifying the Low / Hi End settings.

↘ 2d. Quantization Section

Use the "Quantize" section to set the change rate of a CV signal to a desired interval. Quantization works by sampling the input signal periodically and holding that value till the next period. The period of quantization is set by the "Quantize" knob, and according to the "Quantization Sync Switch" can span time to Time or Measure based units.

2di. Quantize Knob

The knob has two sets of value ranges, one of which is available at a time, according to the setting of the "Quantize Synchronization" Switch. The two value sets are:

- Time Based: 0ms / off (knob turned fully left) or a value in microseconds (ms) from 1ms - 2000ms.

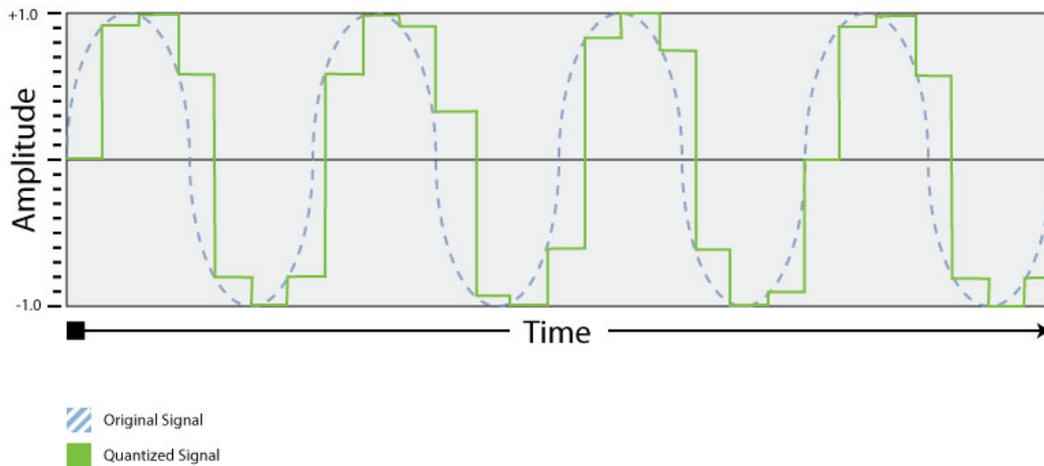- Measure Based: Off (knob turned fully left) or a note length value: 1T, 1d, 1, 2T, 2d, 2 [...] up to 64T, 64d, 64.

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Figure 2di-1: The Reference signal after Quantization. Every interval of n-units the Line Processor samples the input signal and holds the value till the next interval.

2dii. Quantize Synchronization Switch

Use the "Quantize Synchronization Switch" to select which set of value range the "Quantize" parameter knob will use. For more information on these value sets see above (Section 2di)

2diii. Smooth Knob

"Smooth" knob softens the changes between quantization steps. Set to 0 (fully left) there will be no smoothing effect at all. Setting this parameter to higher values, though, will make the transition from each step to the next in a more "softer" manner, interpolating intermediate values between quantization steps.

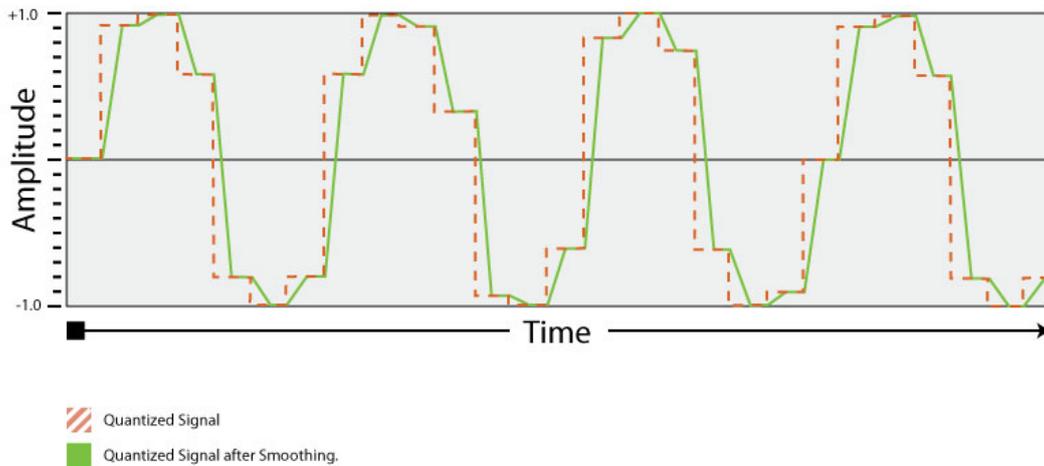| NOTE	*Higher smoothing values on shorter quantization intervals will smooth the sound so intensively that the quantization will not be apparent. This is a good technique to simplify complex CV signals.*

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Figure 2diii-1: The Quantize Signal is applied some smoothing. The rapid changes from sample to sample have been smoothed out by transitioning linearly from step to step.

⇲ 2e. Shaper Section

2ei. Curve Distortion Knob

The "Curve Distortion" control applies a simple bloat / pucker effect to the range of the CV signal. The zero position (middle) of the knob leaves the signal intact. But values higher than zero "push" the CV range to the edges (low & hi end values), while values lower than zero "pull" the range to the middle (balance point).
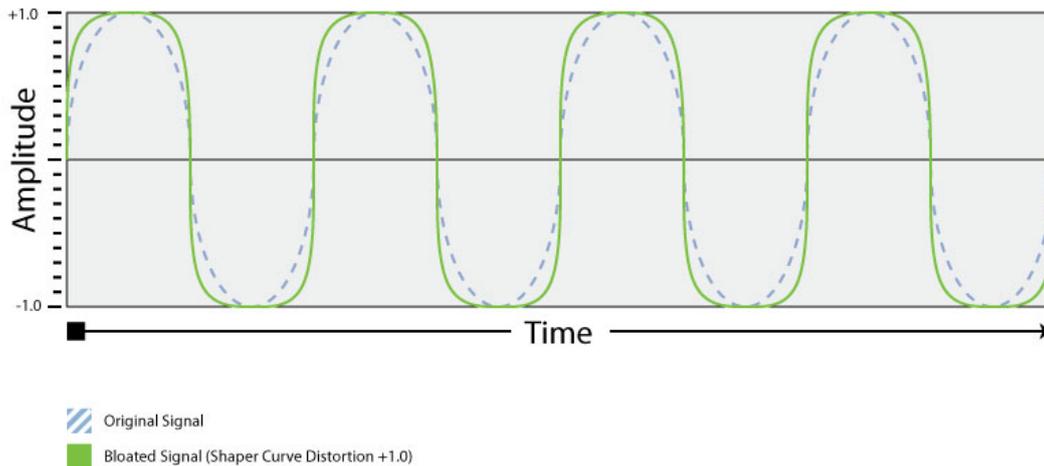

Figure 2ei-1: The Reference Signal "Bloated" by the Shaper's Curve Distortion (Positive Values).
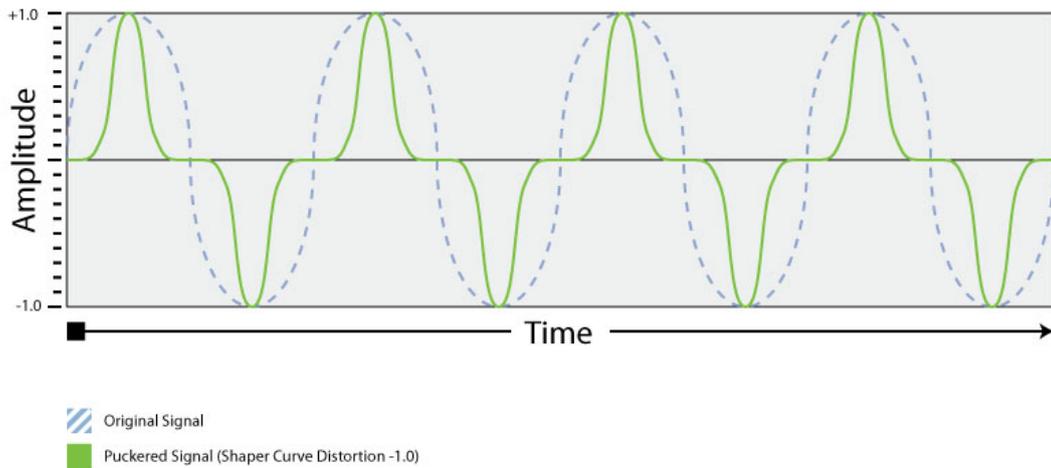
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Figure 2ei-2: The Reference Signal "Puckered" by the Shaper's Curve Distortion (Negative Values)

NOTE	*In contrast to the "Warping" section that warps the entire CV valid range, and not just the trimmed, the Shaper's Curve Distortion is applied only in the range defined by the "Warping" Section. Between the low and the high end settings, while the distortion's midpoint is also set on the "Balance Point".*

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3. The Back Panel

The Back Panel of the device offers a single input. A switch located underneath it, "tells" CV Line Processor to treat it either as Bipolar or Unipolar.

After the modifications, the resulting signal is output to four different CV outs.

You can also affect some of the parameters of the front panel using their corresponding CV modifier inputs.

↘ 3a. Input / Output Connections

From left to right the first set of five CV connectors are the Input CV and the four Output CV sockets.

A Switch located under the Input CV allows you to tell the CV Line Processor what kind of signal you want to process.

The switch can be set either to "UP" (Unipolar), or "BP" (Bipolar):

• Setting the signal to Bipolar will allow the process of signals from -1.0 to +1.0. Connecting a Unipolar signal such as an envelope to the device, while in Bipolar mode, will only process the positive values, so trimming, warping, and shaping changes will operate on the positive "half" part of the signal.

• Setting the signal to Unipolar will extend values from 0.0 to 1.0 to a range from -1.0 to 1.0.

   Connecting a Bipolar signal while in Unipolar mode, will process only the positive range of that signal as described above, ignoring (trimming to zero) all negative values.

The unit outputs the signal to 4 separate outputs, situated right after the Input and Input Range switch.

Below outputs 3 and 4 you'll find a second UniPolar / BiPolar switch. Setting this switch to Unipolar mode will squash the entire bipolar range to Unipolar on the said outputs.

↘ 3b. Modifiers

The unit provides a set of CV Inputs for modifying all applicable parameters on the front panel. These parameters are, and modify:

- Gain: Input - Gain
- Low Cut: Trimmer - Low Cut
- Hi Cut: Trimmer - Hi Cur
- Foldback: Trimmer - Foldback
- Low End: Warping - Low End
- Hi End: Warping - Hi End
- Bal. Point: Warping - Balance Point
- Quant: Quantizer - Quantize
- Smooth: Quantizer - Smooth
- Shaper: Shaper - Curve Dist.

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I. Appendix I: Specifications

↘ Ia. Technical Specifications.

Device Type:	Reason Rack Extension Helper Device. CV Signal Line Processor
Front Panel Controls:	10 Knobs (Gain, Low Cut, Hi Cut, Foldback, Low End, Hi End, Balance Point, Quantize, Smooth, Curve Distortion), 1 Switch (Polarity), 1 Button (Quantize Sync Mode)
Number Of Inputs:	1 x CV Inputs (+Range Switch)
	10 x CV Modifier Inputs (Gain, Low Cut, Hi Cut, Foldback, Low End, Hi End, Bal. Point, Quant., Smooth, Shape
Number Of Outputs:	4 x CV Outputs

↘ Ib. MIDI Control Chart

MIDI CC #	Parameter
80	Input - Gain
81	Input - Polarity
82	Trimmer - Low Cut
83	Trimmer - Hi Cut
84	Trimmer - Foldback
85	Warping - Low End
86	Warping - Hi End
87	Warping - Balance Point
88	Quantizer - Quantize (Time Units)
89	Quantizer - Quantize (Musical Units)
90	Quantizer - Sync Switch
91	Quantizer - Smooth

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92	Shaper - Curve Distribution.

II. Contact Info

Please feel free to contact us using the following methods:

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Facebook: www.facebook.com/quadelectra

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