Push: Euclidean Mode

User Manual – Version 1.0

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1.1 Device Overview

Push Euclidean Mode is a Max for Live device designed for rhythmic sequencing using Euclidean algorithms, fully integrated with Ableton Push 1, 2, and 3. It allows users to generate complex, polyrhymetric sequences across 16 tracks, each with customisable steps, hits, rotation, velocity, pitch, and more — all controllable from the Push hardware.

Push Euclidean Mode implements the original Euclidean algorithm as described in "<u>The Euclidean</u> <u>Algorithm Generates Traditional Musical Rhythms</u>" by Toussaint (2005). This method distributes hits as evenly as mathematically possible using a recursive algorithm.

Whether you're using it for generative rhythms, live performance, or precise studio sequencing, Push Euclidean Mode gives you deep creative control while keeping your workflow intuitive and tactile.

1.2 System Requirements

- Ableton Live 12.
- Max for Live (included with Live Suite).
- Ableton Push 1, 2, or 3.

1.3 Installation

- 1. Double-click the installation file or drag it directly onto an open instance of Ableton Live.
- 2. A dialogue box will appear with a notice and ask if you'd like to continue.
- 3. Click Yes.
- 4. The device will now be installed under: Packs > Push Euclidean Mode (Legacy).
- 5. Drag the device onto a MIDI track in Live to begin using it.

2.1 Device Structure

Each of the 16 tracks has six independent parameters:

- Steps: 1-32 step count.
- Hits: Number of active steps (1-32).
- Rotate: Shift the pattern forward by n steps.
- Note (Pitch): MIDI note number (e.g. 36 = C1).
- Velocity: Maximum velocity (1–127).
- Velocity Preset: Select from a range of looped velocity shapes.
- Run: Enable or disable the track.

2.2 Euclidean Sequencing Logic

The Euclidean algorithm distributes hits across steps as evenly as possible. For example:

- 4 hits in 8 steps = X . X . X . X .

Rotation then shifts the pattern forward by n steps.

You can manually override the generated pattern via Push and still apply rotation.

Push Integration

- 3.1 Activating Push
 - Press Refresh to update the menu with any connected control surfaces.
 - Select the correct Push from the menu.
 - Turn on Active.
 - The device takes over the Push 8x8 pad matrix and other controls whilst the device is selected. If a different device is selected in Ableton Live, the device releases control of Push.



3.2 Track Selection Grid

- The bottom-left 4x4 section of Push's button matrix is used to select among the 16 tracks.
- Each pad corresponds to one track just like navigating a Drum Rack.
- The currently selected track is shown in pink.
- Tracks that are actively playing (i.e., producing notes) will light up in white on note triggers.
- This grid allows for fast switching between tracks, ideal for live performance or on-the-fly adjustments.

3.3 Editing Steps

- The top four rows of Push's 8x8 matrix display the step length for the selected track in blue.
- Pressing a pad in these rows sets the track's number of steps to the selected value.
- The distribution of hits updates immediately based on the Euclidean pattern.

3.4 Editing Hits

- Hold Shift to enter hits mode.
- The same top four rows now show available hit amounts in yellow.
- Dim yellow background indicates the current step length.
- Pressing a pad sets the number of hits.
- Releasing Shift returns you to Steps mode, where you can view the updated pattern.



3.5 Live Editing (Temporary Overrides)

In performance or sketching mode, you may wish to manually override the generated Euclidean pattern.

To do this:

- Hold any track pad in the lower-left 4×4 Push selector grid.
- While held, you can toggle any step in the matrix on/off directly.
- This allows for temporary, expressive modifications to the rhythm.



Note:

- Manual edits are temporary and will be cleared as soon as the track's Steps or Hits are changed, as this triggers a new Euclidean generation.
- Rotation continues to work even with edited patterns.
- This feature is especially useful for jamming, fill creation, or evolving patterns on the fly.

3.6 Velocity Selection Grid (Bottom Right 4x4 on Push)

- The bottom-right 4x4 grid is used to set velocity levels.
- There are 16 velocity stages, increasing from bottom-left to top-right.
- Bottom-left = Velocity 1, top-right = Velocity 127.
- This provides an intuitive and expressive way to assign dynamics to each track.
- Great for creating variation, feel, or accents live without breaking workflow.

				127
		1		

				127
		1		

Shift Modes

- 3.7 Shift Lock Mode
 - A Shift Lock toggle is available in Push's Global section:
 - Allows Shift to act as a toggle (latching) rather than momentary
 - Useful when performing or editing patterns with one hand
 - The Shift Lock option is accessible via bank 2 (Global) on Push's display

3.8 Shift Switch Mode

- The Shift Switch parameter is controlled by the right-most Push encoder
- A Shift Switch setting controls whether hit editing happens in the top or bottom half of Push's 8×8 grid when Shift is active.
- Top (default): Hits display on the top four rows
- Bottom: Hits display on the bottom four rows
 - This mode is useful for comparing the number of hits with the visual step pattern above





Shift Switch: Bottom

3.9 Pad Modes

Whilst holding the pad for the selected track down, an additional parameter is available for editing via Push's encoders:

Velocity Control

- While holding a track pad:
 - The Velocity Macro on Push changes to Minimum Velocity.
 - Lets you scale the range of the velocity preset for the track.

- 3.11 Scene Launch Buttons Global Rate
 - The 8 Scene Launch Buttons on Push are used to set the global playback rate.
 - Each button is mapped to a its labelled note value (e.g. 16n, 8n, 4n, etc.), reflecting the rate options from the device's rate menu.
 - Pressing one of these buttons updates the rate for all tracks, providing fast, performative tempo shifts.



3.12 Arrow Buttons – Rotate Pattern

- The left and right arrow buttons on Push are used to control rotation for the selected track.
- Each press shifts the Euclidean pattern left or right by one step.
- This allows intuitive alignment adjustments without leaving the Push interface.





- 3.13 Play Button Run Toggle
 - The Play button on Push toggles the Run state (play/stop) for the selected track.
 - This allows quick muting or enabling of a rhythmic part during performance.
 - Hold [Shift] to return the Play button to its default behaviour, controlling Ableton Live's global transport.



Encoders

There are two banks of encoders: Pattern and Global

3.14 Pattern

- Each Push encoder corresponds to a track's parameter:
 - 1. Steps
 - 2. Hits
 - 3. Rotate
 - 4. Note Value
 - 5. Run
 - 6. Velocity (shift: Minimum Velocity)
 - 7. Velocity Preset
 - 8. Shift Switch

3.15 Global

- Each Push encoder corresponds to a global parameter:
 - 1. Track Select
 - 2. Rate
 - 3. Run
 - 4. Swing (on/off)
 - 5. Swing Amount
 - 6. Launch Quantize
 - 7. Shift Lock
 - 8. Shift Switch

Velocity Presets 4.1

A set of named velocity maps shape the dynamic accenting of each pattern. When one of the velocity presets is selected, its pattern is visible in the slider user interface. Velocity presets are editable via the device UI sliders.

Available Presets:

Rising:



rise2



rise4



rise8



rise 16

Falling:



fall2



fall4



fall8



fall 16

Up-Down:



updn4



updn8



updn 16

Down-Up:



dnup4



dnup8



dnup16

Accents:

acc4	acc8	acc16
Soft Accents:		
		
accs4	accs8	accs16

Equal: Flat (default)



Random: random



Velocity presets scale from 1 to 100 internally. These values are then mapped between:

- Minimum velocity (user-set)
- Maximum velocity (user-set)

Velocity patterns are looped and rotated in sync with the Euclidean pattern.

If "Equal" or "Random" are selected, they regenerate dynamically when step count changes.

4.2 Swing

- Swing is applied globally.
- Affects only 8n, 16n, or 32n timing resolutions.
- Swing amount ranges from 0–100%:
 - \circ 0% = no swing
 - 100% = maximum delay of every other step
- Applied to every odd-numbered step in the timeline globally (not just per loop).

4.3 Step Resolution (Rate)

- Rate is global and is shared by any running tracks.
- Adjustable via the dropdown or message box.
- Supported values:
 - 64n, 64nd, 32nt, 32n, 32nd, 16nt, 16n, 16nd, 8nt, 8n, 8nd, 4nt, 4n, 4nd, 2nt, 2n, 2nd, 1nt, 1n, 1nd,.
- This setting determines step duration and overall pattern speed.

4.4 Launch Quantize

- The launching of both individual tracks and the global run are quantized to a user specified rate.
- The launch quantize rate can be accessed on Push by pressing and holding the 'Quantize' button or via the Global encoder bank.
- Supported quantize values are:
 - 32nt, 32n, 16nt, 16n, 8nt, 8n, 4nt, 4n, 2nt, 2n, 1nt, 1n.

5.1 Exporting MIDI Clips

- The 'Clip' button is used to export the currently playing tracks as a MIDI clip in Live's session view
- When you trigger export:
 - The device calculates the Least Common Multiple (LCM) of all active track step lengths.
 - This defines the total number of steps in the clip so that all tracks loop seamlessly.
- Notes are exported with:
- Each hit is exported with:
 - MIDI pitch
 - Start time (in beats)
 - Duration (based on note rate)
 - Velocity (from current preset, scaled between min/max)

Swing and velocity are accurately applied to all exported notes.

6.1 Credits

Push Euclidean Mode v1.0 Developed by Mark Towers Compatible with Ableton Live 12 + Max for Live Push 1, 2, and 3 supported

https://isotonikstudios.com/product/pusheuclidean-mode-by-mark-towers/

