AY-3-8912 Tracker User Manual

1. Introduction

Welcome to the AY-3-8912. This Max for Live device brings the authentic, gritty, and iconic sound of the classic ZX Spectrum sound chip directly into your Ableton Live workflow.

Designed for producers who appreciate the raw character of vintage hardware but prefer a streamlined, native software configuration, this device bridges the gap between retro chiptune tracking and modern music production. It faithfully emulates the architecture of the AY-3-8912, utilizing a sample-accurate 1.7734 MHz internal clock to deliver true-to-era tones, noise, and envelope generation.

Unlike standard MIDI synthesizers, this instrument operates on a classic "Tracker" philosophy. Sound design and sequencing are handled through two primary, interchangeable components:

- **Samples (1-16):** These define the core architecture of your sound. A Sample dictates the volume envelopes, noise characteristics, and precise tonal shifts over a 64-step sequence.
- **Ornaments (1-16):** These are independent pitch-modulation sequences. Ornaments are responsible for the rapid, classic arpeggios and trills that give chiptune music its signature fast-paced, melodic texture.

By separating the envelope (Sample) from the pitch sequence (Ornament), you have absolute, surgical control over every step of the audio generation process. Whether you are recreating the exact soundscapes of 1980s gaming, or 1990s demoscene or injecting aggressive, lo-fi hardware textures into modern electronic and rock tracks, the AY-3-8912 puts a complete retro sound engine right inside your DAW.

2. The Interface

The AY-3-8912 interface is designed to maximize visual feedback while keeping the core tracker workflow front and center. The UI is divided into three distinct sections: the Selection Panel on the left, the Central Editor in the middle, and the Global Parameters on the right.

2.1 The Selection Panel (Left)

This section determines which memory slots are currently active and being edited.

- **Sample Knob:** Selects the active Sample (1-16).
- **Ornament Knob:** Selects the active Ornament (0-16). *Note: Setting this to 0 fully disables the Ornament engine for the current track.*

2.2 The Central Editor (Main Display)

This custom display is the heart of the tracker. It holds a 64-step grid where all of your sequencing, envelope drawing, and mask toggling takes place.

The Header Bar Running along the top of the central editor is your quick-access command center:

- **Naming Fields:** Displays the current Sample and Ornament names. Clicking directly on a name allows you to type and rename it instantly.
- **Menu Toggle (▸):** The small arrow on the far right of the header toggles the action buttons between two modes:
    - **Edit Mode:** Provides quick access to **Copy**, **Paste**, **Reset** (clears current slot), and **Reset All** (clears all slots).
    - **Storage Mode:** Provides access to **Save**, **Load**, **Save All**, and **Load All**, allowing you to export and import presets to and from your hard drive.

View Selection On the far left edge of the central display, you will see vertical text for **SAMPLE** and **ORNAMENT**. Clicking these tabs toggles the main grid between editing your volume/noise envelopes (Sample View) and your pitch sequences (Ornament View).

The Grid & Pagination Because the tracker utilizes 64 steps per sequence, the Central Editor displays 16 steps at a time to keep the interface clean and precise.

- Use the **<** and **>** arrows on the left and right edges of the grid to navigate between the four pages (Pg 1 to Pg 4).

Sample View Layout (Top to Bottom):

- **Operations (Ops) Row:** The numbers at the very top allow for micro-adjustments (+/-) to Volume, Tone, and Noise per step.
- **The Canvas:** The large central area where you draw your Tone envelopes (blue) and Noise levels (orange).
- **Loop Indicator:** A horizontal green bar that visually highlights your active loop region.
- **Mask Toggles (T, N, E):** Three rows of toggleable buttons determining if Tone (T), Noise (N), and Envelope (E) are active on a specific step.
- **Step Numbers:** The bottom row displays the current step index (00-63).

2.3 Global Parameters (Right)

To the right of the Central Editor are your global chip settings and macros:

- **E/T (Envelope/Tone):** Selects the active hardware envelope shape (8, A, C, or E). Setting this to F disables the hardware envelope entirely, allowing you to use raw tone generation (with or without Ornaments).
- **Ratio:** Adjusts the hardware frequency ratio when using envelopes.
- **Envelope Mode:** A toggle to switch between ‘Manual’ hardware envelope control and standard note syncing.

- **Command Dropdown:** For triggering specific global chip behaviors.
- **Noise & Volume:** Master control knobs for the chip's base noise floor and overall output level.
- **Perfect Tune / Native Pitch Toggle:** Chooses the mathematical engine used to calculate the Envelope frequencies.
    - **Perfect Tune:** Uses modern, high-precision math to ensure the hardware envelope frequency perfectly matches your MIDI notes. Use this when you need absolute melodic precision, sharp acid plucks, or when layering the device with modern digital synths in your DAW.
    - **Native Pitch (The "Drift" Effect):** Uses the authentic, limited integer math of the original AY chip. Because the original hardware used different resolutions for Tone (12-bit) and Envelope (16-bit) registers, their frequencies could never align perfectly. When both Tone and Envelope are active, this mathematical mismatch causes the two signals to slightly drift in and out of phase with each other. Use this mode when you want that classic, thick, chorusing/phasing hardware sound for fat basses and rich leads.

3. Workflow & Controls

The AY-3-8912 device is built for speed. Because it runs natively inside Ableton Live, the Central Editor relies on a combination of clicking, dragging, and keyboard modifiers to let you sequence patterns rapidly without diving into sub-menus.

3.1 General Editing Rules

- **Double-Click to Reset:** Double-clicking any step in the value rows or the ornament grid will instantly reset that step's value to `0`.
- **Click and Drag:** Most parameters in the central canvas act like faders. Click and hold on a step, then drag your mouse up or down to adjust the value. You can also drag horizontally to "paint" values across multiple steps.
- **Keyboard Modifiers:** When dragging to change numerical values (like the manual pitch offsets), holding keyboard modifiers will change the sensitivity of your mouse movements:
    - **Shift:** Fine adjustment (increments of 1).
    - **No Modifier:** Standard adjustment.
    - **Ctrl / Cmd:** Coarse adjustment (only for pitch offset).
    - **Alt / Option:** Extreme adjustment (only for pitch offset).

3.2 Editing Samples (Tone, Noise, & Masks)

Ensure the **SAMPLE** tab is selected on the left side of the Central Editor.

- **Drawing Envelopes (The Main Canvas):** Click and drag within the large middle grid to draw your Tone volume envelope (represented by blue vertical bars, from 0 to F (you see hex numbers here in respect to how it was represented in the original trackers).

- **Drawing Noise:** Hold **Alt / Option** while clicking and dragging in the main canvas to draw your Noise levels (represented by orange vertical bars, from 0 to 31).
- **Toggling Masks (T, N, E):** At the bottom of the grid are three rows of circular toggles for Tone, Noise, and Envelope. Click a circle to turn it on (bright) or off (dark). You can click and drag horizontally across these rows to quickly paint masks across multiple steps.
- **Step Operations (Top Row):** The numbers at the top of the grid allow you to apply mathematical operations or offsets to specific steps. Click the operation symbols to cycle through them (+, -, 0).

3.3 Editing Ornaments (Pitch Sequencing)

Ensure the **ORNAMENT** tab is selected on the left side of the Central Editor.

Ornaments are sequenced as semi-tone offsets from your base pitch, allowing you to program rapid arpeggios.

- **Setting Pitch Offsets:** Click and drag up or down on any step to set its pitch offset (ranging from -96 to +96).
- **Visual Feedback:** Positive values (+) are displayed in blue, negative values (-) are displayed in red, and 0 is greyed out.

3.4 Setting Loop Points

You do not need to use all 64 steps for every Sample or Ornament. You can define custom loop brackets to create short, repeating textures.

- **Set Loop Start/End:** Hold **Ctrl** (or **Cmd** on Mac) and click on a step to set the beginning of your loop. While still holding Ctrl/Cmd, click on a later step to set the end of the loop.
- **Visual Indicator:** A bright green horizontal bar will appear, highlighting the active loop region. The sequence will loop continuously within these boundaries whenever the note is held.

4. Memory Management & Preset Storage

The AY-3-8912 tracker features a highly optimized memory engine. To ensure your CPU usage remains incredibly low and the UI stays snappy, your graphical edits and audio changes are processed instantly, but the device only writes data to Ableton’s deep storage the moment you release your mouse button. You never have to manually "commit" your drawn envelopes—the device handles it silently in the background.

To manage your patterns, copy data, and save presets to your hard drive, use the **Action Buttons** located in the top right of the Central Editor header.

Click the **Toggle Arrow (▸)** on the far right to switch the Action Buttons between **Edit Mode** and **Storage Mode**.

4.1 Edit Mode (Copy / Paste / Reset)

When the header buttons display Copy/Paste/Reset, you are managing data within your current Ableton session.

A Note on the Global Clipboard: The Copy and Paste memory is shared globally across your entire Ableton project. This means you can copy a custom Sample or Ornament from one instance of the AY-3-8912 device and paste it directly into a completely different instance of the device on another track!

- **Copy:** Copies the currently selected Sample or Ornament to the shared global clipboard.
- **Paste:** Pastes the globally copied data into your currently selected slot. *Note: You cannot paste Sample data into an Ornament slot, or vice versa. The Paste button will visibly dim if the clipboard data does not match your current view.*
- **Reset:** Clears all data in the currently selected slot (sets all values to 0 and resets loop points). A confirmation dialog will appear to prevent accidental deletion.
- **Reset All:** Clears all 16 slots of your current view (wiping all Samples if in Sample View, or all Ornaments if in Ornament View). A confirmation dialog will appear first.
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4.2 Storage Mode (Save / Load)

Clicking the ▸ arrow switches the menu to Storage Mode, allowing you to export your hard work as standalone preset files to your hard drive.

- **Save:** Exports only the *currently selected* individual Sample or Ornament as a JSON preset file.
- **Load:** Imports a previously saved individual Sample or Ornament preset into the *currently selected* slot.
- **Save All:** Exports your entire current bank—all 16 Samples and all 16 Ornaments, along with their names and loop settings—as a single master file.
- **Load All:** Replaces your entire bank with a previously saved master file.

Important Note: The device is smart enough to prevent cross-loading errors. If you attempt to "Load All" using an individual Sample preset, or try to load an Ornament preset into a Sample slot, the device will block the action and post an error to the Max console to protect your current session.

5. Parameter & Command Reference

Because this device accurately emulates the AY-3-8912 chip, it behaves differently than a standard subtractive synthesizer. This section breaks down exactly how the step operations, hardware envelopes, and global commands function under the hood.

5.1 Step Operations (The Top Row: 0, -, +)

Above the drawing canvas in Sample View, you will see three modifiers per step: **Volume**, **Tone**, and **Env/Noise**. These tell the tracker whether the numerical values below them should act as fixed offsets or continuous slides. The device processes these slides at 50Hz (50 ticks per second).

Column 1: Volume Operation (0 | - | +)

- `0` **(Static):** The volume envelope plays exactly as drawn.
- `-` **(Fade Out):** Decreases the volume by 1 unit every tracker tick.
- `+` **(Fade In):** Increases the volume by 1 unit every tracker tick.

Column 2: Tone Operation (0 | +) This operation targets the numerical value box (-4096 to +4096) below it.

- `0` **(Absolute Offset):** The number acts as a fixed pitch offset for that specific step.
- `+` **(Accumulate / Slide):** The number acts as a *speed*. The pitch will continuously slide up or down by that value every single tracker tick, creating smooth pitch bends.

Column 3: Env/Noise Operation (0 | +) This operation targets the orange Noise value (0-31) drawn on the canvas. If the Envelope mask (E) is active on this step, it targets the Envelope pitch instead of the Noise pitch.

- `0` **(Absolute Offset):** The drawn value sets a fixed absolute pitch for the Noise or Envelope.
- `+` **(Accumulate / Slide):** The drawn value acts as a *speed* to continuously slide the Noise/Envelope pitch. *(Note: Because it uses a 5-bit register, values 1-15 slide in one direction, while values 16-31 are treated as negative numbers to slide in the opposite direction).*

5.2 Envelope & Tone Settings (E/T)

The AY-3-8912 does not have standard ADSR envelopes. It uses fixed, repeating geometric shapes generated by the hardware.

- **Envelope Shapes (8, A, C, E):**
  - **8:** Sawtooth Down (Repeats from high to low).
  - **A:** Triangle (Down, then Up, repeating).
  - **C:** Sawtooth Up (Repeats from low to high).
  - **E:** Inverted Triangle (Up, then Down, repeating).
- **F (Disabled):** Disables the hardware envelope generator completely. Volume is determined exclusively by the blue Tone volume envelope you draw in the Central Editor.
- **Ratio:** The AY chip traditionally links the Envelope speed to the Tone pitch. A **1:1** ratio means the envelope cycles at the exact same frequency as the note you play. A **2:1** ratio makes the envelope twice as slow, while **1:2** makes it twice as fast.

5.3 Global Settings

- **Manual Env Toggle:** Disconnects the Hardware Envelope from your MIDI keyboard. Instead of tracking pitch, the envelope cycles at a fixed, static speed determined by the numerical box below it (representing the raw 16-bit hardware period from 0 to 65535).
- **Noise Knob (0-31):** Sets the base pitch for the hardware noise generator. If this dial is set to any value other than 0, it effectively overwrites the individual orange noise values drawn across the steps of your sequence.
- **Volume (0-F):** Acts as a master multiplier for your sequence's volume. Unlike the Noise knob, this does *not* overwrite your drawn step values. Instead, it scales them. If set to maximum (**F**), your sequence plays exactly at the volume levels you drew in the canvas. If you lower this dial, it proportionately reduces the overall amplitude of the entire sequence. This allows you to mix the overall level of the track without having to redraw your carefully shaped envelopes.

5.4 The Command Engine

The dropdown menu on the right allows you to trigger global chip behaviors. The control dials directly below the dropdown will dynamically change to match the specific parameters of the command you select.

(Note: For commands using a "Speed" dial, setting it to 0 means the command executes instantly the moment you press a MIDI key).

- **Tone Down / Tone Up:** Continuously slides the global pitch of the note. The **Speed** dial determines how many ticks pass between each adjustment, and the **Steps** dial sets how drastically the pitch changes. *Tone Down* lowers the pitch (increases period), while *Tone Up* raises the pitch (decreases period).
- **Env Down / Env Up:** Continuously slides the speed of the hardware envelope, making the geometric shape cycle slower (Down) or faster (Up). Controlled by the **Speed** and **Steps** dials.
- **Portamento:** Automatically glides the pitch from the previously played MIDI note to the newly played MIDI note. The **Speed** dial determines how often the pitch updates, and the **Steps** dial determines how fast it travels to the new note.
- **Gate:** Rhythmically chops the audio output. The **Sound On** dial sets exactly how many tracker ticks the audio is active, and the **Sound Off** dial sets how many ticks the audio is muted.
- **Sample start step / Ornament start step:** Skips the beginning of your drawn sequences. The single **Start Step** dial dictates exactly which step (0-63) the respective Sample or Ornament sequence will begin on the moment a note is struck.

6. Practical Sound Design (Tips & Tricks)

The AY-3-8912 requires a slightly different mindset than traditional subtractive synthesis. Because there are no resonant filters to sweep or waveforms to blend, classic chiptune sound design relies on volume manipulation, noise bursts, and rapid pitch changes.

A Crucial Note on Pitch & Looping:

- **MIDI Dependency:** For all of these recipes, the actual fundamental pitch of the sound relies entirely on the MIDI note you play on your keyboard. For example, playing a C2 will yield a deep, thumping kick drum, while playing a C4 will give you a higher-pitched "tok."
- **One-Shot Looping:** By default, the device loops on Step 0. For percussive hits (like kicks and snares), you must move your Loop Start and Loop End to the step where your volume reaches `0`. This forces the playhead to rest in silence while you hold the key, rather than infinitely machine-gunning the start of the sample.

Here are a few standard "recipes" to get you started.

The following examples are for general understanding only. The best way to get an idea of how to create your perfect sound is to study tracks made by the best tracker composers (such tracks are provided together with the device).

6.1 The Classic Chiptune Kick Drum

A kick drum on the AY chip is created by combining a fast volume decay with an extremely rapid pitch drop.

1. **View:** Go to the **Sample** tab.
2. **Masks:** Turn Tone (T) **ON**, Noise (N) **OFF**, and Envelope (E) **OFF**.
3. **Volume:** Draw a sharp decay. Step 0 at `F`, Step 1 at `A`, Step 2 at `5`, and Step 3 at `0`.
4. **Pitch Drop:** Above the drawing canvas, set the Tone operation to `+` (Slide) for the first two steps.
5. **Pitch Values:** In the value box for Step 0, type a high number (e.g., `-1024`). Because it's sliding, the pitch will rapidly dive downwards alongside your volume decay, creating a punchy "thump."
6. **Loop:** Set both the Loop Start and Loop End to **Step 3** (where the volume is 0) to prevent the kick from re-triggering.

6.2 The Snare Drum

A snare needs a solid "body" (tone) followed immediately by a noisy "tail."

1. **View:** Go to the **Sample** tab.
2. **Volume:** Draw a slightly longer decay. Step 0 at `F`, tapering down to `0` by Step 6.
3. **Masks:** Turn Noise (N) **ON** for all active steps. Turn Tone (T) **ON** *only* for Steps 0 and 1, then turn it off.
4. **Noise Knob:** Set the Noise knob (bottom right) to around `10` to `15` for a mid-range snare sizzle. *(Note: Because this is greater than 0, you do not need to draw noise values on the canvas).*
5. **Loop:** Set both the Loop Start and Loop End to **Step 6** (where the volume is 0).

6.3 Closed Hi-Hat

Hi-hats are incredibly simple—they are just pure, high-frequency noise bursts.

1. **View:** Go to the **Sample** tab.
2. **Masks:** Tone (T) **OFF**, Noise (N) **ON**, Envelope (E) **OFF**.
3. **Volume:** Make it incredibly short. Step 0 at `C`, Step 1 at `0`.
4. **Noise Knob:** Leave the Noise knob at `0` to allow your drawn sequence to control the noise, or set it to `1` to overwrite the sequence with a high, bright noise frequency.
5. **Loop:** Set both the Loop Start and Loop End to **Step 1** (where the volume is 0).

6.4 The "Fat Lead" (Hardware Buzz)

Because the AY chip generates pure square waves, a single channel can sound a bit thin. You can create a massive, buzzy "Sawtooth" lead by hijacking the Hardware Envelope.

1. **Masks:** Turn Envelope (E) **ON**. Ensure Tone (T) and Noise (N) are **OFF**.
2. **Global Controls:** Turn the E/T knob to **8** (Sawtooth shape).
3. **Ratio:** Set the Ratio to **1:1** or **1:2**.
4. **Loop:** Set both Loop Start and Loop End to **Step 0**.
5. **Result:** Instead of acting like a volume shaper, the hardware envelope now cycles at the exact same frequency as your MIDI note, transforming the standard square wave into a thick, aggressive hardware sawtooth.

6.5 The Legendary Trick: Drum & Bass on a Single Channel

Because the AY-3-8912 only has three channels, vintage composers had to get creative to fit entire songs into the chip. The most famous tracker technique is combining a percussive hit and a sustained bass tone into a single Sample.

This works by using the first few steps for the drum transient, and then locking the loop bracket onto a sustained hardware envelope for the "tail" of the sound.

Example: Kick Drum + Sawtooth Bass

1. **View:** Go to the **Sample** tab.
2. **The Transient (The Kick):** On Steps 0, 1, and 2, program your standard Kick Drum. Turn Tone (T) **ON**, draw a decaying volume (e.g., F, C, 8), and set a rapid pitch slide downwards (e.g., Tone Operation `+`, Value `-1024` on Step 0).
3. **The Tail (The Bass):** On Step 3, the drum hit is over. Turn the Envelope (E) mask **ON**. Ensure Tone (T) and Noise (N) are **OFF**.
4. **Global Controls:** Turn the E/T knob to **8** (Sawtooth shape) and set the Ratio to **1:1** or **1:2**.
5. **The Loop:** Set both the Loop Start and Loop End to **Step 3**.
6. **Result:** When you press a MIDI key, the tracker plays a punchy 3-tick kick drum and then instantly locks into Step 3, holding a fat, continuous sawtooth bass note at the exact pitch of your MIDI key for as long as you hold the note.

(Note: You can do this exact same trick with a Snare or Hi-Hat on the first few steps by utilizing the Noise (N) mask instead of the Tone mask, allowing you to build an entire rhythm section and bassline on just one MIDI track!)

7. Recreating the Authentic Tracker Experience

While you can drop the AY-3-8912 into any modern Ableton project and use it like a standard synthesizer, true purists may want to replicate the strict, authentic workflow of composing on a 1990s ZX Spectrum tracker (like Pro Tracker 3).

By setting up your DAW with specific rules, you can perfectly emulate the 50Hz interrupt timing, the 64-step pattern structure, and the classic stereo panning standards of the demoscene.

7.1 The Rules of the Hardware (Limitations)

To compose a strictly authentic track, you must enforce the following limitations on yourself:

- **The 3-Channel Limit:** You are only allowed to use exactly three MIDI tracks in Ableton Live, each with one instance of the AY-3-8912 device.
- **Strict Monophony:** The AY chip can only play one note per channel. You cannot play chords on a single track. All chords must be built using fast arpeggios (Ornaments) or spread across the three channels.
- **No Velocity:** The original hardware did not have velocity-sensitive keys. You should rely entirely on the volume envelopes you draw in the Sample tab.
- **No Modern FX:** No Ableton Reverb, Delay, or EQ. All echoes and delays must be programmed manually using volume fades and repeating notes (see 7.5 for more).

7.2 The 64-Step Pattern Setup

Classic trackers use vertical patterns consisting of 64 lines (steps). To map this exactly to Ableton's horizontal piano roll:

1. Create a new MIDI clip.
2. Set the clip length to exactly 2 bars (**2.0.0**).
3. Right-click the piano roll grid and set your quantization to **1/32** notes.
4. **Result:** Two bars divided into 1/32 notes gives you exactly 64 discrete steps. Drawing a 1/32 note is equivalent to entering one "line" of data in a classic tracker.

7.3 Calculating the 50Hz Tempo

ZX Spectrum music is driven by the computer's 50Hz screen refresh rate (50 ticks per second). In classic trackers, "Tempo" does not mean BPM; it means "how many 50Hz ticks pass before the sequencer moves to the next line."

To perfectly synchronize Ableton's timeline to this 50Hz hardware clock so your 1/32 notes trigger at the exact authentic speed, use the following formula:

Ableton BPM = 375 / Tracker Tempo

- **Tempo 3** (Fast / Classic Demoscene): 375 / 3 = **125 BPM**
- **Tempo 4** (Standard / Upbeat): 375 / 4 = **93.75 BPM**
- **Tempo 5** (Mid-tempo): 375 / 5 = **75 BPM**
- **Tempo 6** (Slow / Ballad): 375 / 6 = **62.5 BPM**

Set Ableton's master tempo to one of these exact values, and your 1/32 notes will perfectly match the pacing of the original hardware.

7.4 Authentic Stereo Panning

The original AY-3-8912 was a monophonic chip (all 3 channels output to a single speaker). However, after a while, there were stereo configurations that utilized standard channel spreading, often referred to historically as the ABC or ACB standards.

To recreate this authentic stereo spread, leave your three track volume faders at exactly 0 dB and configure your panning in Ableton to mirror this classic setup:

- Track 1: Pan Left to -30
- Track 2: Pan Center
- Track 3: Pan Right to +30

(Note: While historical documentation distinguishes between ABC and ACB based on which specific channel was centered versus panned right, in practice, it does not matter. Simply panning your outer tracks to -30 and +30 will give you the exact, wide demoscene sound you are looking for.)

7.5 Tracker-Style Effects (Fake Delay & Reverb)

Since modern DAW plugins like Reverb and Delay are strictly forbidden in an authentic demoscene workflow, vintage composers had to create spatial effects using nothing but note placement and volume attenuation. Here is how you can "fake" delays and echoes using classic tracker techniques.

Method 1: Channel Delay (The "Ghost Track")

If you have a sparse arrangement and can afford to use two of your three channels for a single melody, you can create a lush, perfect delay.

1. Copy the entire MIDI clip (your pattern) from your main lead track.
2. Paste it into an empty clip on your second AY-3-8912 track.
3. Inside the piano roll of the copied clip, select all notes and shift them to the right by exactly one 1/32 note (or two, for a slower delay).

4. On the device interface for the copied track, lower the global Volume dial from F (Maximum) down to D or A.

Result: The second track will trail the first track like a ghost, creating a rich, authentic stereo echo.

Method 2: Inline Echo (Single-Channel)

If the active part of your song is busy and all three tracks are playing different parts, you cannot afford to waste an entire channel on an echo. You must program the delay directly into the melody sequence.

1. Open the MIDI clip for your melody.
2. Whenever there is a pause or a sustained rest after a lead note, manually draw trailing 1/32 notes of that exact same pitch.
3. Assign these trailing notes a progressively lower volume level (e.g., stepping down from a loud F down to C, and then to 8).

Result: The hardware rapidly retriggers the note as it fades out, simulating the decaying "tail" of a reverb or delay without sacrificing a second channel.