QU4D

Rob Papen

User Guide

Powered by RPCX

Welcome

QUAD is the first Rack Extension synthesizer built from the ground up for Reason by the Rob Papen team. It features two oscillators with a seemingly simple arsenal of classic waveforms. The sonic palette is huge though, through the vast modulation possibilities that QUAD has to offer.

The oscillators can be combined through many cross modulation functions – generating a wide range of harmonics. The next steps in the sound sculpting are the Phase Distortion and Wave Shaper. These tools are brought to life by four XY-Pads, which can be moved through an extensive modulation matrix. The movements can be recorded as automation directly into Reason's sequencer.

QUAD's oscillators are complemented by two top notch analogue modelled filters, an arpeggiator and two high quality effects processors.

Welcome to the new refreshing synthesizer QUAD – only in Reason!

Rob Papen and the RPCX team, October 2014

Patches and Mod Section

At the top of the QUAD Panel you find the Patch section and modulation controls.

Patch Controls

QUAD uses the standard Reason Patch controls. A click on the Patch menu displays a list of patches in the current folder. The up and down buttons take you through all the available patches one by one.

The Folder button opens the patch browser and lets you select a new folder.

The Save Patch button, allows saves the current patch.

The C3 button will plays a single note (C3) allowing you to preview or audition the sound while you are editing the patch.

Pitch Bend and Mod Wheel

Towards the bottom left of the QUAD panel are the Pitch Bend and Mod Wheels.

The pitch bend wheel bends the pitch up and down and jumps back to its centre position as soon as you release it. The Bend Down and Up controls set the maximum pitch bend range. The maximum setting is 48 semitones (4 octaves) up and down

The Mod Wheel generates a modulation signal when you move the wheel up. The Mod Wheel controller can be patched to any target through the modulation matrix.

Oscillators

An oscillator is a tone generator. It is the first building block in the sound construction process. The frequency setting of the oscillator determines the pitch of the sound. The selected waveform defines the sound's tonal character, or timbre. QUAD uses up to 2 oscillators in per voice (note played).

Oscillator On/Off

Pressing the LED-style buttons in the label area will turn the corresponding oscillator On and Off.

Waveform Type

Use the display next to the On / Off button to select the wave-type or waveform used by the oscillator. QUAD offers a number of classic waveforms: Sine, Square, Triangle, Saw, White Noise and Pink Noise.

Free

The Free button is used to select the reset-behaviour of the oscillator. If Free is turned off, the oscillator waveform is reset to its zero phase position each time you play a note. When Free is turned on, the oscillator is free running; i.e. it is not reset when you play a note. In Free mode the attack is less pronounced, which may be useful for pad sounds.

Track

The track switch enables and disables keyboard tracking. It controls whether the pitch of the oscillator follows the keyboard or is fixed regardless of the note played.

Octave

The octave control sets the base pitch of the oscillator in octave steps. An octave is equivalent to 12 semitones. The range of this control is from -2 octaves to +2 octaves..

Semi

Semi sets the coarse tuning of the oscillator in semitones from 48 semitones (-4 octaves) to +48 semitones (+4 octaves).

Fine

Fine controls the fine-tuning of the oscillator in cents, from -100 cents to +100 cents.

Spread

Spread adds multiple oscillators to the main oscillator with a slightly higher and slightly lower pitch than the main oscillator. In practice it fattens up the sound. The spread control sets the difference in oscillator pitch and higher settings will make the effect more pronounced.

Sub

Sub controls the volume of the sub-oscillator. The sub-oscillator is tuned to one octave below the oscillator. The sub-oscillator knob lets you select two different waveforms. A counter clockwise position produces a sinus waveform. Turn it clockwise and it produces a square waveform. The centre position turns the sub-oscillator off.

Drift

Drift adds slight irregular variations' to the oscillator pitch. This can make a sound livelier and is an essential ingredient for when you want to simulate the behaviour of older analogue synthesizers that operate to a certain extent unstable and temperature dependent electronic circuits.

Volume

This control sets the volume of the oscillator in decibels. When the oscillator is used as the modulator for frequency or ring modulation, it controls the modulation amount.

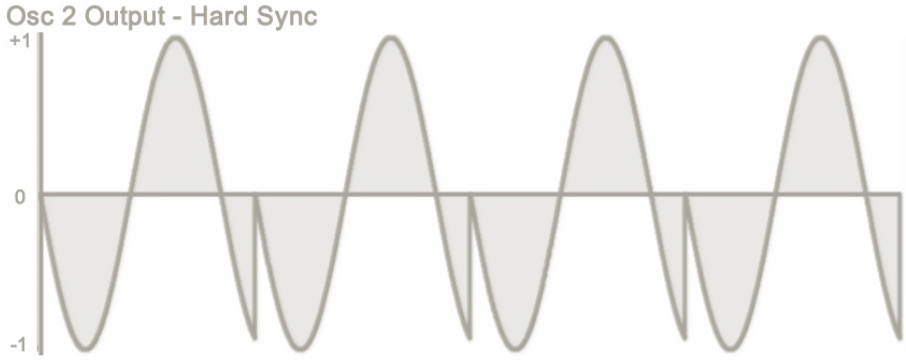
Filter (Oscillator 1 Only)

The Filter switch allows you to disable the oscillator output to the filter. This may be useful when you are using Oscillator 1 as a modulation source rather than a sound source as is the case with FM and ring modulation configurations. Typically, you will want to leave this switch on so that oscillator 1 sound flows through the filter.

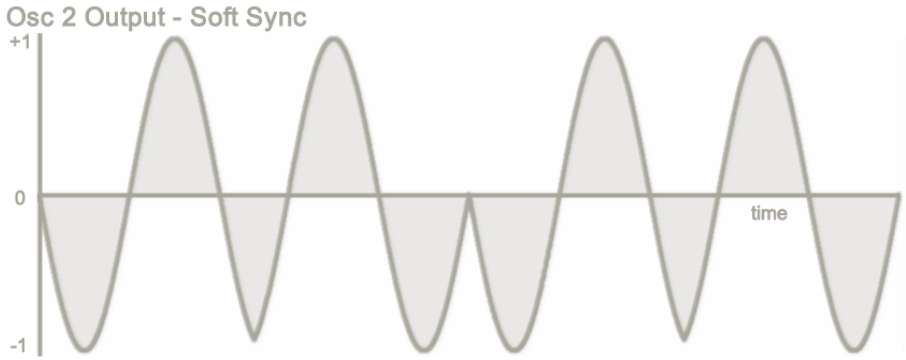
Sync (Oscillator 2 Only)

The Sync control allows you to synchronise (Sync) the oscillator 2 Pitch to the pitch of Oscillator 1. In Hard Sync mode, Oscillator 2's waveform is reset every time Oscillator 1 waveform ends its cycle. This essentially cuts of the Oscillator 2 waveform and resets it to zero, in sync with oscillator 1. Because of the reset, the oscillator 2 waveform will undergo abrupt changes in its shape. These abrupt changes are audible as additional overtones (harmonics). The pitch control of oscillator 2 has now become a harmonics control.

In the example below, Oscillator 2 is hard synced to Oscillator 1 where Oscillator 1 is tuned 3 semitones below Oscillator 2. When Oscillator 1 completes its cycle, you can see Oscillator 2 being reset to its initial position, resulting in a (harmonic) spike towards the end of its wave cycle. This is what generates the additional harmonics.



In Soft Sync mode, Oscillator 2's waveform is also coupled to Oscillator 1's wave cycle, but in a much more subtle way. When oscillator 1 finishes its wave cycle, it reverses the synced oscillator 2 waveform direction Oscillator 2 retains its own pitch, but the reversal of its waveform introduces additional overtones in the oscillator output. It is a much more subtle effect than hard sync.


Osc 2 Output - Soft Sync
+1
0
-1
time

Oscillator Modulation Functions

QUAD has a number of different modulation types that allow oscillator 1 to control oscillator 2 and vice versa. Each of the modulation function has Amt 1 and Amt 2 controls to set specific parameters for each modulation function type.

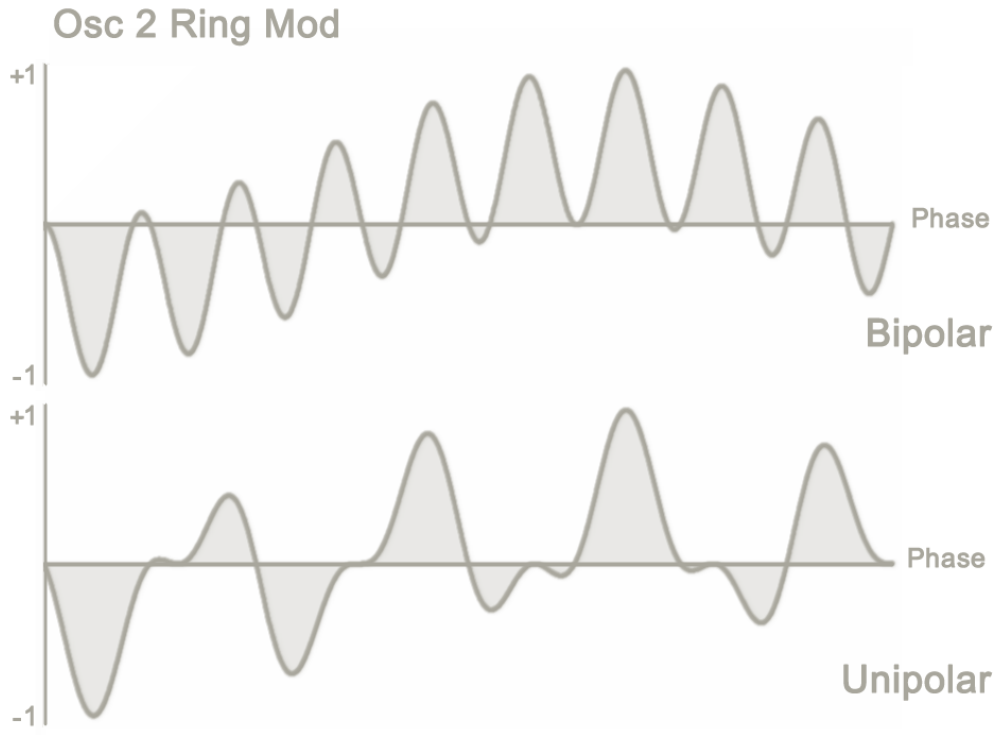
This chapter lists the modulation functions and the role of the Amt 1 and Amt 2 controls. In many cases, the effect of the modulation function is illustrated with waveform graphics. As the sonic impact of the modulation functions can sometimes be unpredictable, we suggest that you experiment with each modulation function and make yourself familiar with the Amt 1 and Amt 2 controls.

Ring Modulation (Ring)

Ring modulation multiplies oscillator 1 with oscillator 2 to create a new waveform.

Amt 1	Sets the amount of ring modulation.
Amt 2	Sets the balance between the bipolar range (-1 to 1) and unipolar range (0 to 1) of the modulation signal (oscillator 1).

The difference between bipolar and unipolar ring modulation, is displayed in the following picture:

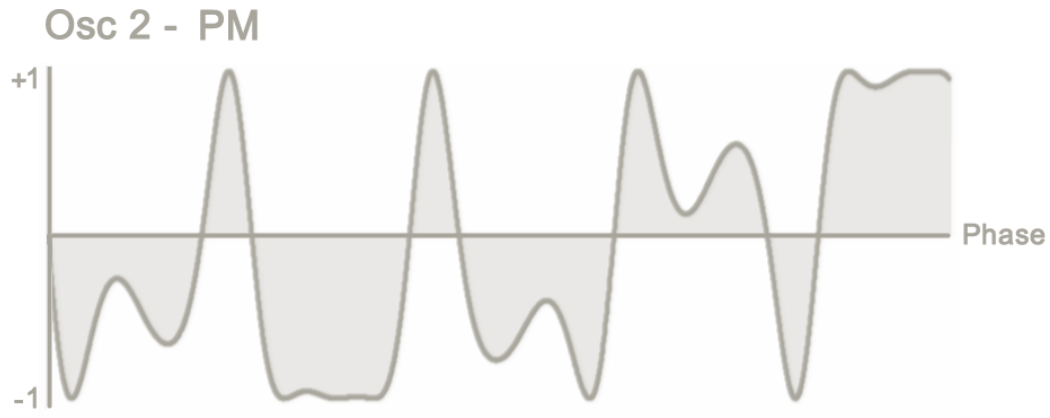


Phase Modulation (PM)

Phase modulation alters the output of Oscillator 2 by using the output of Oscillator 1 to alter the phase of Oscillator 2. QUAD employs cross-phase modulation, which allows Oscillators 2 to alter the phase of Oscillator 1. This creates a more complex waveform.

Amt 1	Sets the modulation amount of oscillator 1 to oscillator 2
Amt 2	Sets the modulation amount of oscillator 2 to oscillator 1

Below is an example of phase modulation:

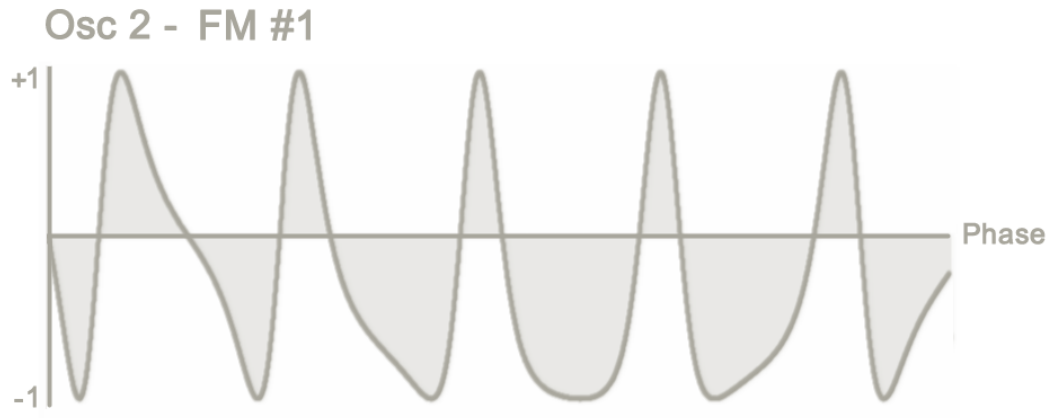


Frequency Modulation 1 (FM1)

Frequency modulation alters the output of Oscillator 2 by using the output of Oscillator 1 to alter the frequency of Oscillator 1. QUAD employs cross-frequency modulation, which allows Oscillators 2 to alter the frequency of Oscillator 1. This creates a more complex waveform.

Amt 1	Sets the modulation amount of oscillator 1 to oscillator 2
Amt 2	Sets the modulation amount of oscillator 2 to oscillator 1

Below is an example of frequency modulation:

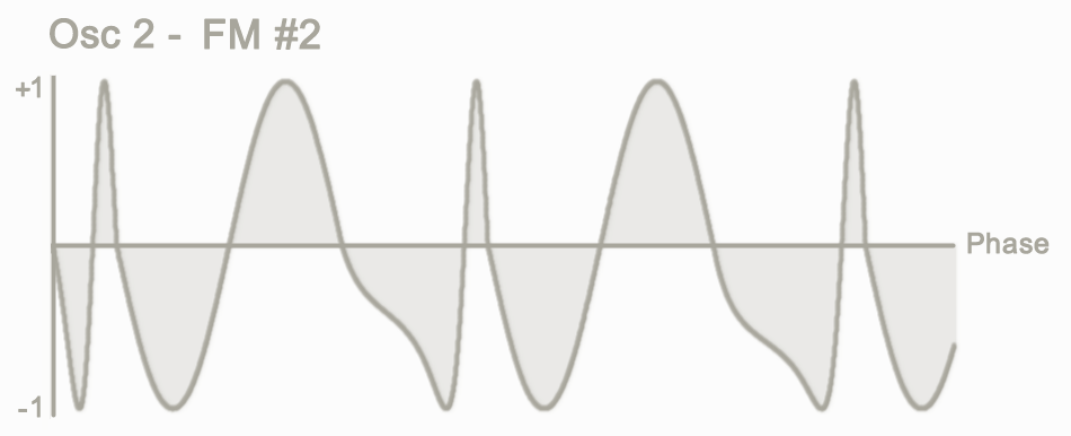


Frequency Modulation 2 (FM2)

FM2 is a non-pitched Sample & Hold modulation algorithm. Instead of the frequency modulation by oscillator 1 being continuous, the amount of frequency modulation is updated at set intervals. Oscillator 1 is sampled every interval and the sampled value is used to modulate oscillator 2.

Amt 1	Sets the FM amount
Amt 2	Sets the Sample & Hold interval

Here is an example of sample & hold FM



Frequency Modulation 3 (FM3)

FM2 is a tuned Sample & Hold modulation algorithm. It is similar to FM2 but the Sample & Hold interval follows the pitch of Oscillator 2. Oscillator 1 is sampled every interval and the sampled value is used to modulate oscillator 2.

Amt 1	Sets the FM amount
Amt 2	Sets the Sample & Hold interval

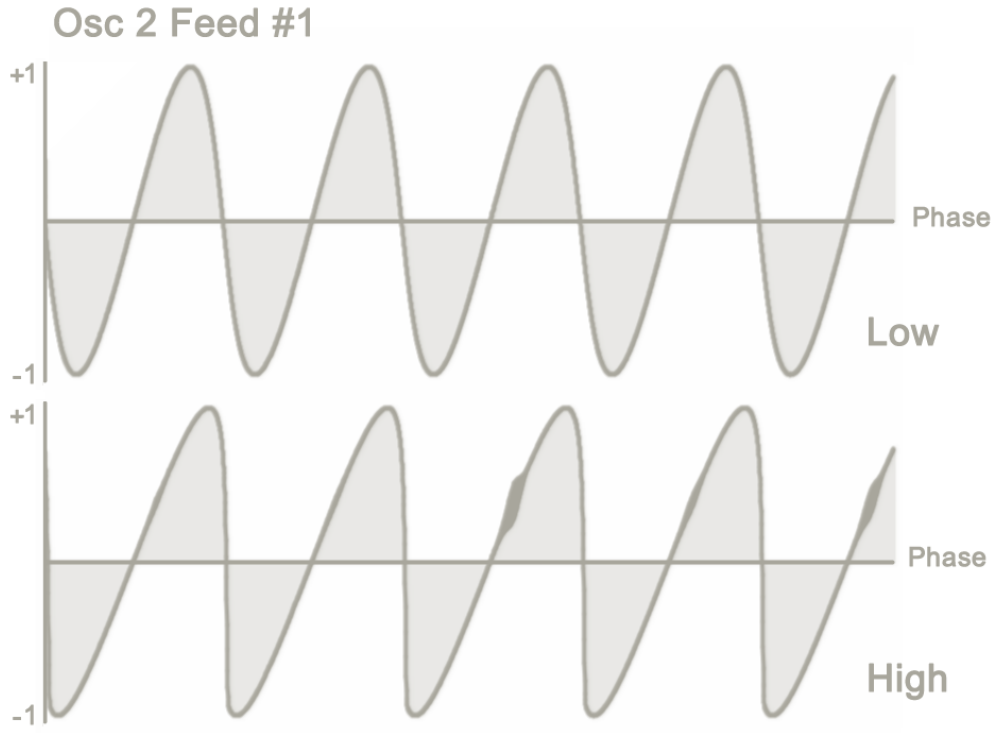
Frequency Modulation 4 (FM4)

FM4 uses alternating modulation amounts between the two oscillators. The modulation level varies with every cycle. The modulation level in the first cycle of oscillator 2 is determined by Amt 1 amount. The modulation level in the second cycle is set by Amt 2 amount. This pattern repeats for all following odd and even waveform cycles.

Feed 1

In the Feed 1 modulation function, Oscillator 2 modulates itself. It feeds back on itself in a frequency modulation loop. At low modulation amounts, it would transform a sine wave towards a saw wave. At high levels a chaotic waveform ensues.

Amt 1	Sets the modulation amount
Amt 2	Sets the balance between self-modulation and frequency modulation. (0 – self , 100% - FM)



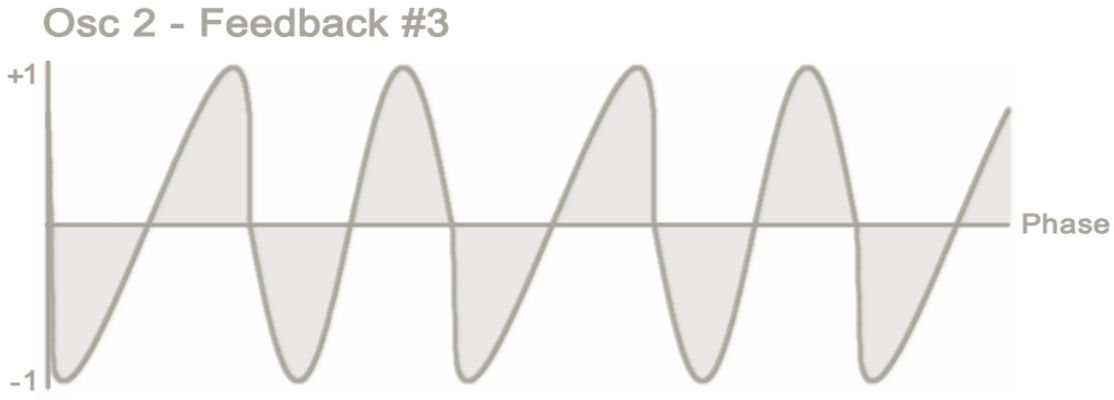
Feed 2

The Feed 2 modulation function is a delayed feedback modulation.

Amt 1	Sets the modulation amount
Amt 2	Sets the delay time

Feed 3

Feed 3 alternates the feedback level for Oscillator 2. The first cycle of Oscillator 2 is modulated at Amt 1 amount, and second cycle is modulated at Amt 2 amount. This pattern then repeats itself.

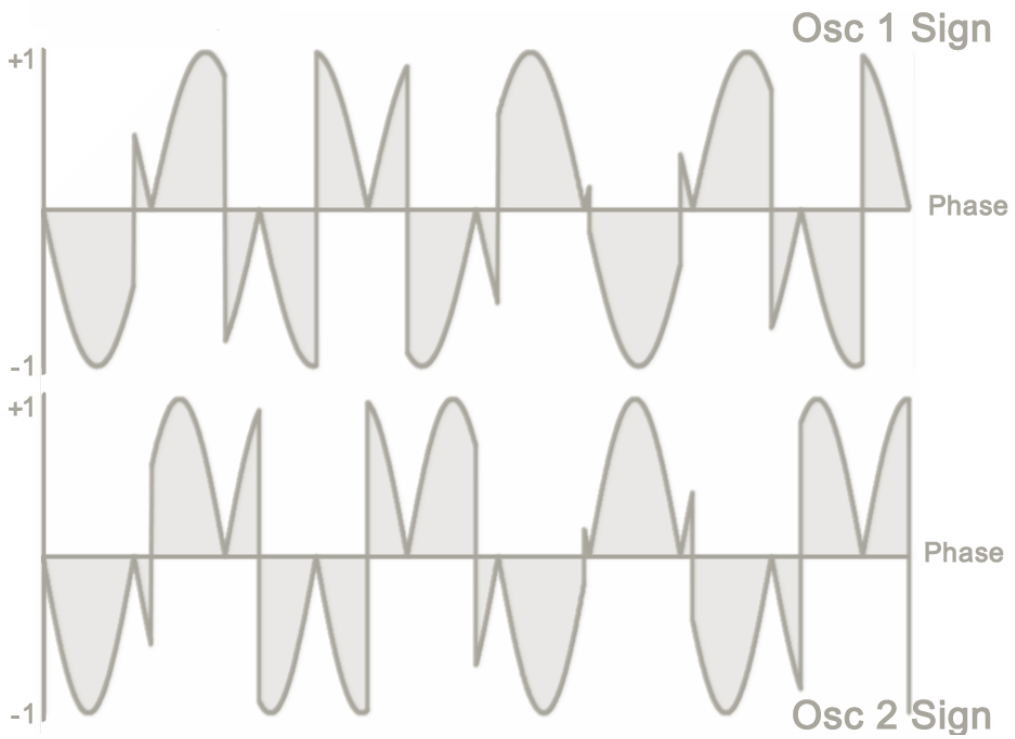


Sign

Sign uses the polarity of one oscillator to change the polarity of the other oscillator.

Amt 1	Sets the balance between the modulated signal and direct signal
Amt 2	Sets the direction of modulation between Oscillator 1 and Oscillator 2.

The difference between sign of Osc 1 * absolute value of Osc 2, and sign of Osc 2 * absolute value of Osc 1 can be seen here:

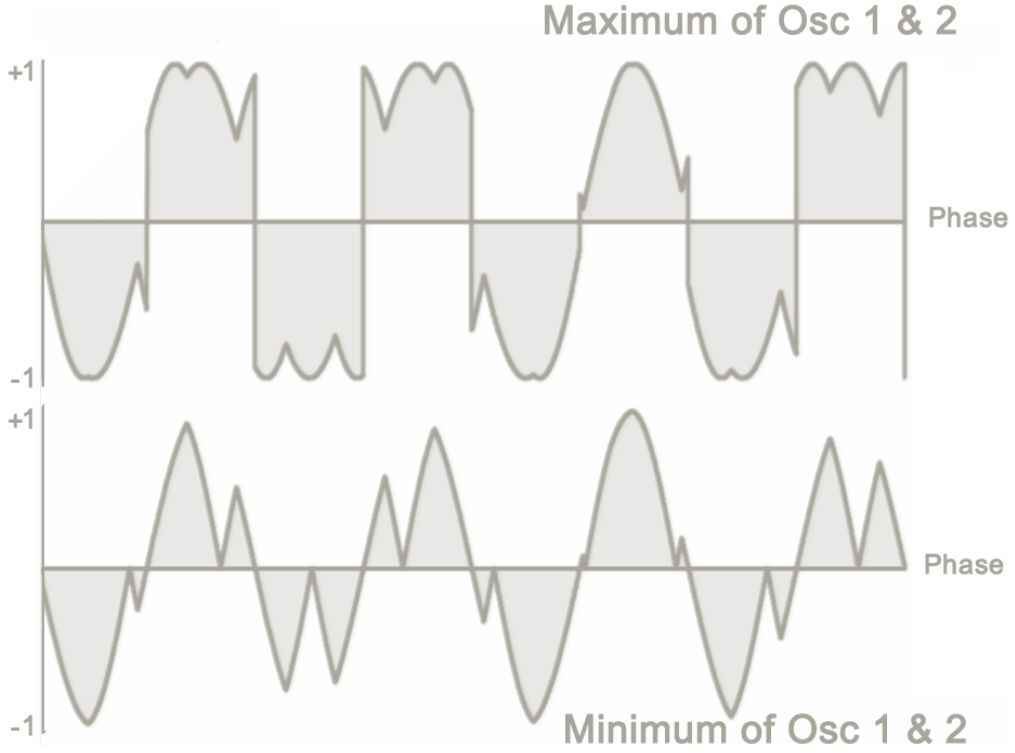


Min/Max

The Min/max function outputs a blend of the minimum and maximum values of oscillator 1 and 2

Amt 1	Sets the balance between the modulated signal and the direct signal of oscillator 2
Amt 2	Sets the balance between the minimum of oscillators 1 and 2 and maximum of oscillators 1 and 2.

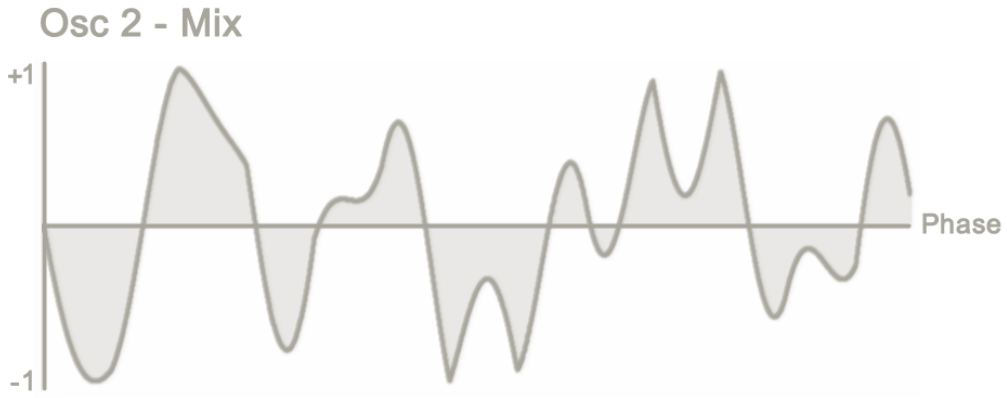
The following graph shows the difference between the minimum and maximum values:



Mix

The Mix algorithm dynamically mixes the outputs from Oscillator 1 and Oscillator 2. It plays oscillator 1's output, followed by Oscillator 2's output. The frequency with which it alternates is determined by Amt 2.

Amt 1	Sets the Mix level of oscillator 1
Amt 2	Sets the frequency of alternating between Oscillator 1 and Oscillator 2



Cross

The cross modulation function plays a set number of cycles of oscillator 1, followed by a set number of cycles of oscillator 2.

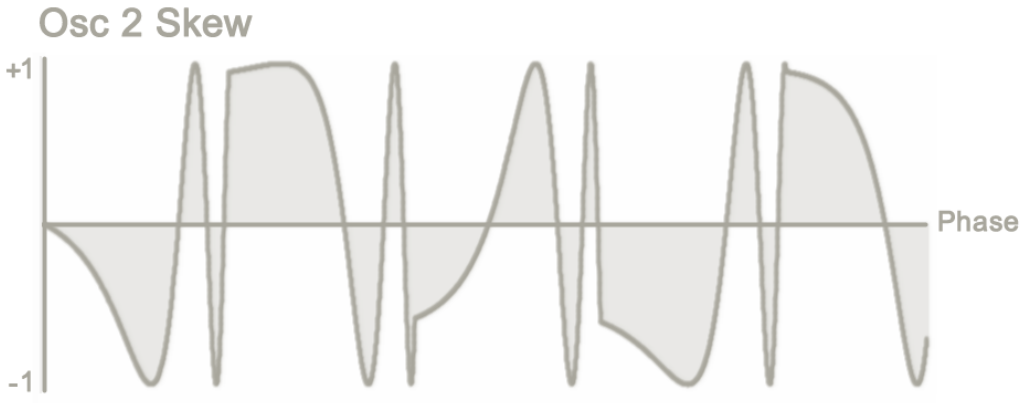
Amt 1	Determines the number of cycles to played from each oscillator
Amt 2	Sets the extent at which the oscillator pitch drives the number of cycles played.

What follows is a display of a sine wave and a saw wave combined in the Cross algorithm:

Skew

In Skew, the FM amount is controlled by the phase of oscillator 1.

Amt 1	Sets the FM amount for minimum phase of oscillator 1
Amt 2	Sets the FM amount for maximum phase of oscillator 1



Filter Modulation

In this modulation function, Oscillator 1 modulates the cutoff frequency of a low pass filter. Oscillator 2 is fed through the filter. If you select a noise waveform for oscillator 1, the filter will operate as a band pass filter.

Amt 1	Sets the centre frequency of low pass filter
Amt 2	Sets the resonance amount

String

String uses oscillator 2's output in a string model (Karplus-Strong), to generate plucked sounds.

Amt 1	Sets the length of string in the model
Amt 2	Sets the level of damping in the model

Phase / Waveshape Distortion

The waveforms as generated by the oscillators are subject to further modulation through Phase Distortion and Wave Shaping. You select these in the XY Pad section of QUAD as explained in the next chapter. Each Phase Distortion and Wave Shaper type has two controls to define the effect.

Distortion Types

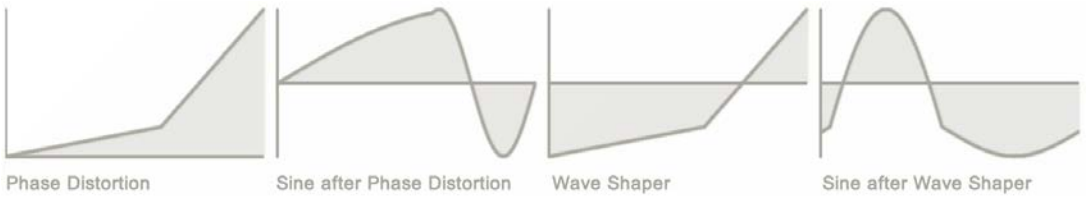
The remainder of this chapter lists the various distortion and shaping algorithms and the functions of the Amt 1 and Amt 2 controls. Where applicable the algorithms are illustrated by a series of four wave form representations. In these illustrations:

- The first waveform is the Phase Distortion modulator
- The second waveform is the effect of the Phase Distortion on a sine wave
- The third waveform represents the Wave Shaper modulator
- The fourth waveform displays the effect of the Wave Shaper on a sine wave

2 Point

2 point applies phase distortion to the signal. Amt1 and Amt 2 control the mid-point position.

Amt 1	Sets the x coordinate of the mid-point.
Amt 2	Sets the x coordinate of the mid-point.



And

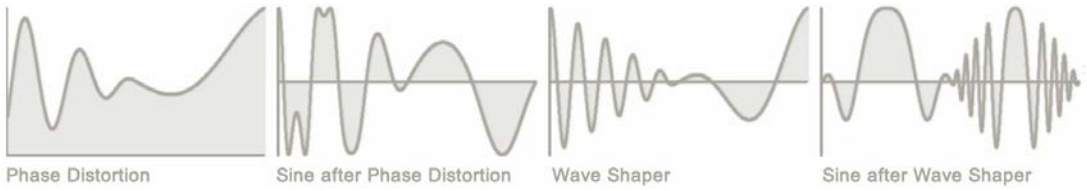
And applies a binary And-function to achieve bit reduction of the signal

Amt 1	Sets the multiplication factor of the And-function
Amt 2	Sets the mask value of the And-function

Cos1

Cos 1 uses a cosine function to modulate the input signal

Amt 1	Sets the frequency of the cos wave
Amt 2	Sets the symmetry level between positive and negative wave cycles



Cos2

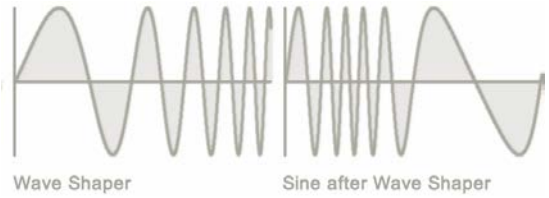
Cos 2 uses a range of cosine frequencies as modulators. The Amt 1 and Amt 2 controls set the width of the frequency window.

Amt 1	Sets the start frequency,
Amt 2	Sets the end frequency.

FM - Waveshaper only

FM applies classic frequency modulation to the signal

Amt 1	Sets the level of FM
Amt 2	Sets the frequency of the FM



Feed

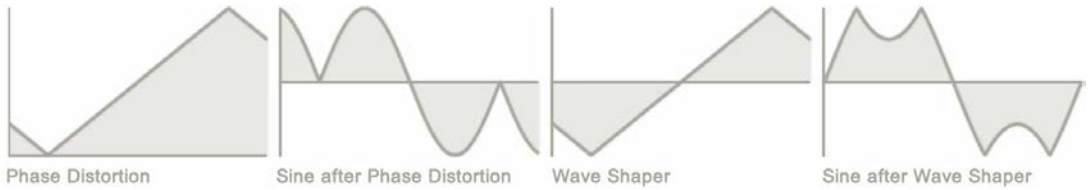
Feed puts the signal in a (delayed) feedback loop which feeds the signal back onto itself.

Amt 1	Sets the delay of the feedback loop
Amt 2	Sets the feedback level.

Fold

Fold introduces distortion by amplifying the signal, clipping it, and subsequently folding over the clipped sections of the waveform.

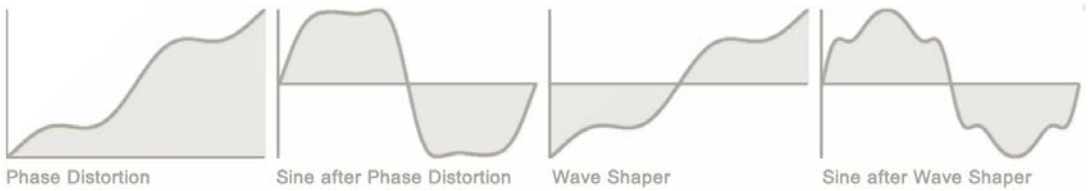
Amt 1	Sets the frequency of the fold-over distortion.
Amt 2	Sets the level of the fold-over distortion.



Fuzz

Fuzz is based on a classic fuzz pedal distortion.

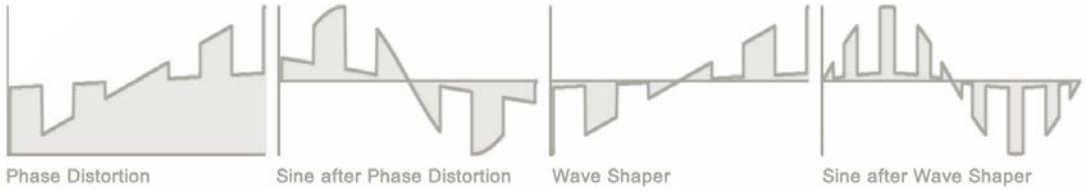
Amt 1	Sets the frequency of the fuzz-distortion effect
Amt 2	Sets the level of fuzz distortion



Gap

Gap is a distortion effect that modulates the input with a square wave. It introduces abrupt on/off changes in the waveform.

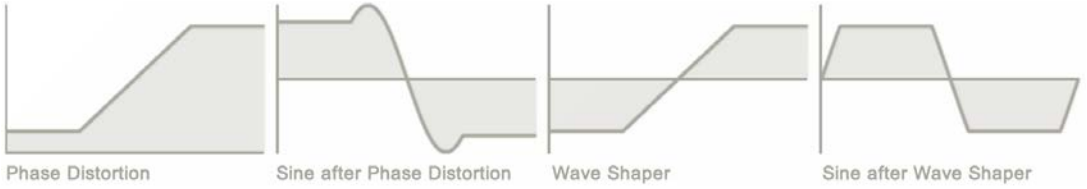
Amt 1	Sets the frequency of the square wave modulation source
Amt 2	Sets the modulation level



Hard

Hard is a limiter which clips the signal at a pre-set level and subsequently boosts the signal.

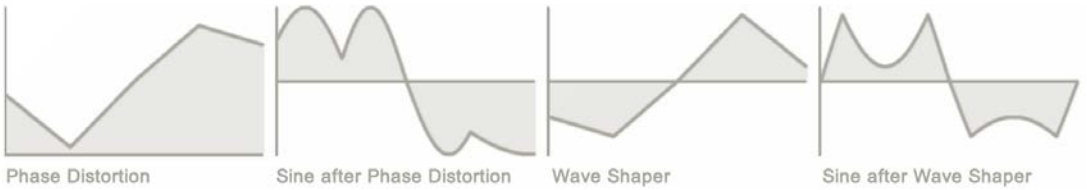
Amt 1	Set the clipping level for the signal.
Amt 2	Sets the level of post-limiting boosting.



Oct1

Oct1 is an octaver effect. It doubles the frequency of the input dynamically and separately for the negative and positive cycles of the wave

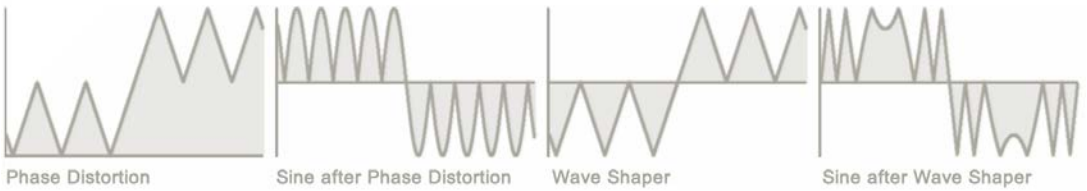
Amt 1	Sets the level of the negative wave cycle
Amt 2	Sets the level of the positive wave cycle



Oct 2

Oct 2 moves the signal up by one or more octaves.

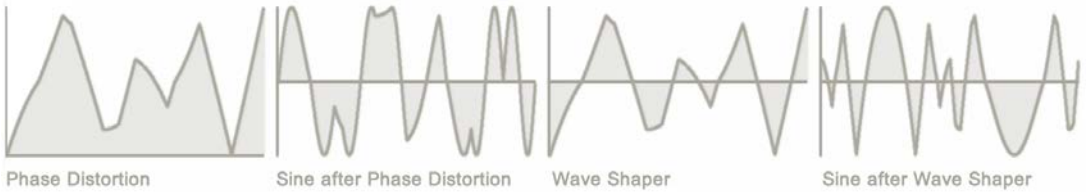
Amt 1	Sets the range of the octave effect.
Amt 2	Sets the level of octave effect.



Oct3

Oct 3 multiplies the input signal across a frequency range set by the Amt 1 and Amt 2 controls.

Amt 1	Sets the start of the pitch range
Amt 2	Sets the end of the pitch range



Or

Or applies a binary Or-function to achieve bit reduction of the signal

Amt 1	Sets the multiplication factor of the Or-function
Amt 2	Sets the mask value of the Or-function

PWM / PWM2 WS Only

PWM and PWM 2 apply Pulse Width modulation to the signal. In PWM 1 the modulation speed is fixed (set by Amt 2). In PWM 2 the modulations speed tracks the note played.

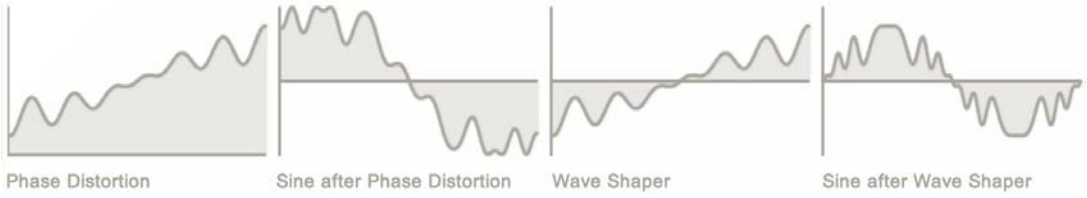
Amt 1	Sets the amount of PWM,
Amt 2	Sets the frequency of the PWM

Rez1 / Rez2

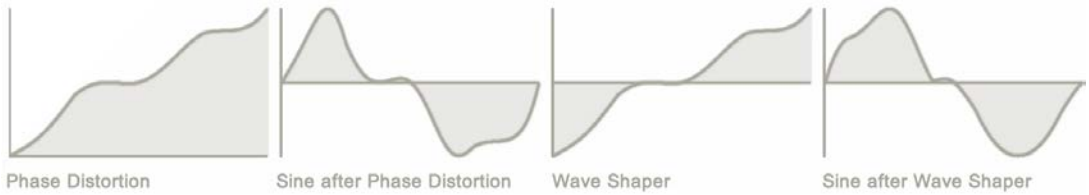
Rez 1 and Rez 2 distort the signal based on resonance peaks,

Amt 1	Sets the amount of resonance
Amt 2	Sets the frequency of the resonance.

Resonance 1 example:



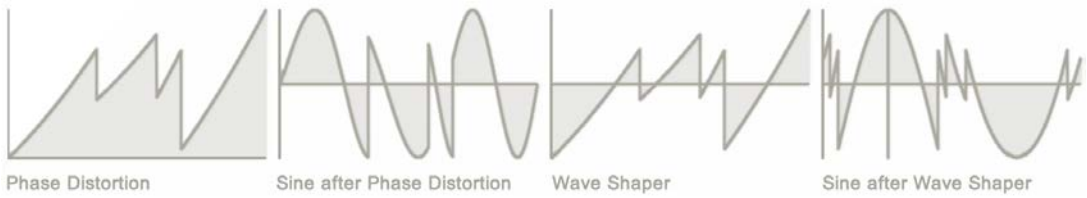
Resonance 2 example:



Saw

The saw wave modulation uses saw waves to introduce sharp peaks in the frequency spectrum in a programmable frequency range

Amt 1	Sets the start of the frequency range
Amt 2	Sets the end of the frequency range.



Shift1 / Shift2 PD Only

Shift 1 changes the frequency (pitch) of the input.

Amt 1	Sets the amount of frequency shifting

Shift 2 Phase Distortion changes the pitch in different amounts for odd and even numbered wave cycles

Amt 1	Sets the amount of pitch shifting for odd cycles
Amt 2	Sets the amount of pitch shifting for even wave cycles. I

Static

Static adds static noise to the sound

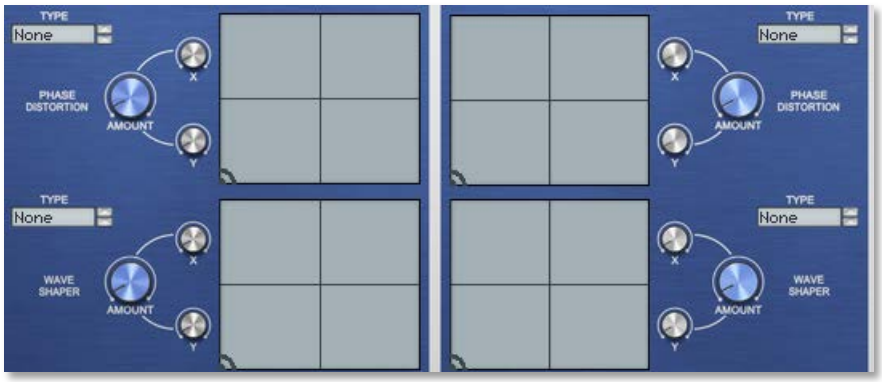
Amt 1	Sets the level of the static noise.
Amt 2	Sets the average frequency of the static noise.

Trans

Trans distorts the transients only. Transient are the sharp peaks that occur at the beginning of waveform.

Amt 1	Sets the transient frequency range
Amt 2	Sets the level of distortion

X/Y Pad



QUAD's X/Y Pads are for quick and easy programming of your sounds. There are four XY Pads at your disposal. Two pads control the Phase Distortion parameters for oscillators 1 and 2. The two other pads control the Wave Shaping parameters for the oscillators. Each XY Pad lets you alter the value of two parameters with a single movement: every position on the pad is represented by an x-value and a y-value that drive the pad's associated control values. Each pad has a type menu control to select one of the Phase Distortion and Wave Shaping types as described in the previous chapter.

While you can leave each XY Pad in a fixed position, they come into their own when you move the crosshairs across the pad as part of the composition you're working on. The Reason sequencer will assist you in accomplishing this. It will record the movement of each pad as part of the sequence. Simply hit record in Reasons transport and use the mouse on the X/Y screens. The movement will be recorded as automation. By using overdub techniques you will be able to change all four XY Pads simultaneously.

An alternative way to create dynamic XY Pads is to draw in the movement manually. The trick here is to create an automation lane for each of the Amount controls. Please refer to the Reason manual for details on how to achieve this..

A third method to get those X and Ys moving is through the CV Inputs. On the QUAD Back Panel you will find CV inputs for the X and Y values for each of the Pads. The control voltage used on these inputs determines the X and Y values. Reason modules that provide CV outputs can thus be used to control QUAD's sound. For example Reason's Matrix device might be a good control candidate. Please refer to the Reason manual for more details.

Filters 1 and 2

QUAD includes two high quality analogue modelled filters that apply subtractive filtering to the soundwaves generated by the oscillators. The filters have their most used modulation parameters hard-wired in the QUAD structure, such as Envelope, Velocity and Modulation Wheel. This makes sound editing easier and faster. Filter 1 and Filter 2 controls are the same for both filters. Select which filter to edit via the LED-style switch in the top right corner of the filter panel.

Filter Select

The LED-Style buttons 1 and 2 select Filter 1 or Filter 2 for editing.

Filter Path Routing

The Mode switch sets the routing of the oscillator signals through the two filter sections (1 and 2). It allows you to set the two filters in series, or in parallel configuration. In the Serial setting, all oscillator signals go to filter 1. The output of the filter 1 is subsequently fed to Filter 2. Filter 2 feeds into the amplifier section.

The Parallel configuration feeds all oscillators to both filters simultaneously. The output signals of both filters are then mixed again and passed on to the amplifier.

In oscillator configuration, oscillator 1 feeds into Filter 1 and oscillator 2 feeds into Filter 2.

Filter Type

Bypass	The filter is bypassed and the sound passes through unaffected
6dB LowPass	Low frequencies pass through this filter; frequencies above the Cutoff frequency are reduced by 6dB per octave. For example: a frequency 2000Hz is 6dB softer in volume if the Cutoff frequency is set to 1000Hz.
6dB HighPass	High frequencies pass through this filter; those below the Cutoff frequency are reduced by 6dB per octave. The filter is open if the Cutoff frequency knob is turned fully counter-clockwise.
12dB LowPass	Low frequencies pass through this filter; those above the Cutoff frequency are reduced by 12dB per octave.
12dB LowPass 2	This is an additional 12 dB LowPass filter with an alternative tonal character
12dB HighPass	High frequencies pass through this filter; those below the Cutoff frequency are reduced by 12dB per octave. The filter is fully open if the Cutoff frequency control knob is turned fully counter-clockwise.
12dB HighPass 2	This is an additional 12 dB HighPass filter with an alternative tonal character

18dB LowPass	Low frequencies pass through this filter; those above the Cutoff frequency are reduced by 18dB per octave.
18dB HighPass	High frequencies pass through this filter; those below the Cutoff frequency are reduced by 18dB per octave. The filter is fully open if the Cutoff frequency knob is turned fully counter-clockwise.
24dB LowPass	Low frequencies pass through this filter; those above the Cutoff frequency are reduced by 24dB per octave.
24dB LowPass 2	This is an additional 12 dB LowPass filter with an alternative tonal character
24dB HighPass	High frequencies pass through this filter; those below the Cutoff frequency are reduced by 24dB per octave. The filter is fully open if the Cutoff frequency knob is turned fully counter-clockwise.

12dB BandPass	This filter mode is a combination of 12dB LowPass and 12dB HighPass filters. Only those frequencies near the filter Cutoff frequency pass through (a band of frequencies), the resonance (Q), controls the width of this band so that low and high frequencies are removed.
12dB BandPass 2	This is an additional 12 dB BandPass filter with an alternative tonal character
24dB BandPass	This filter mode is a combination of a 24dB LowPass and 24dB HighPass filter. Only those frequencies near the filter Cutoff frequency pass through (a band of frequencies), the resonance (Q) controls the width of this band, so low and high frequencies are removed.
24dB BandPass 2	This is an additional 24 dB BandPass filter with an alternative tonal character
12dB Notch	The frequencies in the region around the filter Cutoff frequency are reduced in volume (12dB), the resonance controls the width of this region.
12dB Notch 2	This is an additional 12 dB Notch filter with an alternative tonal character
24db Notch	The frequencies in the vicinity of the filter Cutoff frequency are reduced in volume (24dB), the resonance controls the width of this region.
24dB Notch 2	This is an additional 24 dB Notch filter with an alternative tonal character
36dB LowPass	Low frequencies pass through this filter; those above the Cutoff frequency are reduced by 36dB per octave.
36dB HighPass	High frequencies pass through this filter; those below the Cutoff frequency are reduced by 36dB per octave. The filter is fully open if the Cutoff frequency knob is turned fully counter clockwise

Comb Positive	This is a very short delay, which emphasizes the comb filter frequency. The Cutoff frequency controls the length of this delay and resonance (Q) the feedback of the filter.
Comb Negative	This is a very short delay, which reduces the comb filter frequency. The Cutoff frequency controls the length of this delay and resonance (Q) the feedback of the filter.
Vox filter	Vocal Filter, which adds a voice-like filtering to the sound. In Vox filter mode, the distortion knob controls the vowel of the filter. Vowel Sets the vowel formant (a,e,i,o and u) as used by the vox filter
Formant 2 Band	Vocal Filter, which creates a vocal character based on 2 bands. In Formant 2 mode, the distortion knob controls the separation of the bands.
Formant 4 Band	Vocal Filter, which creates a vocal character based on 4 bands. In Formant 2 mode, the distortion knob controls the separation of the bands.
Ring	Ring Modulation effect, Q alters the amount of ring modulation.

Filter Controls

Frequency

The Cutoff Frequency sets the frequency at which point the filter starts attentuating harmonics in the sound. For instance, if you set the Cutoff to 2000Hz and use a 12dB Lowpass filter it reduces any frequencies above 2000Hz, and frequencies at 4000Hz will be reduced by 12dB. The Cutoff frequency can be static at a single programmed frequency, but for more dynamic sounds, try modulating the Cutoff Frequency with the Filter Envelope, Keyboard tracking, Modulation Wheel and LFO.

Q (Resonance)

Q is the resonance level of the filter. Sounds at and directly around the filter cutoff frequency are emphasised by the resonance. For the 6dB filters types it has no effect though, because the filter's slope is not steep enough. In the Ring filter it controls the amount of ring modulation. In the Comb Filter it controls the amount of feedback and in the Vox filter the bandwidth of the formant filters.

Volume and Pan

The volume and panning controls should be self-explanatory: one sets the output volume of the filter, the other positions the filter output in a stereo field.

Tip: Consider setting one of the filters to Bypass and use the panning control to pan the output of the oscillators without filtering them, or you use it for panning modulation effects.

Vowel

In the Vox filter this controls the vowel of the filter. For Formant 2 / 4 filters, it controls the separation of the filter bands.

Cutoff Frequency Modulation

Envelope (Env)

The envelope moves the filter cutoff frequency, following the contour of the envelope. The Envelope is part of the Filter section. Keep in mind that if you use negative modulation, the control signal is inverted: as the envelope level rises the filter frequency is lowered.

Velocity (Vel)

Typically, the harder you strike the keys, the more the filter opens. When you use negative modulation values the filter closes with increasing velocity. If QUAD is in sequencer mode (Play mode) the sequencer velocity settings drive the filter frequency.

KeyTrk

Again typically, the Cutoff frequency increases, i.e. the filter opens, with notes played higher on the keyboard. When you use negative modulation values, the filter closes with increasing note pitch.

Modulation Wheel (ModWhl)

This control lets the position of the modulation wheel determine the cutoff frequency of the filter. The strength of the Mod Wheel – Filter Frequency coupling is set by the level of this control.

Filter Envelope

An envelope is a time-based modulation source in a synthesizer. When triggered – typically by playing a note – it moves from 0% up to 100% and back to 0% when you release the key. The Filter Envelope determines how the timbre of a sound changes while holding a note. A typical application of a filter envelope is to sweep through the frequency range of the filter.

The first part of the envelope is known as the attack stage. It represents the time it takes for the envelope to reach 100%. If you open the Attack knob, it takes longer to go from 0 to 100%. With Attack closed, the envelope starts at 100%.

After the attack stage, with the envelope at 100%, the decay stage starts. The decay stage brings the volume down to the sustain level. If the sustain is set to 50%, the decay brings the volume down to 50% and stays there for as long as the key is held. If you use a long decay, it takes long to reach the sustain level. This is useful for evolving pad sounds. Short decay times are a god ingredient for percussive sounds. If the sustain level is 100% the impact of the decay stage is effectively eliminated.

The sustain stage is characterised by a (sustain) level setting. After the attack and decay stage, the envelope reaches the sustain stage and remains here for as long as you hold a key. The sustain level is the level of this sustain stage and as such is main control for the perceived volume of a sound.

If the fade control is set to zero, the envelope behaves as a classic ADSR envelope If you open the fade amount in a positive direction, the sustain turns into a second attack. So after the Decay reaches the Sustain level the envelope level will rise to 100% as set by the Fade time. If you open the fade amount in a negative direction the sustain changes into a second decay. In this case after the Decay reaches the Sustain level the envelope level falls back to 0% in the time set by the fade control.

The envelope release stage starts when you release a key. The envelope fades out from the sustain level to 0% in the time set by the release control.

Amplifier

While the oscillator section controls the pitch, the filter section the timbre, the amplifier section is responsible for the volume. It amplifies the signal and modifies the volume. An important component of the amplifier section is the Volume Envelope. The envelope defines the loudness contour. The amplifier section also contains the velocity control. This sets the response of QUAD to the velocity information.

Volume

The Volume sets the overall volume of the Patches. Use this control to adjust the relative volumes between Patches in a Folder.

Velocity (Vel)

The Velocity control determines how the sound's volume responds to changes in note velocity. It applies to notes played on a keyboard and those triggered by the QUAD sequencer.

Velocity shape

The velocity shape changes QUAD's velocity curvature response to the keyboard input or host input. The control ranges from Exponential (negative values) to linear (0) to Logarithmic (positive values). The default setting is linear (0).
Note: many keyboards already have a built-in velocity curvature response setting. The default of 0 is probably the best to use. This setting is also saved as part of a patch.

Pan

The pan control places the sound in a stereo image. The range moves form hard left, through the centre to hard right.

Volume Envelope

An envelope is a time-based modulation inside a synthesizer. When triggered – typically by playing a note – it moves from 0% up to 100% and back to 0% when you release the key. The Volume Envelope determines the volume contour of a sound.

The first part is known as the attack stage. It represents the time it takes for the envelope to reach 100%. If you open the Attack knob, it takes longer to go from 0 to 100%. With Attack closed, the envelope starts at 100%.

After the attack stage, with the envelope at 100%, the decay stage starts. The decay stage brings the volume down to the sustain level. If the sustain is set to 50%, the decay brings the volume down to 50% and stays there for as long as the key is held. If you use a long decay, it takes long to reach the sustain level. This is useful for evolving pad sounds. Short decay times are a god ingredient for percussive sounds. If the sustain level is 100% the impact of the decay stage is effectively eliminated.

The sustain stage is characterised by a (sustain) level setting. After the attack and decay stage, the envelope reaches the sustain stage and remains here for as long as you hold a key. The sustain level is the level of this sustain stage and as such is main control for the perceived volume of a sound.

If the fade control is set to zero, the envelope behaves as a classic ADSR envelope If you open the fade amount in a positive direction, the sustain turns into a second attack. So after the Decay reaches the Sustain level the envelope level will rise to 100% as set by the Fade time. If you open the fade amount in a negative direction the sustain changes into a second decay. In this case after the Decay reaches the Sustain level the envelope level falls back to 0% in the time set by the fade control.

The envelope release stage starts when you release a key. The envelope fades out from the sustain level to 0% in the time set by the release control.

Modulation section

You find QUAD's modulation section in the bottom right hand corner. This section holds 2 Envelopes, 2 LFOs and a modulation matrix with 8 slots. The modulation section is a treasure trove for subtle or complex sound-shaping options.

Envelope 1 and 2

An envelope is a time-based modulation source in a synthesizer. When triggered – typically by playing a note – it moves from 0% up to 100% and back to 0% when you release the key. A typical application of a modulation envelope is to sweep a targeted parameter (destination) through a range of values.

The first part of the envelope is known as the attack stage. It represents the time it takes for the envelope to reach 100%. If you open the Attack knob, it takes longer to go from 0 to 100%. With Attack closed, the envelope starts at 100%.

After the attack stage, with the envelope at 100%, the decay stage starts. The decay stage brings the volume down to the sustain level. If the sustain is set to 50%, the decay brings the volume down to 50% and stays there for as long as the key is held. If you use a long decay, it takes long to reach the sustain level. This is useful for evolving pad sounds. Short decay times are a god ingredient for percussive sounds. If the sustain level is 100% the impact of the decay stage is effectively eliminated.

The sustain stage is characterised by a (sustain) level setting. After the attack and decay stage, the envelope reaches the sustain stage and remains here for as long as you hold a key. The sustain level is the level of this sustain stage and as such is main control for the perceived volume of a sound.

If the fade control is set to zero, the envelope behaves as a classic ADSR envelope If you open the fade amount in a positive direction, the sustain turns into a second attack. So after the Decay reaches the Sustain level the envelope level will rise to 100% as set by the Fade time. If you open the fade amount in a negative direction the sustain changes into a second decay. In this case after the Decay reaches the Sustain level the envelope level falls back to 0% in the time set by the fade control.

The envelope release stage starts when you release a key. The envelope fades out from the sustain level to 0% in the time set by the release control.

Vel > T

This control allows you to change the envelope times based on note velocity (how hard you strike a key). A positive value here means that *forte* notes produce faster envelopes. A negative value has the opposite effect: *piano* notes get the faster envelopes.

Key > T

This control allows you to change the envelope times based on note pitch. A positive value here means that higher keys produce faster envelopes. A negative value has the opposite effect: higher notes get slower envelopes.

Sync

Sync is a switch that enables automatic triggering of the envelope, synchronised to Reason's tempo setting.

LFO 1 and 2

The QUAD modulation section has two LFOs. Both LFOs have an identical set of controls to determine their behaviour.

Waveform type

The available waveforms are Sine, Triangle, Saw Up, Saw Down, Square and S&H. The waveform determines the modulation pattern of the LFO. Sinus and Triangle are often used because these move the LFO up and down in a smooth fashion. The other waveforms are more suitable for a more pronounced impact.

Mode

The LFO reset type has three different modes:

Poly	In poly mode, each note played has its own LFO.
Free	The LFO is free running and all the notes share the same LFO. The LFO is always running and does not reset when you press a key.
Mono	Similar to free mode. All notes share the same LFO. However when you press a key in Mono mode, the LFO is reset to its initial phase (start position)

LFO Speed

The speed control determines how fast the LFO cycles through its selected waveform. It is measured either in hertz (cycles per second) (Sync Off) or note lengths (Sync On). The speed range runs from 0.03 Hz to 27.5 Hz.

LFO Sync Off / On

If you turn Sync on, the Speed of the LFO will be based on Reason's tempo. It will synchronise with the song tempo. In Sync Mode, please use the Speed parameter to select the desired beats / divisions setting.

Free Modulation Slots 1 – 8

There are eight different modulation matrix slots, and they are used in order until a blank modulation slot is encountered. You need to ensure that there are no blank slots in-between populated modulation slots.

The source column gives you access to all modulation sources. There are a total of 40 modulation sources available

The amount control defines the modulation strength for each modulation slot. It sets the level of impact the modulation source has on its destination or target. It speaks for itself that depending on the selected source and the amount the effect ranges from subtle variations to outrageous manipulation. The amount control is an intelligent one. It displays its value according to destination type. For example if the destination is pitch, then the modulation amount is shown in semitones. If the modulation targets are time based such as the Speed of an LFO the range goes from 25% up to 400% which is from 25% of the original speed (i.e. ¼ as fast) to 400% of the original speed (i.e. 4 times as fast).

The destination column lists which parameter is subject to the programmed modulations. You have a choice of 119 destinations here.

Arpeggiator

QUAD incorporates a classic style arpeggiator that plays notes one after another, drawing from all keys that are held down. The playback order happens in a variety of octaves and patterns. The arpeggiator has a built-in pattern sequencer. Each step of the pattern sequencer has individual on/off and velocity settings.

To turn on the arpeggiator, select arpeggiator in the Play Mode section.

Steps

The number of steps in the arpeggiator ranges from 1 – 16.

Speed

This control sets the speed of the arpeggiator relative to the speed of Reason, for example 2 x tempo or ¼ x tempo.

Arp Mode

The arpeggiator mode controls the order in which the arpeggiator plays its notes

Up	The notes are played from low to high
Down	The notes are played from high to low
Up/Down	The notes are played from low to high followed by from high to low
Down/Up	The notes are played from high to low followed by from low to high
Random	The notes are played in random order
Ordered	The notes are played in the order in which they were triggered, i.e. first note played first and last note played last
Rev. Ordered	The notes are played in the reverse order in which they were triggered, i.e. last note played first and first note played last
Ordered Up/Down	The notes are played from first to last followed by last to first
Ordered Down/Up	The notes are played from last to first followed by first to last
Chord	The arpeggiator plays all notes as chord in a rhythmic pattern

Octaves

The octave setting gives you the option to play the arpeggiated notes in multiple octaves, relative to the original notes. For example, an octave setting of 2 means that the original notes will play first, followed by the same notes one octave higher.

Latch

Latch frees your hands. When latch is turned on you don’t need to keep holding notes for the arpeggiator to continue playing. Tip: you can use also the sustain pedal to latch and unlatch the arpeggiator.

Length

The length control can be used to set the arpeggiator note duration for all steps simultaneously at an identical value. This setting is relative to the step size, i.e. from 1% to 100%. Please note that you will need a 100% value for tied notes.

Swing

Swing is a control that allows you to change the rhythmic feel of the arpeggiator. It does this by slightly moving every other note relative a fixed timing grid. Whether it suits your work depends very much of the musical piece you are working on, so you we encourage you to experiment with different values here.

Vel

Vel determines the programmed velocity value for each step. The impact of the programmed value is determined by the setting of the Vel / Key control

Vel / Key

The velocity of the steps in the arpeggiator sequence can be controlled by their programmed values, by the velocity of the key played that is used to trigger the arpeggiator or a combination of both. The Vel / Key control sets the balance between these.

Step 1 – 16 On/Off

Click on a step number to mute and un-mute it.

Play Mode

This panel contains controls to set the Play settings for QUAD

Play Mode

Poly	Multiple notes can be played at the same time. QUAD is polyphonic
Mono	Only a single note can be played at a time. Any new note will stop previous note.
Legato	Similar to mono but if you play overlapping notes, the envelopes and LFOs will not be retriggered for the new note.
Arpeggiator	Any notes played will trigger the sequencer (See the Arpeggiator section)
Unison	QUAD will stack multiple voices for every not played

Unison

In Unison mode, QUAD plays multiple voices, for each note played. The Unison detune parameter makes that these voices can be detuned slightly from each other. Ultimately this gives you an extremely rich sounding stack of voices. The unison parameters are an excellent tool to create fat lead sounds.
The table below lists the unison options:

Off	Unison is not activated. Each note played uses only a single voice.
Unison 2	This combines 2 voices on one note. If you use the unison detune these 2 voices are detuned resulting in a fatter sound.
Unison 3	This combines 3 voices on one note. If you use the unison detune these 3 voices are detuned resulting in a fatter sound.
Unison 4	This combines 4 voices on one note. If you use the unison detune these 4 voices are detuned resulting in a fatter sound.
Unison 6	This combines 6 voices on one note. If you use the unison detune these 6 voices are detuned resulting in a fatter sound.

Unison Detune Amount

Unison detune amount controls the level of detuning between the stacked voices in Unison 2/3/4/6 play modes. It creates a natural chorus effect.

Stereo Spread

Stereo spread places the unison voices in a stereo image, and in doing so widens the sound and creates a spatial effect.

Port Mode

Portamento mode (the amount of portamento is controlled by the Port control)

None	No portamento.
Constant Rate	The note pitch changes at a constant rate from one note to the next. Greater keyboard note ranges take a longer time.
Constant Time	The note pitch changes between notes always take the same time, regardless of note range.
Held Rate	This mode works the same as constant rate, but only affects overlapping notes (legato style)
Held Time	This mode works the same as constant time, but only affects overlapping notes (legato style)

Port

This control sets the rate or time for the portamento effect.

FX section

Each QUAD Patch incorporates up to two independent high quality effects. The effects are connected in series. Each effect type comes with default parameter settings and can be used straight away upon selection. If you make any changes to the effect controls however, it will remember these. This allows you to experiment with different effect types, while keeping any changes you made intact.

Mix

The Mix control sets the balance between the original synth signal and the effect signal. Turn it fully counter clockwise to hear the original signal only. As you start turning the Mix control clockwise, more and more effect signal will become audible.

Effect Types

Type sets the effect type for the effect units. FX 1 delivers the modulation effects: Chorus, Ensemble, Phaser, Flanger and Widener. FX2 takes care of the delays and reverbs.

Stereo Delay

The stereo delay is made up of two tempo based delays. One delay for each of the audio channels (left and Right). This is useful for making deep pad sounds if you use 1/8* (Left) and 1/4 (right) settings. The Feed Equal option makes it possible to have equal feedback fade time, even if the left and right delay are have other length settings.

Left Delay	Left length of the delay set in tempo based settings
Right Delay	Right length of the delay set in tempo based settings
Feedback	Feedback of the delay
CrossFeed	Feedback between the left / right delay
LP Filter	Low pass filter frequency
HP Filter	High pass filter frequency
Mod Amount	Delay modulation amount
Feed Equal	Equal on makes that both L and R feedback do fade way equal, regardless which length you use.

Reverb

This effect reproduces the sound of acoustics in rooms using different sizes and reflections.

Pre-Delay	Pre-delay amount of the reverb signal
Size	Reverb room size
Damp	Reverb damping amount
LP Filter	Low pass filter frequency
HP Filter	High pass filter frequency
Spread	Stereo spreading amount
Length	Length of reverb
Gate Limit	Noise Gate threshold level
Gate Hold	Hold time for the noise gate
Gate Decay	Decay time for the noise gate

Chorus

The chorus is a modulated delay signal which is useful for thickening up the sound and making it sound fatter.

Length	Length of the chorus
Width	Maximum change or modulation to chorus length
Speed	Speed that the chorus length changes
Spread	Difference in speed between the left and right hand channels
LP Filter	Low pass filter frequency
Widen	Stereo widening amount

Ensemble

This effect uses 6 choruses, each having its own setting, to give the effect of several copies of the sound playing at once.

Length	Length of the ensemble effect
Width	Maximum change to ensemble length
Speed	Speed the ensemble length changes
Sync	Synchronises the ensemble speed with the host DAW tempo
Feedback	Amount the choruses differ from each other
Ensemble	Introduces slight differences between the chorus units
Spread	The amount of panning for each of the chorus units
LP Filter	Low pass filter frequency
HP Filter	High pass filter frequency

Flanger

The flanger effect is based on a very short modulated delay.

Length	Length of the delay (time)
Width	Maximum change to flanger length
Speed	Speed the flanger length changes, this is midi tempo based
Feedback	Feedback of the flanger
Pan Mod	Flanger panning amount
LP Filter	Low pass filter frequency
HP Filter	High pass filter frequency

Phaser

A phaser is a combination of filters that can create a phasing effect

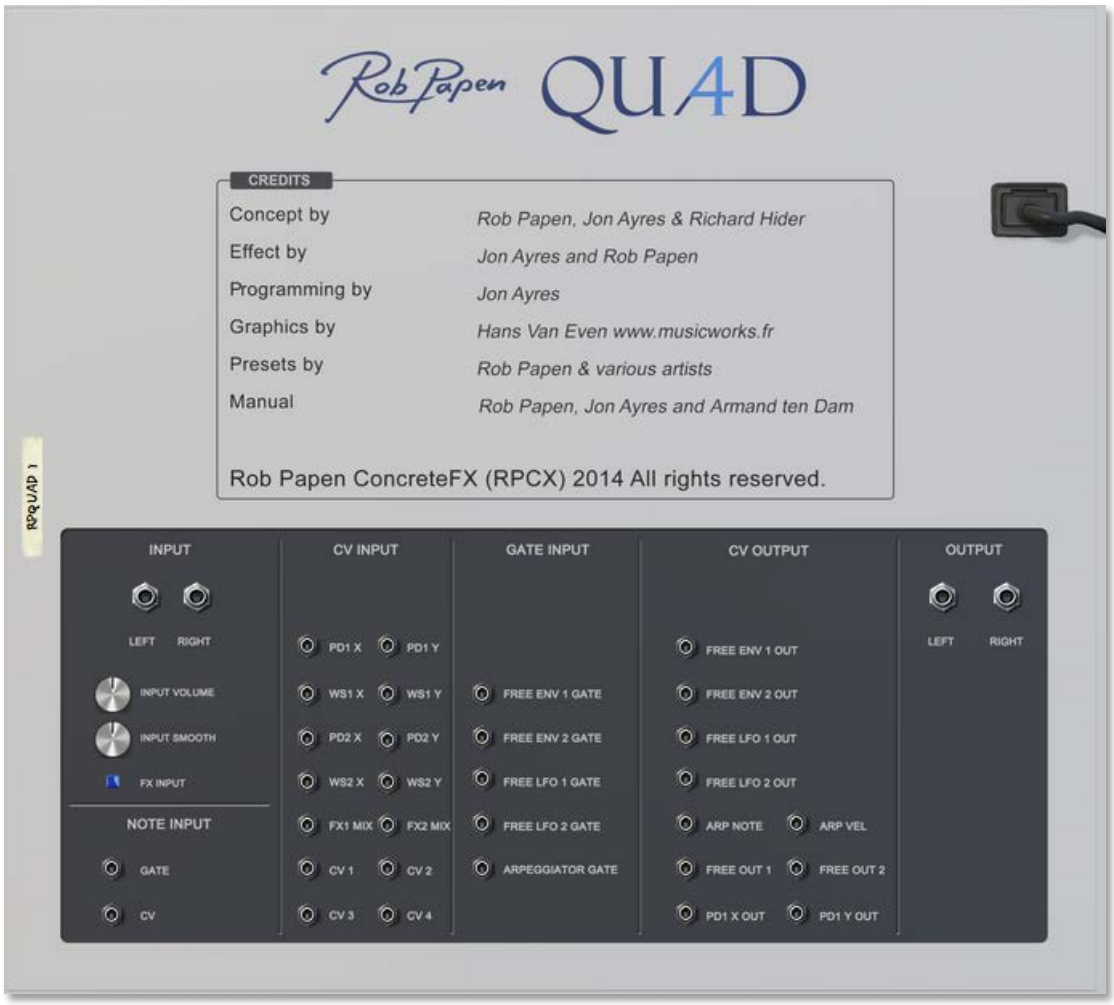
Stages	Number of stages in the phaser
Pitch	Pitch of the phaser
Feedback	Feedback of the phaser
Width	Maximum change to phaser pitch
Speed	Speed the phaser length changes, this is midi tempo based
Spread	Amount the phaser stages are spread from the central pitch
Pan Mode	Speed the phaser pans from the left / right hand channels

Stereo Widener

This widener is a spatial effect that broadens a sound’s soundstage.

Widen	Stereo widening amount
Width	Maximum change to the stereo widening amount
Speed	Speed that the stereo widening amount changes.
LP Filter	Low pass filter frequency.
HP Filter	High pass filter frequency.

Back Panel



A click on the QUAD logo will display the back panel. The back panel contains a large number of connection points to hook-up QUAD as part of your Reason set-up.

Input

The input sockets accept an audio signal to be used as modulation source or to be processed by the effect units.

Note Input

QUAD has Note Gate and CV input pair. This allow QUAD to be controlled by other Reason units, such as the Matrix Pattern Sequencer.

CV Input

There are 14 CV Inputs that can be used to externally control the X and Y positions of all 4 XY Pads, FX1 Mix, FX2 Mix and 4 modulation sources.

Gate Input

The five Gate inputs enable triggering of the modulation LFOs, the modulation Envelopes and the Arpeggiator.

CV Output

The ten CV Outputs present the signals of various QUAD modulation sources to be used to control external Reason modules. The following CVs are available: Envelope 1 and 2, LFO 1 and 2, Arpeggiator Note, Arpeggiator Velocity, Free 1, Free 2, Phase Distortion Out X and Y.

Output

Output is a stereo output that present QUAD’s overall audio signal.

Modulation Sources

Source	Description
None	None
Mod Wheel	Modulation Wheel (Midi CC 1)
Pitch Bend	Pitch Bend
Sustain	Sustain (Midi CC 64)
Expression	Expression (Midi CC 11)
Breath	Breath (Midi CC 2)
Note	Note Midi Value
Velocity	Note Velocity Value
Aftertouch	Key Aftertouch
After/Mod Wheel	Key Aftertouch / Mod Wheel
Random Note 1	Random Note 1 Value
Random Note 2	Random Note 2 Value
Offset	Constant Offset
Random	Random Value
Free Env 1	Free Envelope 1 Value
Free Env 2	Free Envelope 2 Value
Free LFO 1	Free LFO 1 Value
Free LFO 2	Free LFO 2 Value
Filter 1 Env	Filter Envelope 1 Value
Filter 2 Env	Filter Envelope 2 Value
PD 1 X	Phase Distortion 1 X Value
PD 1 Y	Phase Distortion 1 Y Value
PD 1 Dist	Phase Distortion 1 Distance from centre
WS 1 X	Wave Shaper 1 X Value
WS 1 Y	Wave Shaper 1 Y Value
WS 1 Dist	Wave Shaper 1 Distance from centre
PD 2 X	Phase Distortion 2 X Value
PD 2 Y	Phase Distortion 2 Y Value
PD 2 Dist	Phase Distortion 2 Distance from centre
WS 2 X	Wave Shaper 2 X Value
WS 2 Y	Wave Shaper 2 Y Value
WS 2 Dist	Wave Shaper 2 Distance from centre

Arp Vel	Arpeggiator Velocity
Smth	Smoothed Input
Input Left	Left Input
Input Right	Right Input
CV 1	CV Input 1
CV 2	CV Input 2
CV 3	CV Input 3
CV 4	CV Input 4

Modulation Destinations

None	*WS 2 X*	*Amp Envelope Decay*
Pitch	*WS 2 Y*	*Amp Envelope Sustain*
Pitch Fine	*WS 2 Magnitude*	*Amp Envelope Fade*
Port	*WS 2 Phase*	*Amp Envelope Release*
Vol 1	*WS 2 Amount*	*Envelope 1 Speed*
Semi 1	*Filter 1 Volume*	*Envelope 1 Attack*
Fine 1	*Filter 1 Pan*	*Envelope 1 Decay*
Sub 1	*Filter 1 Frequency*	*Envelope 1 Sustain*
Phase 1	*Filter 1 Q*	*Envelope 1 Fade*
Pan 1	*Filter 1 Vowel*	*Envelope 1 Release*
PD 1 X	*Filter 1 Envelope*	*Envelope 2 Speed*
PD 1 Y	*Filter 1 Envelope Speed*	*Envelope 2 Attack*
PD 1 Magnitude	*Filter 1 Attack*	*Envelope 2 Decay*
PD 1 Phase	*Filter 1 Decay*	*Envelope 2 Sustain*
PD 1 Amount	*Filter 1 Sustain*	*Envelope 2 Fade*
WS 1 X	*Filter 1 Fade*	*Envelope 2 Release*
WS 1 Y	*Filter 1 Release*	*LFO 1 Speed*
WS 1 Magnitude	*Filter 2 Volume*	*LFO 1 Phase*
WS 1 Phase	*Filter 2 Pan*	*LFO 1 Shape*
WS 1 Amount	*Filter 2 Frequency*	*LFO 1 Delay*
Vol 2	*Filter 2 Q*	*LFO 2 Speed*
Semi 2	*Filter 2 Vowel*	*LFO 2 Phase*
Fine 2	*Filter 2 Envelope*	*LFO 2 Shape*
Sub 2	*Filter 2 Envelope Speed*	*LFO 2 Delay*
FM Amount 1	*Filter 2 Attack*	*Mod 1 Amount*
FM Amount 2	*Filter 2 Decay*	*Mod 2 Amount*
Phase 2	*Filter 2 Sustain*	*Mod 3 Amount*
Pan 2	*Filter 2 Fade*	*Mod 4 Amount*
PD 2 X	*Filter 2 Release*	*Mod 5 Amount*
PD 2 Y	*Volume*	*Mod 6 Amount*
PD 2 Magnitude	*Panning*	*Mod 7 Amount*
PD 2 Phase	*Amp Envelope Speed*	*Mod 8 Amount*
PD 2 Amount	*Amp Envelope Attack*	*FX Mod Mix*

FX Mod Pan	*FX Mod Parameter 7*	*Delay FX Parameter 4*
FX Mod Parameter 1	*FX Mod Parameter 8*	*Delay FX Parameter 5*
FX Mod Parameter 2	*Delay FX Mix*	*Delay FX Parameter 6*
FX Mod Parameter 3	*Delay FX Pan*	*Delay FX Parameter 7*
FX Mod Parameter 4	*Delay FX Parameter 1*	*Delay FX Parameter 8*
FX Mod Parameter 5	*Delay FX Parameter 2*	*Free Out Value 1*
FX Mod Parameter 6	*Delay FX Parameter 3*	*Free Out Value 2*

CC Remote Names

CC #	**Value**
4	Pitch Bend Up
5	Pitch Bend Down
7	Main Volume
8	Velocity > Volume
10	Velocity Shape
12	Volume Envelope Attack
13	Volume Envelope Decay
14	Volume Envelope Sustain
15	Volume Envelope Fade
16	Volume Envelope Release
17	Osc 1 On
18	Osc 1 Type
19	Osc 1 Output
20	Osc 1 Volume
21	Osc 1 Octave
22	Osc 1 Semi
23	Osc 1 Fine
24	Osc 1 Sub-Osc Volume
25	Osc 1 Drift
26	Osc 1 Twin
27	PD 1 Amount
28	PD 1 X
29	PD 1 Y
30	WS 1 Amount
31	WS 1 X
33	WS 1 Y
34	Osc 2 On
35	Osc 2 Type
36	Osc 2 Volume
37	Osc 2 Octave
39	Osc 2 Semi
40	Osc 2 Fine

41	Osc 2 Sub-Osc Volume
42	Osc 2 Drift
43	Osc 2 Mod Amount 1
44	Osc 2 Mod Amount 2
45	Osc 2 Twin
46	PD 2 Amount
47	PD 2 X
48	PD 2 Y
49	WS 2 Amount
50	WS 2 X
51	WS 2 Y
52	Filter 1 Frequency
53	Filter 1 Resonance
54	Filter 1 Vowel
55	Filter 1 Volume
56	Filter 1 Pan
57	Mod > Filter 1 Frequency Amount
58	Filter 1 Keytracking
59	Velocity > Filter 1 Frequency Amount
60	Filter 1 Envelope Amount
61	Filter 1 Envelope Attack
62	Filter 1 Envelope Decay
63	Filter 1 Envelope Sustain
65	Filter 1 Envelope Fade
66	Filter 1 Envelope Release
67	Filter 2 Frequency
68	Filter 2 Resonance
69	Filter 2 Vowel
71	Filter 2 Volume
72	Filter 2 Pan
73	Mod > Filter 2 Frequency Amount
74	Filter 2 Keytracking
75	Velocity > Filter 2 Frequency Amount
76	Filter 2 Envelope Amount
77	Filter 2 Envelope Attack

78	Filter 2 Envelope Decay
79	Filter 2 Envelope Sustain
80	Filter 2 Envelope Fade
81	Filter 2 Envelope Release
82	Port Speed
83	Unison Amount
84	Unison Spread
85	Arp Speed
86	Arp Steps
87	Arp Note Length
88	Arp Swing
89	Arp Latch
90	Free Envelope 1 Attack in MS
91	Free Envelope 1 Decay in MS
92	Free Envelope 1 Sustain MS
93	Free Envelope 1 Fade in MS
94	Free Envelope 1 Release in MS
95	Free Envelope 1 Attack in QB
102	Free Envelope 1 Decay in QB
103	Free Envelope 1 Sustain QB
104	Free Envelope 1 Fade in QB
105	Free Envelope 1 Release in QB
106	Key > Free Envelope 1 Speed
107	Vel > Free Envelope 1
108	Free Envelope 2 Attack in MS
109	Free Envelope 2 Decay in MS
110	Free Envelope 2 Sustain MS
111	Free Envelope 2 Fade in MS
112	Free Envelope 2 Release in MS
113	Free Envelope 2 Attack in QB
114	Free Envelope 2 Decay in QB
115	Free Envelope 2 Sustain QB
116	Free Envelope 2 Fade in QB
117	Free Envelope 2 Release in QB
118	Key > Free Envelope 2 Speed

119	Vel > Free Envelope 2
128	Free LFO 1 Speed in HZ
129	Free LFO 1 Speed in QB
130	Free LFO 1 Sync
131	Free LFO 2 Speed in HZ
132	Free LFO 2 Speed in QB
133	Free LFO 2 Sync
134	Mod 1 Amount
135	Mod 2 Amount
136	Mod 3 Amount
137	Mod 4 Amount
138	Mod 5 Amount
139	Mod 6 Amount
140	Mod 7 Amount
141	Mod 8 Amount
142	Mod FX On / Off
143	FilterNo
144	Mod FX Mix
145	Mod FX None 1
146	Mod FX None 2
147	Mod FX None 3
148	Mod FX None 4
149	Mod FX None 5
150	Mod FX None 6
151	Mod FX None 7
152	Mod FX None 8
153	Chorus Length
154	Chorus Width
155	Chorus Speed
156	Chorus Spread
157	Chorus Lowpass Filter
158	Chorus Widen
159	Chorus Highpass Filter
160	Ensemble Length
161	Ensemble Width

162	Ensemble Speed
163	Ensemble Feedback
164	Ensemble Amount
165	Ensemble Spread
166	Ensemble Lowpass Filter
167	Ensemble Highpass Filter
168	Flanger Length
169	Flanger Width
170	Flanger Speed
171	Flanger Feedback
172	Flanger Pan Modulation
173	Flanger Lowpass Filter
174	Flanger Highpass Filter
175	Phaser Stages
176	Phaser Pitch
177	Phaser Feedback
178	Phaser Width
179	Phaser Speed
180	Phaser Spread
181	Phaser Pan Modulation
182	Phaser Q
183	Widener Amount
184	Widener Width
185	Widener Speed
186	Widener Lowpass Filter
187	Widener Highpass Filter
188	Delay FX On / Off
189	Main Panning
190	Delay FX Mix
191	Delay FX None 1
192	Delay FX None 2
193	Delay FX None 3
194	Delay FX None 4
195	Delay FX None 5
196	Delay FX None 6

197	Delay FX None 7
198	Delay FX None 8
199	Stereo Delay Left Length
200	Stereo Delay Right Length
201	Stereo Delay Feedback
202	Stereo Delay Crossfeed
203	Stereo Delay Lowpass Filter
204	Stereo Delay Highpass Filter
205	Stereo Delay Mod Amount
206	Stereo Delay Equal Feed
207	Reverb Pre-delay
208	Reverb Size
209	Reverb Damping
210	Reverb Lowpass Filter
211	Reverb Highpass Filter
212	Reverb Spread
213	Reverb Length
214	Osc 1 Free Running
215	Osc 1 Tracking
216	PD 1 Type
217	WS 1 Type
218	Osc 2 Free Running
219	Osc 2 Tracking
220	Osc 2 Sync Mode
221	Osc 2 Mod Mode
222	PD 2 Type
223	WS 2 Type
224	Filter 1 Type
225	Filter 2 Type
226	Play Mode
227	Port Mode
228	Unison Mode
229	Free Envelope 1 Sync
230	Free Envelope 2 Sync
231	Free LFO 1 Wave

232	Free LFO 1 Mode
233	Free LFO 2 Wave
234	Free LFO 2 Mode
235	Arp Mode
236	Arp Octaves
237	Mod FX Type
238	Delay FX Type
239	Arp Vel / Key