



# **EUCLID** RHYTHM GENERATOR

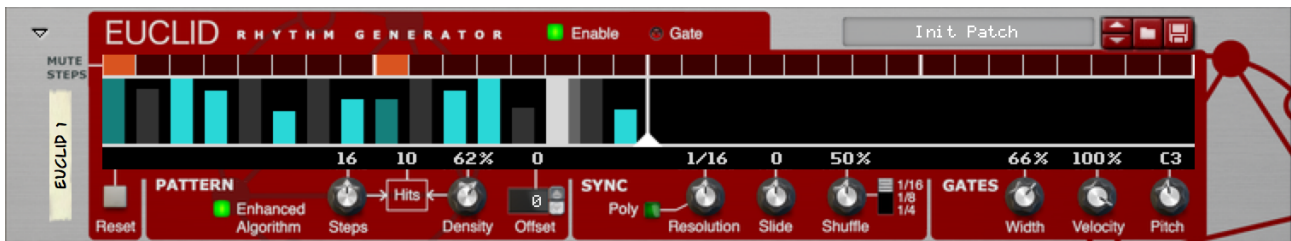
## **User Guide**

Version 1.2.0

# Contents

<b>Introduction.....</b>	<b>3</b>
<b>Getting Started.....</b>	<b>4</b>
Loading a Combinator Patch.....	4
<b>The Front Panel.....</b>	<b>5</b>
The Display.....	5
Pattern.....	6
Sync.....	6
Gates.....	8
Reset.....	8
Enable.....	8
Gate LED.....	9
Folding the Front Panel.....	9
<b>Connections.....</b>	<b>10</b>
Outputs.....	10
Modulation Inputs.....	11
Control.....	11
<b>Controlling Euclid's Pitch via MIDI.....</b>	<b>13</b>
Using a Combinator.....	13
Using a Sequencer Track.....	13
<b>Automating Euclid.....</b>	<b>13</b>
<b>Advanced Patching Tips.....</b>	<b>14</b>
Syncing Euclid to Reason's Pattern Devices.....	14
Merging Several Euclid Patterns.....	16
Using Euclid as a regular step sequencer.....	17
<b>MIDI Implementation Chart.....</b>	<b>18</b>
<b>Remote Implementation Chart.....</b>	<b>19</b>

# Introduction



Euclid Rhythm Generator is an algorithmic gate sequencer for Reason. It means that instead of explicitly programming your rhythm patterns, you just set a couple of parameters and a rhythm pattern is generated for you. By changing the parameters in real-time using automation or CV, you can get almost endless variations for your rhythm tracks!

Euclid also offers plenty of manual control if you want — You can for instance mute individual steps and draw their velocities. It has its own sync engine with support for true polyrhythms and shuffle at various resolutions. You can also override the internal sync and clock it from other devices if you want.

Euclid offers full automation support, so any changes you perform on the front panel — Including individual mutes and velocities — Can be recorded in Reason's sequencer.

You will typically use Euclid to control drum devices such as Kong and Redrum, but you can also easily control synths and samplers since Euclid also outputs Pitch CV.

# Getting Started

Creating your first rhythm pattern with Euclid is really easy!

1. Start off by creating an instance each of Kong (or Redrum if you have Reason Essentials) and Euclid, and connect Euclid's Gate output to one of Kong's inputs:

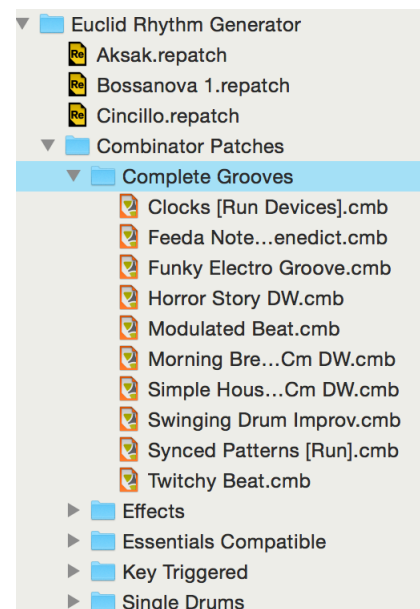


2. Press the play button in Reason's transport bar and you should already hear a rhythm. (If not, make sure you have loaded a sound into the Kong pad.)
3. Try moving the controls in the Pattern section on the front panel, especially Density. See and hear how the pattern changes.
4. Try routing one of Euclid's other outputs, for example the Inverse Gate, to another drum pad. You can also create more instances of Euclid and start tweaking them in parallel.

## Loading a Combinator Patch

The included Combinator patches can be a great inspiration if you want to move on to some more advanced Euclid patching. To open a Combinator patch, do the following:

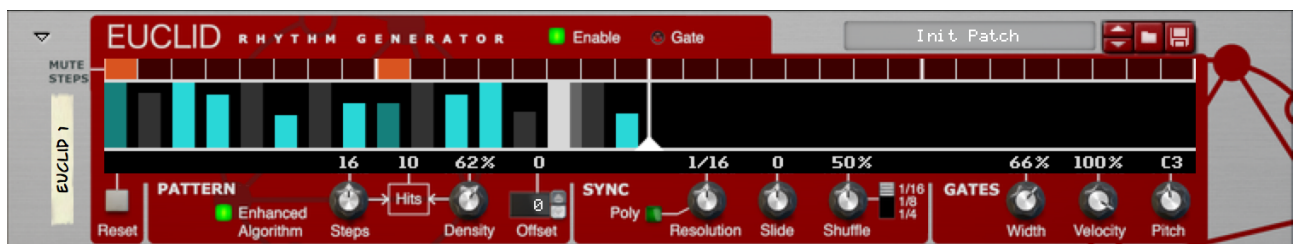
1. In Reason's browser, select the folder called **Rack Extensions**, and look for the subfolder called **Euclid Rhythm Generator**.
2. Under **Combinator Patches** you will find all the combinators that are included with Euclid.
3. The **Complete Grooves** folder contains the most complete examples, but feel free to explore the other folders as well!
4. Double-click on the patch you want, or drag it into the rack.



That's all you need to get started with Euclid! But there's a lot more you can do, of course. Read on and we'll start going through all the front panel controls.

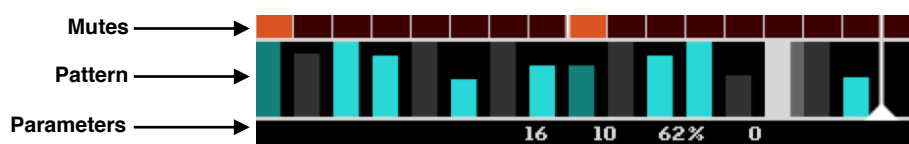


# The Front Panel



## The Display

Euclid comes with an advanced interactive display that gives you a great view of what's going on with Euclid at all times. The display is divided into three areas:

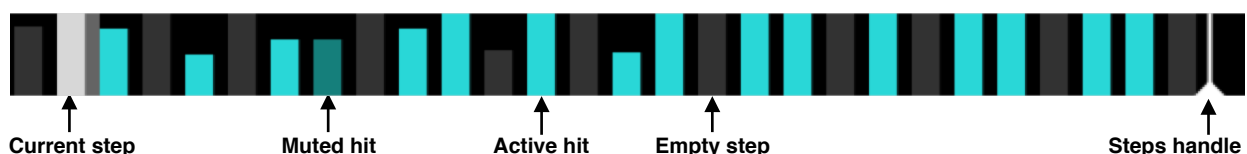


### Mutes:

Consists of a row of red Mute buttons that can be used to force the corresponding steps in the pattern to be silent. This comes in handy if you want to leave certain steps free for other elements in your song, for example. If you click and drag across several mute buttons, you can enable/disable them all in a single gesture.

The Mutes area also functions as a reference grid, where the thicker vertical lines will be placed according to the current Resolution value.

### Pattern:



Each active hit in the pattern is represented by a bright cyan bar. The width and height of each bar represents the gate width and velocity of each hit. Muted hits appear in a darker color. The “shadow bars” behind and between the hits represent the “potential velocity” of each step. You can change this by clicking in and dragging directly in the display. The Velocity knob scales the velocity of all the hits in relation to the potential velocity.

You can modify the length of the pattern by clicking and dragging the Steps Handle to the left or right. If you align the Steps marker with the guides (bolder grid lines) in the Mutes area, the length of the pattern will line up evenly with bars in the song.

**The Parameter area** in the lower part of the display shows you all the current parameter values, taking CV modulation into account. This means that you will always see the actual parameter values being used by Euclid. This area will also indicate if Euclid is being reset (either manually or through CV) or if an External Clock is being used.

## Pattern

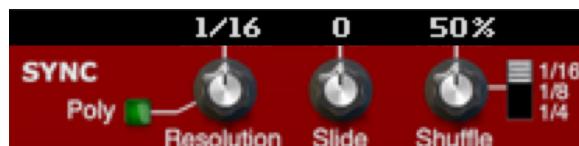
Here is where you set the parameters that Euclid uses to generate a rhythmical pattern. Any changes to these parameters will result in the pattern being recalculated on the fly, without losing synchronization with the song.



<b>Enhanced Algorithm</b>	Enables the enhanced (compared to Euclid 1.0.0) implementation of Euclid's algorithm. The enhanced algorithm generates patterns that are equivalent to those of the original algorithm, but rotated in ways that makes the pattern grow in a more "natural" way as Density is increased.
<b>Steps</b>	Decides how long the pattern will be. The range is 0 to 32 steps. At 0 steps, Euclid will not output anything. Turning the Steps knob is exactly the same as dragging the Steps handle in the interactive display.  💡 <i>Whenever the Steps parameter is changed, Euclid will recalculate its position in relation to the beginning of the song. So if you temporarily change it during playback and change it back again, the timing of the original pattern will be maintained.</i>
<b>Density</b>	Decides the density of hits, in percent of the available steps. 0% means that no steps will be hits, and 100% means that all steps will be hits.
<b>Hits</b>	Displays the actual number of hits that are being distributed by the algorithm.
<b>Offset</b>	Rotates the pattern to the left or right. The range is -16 to 16 steps. If the offset amount exceeds the number of steps, the pattern will "wrap around itself".  💡 <i>Both versions of the algorithm are implemented in such a way that if there is at least one hit, you're guaranteed to get a hit on the first step of your pattern. This changes when Offset is applied, so if Offset is set to +4, there will always be a hit on the 5th step of the pattern, and so on.</i>

## Sync

The Sync parameters control the speed and groove of the pattern in relation to the song.

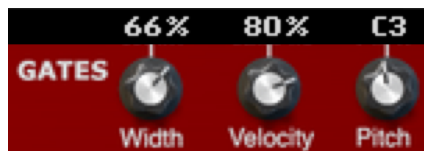


⚠️ *If you have a cable connected to the Clock Input, the Sync section will be disabled altogether, and its parameter values will be dimmed in the display.*

<b>Poly</b>	Enables Polyrhythmic Mode, which gives you access to a wider range of resolutions on the Resolution knob (see below).
<b>Resolution</b>	<p>Determines the speed of the pattern in relation to the song clock. Possible values in the regular mode are 1/2, 1/4, 1/8, 1/8T, 1/16, 1/16T, 1/32, 1/64 and 1/128. In Polyrhythmic Mode you also get access to every division between 1/1 and 1/16.</p> <p>💡 <i>Whenever the Resolution changes, Euclid will recalculate its position in relation to the song. This means that you can temporarily “glitch out” your pattern by dramatically increasing the resolution, and when you turn it back to the original resolution, the timing of the original pattern will be maintained.</i></p>
<b>Slide</b>	<p>Allows you to smoothly slide the entire pattern forwards or backwards in time. The range is +/-120 ticks, which means +/- one 32nd note. Negative slide will give the pattern a more hurried feel in relation to the song, while positive slide will give the pattern a more relaxed feel in relation to the song. When slide is 0, the pattern will be exactly on the beats of the song. The knob will snap to this value.</p> <p>💡 <i>This parameter corresponds exactly to the Slide parameter found in Reason’s own ReGroove mixer.</i></p> <p>💡 <i>Slide also comes in handy when you’re controlling external MIDI instruments live, since you can use small negative slide values for latency compensation.</i></p>
<b>Shuffle</b>	The Shuffle parameter will move some of the notes in the pattern forwards or backwards in time, giving it more of a swing feel. The range of the knob is 25% to 75%. At 50%, no shuffle is applied. The knob will snap to this value.
<b>Shuffle Mode</b>	<p>The Shuffle Mode switch located just to the right of the Shuffle knob determines the resolution and maximum effect of Shuffle. When Shuffle Mode is 1/16, Shuffle will affect every other 16th note in your pattern and move them up to a 32nd note in each direction. At 1/8, Shuffle will affect every other 8th note and move them up to a 16th note in each direction, and so on.</p> <p>💡 <i>When Shuffle Mode is 1/16, Euclid’s Shuffle parameter corresponds exactly to the Shuffle parameters (individual and global) found in Reason’s own ReGroove mixer. For example, if you set Euclid’s Shuffle value to the same value as Global Shuffle in the ReGroove mixer, Euclid will shuffle perfectly together with Redrum, Matrix and RPG-8.</i></p> <p>⚠️ <i>When Shuffle Mode is 1/16 and Resolution is 1/8 or lower, the Shuffle parameter will have no effect. (This is the exact same behavior that Reason’s own shuffle functionality exhibits.) If you want shuffle at lower resolutions, choose a lower Shuffle Mode setting.</i></p>

## Gates

The gate parameters control the width (duration), velocity and pitch of the gates. Modulating or automating the width and velocity will typically breathe more life into your patterns. They can also come in handy if you want to use Euclid to control external analog equipment that may be sensitive to levels and durations when detecting triggers.



Width	<p>Sets the duration of the gates, in percent of the step length. At 0%, extremely short triggers are generated. At 100%, adjacent hits will be tied together (legato).</p> <p>⚠ <i>If you have a cable connected to the Clock input, the Width parameter will be ignored. Instead, the gate widths will be determined by the width of the incoming clock pulses.</i></p>
Velocity	<p>Sets the overall velocity of the gates, in percent of their potential velocities (that are drawn in the display). 0% corresponds to a MIDI velocity value of 0, which means that no gates will be played.</p> <p>💡 <b>Patch Tip:</b> <i>Modulate Velocity with a curve pattern from Matrix with a different pattern length to get accents that shift over time.</i></p>
Pitch	<p>Sets the note value to be sent out through Euclid's Pitch CV output. If the pitch is controlled from a sequencer track, the incoming MIDI note value will be shown in the display.</p>

## Reset



Pushing this button will immediately force Euclid's playhead to return to the beginning of the pattern. The exact timing of the reset is quantized to the selected resolution to make sure you don't lose the beat when using it in a live situation. The button can of course be automated and remote controlled.

## Enable



The Enable button controls all the gate outputs from Euclid. When disabled, no gates will be sent out from any of the gate outputs. The main purpose of this button is to automate it in order to turn patterns on and off in your arrangements.

- ⚠ *The state of the Enable button is not stored as part of device patches for Euclid, but it is remembered in songs and Combinator patches.*

💡 *The pattern display will be dimmed while the outputs are disabled, but it will still be fully functional, so you can edit your pattern even when it's not being sent out.*

## Gate LED



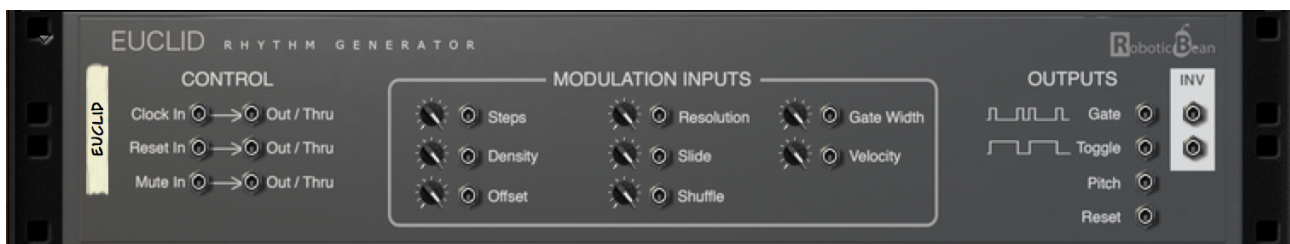
The Gate LED lights up whenever the main Gate output is active.

## Folding the Front Panel

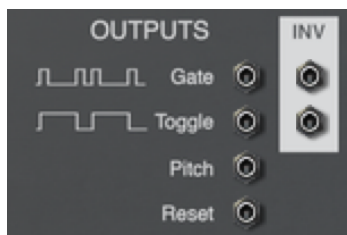
When you fold the front panel you still have access to the Patch browser, Enable button and Gate LED. This makes it easy to see what's going on when you're running several Euclid instances in parallel.



# Connections



## Outputs



Euclid has four gate outputs that will each produce a unique variation of the current pattern. There are also outputs for Pitch and Reset.

<b>Gate</b>	This is Euclid's main output, which will play back the pattern exactly as you see it in the display.
<b>Inverse Gate</b> (To the right of Gate)	<p>This is the opposite of the Gate output, so it will send a gate for every rest you see in the display. This also includes muted notes. This output is very useful for complementing the Gate output, for instance to trigger two different hihat samples.</p> <p>💡 <b>Patch Tip:</b> If you use this output with Density set to 100% you can program Euclid as an ordinary step sequencer using the mute buttons. See the advanced patching tips section for details.</p>
<b>Toggle</b>	Switches between "high" (the velocity value) and "low" (0) whenever a hit is played on the Gate output. This means that you can get gates of varying lengths on this output.
<b>Inverse Toggle</b> (To the right of Toggle)	Is always high when Toggle is low and vice versa. Perfect for complementing the Toggle output.
<b>Pitch</b>	Outputs the current Pitch value, either set by the Pitch knob or by incoming MIDI notes. In order to send MIDI notes you should create a track for Euclid, or put it in a Combinator and set it up to receive notes.
<b>Reset</b>	This output will send a gate whenever Euclid goes back to its first step, either when the pattern starts over naturally, or when Euclid has been reset using the Manual Reset button or Reset CV input. This output is mostly useful for forcing other Euclid instances to reset at the same time, but it can also be used for triggering sounds.

## Modulation Inputs



There is a CV modulation input for almost every control on the front panel. All modulation inputs have corresponding trim knobs that attenuate the incoming CV signal. The trimmed CV value is then added to the value set on the front panel.

## Control



There are three control CV inputs that can be used to control various aspects of Euclid's playback via CV. Each one has a corresponding Out/Thru output that has two different modes:

- If something is connected to the corresponding input, Out/Thru is in **Thru Mode**, sending out an exact copy of the input signal. This makes it easy to chain several devices together.
- If the input is disconnected, Out/Thru is in **Out Mode**, generating appropriate signals to send to other devices.

### Clock:

When a cable is connected to the Clock input, Euclid's own Sync section will be disabled until the cable is disconnected again. If the value on the Clock input goes from 0 to a positive value, Euclid will advance its playhead one step and hold the gate until the input goes down to (or below) 0 again. You can basically clock Euclid with any kind of CV signal, including a continuous LFO, provided that the value crosses 0 occasionally.

You will usually want to connect it to a gate output on a pattern device such as a Redrum or a Matrix, or the output of another Euclid, but feel free to experiment!

Clock Out/Thru (in Out Mode) will generate clock pulses that are affected by the settings in the Sync sections and the Gate Width knob. Pattern settings, velocities and mutes are ignored. The amplitude of the clock pulses are 1V.

### Reset:

Whenever the incoming signal on the Reset input rises above 0, Euclid will return to the first step. It's exactly the same thing as if the Manual Reset button on the front panel would have been pushed. You would normally connect it to a Reset output on another Euclid, but you can really plug anything into it, just like the Clock input.

Reset Out/Thru (in Out Mode) behaves exactly like the Reset output in the Output section.

💡 **Patch Tip:** You can use the Clock and Reset inputs together in order to sync Euclid perfectly to Reason's native pattern devices, even when the main sequencer is not running! See the Advanced Patch Tips section for details.

## Mute:

While the value on the Mute input is above 0, a special “mute override mode” is enabled. Steps that are triggered during this time will be treated exactly as if they were muted. This means that the Gate output will be silent and the Inverse Gate output will be active.

The display will indicate this by lighting up the current step's Mute button with a slightly darker color than the manually assigned mutes:



The Mute input is something that looks really simple on the surface, but it opens up a lot of possibilities!

💡 **Patch Tip:** By connecting the Gate output from another Euclid to the Mute input (and then connecting the Mute Thru output to the original destination) you can make sure that two Euclid's never play at the same time.

💡 **Patch Tip:** By connecting the **Inverse Gate** output from another Euclid to the Mute input, you can make sure that the second Euclid **only** plays together with the first.

💡 **Patch Tip:** You can make your Euclid pattern “duck” a drum sound on a Kong by connecting the Kong pad's Gate output to Euclid's Mute input. You can also merge several gates using a CV Spider before connecting them to Euclid.

Mute Out/Thru (in Out Mode) will generate a positive signal (1V) whenever a muted step is played. You can use this output to synchronize mutes with another instance of Euclid by connecting it to its Mute input.

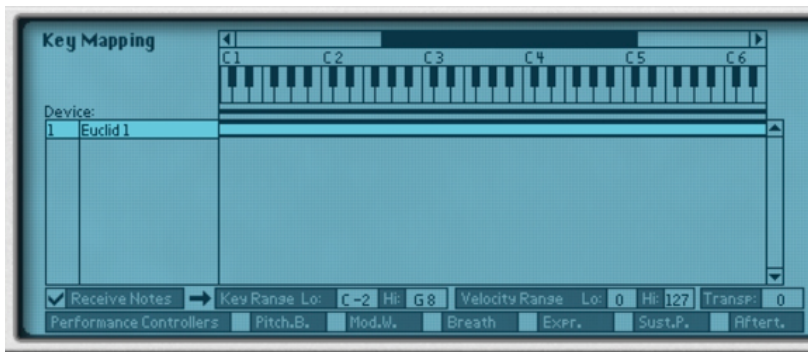


# Controlling Euclid's Pitch via MIDI

There are two ways to send MIDI notes to Euclid: Using a Combinator or a sequencer track.

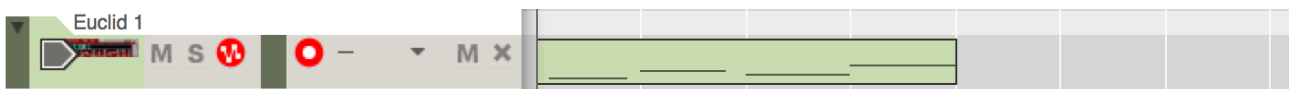
## Using a Combinator

If you have Euclid inside a Combinator, make it receive MIDI notes by opening the Combinator's programmer, selecting the Euclid instance in the list, and checking the "Receive Notes" box in the lower left.



## Using a Sequencer Track

To create a sequencer track for Euclid, right click on Euclid and select "Create Track for Euclid". A new sequencer track will appear, and it will already have a note lane ready to receive MIDI.



## Automating Euclid

Everything in Euclid can be automated, including individual mute and velocity settings. This lets you add even more variation to your rhythm tracks.

To automate one of the knobs or switches on the front panel, just click on it while holding down the **Alt** key.

In order to automate display-only controls such as the mute buttons, you have to create a sequencer track for Euclid first as described in the previous section. When the track has been created, all you have to do is start recording on the main sequencer and start moving the controls.

You can also create automation lanes manually using the automation drop-down menu in the sequencer window.

**!** If you automate per-step parameters such as individual mutes and velocities, a large number of automation tracks may be created. It's recommended to fold Euclid's sequencer track (by clicking on the small arrow to the left) to avoid cluttering up the sequencer window.

# Advanced Patching Tips

Once you're more comfortable with Euclid you can move on to some more advanced patching techniques!

## Syncing Euclid to Reason's Pattern Devices

All the built-in pattern devices in Reason such as Matrix, Redrum and RPG-8 can run "standalone", without Reason's sequencer running, and they will still play in perfect sync with each other. Well, now Euclid can join the party as well! Thanks to the Clock and Reset inputs we can use one of the other pattern devices as a clock source for Euclid. Redrum is best suited for this purpose.

Start off by creating a Redrum. Make sure that it's in an initialized state (you can right-click it and choose Reset Device), since we don't want it to make any sounds.

We're going to need two patterns: One for clocking Euclid, and one for resetting it. Let's use channel 1 for Clock and channel 2 for Reset. Connect Redrum's gate outputs to Euclid like this:



The next step is to program the patterns in Redrum. On Channel 1, enable all the steps by dragging across all the buttons:



And on Channel 2, just enable the first step:

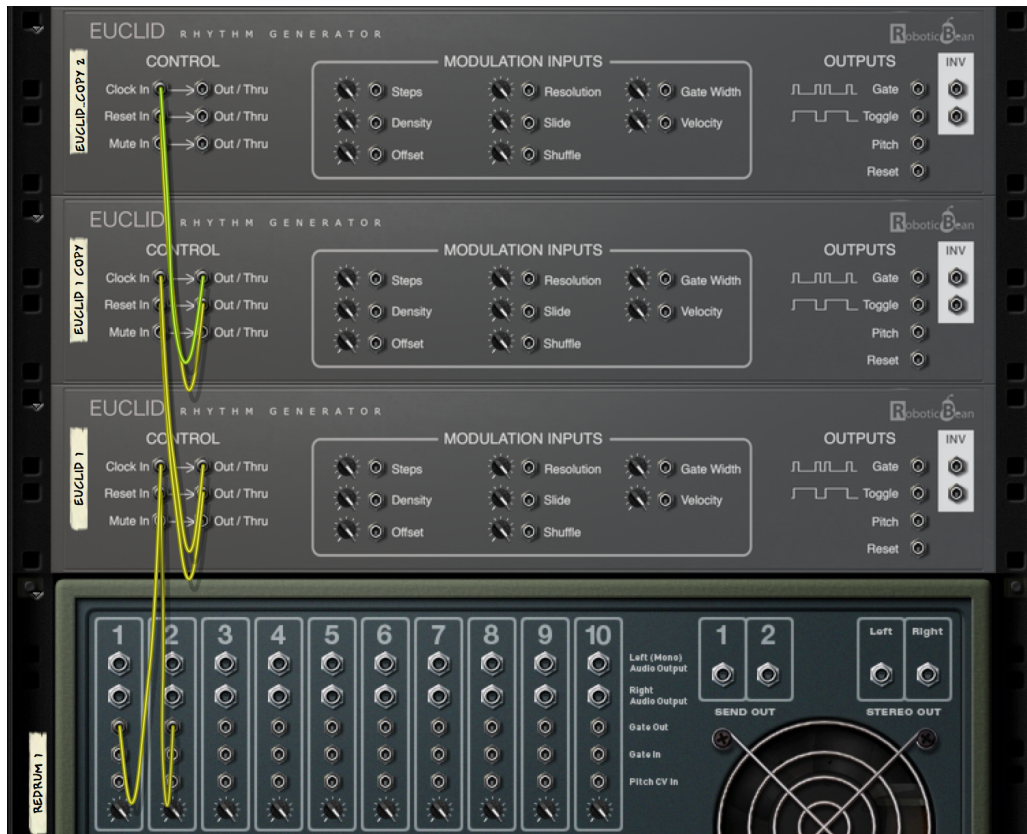


Make sure that the Steps parameters on both devices are set to the same value, for example 16:



Now you just have to hit Run on Redrum, and Euclid will play along without the main sequencer running! You can start other pattern devices, and they will sync up perfectly as well.

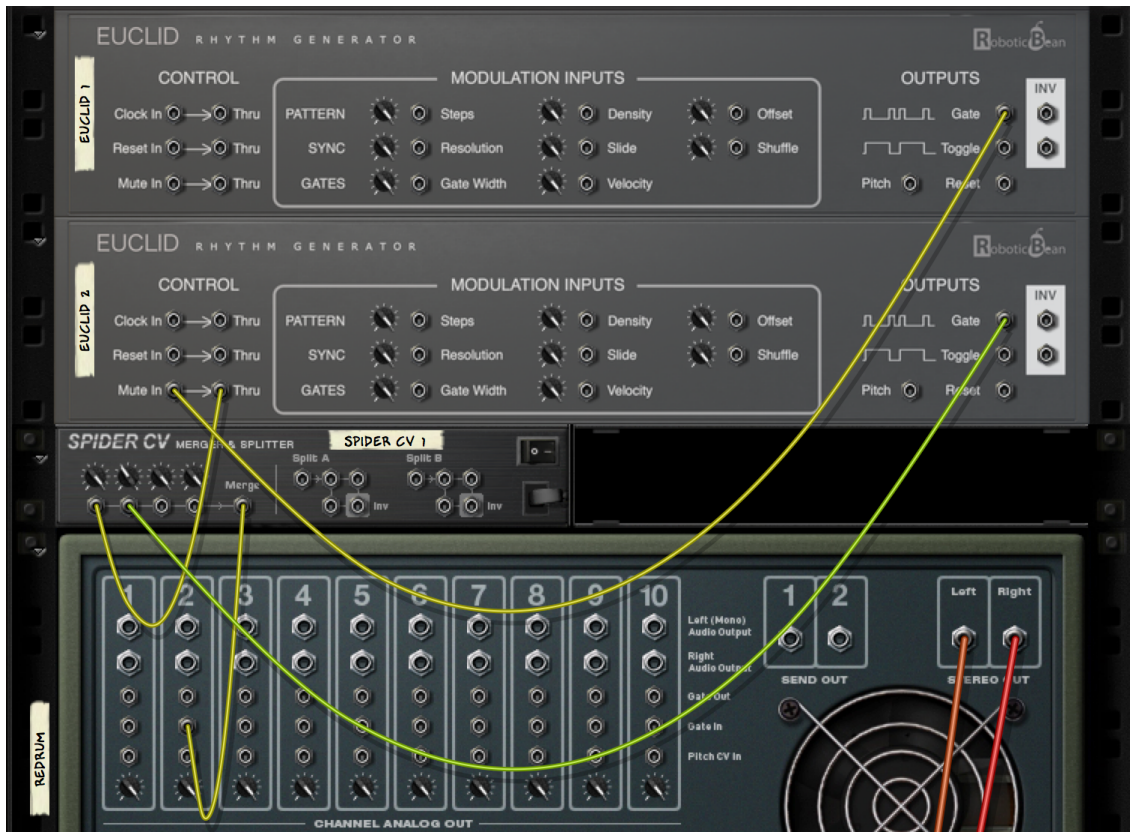
If you have more Euclids you want to sync, you can create a chain using the Thru outputs to have all of them sharing the same clock and reset signal:



The Clock input opens up tons of new possibilities, so experiment!

## Merging Several Euclid Patterns

You can have several Euclid patterns triggering the same sound by using a simple device such as Spider CV Merger. Note how we're using the trim knobs on the Spider to get different velocities for the different patterns. In this example we're also using the Mute input on one of the Euclids to ensure that the patterns overlap.



Now, if you give the two Euclid patterns different lengths, you will have accentual patterns that may not repeat themselves for a long time.



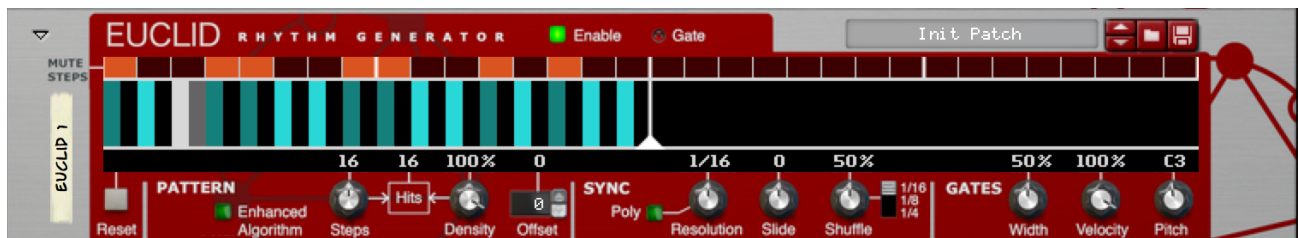
## Using Euclid as a regular step sequencer

Here's a way you can manually program patterns on Euclid:

1. Set Steps to the number of steps you want to program
2. Set Density to 100%
3. Connect the **Inverse** Gate output to your sound source



Now you can program a rhythm manually using the mute buttons on Euclid. Since you're using the inverse output, all the rests (darker bars) will become gates.



If you modulate Density with a negative CV value, Euclid will occasionally fill in some of the gaps in the pattern, for slight variations in your rhythms.

# MIDI Implementation Chart

MIDI CC#	Parameter
12	Resolution
13	Steps
14	Density
15	Offset
16	Gate Width
17	Velocity
18	Reset
19	Enable
20	Slide
21	Shuffle
22	Polyrhythmic Resolution
23	Polyrhythmic Mode
24	Shuffle Mode
25	Algorithm
26	Pitch
66 – 95	Velocity 01 – Velocity 30
102, 103	Velocity 31, Velocity 32
176 – 207	Mute 01 – Mute 32

# Remote Implementation Chart

The following are Remotable objects in Euclid:

Manual Reset	Shuffle
Algorithm	Shuffle Mode
Steps	Gate Width
Density	Velocity
Offset	Pitch
Polyrhythmic Mode	Enable Outputs
Resolution	
Polyrhythmic Resolution	Mute 01 — Mute 32
Slide	Velocity 01 — Velocity 32

## Read-only objects:

Current Step  
Gate Lamp  
Step 01 — Step 32

You can download the full Remote map template from Euclid's product page at

<http://roboticbean.com/creative/products/euclid/>